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April 21st, 2020
File No. W2020-019

FERNIE ALPINE RESORT UTILITIES CORPORATION
1505 17th Avenue SW
Calgary, Alberta
T2T 0E2

Attention: Mr. Patrick Majer

Dear Mr. Majer:

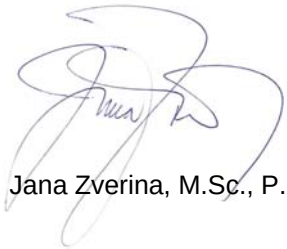
Re: FERNIE ALPINE RESORT
WASTEWATER TREATMENT PLANT
2019 ANNUAL REPORT

Forwarded is a pdf copy of the 2019 Annual Wastewater Report for the above property.

Should you have any questions, please call us at 403-238-9510or email to jana@iqwater.ca.

Sincerely,

IQWATER INC.



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

2019 WASTEWATER TREATMENT PLANT ANNUAL REPORT

FERNIE ALPINE RESORT FERNIE, B.C.

Prepared for:

FERNIE ALPINE RESORT
UTILITIES CORPORATION
1505-17th Avenue SW
Calgary, Alberta
T2T 0E2

Prepared by:

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April 21st, 2020
Report # W2020-019

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1.0 INTRODUCTION

1.1 BACKGROUND

The following annual report for the Wastewater Treatment Plant at Fernie Alpine Resort (FAR) operated by Fernie Alpine Resort Utilities Corporation (FARUC) is compiled in accordance with the requirements of the Municipal Sewage Regulation (MSR). This report covers the 2019 calendar year.

Due to the nature of the resort the plant is subjected to a large seasonal swing in utilization with the winter ski period imposing the highest demands. The critical time for sewage flows at the resort is from mid-December to the end of March during the peak ski season. Summer utilization of the treatment work is generally low.

FARUC treats its wastewater at a tertiary treatment plant designed to remove BOD_5, suspended solids, ammonia, and phosphorous. Wastewater is disinfected with ultraviolet (UV) lamps prior to discharge into the Elk River.

Plant effluent quality has been high during the year. There is a clearly decreasing trend in ortho-phosphorus and total phosphorus levels during the last several years. All the results for ortho-phosphorus and total phosphorus were below the MSR discharge limits with an exception of one ortho-phosphate result, which was at or only marginally above the discharge limits. FARUC began a monitoring and Clearpac dosing investigation in the winter of 2007 to reduce effluent phosphorous concentrations. The reduction program has shown significant improvement of phosphorus levels in plant effluent. This work will continue to maintain all the ortho and total phosphorus concentrations below the discharge limits.

2.0 REGISTRATION REQUIREMENTS

This section describes operating requirements as specified in the Resorts of the Canadian Rockies Inc.'s (RCRI) Registration Letter RE 17139 issued on September 30th, 2002. The registration describes parameters that must be tested for 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^3 /d
BOD_5	Five day biochemical oxygen demand, measured in mg/l
TSS	Total suspended solids or non-filterable residue, measured in mg/l
NH_3	Ammonia concentration, expressed as nitrogen in mg/l
NO_3	Nitrate concentration, expressed as nitrogen in mg/l
NO_2	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
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	1280	m^3/d
BOD_5	45	mg/l
TSS	45	mg/l
Total-P	1.0	mg/l
Ortho-P	0.5	mg/l
Coliforms*	200	CFU/100ml
Toxicity Bioassay	pass	n/a

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

Primary screenings and dewatered sludge are to be disposed of at the Crowsnest Pass/Pincher Creek Landfill. Disposal at other sites requires authorization under the Waste Management Act.

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. The report must include tabulated standards and results for all test samples, interpretation of the results, an indication of the state of compliance of the facility, and the total wastewater flow for the reported period.
In addition the report must also include the following:

- Notification of significant operating events including discharge variances outside given limits,
- Recommendations for operational or facility modifications,
- Notification of proposed or implemented plant modifications,
- Details of proposed or implemented water conservation measures,
- A plan indicating existing and proposed developments,
- A comparison of projected and actual wastewater flows,
- Projected wastewater flows resulting from proposed development compared to the remaining waste water treatment plant (WWTP) capacity, and
- A comparison of water supply and wastewater flows.

As with the previous Annual Reports, this report includes additional information on wasted sludge volumes.

2.4 SAMPLING FREQUENCY

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

Elk River testing requires that a minimum of 18 samples annually are taken from each of the upstream, initial dilution zone (IDZ) and downstream river locations, relative to the outfall diffuser. The sampling locations were identified in the April 2001 Environmental Impact Study.

A minimum of 12 influent samples are required for BOD_5 and TSS. Flow data is to be collected continuously.

The intent of the environmental testing procedure outlined in Table 2 is to collect influent and effluent samples during peak demand periods as indicated by resort bookings. To correspond with peak plant loading, river samples are to be collected on the same day as effluent samples.

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					
	Elk River	**QTY**	**Influent**	**QTY**	**Effluent**	**QTY**
pH	WS/G	18	/	/	M/G, WS/G	25
Temp	WS/G	18	/	/	/	/
Flow	/	/	D/C	n/a	D/C	n/a
BOD_5	/	/	M/G	12	M/G, WS/G	25
TSS	WS/G	18	M/G	12	M/G, WS/G, D/C	25
NH_3-N	WS/G	18	/	/	M/G, WS/G	25
NO_3-N	WS/G	18	/	/	M/G, WS/G	25
NO_2-N	WS/G	18	/	/	M/G, WS/G	25
Total-P	WS/G	18	/	/	M/G, WS/G	25
Ortho-P	WS/G	18	/	/	M/G, WS/G	25
Fecal Coliform	WS/G	18	/	/	M/G, WS/G	25
Toxicity Bioassay	/	/	/	/	3 Y/G	3

Where:

WS/G	Weekly seasonal grab sampling, required for three six-week periods during the winter peak, the spring after ice-out, and in the fall when river turbidity and flows are low.
D/C	Daily continuous sampling using an on-line instrument and data logger.
M/G	Monthly grab sample (not required when weekly seasonal testing is taking place).
3Y/G	Three samples per year to correspond with WS/G sampling periods.

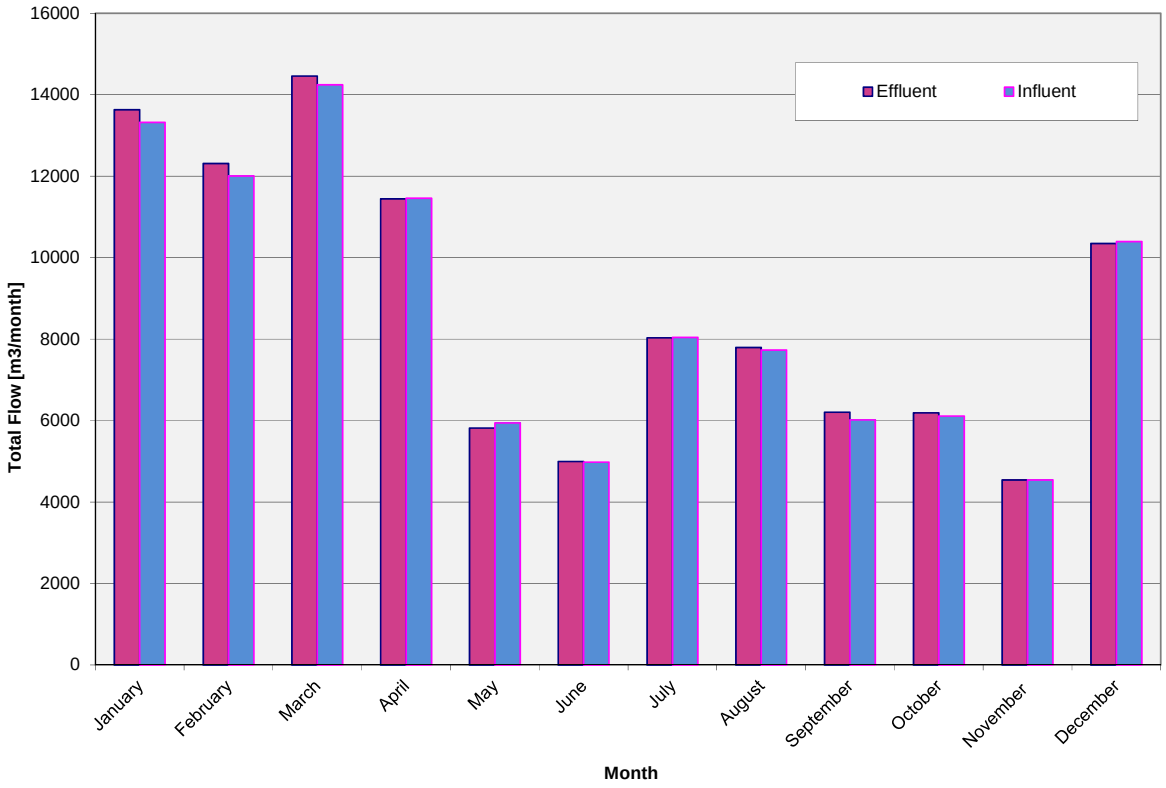
3.0 SEWAGE FLOW RECORDS

This section provides data and analysis regarding the plant influent and effluent flows, and compares 2019 data to previous years.

Total effluent flow from the WWTP for all of 2019 was recorded from the effluent weir type flow meter as 105,748 m^3 and the average was 290 m^3 per day. The graph below shows the 2019 total effluent flow per month vs total influent for the plant. The effluent flow follows very closely the influent.

Available monthly total effluent flow meter records for 2019 are provided in Figure 1a.

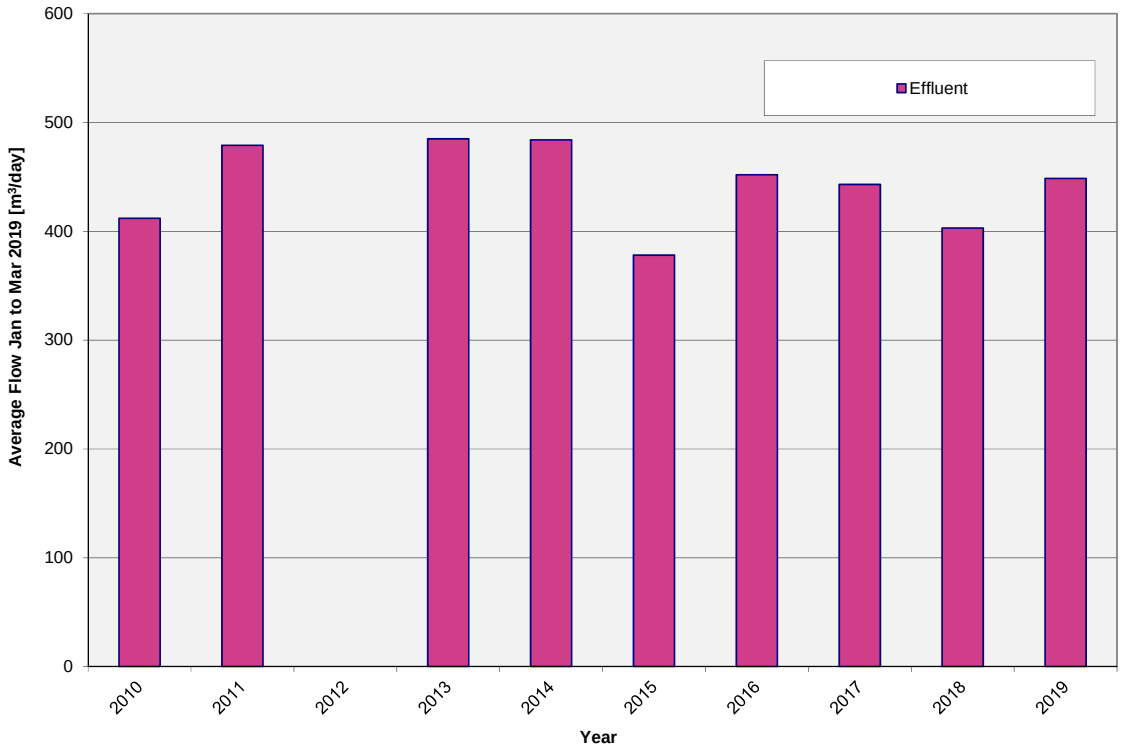
Figure 1a
Effluent and Influent Flow Meter Monthly Flow Totals



The ski resort operates with higher winter and late spring sewage flows (January to March) than during any other period. The average daily plant flow through January, February and March of 2019 was 448.6 m^3/day.

The average daily plant flow through January, February and March of 2018 was 403 m^3/day. The average daily flow was 443 m^3/day in 2017, 452 m^3/day in 2016, 378 m^3/day in 2015, 484 m^3/day in 2014, 485 m^3/day in 2013, the average daily flow could not be calculated in 2012 but it was 479 m^3/day for the same time period in 2011, compared to 412 m^3/day over the same period in 2010.

Figure 1b
Average Daily Flow during Jan – Mar Period



Peak flow for the year reached 1043 m^3/day on December 22nd, 2019 which was 18 % below the allowable daily limit of 1,280 m^3/day. Historical peak flows are as follows, 2018 (687 m^3/day), 2017 (1,095 m^3/day), 2016 (844 m^3/day), 2015 (1,058 m^3/day), 2014 (1,036 m^3/day), 2013 (1,181 m^3/day), 2012 (811 m^3/day), 2011 (989 m^3/day) and 2010 (823 m^3/day) and 2009 (1,178 m^3/day). The peak flow day occurred during the heavy ski season, which is to be expected.

A summary of sewage flow for years 2003 through 2019 is provided in Table 3 and Figures 2 and 3:

Table 3

2003 – 2019 Flow Comparisons

Year	Sewage Flow (m^3/day)			Days Over Limit
	Total	Average	Peak	
2003	137,035	375	1,244	0
2004	151,815	414	1,307	1
2005	125,699	344	1,293	1
2006	127,202	348	1,058	0
2007	144,480	396	1,177	0
2008	135,767	372	873	0
2009	113,336	311	1,178	0
2010	104,815	287	823	0
2011	90,213* (**122,275**)[1]	335	**989**[2]	0
2012	62,509** (**122,610**)[1]	335	**811**[2]	0
2013	121,982	335	1,181	0
2014	125,437	344	1,036	0
2015	90,931	250	1,058	0
2016	108,326	296	844	0
2017	108,695	296	1,095	0
2018	105,073	288	687	0
2019	105,748	290	1043	0

* not including part of Sept and all of Oct, Nov, and Dec 2011
** not including all of Jan, Feb, part of Aug, and all of Sept, Oct, and Nov 2012
[1] (data) in brackets – estimate based on daily average
[2] the number does not reflect a true peak as all the data was not available during high flow months

2004 to 2012

Higher flows in 2004 were caused by severe infiltration through the collection system.

Lower flows in 2005 and 2006 can also be attributed to the fact that a lot of sludge together with water was trucked away from the WWTP itself due to the volumes of sewage the existing plant would not handle without an equalization tank.

Through 2008 total and average flow decreased somewhat from 2007, there were no instances where flow exceeded the 1,280 m^3/day registration limit, compared to one day in each of 2004 and 2005. Peak flow dropped due to full operation of the equalizing tank and collection system improvements to eliminate storm water infiltration.

The average flow for 2009 further decreased from 2008 (372 m^3/day down to 311 m^3/day) and there were no instances where the flow exceeded the 1,280 m^3/day. The peak flow increased from 2008 but is comparable to the other years.

The average flow for 2010 further decreased from 2009 (311 m^3/day down to 287 m^3/day) and there were no instances where the flow exceeded the 1,280 m^3/day. The peak flow decreased from 2009 and is comparable to 2008.

The average flow for 2011 had increased slightly from 2010 (287 m^3/day) and 2009 (311 m^3/day) and there were no instances where the flow exceeded the 1,280 m^3/day limit. The peak flow had increased slightly from 2010; however it was still lower than 2008 and prior. Please note, the average flow was calculated for the data available and may not have been representative of the whole year as October, November and December were usually lower flow months.

Note that historically from 2004 to 2010 the peak flow occurred systematically in January, February, March and December, which was consistent with the facility operations. Although some data was missing, the values for 2011 were considered "as is". However, there was more data missing in 2012. In addition, the missing data was among others in January and February, which were historically two out of four highest flows in a year. January was on average the highest month.

The average flow for 2012 was the same as observed in 2011 (335 m^3/day) which had increased slightly from 2010 (287 m^3/day) and 2009 (311 m^3/day). There were no instances where the flow exceeded the registration limit of 1,280 m^3/day; however, there was no data for January and February (two out of four peak months in a year). The peak flow of 811 m^3/day was recorded in December, which was one of the four peak flow months, and therefore it was reasonable to assume that it would be close to or somewhat above the same number in January or February. Based on the remaining measurements it was unlikely that the peak in January or February would exceed the registration limit.

Please note, the average flow was calculated for the data available and may not have been representative of the whole year as January, February, part of August and all of September, October, and November information was not available. This average flow was used to estimate the total yearly effluent flow, which likely represented a reasonable estimate.

The records for 2011 and 2012 were incomplete due to the effluent flow meter failure from a lightning strike. The meter was repaired and fully functional for 2013.

2013 to 2019

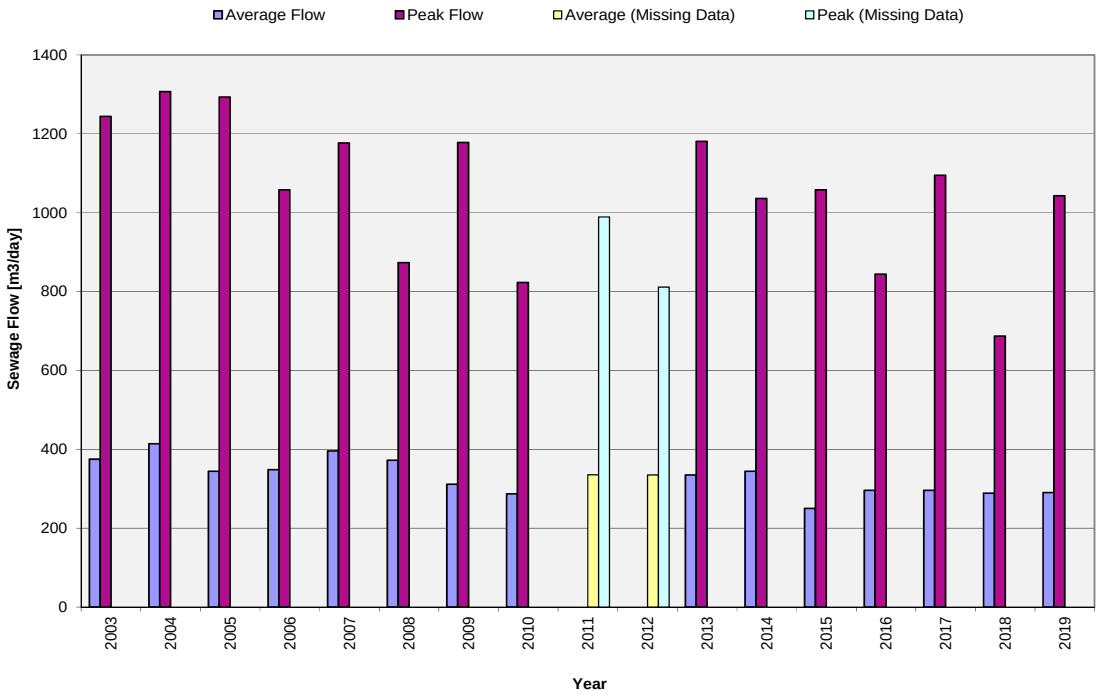
The average flow for 2019 was very similar to that of 2018 at 290 (vs 288) m^3/day. There are no instances where the flow exceeded the plant maximum allowable flow and daily discharge of 1,280 m^3/day. The peak flow is higher than that of 2018 but very similar to 2013 to 2015 and 2017.

As seen in previous years, the highest peak flow was in December; high peak flows also occurred systematically in January, February and March, which is consistent with the facility operations. The highest month in 2019 for average flows was in March followed by February and January, although the peak flow was observed in December.

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 flow results from non-skiing related recreational activities, generally hiking or mountain biking events. The lowest plant flow is experienced in the shoulder season periods (April to June and September to November).

The approximately 70 permanent residents in addition to several year-round restaurants providing services to casual visitors ensure that the sewage flows never drop to zero. Figure 2 provides monthly average and peak day sewage flows since 2003.

Figure 2
Average and Peak Sewage Flow Comparison Graph



* Note that the values for 2011 and 2012 may not be representative as some of the effluent flow data for these years are missing

Figure 3
Total Sewage Flow Graph

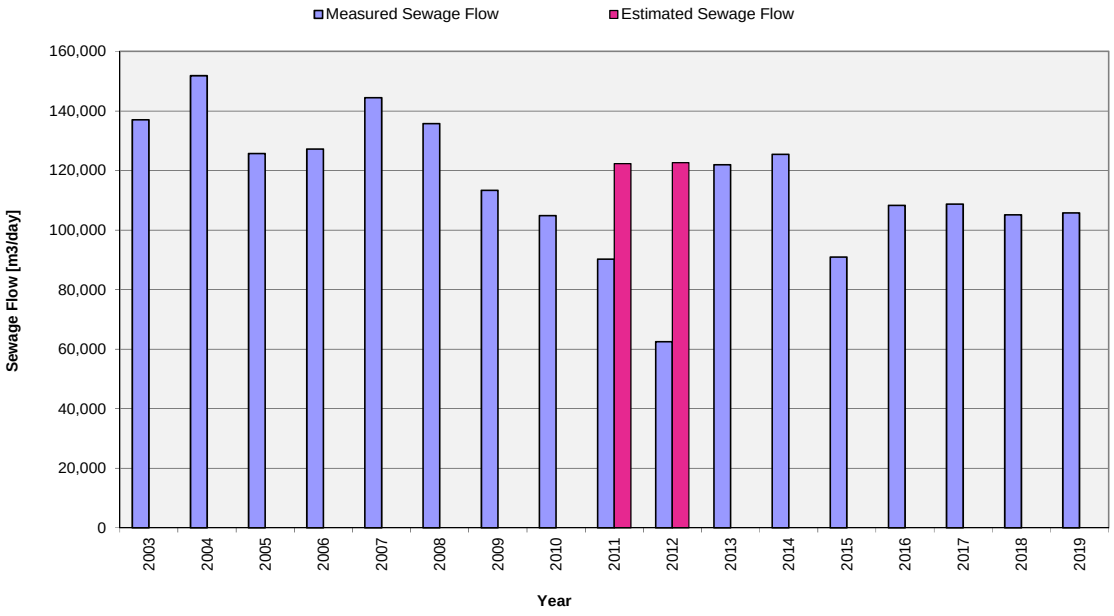
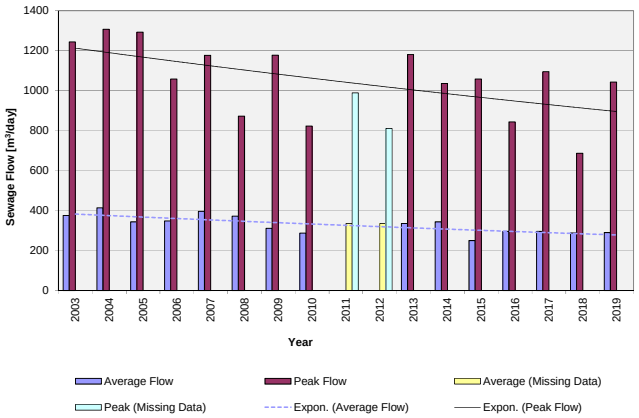
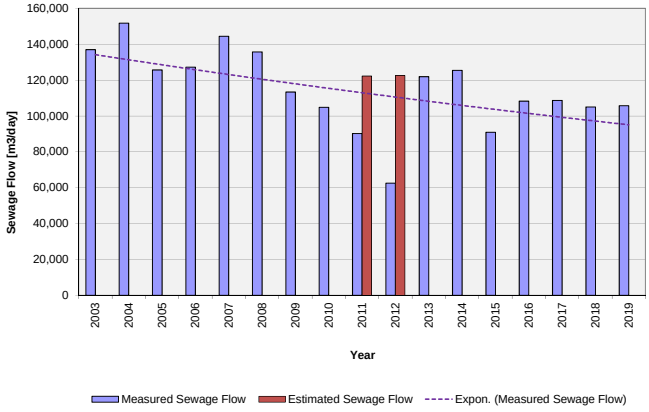


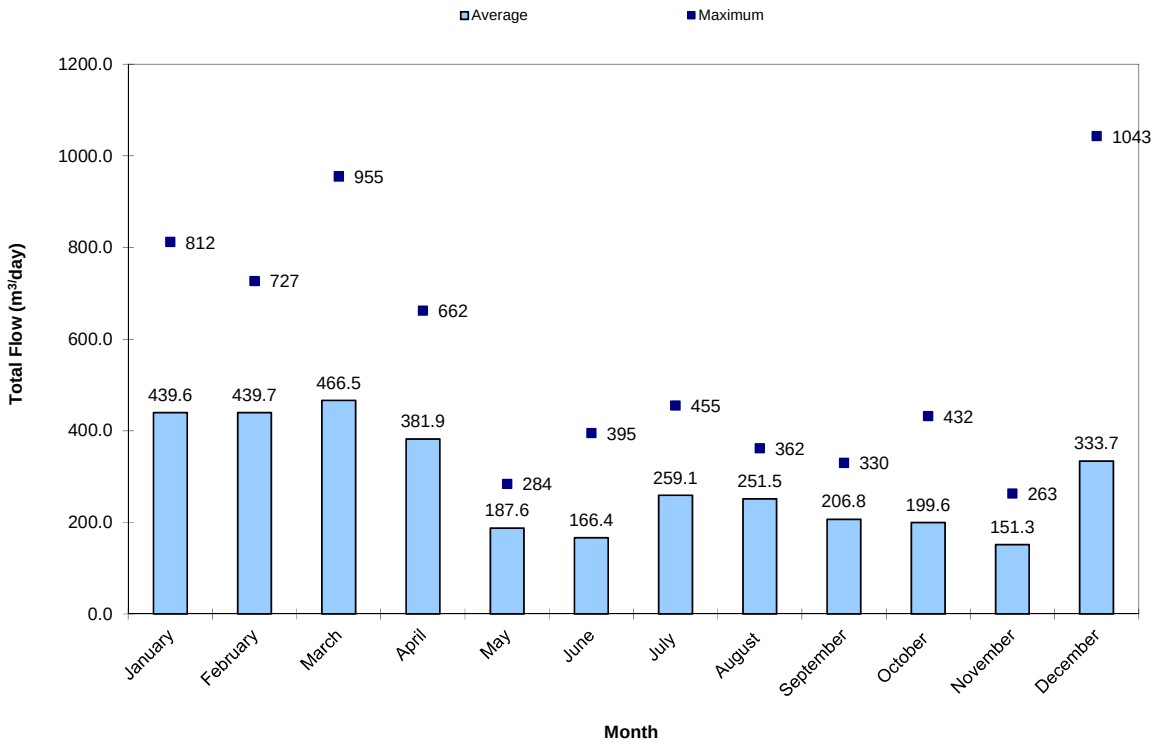
Figure 3a and Figure 3b
Trendlines for Average, Peak and Total Sewage Flow Graphs





Sewage flow trend is shown on Fig 3a and 3b above, note that total sewage production has in general a declining trend with stable flow numbers over the last four years.

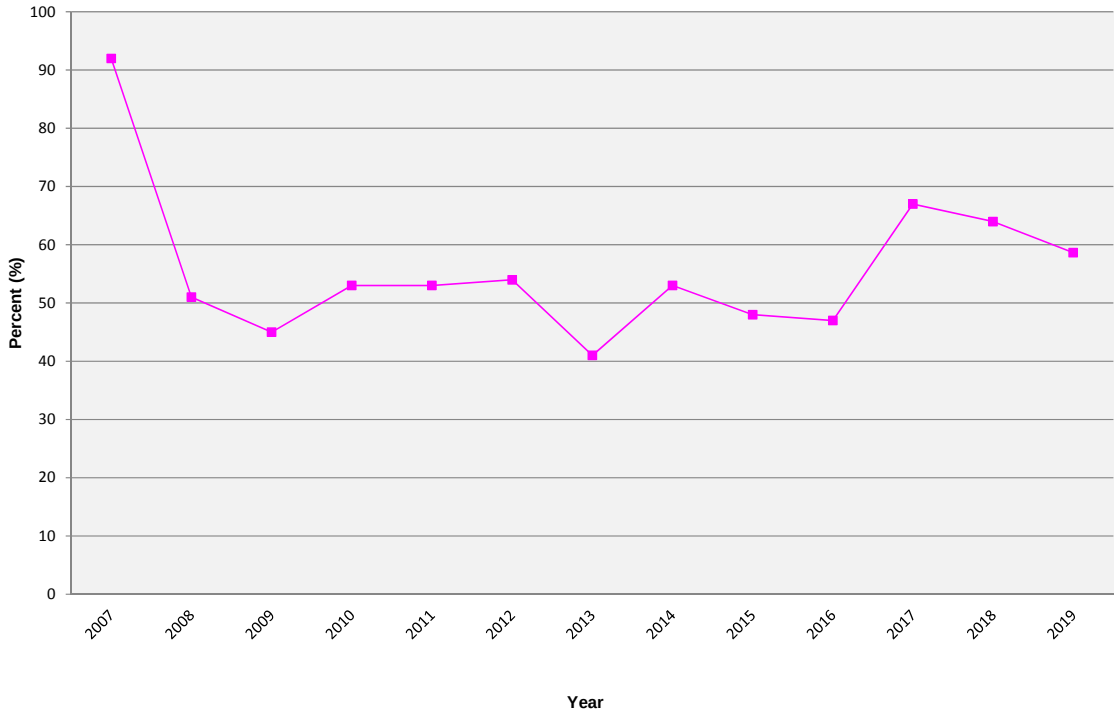
Figure 4
2019 Sewage Effluent Average and Peak Flows by Month



The Resort's ongoing program to reduce sewer infiltration is demonstrated by the reduction in return flow to the plant vs. total water usage. In 2007 the total sewage flow was equal to 92% of the total water production; however this number may not be representative as the total water production values were incomplete. In 2008 this figure decreased to 51%, which is considered to be a more representative. In 2009, this figure decreased even further to 45%. In 2012, the total sewage flow was equal to 54% of the total water production, and was consistent with 2010 and 2011. This again is slightly higher than in 2009 but similar to 2008. In 2013, the total sewage flow was 41% of the total water production, which was the lowest observed to date. In 2014, the total sewage flow was 53% of the total water production which was a slight increase from 2013 but comparable to that of 2008, 2010, 2011 and 2012. There was a slight decrease in 2015. The total sewage flow was 48% of the total water production which is comparable to 2013. The total sewage flow for 2016 was 47% which was very similar to that found in 2015. The total sewage flow for 2017 and 2018 was 67% and 64 %, respectively, which was an increase from previous years. The total sewage flow for 2019 was 59% showing a slightly decreasing trend.

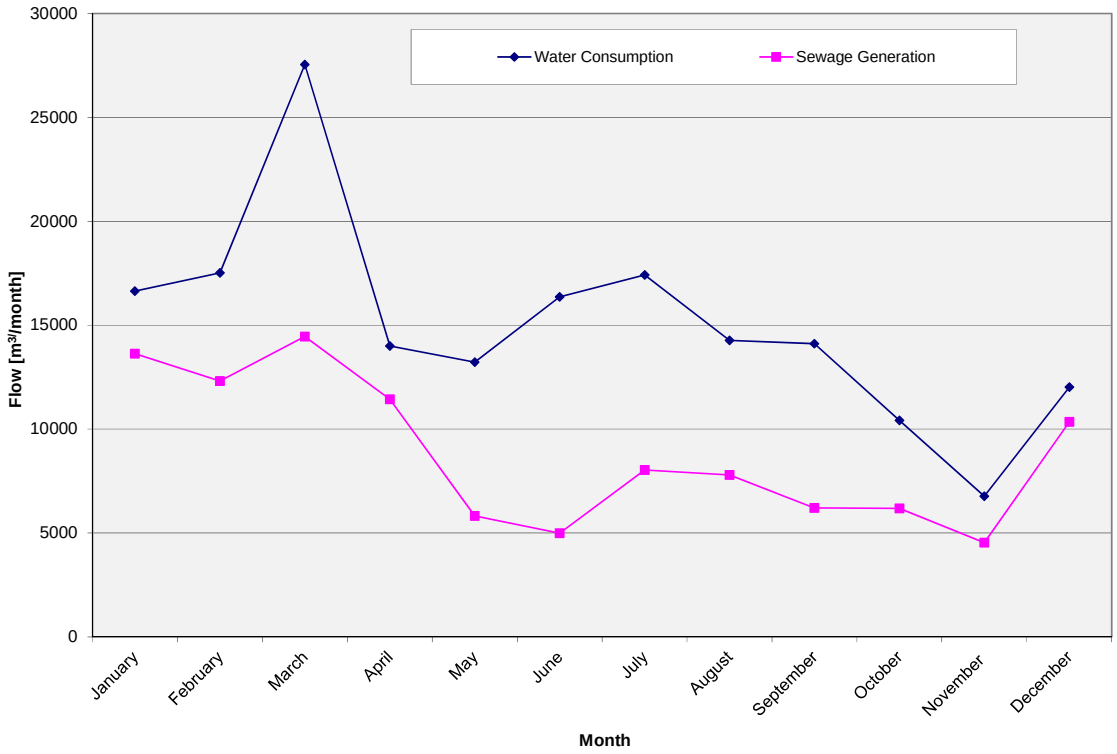
Note that in general, with the exception of 2007, there is relatively steady trend in % of return flow vs total water usage with the exception of 2017 and 2018. The percent sewage flow vs the water production for each year since 2007 has been plotted in Figure 5 below.

Figure 5
Percent Sewage Flow vs Water Production



Water use at the hill is compared to the amount of sewage received at the WWTP in Figure 6 for 2019.

Figure 6
2019 Water Consumption and Sewage Generation



The impact of rainfall and snowmelt on sewage flow has decreased each year since 2007 as a result of system improvements, the use of water restrictive fixtures and the infiltration reduction program.

4.0 SEWAGE FLOW PROJECTION

This section shows projected wastewater flow for 2007 through 2019 based on 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, the estimated highest day wastewater generation for 2011 would have been 1302.3 m^3/day. Using the actual peak flow of 811 m^3/day, a correction factor of 0.62 was calculated. Averaged correction factor for 2007, 2008, 2009, 2010, 2011, 2012, 2013 and 2014 was calculated and multiplied by the future estimated flows to more accurately reflect potential resort sewage generation rates.

In 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2015, 2016, 2017 and 2018, respectively, the correction factors were 1.20, 0.89, 1.14, 0.65, 0.76, 0.62, 0.91, 080, 0.81, 0.65, 0.84 and 0.51, which showed that the resort had reduced the impact of both storm water infiltration and reduced peak flows.

Projected daily peak wastewater flows until 2010 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 and 2019 was calculated based on the BC Health Act (refer to Table 11 enclosed at the end of this report). The future flows will be re-evaluated if further expansion occurs. The resort is committed to continuing the initiative on introducing a storm water 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. FARUC will monitor sewage flows to determine the efficacy of the program.

Based on a report prepared by Urban Systems, Wastewater Treatment Plant Assessment, prepared in October 2017, it was concluded that even with the additional expansion of the proposed Timberlanding, 27 residential lots (Phase 1) possibly in 2018 FARUC may not require an increase to permit discharge above the current limit of 1280 m^3/day if the flow restriction measures prove sustainable. Note that Phase 2 development may need a licence amendment to increase the maximum daily flow from 1280 m^3 to a maximum plant capacity of 1760 m^3. Sewage discharge rates will be monitored and an application will be submitted to increase the maximum daily discharge when warranted.

From the 27 lots that were registered in Phase 1 of the Timberlanding Development, 12 have been sold. 4 of the sold lots were consolidated into 2 as the owners wanted larger parcels to accommodate larger homes. Two are built and occupied with a 3rd nearing completion in the spring of 2020. One of the double lots is under construction with the other set to begin this spring. 4 others are also planning on beginning construction this spring.

Based on the 2019 flow data, the plant has an unused capacity of 237 m^3/day due to the flow saving measures. This still needs to be closely monitored during 2020 and further considered when adding additional development.

Table 4
Projected Peak Flows: 2007-2019

	2007	**2008**	**2009**	**2010**	**2011**	**2012**
Estimated Wastewater Flow (m^3/day)	979.2	979.9	1032.4	1261.4	1302.3	1302.3
Actual and Corrected (m^3/day)	1177 (a)	873 (a)	1178(a)	823 (a)	989 (a)	811 (a)

	2013	**2014**	**2015**	**2016**	**2017**	**2018**
Estimated Wastewater Flow (m^3/day)	1302.3	1302.3	1302.3	1302.3	1302.3	1337.6
Actual and Corrected (m^3/day)	1181 (a)	1036 (a)	1058 (a)	844 (a)	1095 (a)	687 (a)

	2019	**2020**
Estimated Wastewater Flow (m^3/day)	1344.5*	1344.5*
Actual and Corrected (m^3/day)	1043 (a)	1090 (b)

**Note that all 27 lots for Timberlanding Phase 1 are included in the Estimated Flow (only 9 including 2 double lots are either developed, under development or beginning construction)*

(a) actual peak flow

(b) corrected daily peak flows by the averaged correction faction for 2007 to 2019 and correction factor

2007	*correction factor of*	*1177/979.2*	*1.2*
2008		*873/979.9*	*0.89*
2009		*1178/1032.4*	*1.14*
2010		*823/1261.4*	*0.65*
2011		*989/1302.3*	*0.76*
2012		*811*/1302.3*	*0.62*
2013		*1181/1302.3*	*0.91*
2014		*1036/1302.3*	*0.8*
2015		*1058/1302.3*	*0.81*
2016		*844/1302.3*	*0.65*
2017		*1095/1302.3*	*0.84*
2018		*687/1337.6*	*0.51*
2019		*1043/1344.5*	*0.78*
AVERAGE			***0.81***

*Since only two out of the four months with the historically highest peaks were recorded, this number may be underestimated.

Note that based on the historical data and the above projections the actual flows based on Phase 1 Timberlanding expansion should not exceed the permitted discharge of 1280 m^3/d.

Graphs showing estimated vs actual historical peak flows and general trending of the correction factor are shown below.

Figure 7a
Estimated vs Actual Peak Flows (Historical)

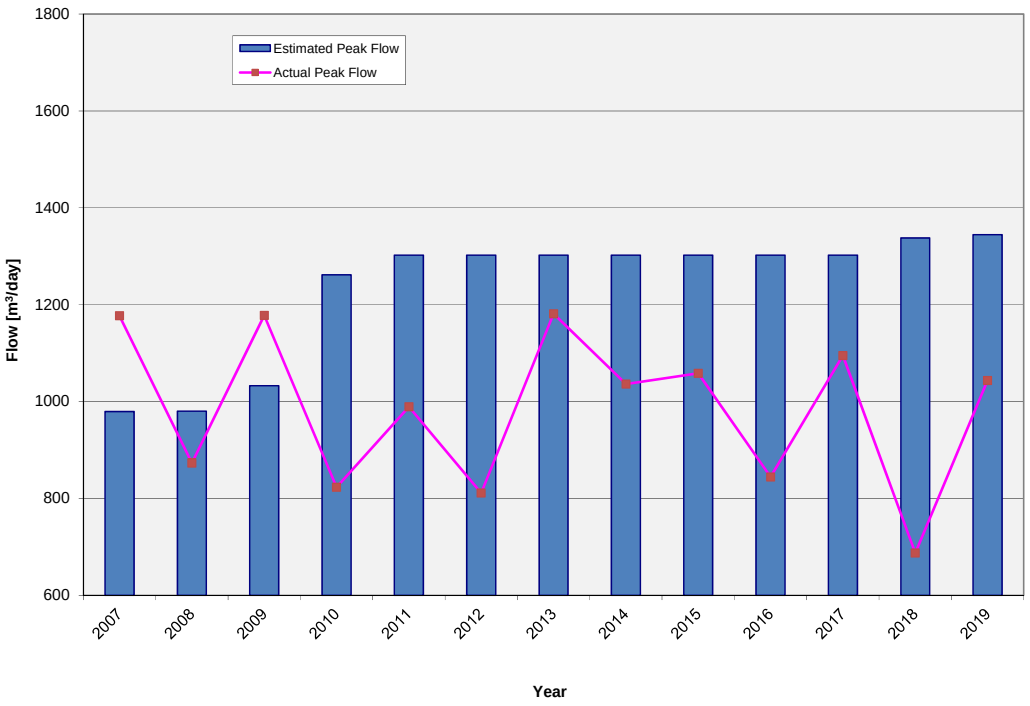
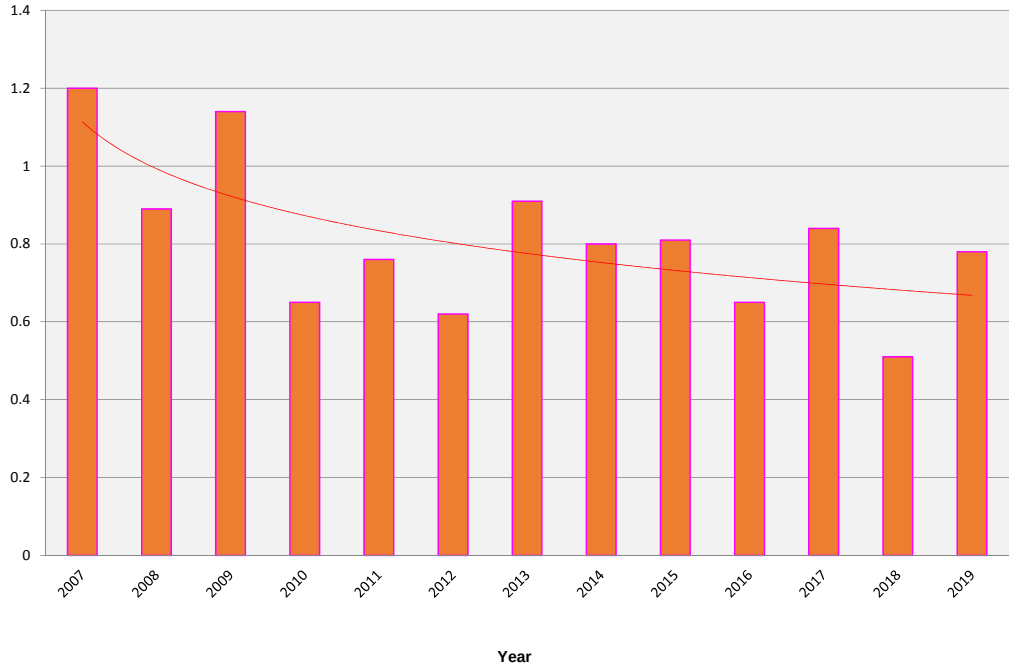


Figure 7b
Correction Factor and Trendline for Peak Flow (Historical)



5.0 OVERVIEW OF ELK RIVER SAMPLE RESULTS

This section provides data and analysis for the Elk River samples taken during 2019.

Table 5 provides a summary record of the Elk River test results for the time period from January 2nd, 2019 to December 23rd, 2019.

Table 5
2019 Elk River Sample Results

Sample Date	Ammonia-N			Ortho-P			Coliform - Fecal			Total P mg/L		
(yyyy-mm-dd)	UP	IDZ	DN	UP	IDZ	DN	UP	IDZ	DN	UP	IDZ	DN
2019-01-02	0.05	0.12	0.05	0.010	0.033	0.010	1	39	2	0.020	0.033	0.020
2019-01-09	0.05	0.05	0.05	0.010	0.012	0.010	8	1	5	0.020	0.020	0.020
2019-01-29	0.05	0.05	0.05	0.005	0.011	0.005	1	5	2	0.005	0.012	0.005
2019-02-05	0.05	0.05	0.05	0.008	0.031	0.005	4	1	2	0.009	0.030	0.009
2019-02-12	0.05	0.05	0.05	0.005	0.031	0.005	1	64	2	0.005	0.026	0.005
2019-02-19	0.05	0.05	0.05	0.005	0.173	0.005	1	49	2	0.005	0.187	0.003
2019-02-26	0.05	0.05	0.05	0.005	0.199	0.005	1	14	1	0.005	0.214	0.005
2019-03-04	0.05	0.05	0.05	0.005	0.045	0.005	1	4	1	0.005	0.659	0.005
2019-04-30	0.05	0.05	0.05	0.005	0.010	0.005	1	1	1	0.011	0.014	0.007
2019-05-08	0.05	0.05	0.05	0.005	0.112	0.005	2	1	1	0.009	0.020	0.010
2019-05-15	0.05	0.05	0.05	0.005	0.008	0.005	6	9	1	0.086	0.051	0.073
2019-05-23	0.05	0.09	0.07	0.005	0.005	0.005	1	1	1	0.006	0.007	0.008
2019-05-29	0.05	0.05	0.05	0.005	0.009	0.007	14	19	1	0.017	0.014	0.019
2019-06-05	0.05	0.05	0.05	0.005	0.005	0.005	12	19	14	0.073	0.064	0.064
2019-08-28	0.05	0.05	0.05	0.005	0.023	0.005	1	15	1	0.005	0.024	0.005
2019-09-04	0.05	0.16	0.05	0.005	0.094	0.005	5	91000	5	0.005	0.121	0.005
2019-09-11	0.05	0.05	0.05	0.030	0.005	0.005	209	3	67	0.025	0.005	0.005
2019-09-18	0.05	0.05	0.05	0.005	0.032	0.005	5	82	2	0.005	0.027	0.005
2019-10-02	0.05	0.05	0.05	0.005	0.007	0.005	1	10	1	0.005	0.008	0.005
2019-10-09	0.05	0.05	0.05	0.005	0.011	0.005	6	26	4	0.008	0.016	0.005
2019-11-27	0.05	0.05	0.05	0.005	0.009	0.005	2	3	1	0.005	0.008	0.005
2019-12-04	0.05	0.05	0.05	0.005	0.012	0.005	1	33	1	0.005	0.028	0.005
2019-12-11	0.05	0.05	0.05	0.005	0.010	0.005	1	1	1	0.005	0.012	0.005
2019-12-18	0.05	0.05	0.05	0.005	0.009	0.005	1	1	1	0.005	0.012	0.005
2019-12-23	0.05	0.05	0.05	0.006	0.013	0.005	4	1	5	0.018	0.026	0.014
# Samples	25	25	25	25	25	25	25	25	25	25	25	25
Average	0.05	0.06	0.05	0.007	0.036	0.005	12	17 (3656)*	5	0.015	0.065	0.013
Maximum	0.05	0.16	0.07	0.030	0.199	0.007	209	82 (91000)*	67	0.086	0.659	0.073
Minimum	0.05	0.05	0.05	0.005	0.005	0.005	1	1	1	0.005	0.005	0.003

*The result on September 4th, 2019 is considered an outlier; the numbers in brackets included the outlier value

Light green 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
IDZ – Initial Dilution Zone
DN – Downstream

Table 5 – cont.
2019 Elk River Sample Results

Sample Date	TSS			pH			$N\text{-}NO_3$			$N\text{-}NO_2$		
(yyyy-mm-dd)	UP	IDZ	DN	UP	IDZ	DN	UP	IDZ	DN	UP	IDZ	DN
2019-01-02	3.00	3.00	3.00	8.34	8.29	8.34	1.66	1.33	1.63	0.01	0.04	0.01
2019-01-09	3.00	3.00	3.00	8.31	8.15	8.32	1.66	0.49	1.62	0.01	0.01	0.01
2019-01-29	3.0	3.0	67.0	8.22	8.35	8.24	1.95	0.10	1.92	0.01	0.01	0.01
2019-02-05	4.70	3.00	3.30	8.13	7.98	8.23	0.88	4.19	1.73	0.01	0.01	0.01
2019-02-12	3.00	3.00	3.00	8.38	8.34	8.39	2.04	5.39	1.97	0.01	0.01	0.01
2019-02-19	3.00	3.00	3.00	8.15	7.95	8.17	1.98	18.30	1.96	0.01	0.01	0.01
2019-02-26	3.00	3.00	3.00	8.24	7.96	8.25	1.94	27.50	2.00	0.01	0.05	0.01
2019-03-04	3.00	12.00	3.00	8.33	7.96	8.16	1.94	9.88	2.00	0.01	0.01	0.01
2019-04-30	6.00	3.00	4.70	8.27	8.28	8.28	0.99	0.09	1.33	0.01	0.01	0.01
2019-05-08	5.70	3.00	5.70	8.40	8.40	8.39	1.26	0.21	1.18	0.01	0.01	0.01
2019-05-15	68.00	32.70	52.70	8.25	8.33	8.24	0.97	0.69	0.92	0.01	0.01	0.01
2019-05-23	3.70	3.70	5.00	8.46	8.47	8.47	1.13	0.84	1.27	0.01	0.01	0.01
2019-05-29	11.30	3.00	12.00	8.47	8.57	8.47	0.94	0.34	0.95	0.01	0.01	0.01
2019-06-05	54.70	49.30	52.70	8.35	8.34	8.35	0.92	0.81	0.92	0.01	0.01	0.01
2019-08-28	3.00	5.00	3.00	8.44	8.12	8.45	1.59	2.77	1.60	0.01	0.01	0.01
2019-09-04	3.00	3.00	3.30	8.50	8.05	8.39	1.51	6.11	1.61	0.01	0.05	0.01
2019-09-11	3.00	3.00	3.00	8.36	8.44	8.49	2.88	1.40	1.50	0.01	0.01	0.01
2019-09-18	3.30	3.00	3.00	8.41	8.18	8.40	1.66	3.55	1.72	0.01	0.01	0.01
2019-10-02	3.00	8.42	3.00	8.40	8.42	8.40	1.70	0.05	1.70	0.01	0.01	0.01
2019-10-09	3.00	3.70	3.00	8.32	8.37	8.39	1.22	0.07	1.35	0.01	0.01	0.01
2019-11-27	3.00	3.00	3.00	8.24	8.24	8.23	1.41	0.45	1.58	0.01	0.01	0.01
2019-12-04	3.30	8.00	3.30	8.28	8.30	8.29	1.78	0.26	1.81	0.01	0.01	0.01
2019-12-11	3.00	3.00	3.00	8.31	8.31	8.32	1.64	0.09	1.87	0.01	0.01	0.01
2019-12-18	3.00	3.00	3.00	8.29	8.38	8.33	1.47	0.17	1.55	0.01	0.01	0.01
2019-12-23	5.30	6.70	4.00	8.20	8.20	8.20	1.14	0.11	1.28	0.01	0.01	0.01
# Samples	25	25	25	25	25	25	25	25	25	25	25	25
Average	8.44	7.10	10.23	8.32	8.26	8.33	1.53	3.41	1.55	0.01	0.01	0.01
Maximum	68.00	49.30	67.00	8.50	8.57	8.49	2.88	27.50	2.00	0.01	0.05	0.01
Minimum	3.00	3.00	3.00	8.13	7.95	8.16	0.88	0.05	0.92	0.01	0.01	0.01

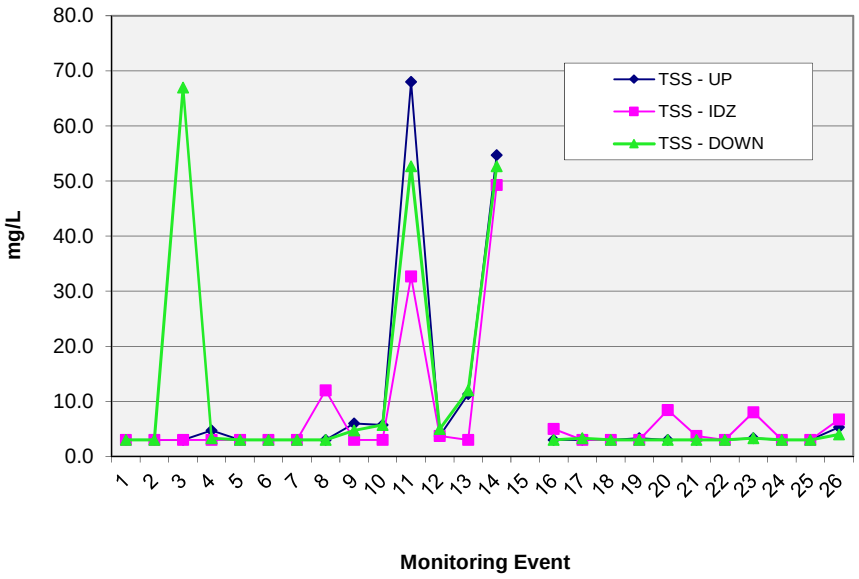
Light green squares show tests reported at less than the stated value, for calculations these are listed as equal to the value stated, ie. <0.05 is assumed to be 0.05
UP – Upstream
IDZ – Initial Dilution Zone
DN – Downstream

TSS

Although below detection limit upstream and at the outfall, downstream TSS results were high on January 29th, 2019. Two high outfall results, on May 15th and June 5th, however, correspond with high upstream and downstream values. The effluent results on these days were low at <3 mg/L.

Slightly elevated TSS was observed at the outfall on March 4th, October 2nd, and December 4th, 2019; the levels in the corresponding effluent and down-stream samples were very low on the corresponding days. Note that 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.

Figure 8a
2019 TSS Results in the River Upstream, at the Outfall and Downstream

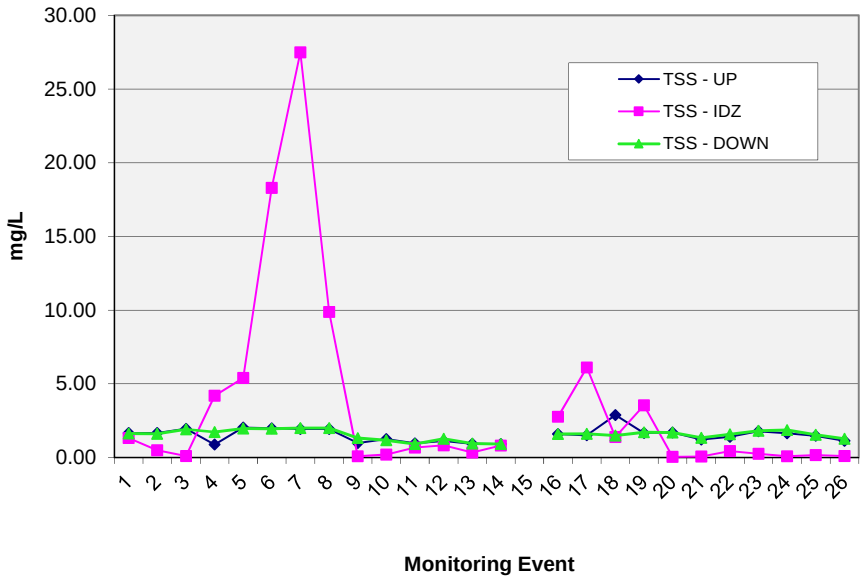


Nitrate-N & Nitrite-N

High levels of nitrate-n (27.50 mg/L) were observed at the outfall on February 26th, 2019. The levels of nitrate-n up-stream and down-stream were significantly lower (1.94 mg/L and 2.00 mg/L) on the same day. The level of nitrate-n in the effluent on the same day was 32.2 mg/L, which is consistent with other weekly samples from the plant effluent and suggests the effluent was not the cause of the elevate nitrate levels at the outfall. Note that all the downstream results were within the BC AWQG Long Term Chronic threshold at 3.0 mg/L.

All downstream nitrite-n results were below the detection limits and, therefore, below the BC AWQG Long Term Chronic threshold at 0.02 mg/L (the most stringent guideline for chloride < 2 mg/L).

Figure 8b
2019 Nitrate-N Results in the River Upstream, at the Outfall and Downstream

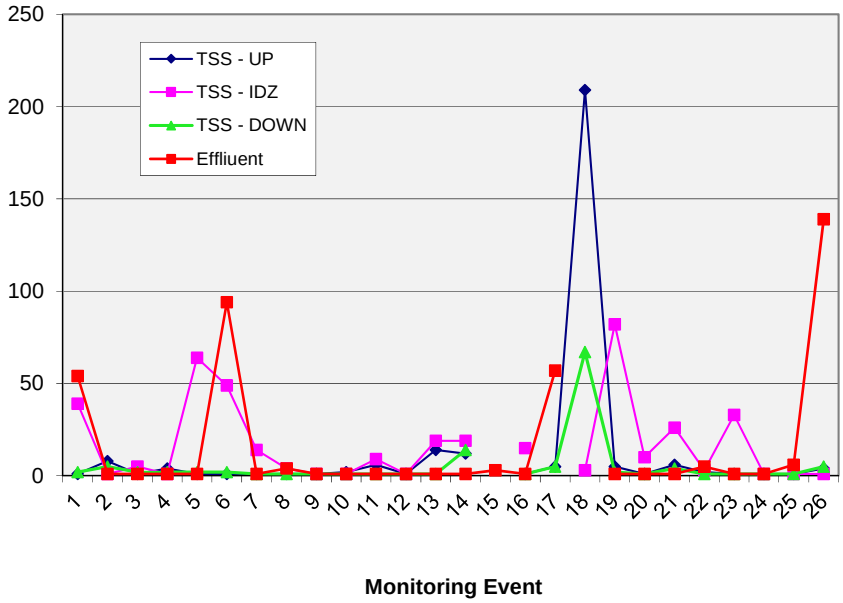


Fecal Coliform

Elevated levels of coliforms were tested at the outfall on February 12th, 19th, September 18th, October 9th and December 4th, 2019. Note that this values do not correspond with low effluent results on the corresponding days (refer to the graph below). Also, the results downstream on these particular days are low. In general, the coliform results downstream are low and/or correspond with the background readings (upstream).

The laboratory test results for the outfall on September 4th, 2019 show very high levels at 91,000 CFU/100 mL, these results correspond neither to the effluent on this day (57 CFU/100 mL) nor the downstream results at 5 CFU/100 mL (same as the upstream). This result, which is not likely due to the effluent discharge, is considered an outlier.

Figure 8c
2019 Fecal Coliform Results in the River Upstream, at the Outfall, Downstream and Effluent
(The graph does not show the September 4th, 2019 result, which is considered an outlier.)



No significant changes were observed in **ammonia-n**, ***pH*** or ***phosphorus*** concentrations during any of the river sample periods. Majority of ammonia-n samples downstream were below their detection limits and/or well below the BC AWQG guideline). In general, ortho and total phosphorus was highest in the outfall but the majority of the results from down-stream were below laboratory detection limits and/or within the background (upstream) values.

Overall, the analyzed concentrations remain constant between the upstream (US) sampling zone and the downstream (DS) sampling zone. The data indicates that the plant's effluent appears not to have any adverse effect on background nutrient concentrations in the Elk River.

pH results in the downstream samples followed closely those in the upstream with no guideline (6.5 – 9.0) exceedance.

6.0 OVERVIEW OF INFLUENT TEST RESULTS

This section provides data and analysis for the plant influent (raw sewage) samples taken during 2019.

Table 6 provides a summary record of the influent test results for the period January 2nd, 2019 to December 23rd, 2019.

Table 6
2019 Influent Results

Date	2019 Influent Results Summary					
	Flow	Temp	pH	TSS	BOD	COD
(yyyy/mm/dd)	m^3/d	C		mg/L	mg/L	mg/L
2019-01-02	672	-5.0	7.77	277.0	178.0	-
2019-01-09	260	-6.0	7.46	180.0	98.0	-
2019-01-29	358	-8.0	7.60	148.0	84.0	-
2019-02-05	241	-22.0	7.77	168.0	99.0	-
2019-02-12	372	-15.0	7.84	215.0	180.0	-
2019-02-19	585	-18.0	7.58	235.0	136.0	-
2019-02-26	306	-20.0	7.60	179.0	190.0	-
2019-03-04	410	-24.0	7.75	182.0	129.0	-
2019-04-30	227	-4.0	7.71	48.7	30.8	-
2019-05-08	286	5.0	7.85	50.5	65.0	-
2019-05-15	176	9.0	7.92	38.7	24.1	-
2019-05-23	133	18.0	7.86	157	44.0	-
2019-05-29	127	8.0	8.12	32.0	69.0	-
2019-06-05	115	8.0	7.94	150.0	149.0	-
2019-07-24	270	13.0	7.88	124.0	78.0	-
2019-08-28	177	22.0	-	-	-	-
2019-09-04	200	12.0	8.10	112.0	57.0	-
2019-09-11	250	5.0	8.02	46.3	29.0	-
2019-09-18	177	13.0	8.05	83.6	51.0	-
2019-10-02	124	-3.0	7.88	103	59.0	-
2019-10-09	434	-6.0	8.04	65.0	44.0	-
2019-11-27	150	-7.0	7.81	77.0	52.0	-
2019-12-04	160	3.0	7.89	138.0	68.0	-
2019-12-11	104	-2.0	7.88	124.0	69.0	-
2019-12-18	134	-2.0	7.96	38.7	96.0	-
2019-12-23	698	-2.0	7.82	151.0	170.0	-
# Samples	26	26	25	25	25	0
Average	275	-1.1	7.84	124.9	90.0	-
High	698	22	8.12	277.0	190.0	0
Low	104	-24	7.46	32.0	24.1	0

A total of 25 BOD and TSS samples were analysed.

BOD

Inlet BOD ranged from 24.1 mg/l to 190.0 mg/L with an average of 90.0 mg/L. The average influent sewage strength was measured at 102 mg/L in 2018, 114.5 mg/L in 2017, 95.8 mg/L in 2016, 190.1 mg/L in 2015, 92.3 mg/L in 2014, 106 mg/L in 2013, 220 mg/L in 2012, 108 mg/L in 2011, 142 mg/L in 2010, 143 mg/L in 2009, 99 mg/L in 2008 and 488 mg/L in 2007. Since a typical municipal waste water BOD is in the range of 100 to 300 mg/L, it is assumed that the average BOD is well within the expected level.

TSS

TSS values ranged in the influent from 32 to 277 mg/L with an average of 124.9 mg/L. The values fall well within the expected municipal wastewater values between 100 and 350 mg/L.

7.0 OVERVIEW OF EFFLUENT RESULTS

This section provides data and analysis for the effluent (treated) samples and plant flows for 2019.

A total of 391 effluent samples were collected and analyzed for TSS (26 were laboratory tested for TSS), 26 out of 391 samples were laboratory tested for BOD5, 25 samples were laboratory tested for ortho-phosphate, total phosphate, fecal coliforms and 3 samples were laboratory tested for 96-hr LC50 Bioassay.

Effluent samples were collected on the same dates as influent samples to permit an evaluation of plant performance. Table 7 summarizes the laboratory effluent test results for 2019.

Table 7
2019 Effluent Results

Date	2019 Effluent Results Summary											
	Flow	Temp	NH_3-N	BOD	COD	P-OP04	Coliforms Fecal	Total P	TSS	pH	NO_3-N	NO_2-N
(yyyy/mm/dd)	m^3/d	C	mg/L	mg/L	mg/L	mg/L	cfu/100ml	mg/L	mg/L		mg/L	mg/L
2019-01-02	674	-5.0	0.092	2.0	20	0.501	54	0.689	3.3	7.90	35.1	0.109
2019-01-09	278	-6.0	0.050	2.0	11	0.113	1	0.132	3.0	7.86	27.8	0.050
2019-01-29	370	-8.0	0.050	2.0	10	0.207	1	0.222	3.0	7.54	38.5	0.050
2019-02-05	261	-22.0	0.050	2.0	10	0.067	1	0.056	3.0	7.64	29.1	0.050
2019-02-12	380	-15.0	0.097	2.0	10	0.114	1	0.056	3.0	8.04	33.6	0.050
2019-02-19	588	-18.0	0.057	2.1	10	0.314	94	0.410	3.0	7.68	33.7	0.050
2019-02-26	271	-20.0	0.050	2.0	13	0.238	1	0.285	3.0	7.84	32.2	0.050
2019-03-04	417	-24.0	0.050	2.0	10	0.210	4	0.260	3.0	7.49	42.9	0.050
2019-04-30	215	-4.0	0.050	2.0	10	0.205	1	0.203	3.0	8.04	14.8	0.010
2019-05-08	284	5.0	0.083	2.0	10	0.185	1	0.208	3.0	8.09	15.1	0.010
2019-05-15	197	9.0	0.050	2.0	10	0.346	1	0.343	3.0	8.12	16.3	0.013
2019-05-23	72	18.0	0.050	2.0	10	0.164	1	0.270	3.0	8.10	30.3	0.010
2019-05-29	143	8.0	0.050	2.0	10	0.192	1	0.306	3.3	8.14	29.3	0.050
2019-06-05	128	8.0	0.050	2.0	10	0.159	1	0.197	3.0	8.08	32.8	0.050
2019-07-24	258	13.0	0.050	2.0		0.121	3	0.216	3.0	8.01	22.0	0.050
2019-08-28	179	22.0	0.050	2.0	10	0.099	1	0.091	3.0	7.77	35.1	0.050
2019-09-04	207	12.0	0.288	2.5	19	0.257	57	0.664	6.7	8.07	25.0	0.094
2019-09-11	234	5.0	-	2.0	-	-	-	-	3.0	7.99	-	-
2019-09-18	186	7.0	0.050	2.0	10	0.096	1	0.086	3.0	7.87	31.1	0.050
2019-10-02	146	-3.0	0.050	2.0	11	0.038	1	0.038	3.0	7.97	25.6	0.050
2019-10-09	432	-6.0	0.050	2.0	13	0.185	1	0.472	4.3	8.16	13.2	0.010
2019-11-27	143	-7.0	0.147	2.0	11	0.055	5	0.087	3.0	7.71	20.7	0.046
2019-12-04	161	3.0	0.050	2.0	10	0.107	1	0.140	3.0	8.10	21.9	0.050
2019-12-11	89	-2.0	0.050	4.8	10	0.111	1	0.161	3.0	8.11	18.4	0.012
2019-12-18	140	-2.0	0.050	2.0	10	0.135	6	0.164	3.0	7.92	33.2	0.018
2019-12-23	602	-2.0	0.050	2.0	12	0.183	139	0.243	3.0	7.66	17.0	0.010
# Samples	26	26	25	26	25	25	25	25	26	26	25	25
Average	271	-1	0.07	2.1	11	0.176	15	0.2	3	7.92	27.0	0.04
High	674	22	0.29	4.8	20	0.501	139	0.7	7	8.16	42.9	0.11
Low	72	-24	0.05	2.0	10	0.038	1	0.0	3	7.49	13.2	0.01
Limit	1280	N/A	N/A	45	N/A	0.5	200	1	45	N/A	N/A	N/A
# Over Limit	0	N/A	N/A	0	N/A	1	0	0	0	N/A	N/A	N/A

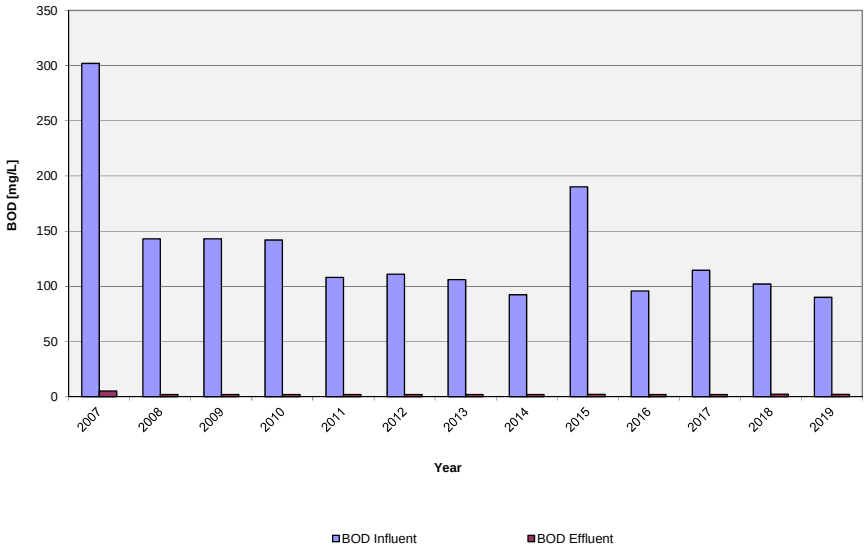
Notes: 1. Light green squares show tests reported at less than the stated value, for calculations these are listed as equal to the value stated, ie. <0.05 is assumed to be 0.05
2. Geometric mean is used for coliform results

7.1 RESULTS ANALYSIS

BOD

The average BOD in the effluent was 2.1 mg/L in 2019, which was similar to the previous years. Historically, the average BOD was 2.3 mg/L in 2018, , 2.2 mg/L in 2015, 5.0 mg/L in 2007 and <2.0 mg/L in 2017, 2016 and between 2008 and 2014.

Figure 9
Historical BOD Test Results for Influent vs Effluent

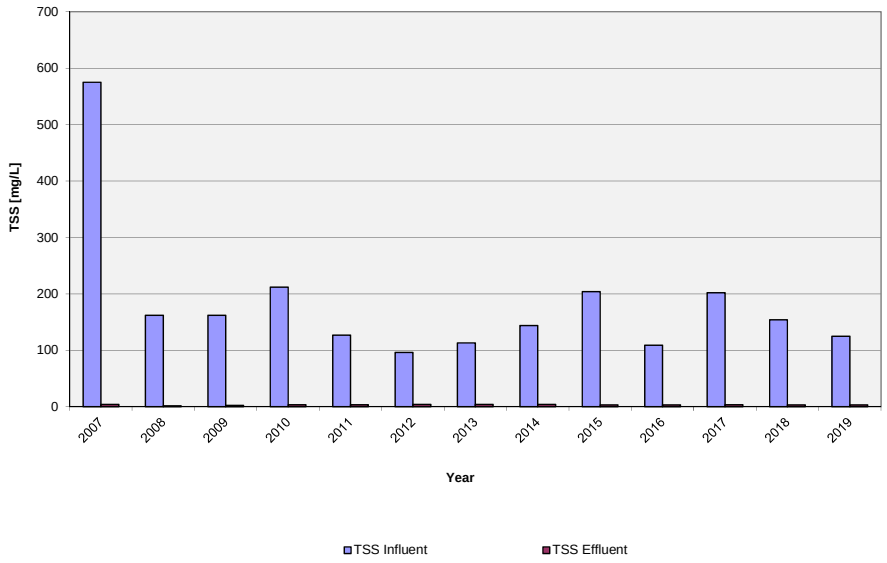


TSS

Laboratory tests indicated that the majority of TSS samples were at <3.0 mg/L with all but four out of 26 results being below laboratory detection limits. The highest laboratory test result was at 6.7 mg/L on September 4th, 2019.

The plant measured TSS on a daily basis. All the results measured at the plant were below the discharge limit. The highest result measured at the plant was recorded on July 23rd, 2019 at 4.2 mg/L. Average TSS measured at the plant was at 0.9 mg/L with the highest results in the fourth quarter of the year at 1.2 mg/L.

Figure 10
Historical TSS Test Results for Influent vs Effluent



Based on the above results the plant provides excellent BOD_5 and TSS treatment with average removals of 100%.

Fecal Coliforms

Due to the relatively low levels of TSS, UV disinfection was able to effectively control the amount of coliform concentration found in the effluent. The UV disinfection was able to keep the coliform levels well below the acceptable limits for recreational waters (200 CFU/100 mL) throughout the year.

The levels of coliforms tested in the Elk River downstream between January 2nd and December 23rd, 2019 were well below the acceptable limit for all monitoring events. The highest results in the river downstream were 67 CFU/100 mL on September 11th, 2019 corresponding to high results in the river upstream.

All the results were well below the acceptable limit for recreational water indicating there were no measurable impacts of the effluent discharge on the river.

Effluent ammonia concentrations are consistently low with an average values at 0.07 mg/L in 2019. The maximum value at 0.288 mg/L was well below the BC aquatic guideline of 0.890 mg/L (ppH – 8.07 and 12 degree C). Effluent data shows the plant is effectively oxidizing ammonia nitrogen and that there is no evidence of elevated ammonia levels in the Elk River as a result of discharge from the treatment plant.

As was the case in previous years, the bioassay toxicity tests in 2019 shows that plant effluent is non-toxic. The results of these tests are shown below in Table 8.

Table 8
Toxicity Test Results

Sample Date	Result
2018/12/27*	Pass
2019/05/08	Pass
2019/12/04	Pass

*Please note two trout tests were completed in the calendar year for 2019; however, one test was completed at the very end of December 2018. As the test was close to the 2019 year, it was included in both the 2018 report and this report.

The level of ortho-phosphorus exceeded very marginally the allowable limit on January 2nd, 2019 at 0.501 mg/L vs the allowable limit of 0.500 mg/L. All the other ortho phosphorus results were below the allowable limit. All the total phosphorus levels were below the discharge limits for 2019.

A phosphorus reduction strategy, as outlined in Section 11, was started in the winter of 2007 to address the removal of soluble phosphorus from the effluent stream. The plant has sufficient infrastructure to remove precipitated nutrients and no additional treatment processes are required.

Phosphorus in the plant effluent has no discernable impact on background nutrient levels in the Elk River, with upstream and downstream concentrations being virtually identical. A 2001 report by Highwood Environmental indicated that phosphorus releases would have a negligible impact on aquatic life in the Elk River.

FARUC completed plant modifications for phosphorous removal.

7.2 COMPLIANCE SUMMARY

Table 9 summarizes the number of days that samples exceeded MSR effluent requirements.

Table 9
2019 MSR Parameter Compliance

Parameter	Unit	MSR Limit	No. of Samples	Average Value	Max. Value	Samples Over Limit
Flow	m^3/day	1280	365	290	1043	0
BOD_5	mg/l	45	26	2.1	4.8	0
TSS	mg/l	45	391	1.1***	6.7**	0
Total Phosphorous	mg/l	1	25	0.2	0.7	0
Ortho Phosphate	mg/l	0.5	25	0.176	0.501	1
Fecal Coliforms*	CFU/100ml	200	25	15	139	0
96 hr LC_{50} Bioassay	/	Non-toxic	3.0	/	/	0

** Limit for recreational waters only, not included in FAR registration letter*
***Max value (laboratory test)*
***Average of daily measurements and laboratory tests (<3 considered at 3 mg/L)

In 2019 all the parameters were within the discharge limits with only ortho-phosphorus exceeding very marginally the allowable limit (0.501 vs 0.500 mg/L) one day in 2019.

8.0 SLUDGE PRODUCTION AND DISPOSAL

This section provides data regarding the disposal of bio-solids (sludge) from the treatment facility in 2019.

Operation of the 200 m^3 aerated sludge digester allowed the plant to bag and landfill all of its bio-solids without resorting to vacuum truck services. All solids were transported to the Crowsnest/Pincher Creek Landfill site.

Hauling data for bagged solids are in Table 10.

Table 10
2019 Bagged Solids Data

Month	**Vol. Bagged (m^3)**
January	185.2
February	168.8
March	160.4
April	159.4
May	179.0
June	98.5
July	59.9
August	95.0
September	107.5
October	90.0
November	131.6
December	84.3
Total	**1,519.6**

The aerated sludge digester has allowed the operators to store liquid sludge during peak winter weekend periods and bag at the less active midweek times, avoiding the need for emergency vacuum truck services. Sludge bag data indicates the winter season is most active for the plant.

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

9.0 BYPASS EVENTS

This section provides information about bypass events in 2019.

Bypass events result in elevated effluent suspended solids concentrations, which decrease the effectiveness of the UV disinfection system; an increase in TSS results in a simultaneous increase in coliform counts. While soluble BOD is removed though the aeration basins, the overflow of TSS also results in an increase in BOD readings due to the presence of biological floc.

There were no bypass events in 2019.

10.0 PLANT IMPROVEMENTS

In January of 2015 the plant was retrofitted with a submersible pump in the Clearwell in order to utilize Clearwell effluent to spray down clarifiers. This was done to rectify the discrepancy between influent and effluent flows and to hopefully reduce the effluent flows. As seen in Figure 1 and Table 3, the influent and effluent flows were very similar and the total effluent and average effluent decreased from 2014.

The continuous strive for the improvements of the Waste Water Treatment System by RCR will continue along with minimization of the potable water use ie clear well water will be used to spray down the clarifiers instead of potable water.

There were no major plant improvements in 2019.

11.0 PHOSPHORUS REMOVAL

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

In the winter of 2007, the plant increased chemical dosing with Clearpac to reduce effluent phosphorus concentrations. By late January 2008 sample results showed marked improvement with both ortho and total phosphorus concentrations falling below discharge requirements.

The increased application of Clearpac in 2008, while effective, has been operationally costly; the relationship between chemical dose and nutrient removal will be adjusted for best efficiency.

The monitoring and removal program continued in the summer of 2008 with the plant evaluating additional removal strategies, including:

- Implementation of sampling procedures to measure total phosphorus concentrations at the following locations; auger monster (raw sewage), clarifier supernatant, RBC overflow, mix tank liquor, sand filter filtrate, filter backwash, sludge digester supernatant, and effluent,
- Evaluation of precipitant dose on effluent phosphorous levels at the current chemical addition point (clarifier overflow),
- Evaluation of changing the precipitant dose location, and
- Evaluation of alternative chemicals.

The plant planned to continually monitor and optimize coagulant dosages for improved phosphorus removal.

In 2009 upgrades to the phosphorus injections points and mixing tanks began. In the spring of 2011 the final stage of this improvement was completed with the installation of a rapid mixer and flocculation system and the relocation of the UV system. This resulted in the better usage of tertiary filtration. Longer runs, less backwash water, better phosphorus removal and better effluent quality were to be the result.

2010 data shows further improvement in phosphorus concentrations with only three exceedances for ortho phosphorus (all results for total phosphorus were below the limits) with only a 15% exceedance compared to 2008 results with 50% exceedance and to 2009 with only a 18% exceedance.

2011 data showed further improvement in phosphorus concentrations with only one exceedances for each total phosphorus and ortho-phosphorus, both on July 14th, 2011. The exceedances for ortho phosphorus was only 4% and for total phosphorus was only 13% above the limit with is less than those of previous years.

The 2012 data showed similar results to that of 2011. Two samples exceeded the limit both for ortho phosphorus. The exceedance was 14% on January 5th and 16% on December 27th. It was anticipated that the program will continue to show improvement to plan effluent quality in 2013.

The 2013 data showed slightly elevated results to that of 2012. Six samples exceeded the limit for ortho phosphorus and one for total phosphorus. The exceedance ranged from 4% to 54% for ortho phosphours and 9% for total phosphorus. The exceedances for ortho phosphorus were observed on January 3rd, January 17th, January 23rd, February 26th, July 30th and December 26th. The exceedance for total phosphorus was observed on January 3rd.

The 2014 data showed slightly lower results than those in 2013. Only one sample for each total and ortho phosphorus were above the limits. The exceedance was 9% for ortho-phosphours and 40% for total phosphorus. The exceedance for ortho phosphorus was observed on December 21st. The exceedance for total phosphorus was observed on January 16th.

The average total phosphorus and ortho phosphorus for 2015 were slightly lower than in 2014. Three samples exceeded the limit for ortho phosphorus and none for total phosphorus. The exceedances for ortho phosphorus were 22% on January 1st, 3% on January 7th and 19% on December 22nd.

The average total phosphorus and ortho phosphorus for 2016 were similar to previous years. One sample exceeded the limit for ortho phosphorus and one for total phosphorus. The exceedance for ortho phosphorus was 18% December 28th and for total phosphorus was it 23% on December 28th.

The results for total and ortho phosphorus have decreased and during the 2017 season, all the ortho and total phosphorus results were below the discharge limits.

The results for total phosphorus remained low (no days above the discharge limit) for 2018. There was one ortho phosphorus result from March 21st that slightly exceeded the discharge limit (0.703 mg/L vs 0.5 mg/L); however all the remaining results were below the discharge limit for the year.

In 2019 the results for total phosphorus remained low and below the discharge limit of 1 mg/L. Only one result for ortho-phosphorus exceeded marginally (0.501 vs 0.500 mg/L0 the discharge limit.

Figure 11
Total Phosphorus Levels 2007-2019

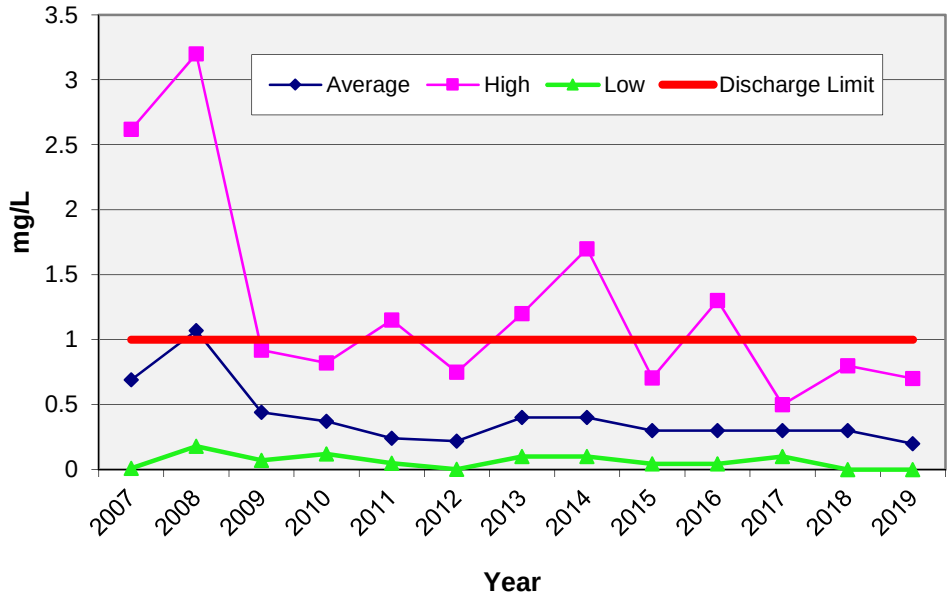
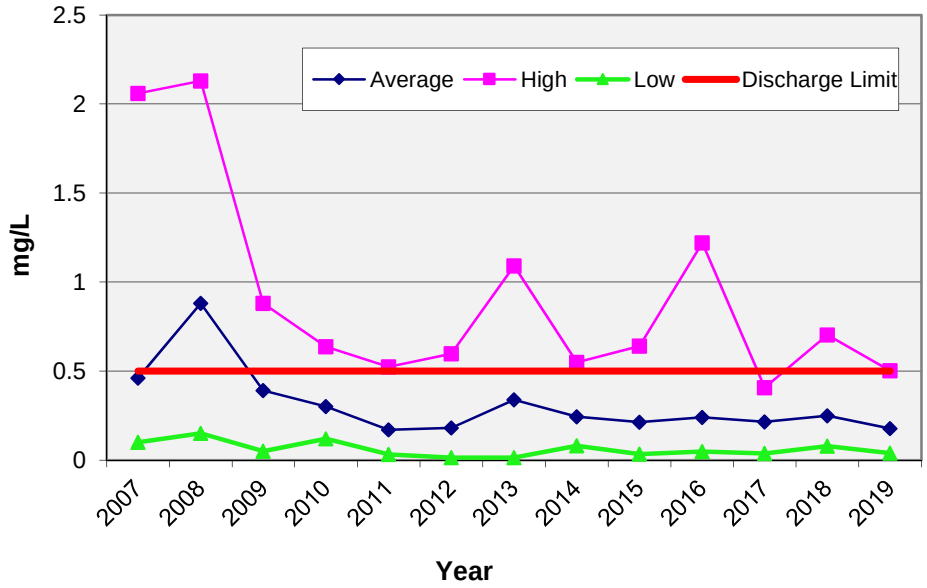
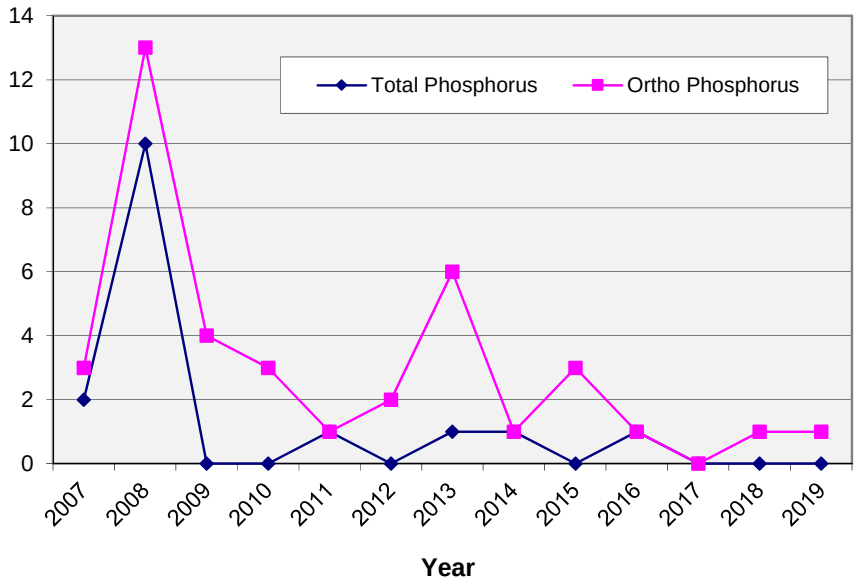


Figure 12
Ortho Phosphorus Levels 2007-2019



.Figure 13
Days over Limit 2007-2019



12.0 ASSESSMENT SUMMARY

The plant has produced high quality effluent with ***BOD_5*** normally below the regulated limit of 45 mg/l and for all but three instances, the results were less than 2 mg/L (on February 19th, BOD was measured at 2.1 mg/L, on September 4th, 2019 at 2.5 mg/L and on December 11th, 2019 at 4.8 mg/L)

TSS was less than laboratory detection limit for all but four samples (on January 2nd, May 29th, September 11th, and October 9th, 2019 with the highest result at 6.7 mg/L. The highest result for the daily testing was at 4.2 mg/L on July 23rd, 2019.

Both TSS and BOD were well below the MSR limits.

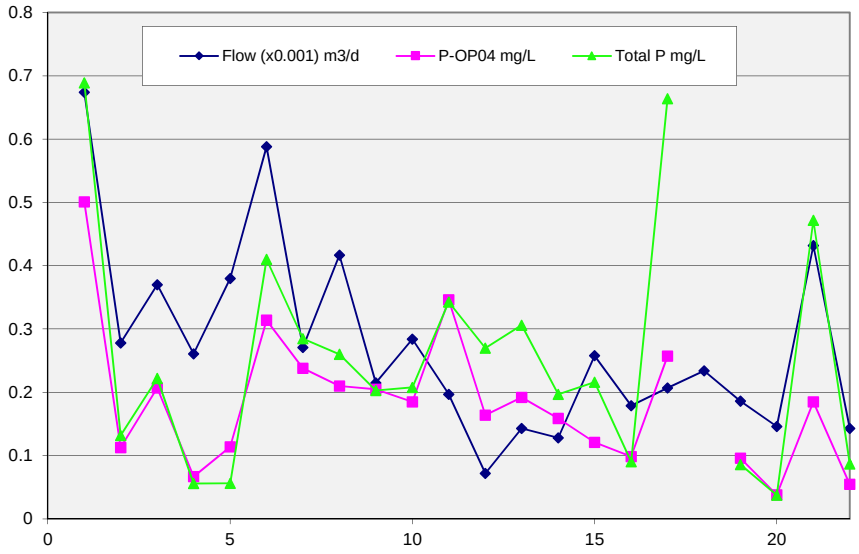
Nitrogen
Ammonia-n results in the effluent are low varying between less than detection limit and 0.29 mg/L, the average value is 0.07 mg/L. Nitrate-n values vary between 13.2 and 42.9 mg/L, these values are fairly typical for a municipal wastewater effluent and fairly consistent throughout the years. Nitrite-n values are also very low with majority of the results below the detection limits. Nitrogen results indicate that the plant functioned well again in 2019.

Fecal Coliforms
Generally, fecal coliforms in the effluent conformed to the applicable discharge levels throughout the year. Elevated coliform levels in the effluent did not coincide very well with elevated levels found in Elk River at the outfall and downstream. The highest downstream level, however, coincided well with the upstream results on September 11, 2019.

There does not appear to be any adverse impacts to the Elk River from the effluent discharged.

With the exception of one result for ortho-phosphorus all the parameters were below the discharge limits for 2019.

Figure 14
Total Flow and Phosphorus Levels



Operation of the sludge digester has eliminated the need for emergency liquid sludge hauling. All sludge was bagged and disposed of at the approved landfill site.

A new subdivision has been approved and is currently under construction (Timberlanding). A capacity report from Urban Systems has been submitted and approved by the RDEK for the tying in of the subdivision into the WWTP. Details of the subdivision at build-out include 48 single family lots (27 in the first phase). The second phase includes the remaining 21 single family lots and 2 multifamily lots, each with a maximum density of approximately 56 units. Please note the first phase also includes 4 infill lots on Lower Timberline Crescent.

Analysis shows sufficient capacity in the WWTP for the first phase of development but likely an increase to the maximum allowable daily discharge will be required for Phase 2. Please note that when the WWTP was upgraded in 2005, additional capacity was built into the plant which would allow it to operate to a maximum flow of 1760 m^3. In order to utilize this capacity, a licence amendment to increase the maximum daily flow from 1280 m^3 to 1760 m^3 will be required. The facility operators will have to monitor flows closely and ensure this application happens in a timely fashion.

13.0 AUTHORITIZATION AND CLOSING

This report, titled *2019 Sewage Treatment Plant Annual Report,* was prepared for FARUC 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.
Manager, Water & Wastewater

iqw/jobs/W2020-019

14.0 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. 23rd Edition

BC Environmental Management Act, Municipal Wastewater Regulation B.C. Reg. 87/2012, lasts Amended April 1st, 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

15. 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, EDI assumes no responsibility for matters of legal nature affection 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 nay 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 11 - Fernie Alpine Resort Estimated Sewage Generation (m3/day)

Existing Development	Flow* (l/unit/day)	Units	2011 Generation (m3/day)	2012 Generation (m3/day)	2013 Generation (m3/day)	2014 Generation (m3/day)	2015 Generation (m3/day)	2016 Generation (m3/day)	2017 Generation (m3/day)	2018 Generation (m3/day)	2019 Generation (m3/day)	2020 Generation (m3/day)
Griz Inn	1136	45	51.1	51.1	51.1	51.1	51.1	51.1	51.1	51.1	51.1	51.1
Wolf's Den	318	42	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4
Cornerstone	1136	26	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5
Timberline Condos	1022	58	59.3	59.3	59.3	59.3	59.3	59.3	59.3	59.3	59.3	59.3
Polar Peaks (4-Plex Units)	1136	24	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3
Timberline Single Family & B&B	1363	51	69.5	69.5	69.5	69.5	69.5	69.5	69.5	69.5	69.5	69.5
	Subtotal	**246**	**250.1**	**250.1**	**250.1**	**250.1**	**250.1**	**250.1**	**250.1**	**250.1**	**250.1**	**250.1**

Infill Units	Flow* (l/unit/day)	Units	2011 Generation (m3/day)	2012 Generation (m3/day)	2013 Generation (m3/day)	2014 Generation (m3/day)	2015 Generation (m3/day)	2016 Generation (m3/day)	2017 Generation (m3/day)	2018 Generation (m3/day)	2019 Generation (m3/day)	2019 Generation (m3/day)
Timberline Infills	1022	141	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1
Timberline Single Family	1363	2	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Timberline Infills	1022	106	108.3	108.3	108.3	108.3	108.3	108.3	108.3	108.3	108.3	108.3
Timberlanding Multifamily	1022	45	60.0	60.0	60.0	60.0	60.0	60.0	60.0	46.0	46.0	46.0
Timberlanding Single Family[1)]	1363	59.5	44.3	44.3	44.3	44.3	44.3	44.3	44.3	81.1	81.1	81.1
Highline Infill	1022	26	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6
	Subtotal	**379.5**	**386.0**	**386.0**	**386.0**	**386.0**	**386.0**	**386.0**	**386.0**	**408.8**	**408.8**	**408.8**

Highline Subdivision	Flow* (l/unit/day)	Units	2011 Generation (m3/day)	2012 Generation (m3/day)	2013 Generation (m3/day)	2014 Generation (m3/day)	2015 Generation (m3/day)	2016 Generation (m3/day)	2017 Generation (m3/day)	2018 Generation (m3/day)	2019 Generation (m3/day)	2019 Generation (m3/day)
Single Family	1363	54	66.8	66.8	66.8	66.8	66.8	66.8	66.8	66.8	73.6	73.6
Duplexes	1363	10	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6
Parcel 31-Condotel	318	61	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4
Parcel 32-Duplex	1363	16	21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8
Parcel 36-Hotel	318	101	32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1
Parcel 37-Townhouses	1363	8	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9
Parcel 38-Townhouses	1363	23	31.3	31.3	31.3	31.3	31.3	31.3	31.3	31.3	31.3	31.3
Parcel 3-Condominium	1363	12	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4
Parcel 8-Condominium	1363	42	57.2	57.2	57.2	57.2	57.2	57.2	57.2	57.2	57.2	57.2
	Subtotal	**327**	**269.5**	**269.5**	**269.5**	**269.5**	**269.5**	**269.5**	**269.5**	**269.5**	**276.4**	**276.4**

Day Users	Flow* (l/unit/day)	Population (each)	2011 Generation (m3/day)	2012 Generation (m3/day)	2013 Generation (m3/day)	2014 Generation (m3/day)	2015 Generation (m3/day)	2016 Generation (m3/day)	2017 Generation (m3/day)	2018 Generation (m3/day)	2019 Generation (m3/day)	2019 Generation (m3/day)
Skiers	36	700	252	252	252	252	252	252	252	252	252	252
	Subtotal	**700**	**252**	**252**	**252**	**252**	**252**	**252**	**252**	**252**	**252**	**252**

Dining Facilites/Bars	Flow* (l/m^2/day)	Area (m2)	2011 Generation (m3/day)	2012 Generation (m3/day)	2013 Generation (m3/day)	2014 Generation (m3/day)	2015 Generation (m3/day)	2016 Generation (m3/day)	2017 Generation (m3/day)	2018 Generation (m3/day)	2019 Generation (m3/day)	2019 Generation (m3/day)
Lizard Creek - Dining	97	54.7	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
Lizard Creek - Bar	145	40.4	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9
Kelseys - Dining	97	204.4	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8
Kelseys - Bar	145	65	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4
Daylodge - Dining	97	358.6	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8
Daylodge - Bar	145	260.7	37.8	37.8	37.8	37.8	37.8	37.8	37.8	37.8	37.8	37.8
Mean Bean	97	26.8	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Gabrielles	97	133.8	13	13	13	13	13	13	13	13.0	13.0	13.0
Powder House Inn	97	232.2	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Bears Den	97	62.4	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
	Subtotal	**1439**	**157.2**	**157.2**	**157.2**	**157.2**	**157.2**	**157.2**	**157.2**	**157.2**	**157.2**	**157.2**

Daily Wastewater Flow (m3/day)*	1302.3	1302.3	1302.3	1302.3	1302.3	1302.3	1302.3	1337.6	1344.5	1344.5
Corrected Daily Peak Flow Projections**	989 (actual)	811***(actual)	1181 (actual)	1036 (actual)	1058 (actual)	844 (actual)	1095 (actual)	687 (actual)	1043 (actual)	1090 (projected)

*Estimated Wastewater flows from BC Health Act, Sewage Disposal Regulation

**Based on 2005 flow for peak day flows

*** Note that the number does not reflect a true peak as all the data were not available during high flow months

1) 27 units added for Phase 1 Timberlanding in 2018

BRITISH COLUMBIA

Date: September 30, 2002 Our File: RB 17139

REGISTERED MAIL

Resorts of the Canadian Rockies Inc.
PO Box 997
Victoria, BC V8W 2S8

Resorts of the Canadian Rockies Inc.
1507 – 17th Avenue, SW
Calgary Alberta T2T 0E2

Dear Sir:

Re: Registration under the *Municipal Sewage Regulation* of the discharge to the Elk River from the Fernie Alpine Resort sewage treatment plant located at District Lot 8900, Kootenay District (Plan 1687) near Fernie British Columbia

This is to acknowledge your registration form under the *Municipal Sewage Regulation* (the *Regulation*) dated August 30, 2001, and received at this office on October 31, 2001, for the registration of the wastewater treatment plant owned and operated by Resorts of the Canadian Rockies Inc. at the Fernie Alpine Resort ski hill located near Fernie, British Columbia. Pursuant to Part 2, section 3 of the *Regulation*, the effective date of registration of this discharge is the date of this letter. The ministry file number for this discharge is RB 17139. Please indicate this number on all future correspondence regarding this discharge.

The initial registration fee is $148.55. Please submit to the Regional Manager (the *Manager*) a cheque payable to the Minister of Finance and Corporate Relations, for this amount by September 25, 2002. 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 *Regulation*. Fees will be calculated using a maximum effluent flow of 1280 m^3/day, a maximum BOD_5 of 45 mg/L and a maximum TSS of 45 mg/L.

We wish to remind you that the discharger is responsible for compliance with the requirements of the *Regulation*, the registration, the *Waste Management Act* (the *Act*) and this registration letter. Your attention is respectfully directed to the terms and conditions outlined in the *Regulation*, the registration, this registration letter and the *Act*. Compliance with all the terms and conditions of the *Regulation*, the registration and this registration letter is required. Contravention of any of the conditions of the *Regulation*, the registration and this letter is a violation of the *Act* and may result in prosecution.

Ministry of Water, Land and Air Protection
Kootenay Region
Mailing/Location Address: 401 - 333 Victoria Street Nelson BC V1L 4K3
Telephone: 250 354-6333
Facsimile: 250 354-6332
PP Facsimile: 250 354-6367

We also wish to draw your attention to the Environmental Impact Study Guideline dated December 2000 or the latest version and the *Regulation* Compliance Guideline dated January 2001 or the latest version, these policy documents are used in conjunction with the *Regulation*, the registration and the *Act*.

The *Regulation* and policy documents are available at :

http://wlapwww.gov.bc.ca/epd/epdpa/mpp/msrhome.html

This letter does not replace the *Act*, regulations issued under the *Act* or the *Regulation*. It does not list all provisions relating to municipal sewage discharges. If there are differences or omissions in this document then the *Act*, the regulations issued under the *Act* and the *Regulation* apply except where expressly noted in this letter.

Registration under the *Regulation* should not be construed as a representation that the authorized works are adequately designed or will satisfy 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* and this letter. Registration under the *Regulation* and this letter are without prejudice to any additional works that may be required or any additional requirements that may be specified by the *Manager*. The *Manager* may also issue Orders under the *Act*.

Registration under the *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 *Act*, the *Regulation*, the registration and this registration letter will be carried out by staff from our Sub-Regional Office located at #205 Industrial Road G, Cranbrook, British Columbia, V1C 7G5, (telephone: (250) 489-8570) or from our Regional Office located at #401 - 333 Victoria Street, Nelson, British Columbia, V1L 4K3. Plans, data and reports pertinent to the *Regulation*, registration and this letter are to be submitted to the *Manager* at the Sub-Regional office address at Cranbrook, British Columbia in the form required by the *Regulation* or in the form required by the *Manager*. The ministry uses a reference number to track monitoring data associated with discharges. The site reference number for this discharge is E102571.

Registration Reference Documents

This registration under the *Regulation* is based on the following documents:

1. The Fernie Alpine Resort Limited, Registration Form dated August 30, 2001 and received October 31, 2001.
2. Environmental Impact Study, Sewage Treatment Plant at Fernie Alpine Resort, prepared for Fernie Alpine Resort Ltd. by Highwood Environmental Management Limited dated April 2001.
3. Environmental Impact Study for Fernie Alpine Resort's Wastewater Discharge into the Elk River, Interim Report prepared by Conor Pacific Environmental Technologies Incorporated dated May 1, 2001.
4. Fernie Alpine Resort, Wastewater Treatment Plant, Guiding Document for Proposed Improvements 2001 prepared by Urban Systems dated May 2001.
5. Urban Systems drawings titled Fernie Alpine Resort Wastewater Treatment Plant Expansion dated August, 2001.

Treatment Plant Works

The treatment plant works are one influent macerator and screen, two aeration flow equalization tanks, a separate equalization tank, two clarifiers, two three stage rotating biological contactors, two flocculation tanks with mixers and coagulant feed, two sand filters, a backwash water settling tank, UV disinfection units, one aerated biosolids (sludge) digestion tank, biosolids (sludge) dewatering equipment and a pipeline and outfall to the Elk River and related appurtenances approximately as shown on Urban Systems drawings titled Fernie Alpine Resort Wastewater Treatment Plant Expansion dated August, 2001 or on the attached Site Plan. The plant maximum daily flow and discharge to the environment is 1280 m^3/day. The effluent quality shall be BOD_5 of 45 mg/L, TSS of 45 mg/L, total phosphorus of 1.0 mg/L, ortho phosphate 0.5 mg/L and the effluent shall also pass a 96 hour LC50 bioassay test.

Primary Screenings and Dewatered Biosolids (Sludge) Disposal

Primary screenings and dewatered biosolids (sludge) from the treatment plant shall be disposed at the Crowsnest/Pincher Creek Landfill. The discharger shall submit confirmation of acceptance of the screenings and biosolids by the Crowsnest/Pincher Creek Landfill Authority on or before October 25, 2002. If primary screenings and dewatered biosolids (sludge) from the treatment plant are not disposed at the Crowsnest/Pincher Creek Landfill they must be disposed in accordance with an authorization issued under the *Act*, the Organic Matter Recycling Regulation or in a manner approved by the *Manager*.

Semi-solid Waste

The discharger shall not accept semi-solid wastes at the treatment plant. Semi-solid wastes means septic tank pumpage, holding tank solids or sludge from sewage facilities.

Plant Design

The treatment plant design must be in accordance with Schedule 7 of the *Regulation* and meet reliability Category I. The discharger shall provide written confirmation that the treatment plant works meet reliability Category I and confirm that multiple disinfection units have been installed. The confirmation shall be submitted on or before October 25, 2002.

Outfall Diffuser

The discharger shall install an outfall diffuser in accordance with Part 4, Section 5 and Schedule 7, Condition 4 of the *Regulation*. The diffuser shall be installed on or before August 31, 2003. The discharger must obtain all necessary approvals from other agencies prior to installing the diffuser.

Additional Works

The works are to be designed to allow for additional facilities in future to reduce effluent ammonia levels if ammonia levels in the Elk River exceed the current British Columbia Approved Water Quality Guidelines (Criteria) or if monitoring results indicate exceedance of the current Criteria for ammonia is imminent. Water quality Criteria apply at the edge of the initial dilution zone.

The works are also to be designed to allow for increased phosphorus removal if algae problems develop in the Elk River.

Operator Qualifications and Certification

The discharger shall ensure that the treatment plant is classified and the treatment plant operators certified in accordance with Part 6, Section 22 of the *Regulation*. Proof of treatment plant classification (copy of classification) and operator certification (copy of certification) shall be submitted to the *Manager* on or before October 25, 2002.

Monitoring

The discharger shall undertake monitoring in accordance with Part 7 and applicable conditions of Schedule 6 of the *Regulation* subject to the requirements as follows:

Sampling and Analysis

Sampling and analysis shall be in accordance with Part 7, Section 25 of the *Regulation*. Minimum detection limits for nutrients shall be:

Ammonia	5µg/L (5ppm)
Nitrate	5 µg/L
Nitrite	2 µg/L
Total Phosphorus	3 µg/L
Orthophosphate	3 µg/L

These detection limits shall only apply to the analysis of samples obtained from the Elk River. These detection limits will not apply to the analysis of samples obtained from the plant influent and effluent.

Please note the requirement to submit data in accordance with the *Environmental Data Quality Assurance Regulation* as per Section 25 (3) of the *Regulation*.

Discharge Monitoring and Receiving Environment Monitoring

In accordance with Part 7, Section 26 and 27 of the *Regulation* the discharger shall undertake the following monitoring program:

Sampling Location Frequency/Type

	Elk River[4] (At Sites UP, IDZ and DN)	Plant Influent[3]	Plant Effluent[3]
Parameter			
pH (field test)	WS/G		M/G and WS/G
temperature (field test)	WS/G		
flow		D/CON.	D/CON.
BOD_5 [1]		M/G	M/G and WS/G
TSS[2]	WS/G	M/G	M/G and WS/G and D/CON.
ammonia (as nitrogen)	WS/G		M/G and WS/G
nitrate (as nitrogen)	WS/G		M/G and WS/G
nitrite (as nitrogen)	WS/G		M/G and WS/G
total phosphorus	WS/G		M/G and WS/G
	Elk River[4] (At Sites UP, IDZ and DN)	Plant Influent[3]	Plant Effluent[3]
orthophosphate	WS/G		M/G and WS/G
fecal coliforms	WS/G		M/G and WS/G
Toxicity			3Y/G

1. BOD_5 - means the total 5-day biochemical oxygen demand.
2. TSS - means total suspended solids or non-filterable residue.
3. Plant influent and effluent samples must be obtained at peak times on peak flow days. The peak flow days shall be based on bookings at the resort. An influent flow meter shall be installed on or before December 31, 2003.
4. Sampling of the Elk River shall be done on the same day as plant influent and effluent sampling and also correspond with peak flow days at the resort in a manner similar to plant influent/effluent sampling.

Sampling Location Frequency/Type

	Elk River[4] (At Sites UP, IDZ and DN)	Plant Influent[3]	Plant Effluent[3]
Parameter			
pH (field test)	WS/G		M/G and WS/G
temperature (field test)	WS/G		
flow		D/CON.	D/CON.
BOD_5[1]		M/G	M/G and WS/G
TSS[2]	WS/G	M/G	M/G and WS/G and D/CON.
ammonia (as nitrogen)	WS/G		M/G and WS/G
nitrate (as nitrogen)	WS/G		M/G and WS/G
nitrite (as nitrogen)	WS/G		M/G and WS/G
total phosphorus	WS/G		M/G and WS/G
	Elk River[4] (At Sites UP, IDZ and DN)	**Plant Influent[3]**	**Plant Effluent[3]**
orthophosphate	WS/G		M/G and WS/G
fecal coliforms	WS/G		M/G and WS/G
Toxicity			3Y/G

1. BOD_5 - means the total 5-day biochemical oxygen demand.
2. TSS - means total suspended solids or non-filterable residue.
3. Plant influent and effluent samples must be obtained at peak times on peak flow days. The peak flow days shall be based on bookings at the resort. An influent flow meter shall be installed on or before December 31, 2003.
4. Sampling of the Elk River shall be done on the same day as plant influent and effluent sampling and also correspond with peak flow days at the resort in a manner similar to plant influent/effluent sampling.

Sampling Frequency:

D - means daily.

M - means monthly.

WS – weekly seasonal (This means obtaining samples weekly for a six week period in the spring, in the fall and during the Christmas season at peak flow times and days. Peak flow days will be predicted on the basis of resort bookings. The commencement of the spring and fall sampling sessions depends on weather and hydrologic conditions. The spring sampling should begin early in the spring after ice-out when river flows are low and the fall sampling should begin when river flows are low and turbidity is low. Professional judgment should be used regarding the start times of the weekly sampling programs in the spring and fall. The Christmas sampling should begin in mid December and extend into January. During the six week sampling period the monthly sampling is not necessary.)

3Y – means three times per year to correspond with the WS sampling.

Sample Type:

G - means grab sample (Note: when obtaining samples of the influent and effluent the grab samples will be taken on peak flow days at peak flow times during the day. Peak days shall be predicted on the basis of bookings at the resort.)

CON. - means continuous using a data logger. (Note: Flow meters and TSS monitors shall be calibrated. The flow meter and TSS meter calibration frequency and procedures shall be contained in the operating plan.)

Monitoring for Plant Operation Purposes

The discharger is expected to undertake additional monitoring for plant operation purposes. The monitoring program outlined in this letter is not considered adequate for plant operation purposes.

Environmental Monitoring System (EMS) Numbers

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*. Monitoring data shall be submitted to the Ministry data base quarterly within 30 days of the end of each quarter.

Monitoring Program Changes

The *Manager* may modify the monitoring program from time to time. The annual report shall contain recommendations regarding changes (additions/deletions/modifications) to the monitoring program.

Supervisory Control and Data Acquisition (SCADA)

The discharger is encouraged to install a SCADA system. SCADA systems may be a requirement in the future.

If you have any questions concerning this registration, please contact our Cranbrook Sub-Regional Office at (250) 489-8540.

Yours truly,

Carl Johnson, P.Eng.
Assistant Regional Waste Manager

/lp

cc: Paul Bates, Resorts of the Canadian Rockies, Calgary
Toby Todaro, Resorts of the Canadian Rockies, Calgary
Peter Gigliotti, P.Eng. Urban Systems, Kelowna
Andrew Walls, Fernie Alpine Resort, Fernie
Andrew Brown, Fernie Alpine Resort, Fernie
Ken van Heyningen, Fernie Alpine Resort, Fernie
Gary Lawrence, MWLAP, Cranbrook

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 03-JAN-19
Report Date: 10-JAN-19 10:28 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L2216097

Project P.O. #: NOT SUBMITTED
Job Reference: F A R U C - FALL 2018 EMS WK # 5
C of C Numbers:
Legal Site Desc:

Nancy Sonompil, B. Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2216097-1 WWTP INFLUENT							
Sampled By: HUNGRY BAYTALUKE on 02-JAN-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	178	DLHC	75	mg/L		04-JAN-19	R4436287
Total Suspended Solids	277	DLHC	15	mg/L		03-JAN-19	R4427534
pH	7.77		0.10	pH		07-JAN-19	R4432731
L2216097-2 WWTP EFFLUENT							
Sampled By: HUNGRY BAYTALUKE on 02-JAN-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	0.092	RRV	0.050	mg/L		07-JAN-19	R4430507
Biochemical Oxygen Demand	<2.0		2.0	mg/L		04-JAN-19	R4436287
Chemical Oxygen Demand	20		10	mg/L		07-JAN-19	R4431928
Orthophosphate-Dissolved (as P)	0.501		0.010	mg/L		04-JAN-19	R4428652
Coliform Bacteria - Fecal	54		1	CFU/100mL		03-JAN-19	R4429074
Nitrate (as N)	35.1	DLHC	0.10	mg/L		04-JAN-19	R4429300
Nitrite (as N)	0.109	DLHC	0.050	mg/L		04-JAN-19	R4429300
Phosphorus (P)-Total	0.689		0.020	mg/L	05-JAN-19	06-JAN-19	R4429575
Total Suspended Solids	3.3		3.0	mg/L		03-JAN-19	R4427534
pH	7.90		0.10	pH		07-JAN-19	R4432731
L2216097-3 ELKRIVER UPSTREAM							
Sampled By: HUNGRY BAYTALUKE on 02-JAN-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		07-JAN-19	R4430507
Orthophosphate-Dissolved (as P)	<0.010		0.010	mg/L		04-JAN-19	R4428652
Coliform Bacteria - Fecal	<1		1	CFU/100mL		03-JAN-19	R4429074
Nitrate (as N)	1.66		0.020	mg/L		04-JAN-19	R4429300
Nitrite (as N)	<0.010		0.010	mg/L		04-JAN-19	R4429300
Phosphorus (P)-Total	<0.020		0.020	mg/L	05-JAN-19	06-JAN-19	R4429575
Total Suspended Solids	<3.0		3.0	mg/L		03-JAN-19	R4427534
pH	8.34		0.10	pH		07-JAN-19	R4432731
L2216097-4 ELKRIVER OUTFALL							
Sampled By: HUNGRY BAYTALUKE on 02-JAN-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	0.116	RRV	0.050	mg/L		07-JAN-19	R4430507
Orthophosphate-Dissolved (as P)	0.033		0.010	mg/L		04-JAN-19	R4428652
Coliform Bacteria - Fecal	39		1	CFU/100mL		03-JAN-19	R4429074
Nitrate (as N)	1.33		0.020	mg/L		04-JAN-19	R4429300
Nitrite (as N)	0.041		0.010	mg/L		04-JAN-19	R4429300
Phosphorus (P)-Total	0.033		0.020	mg/L	05-JAN-19	06-JAN-19	R4429575
Total Suspended Solids	<3.0		3.0	mg/L		03-JAN-19	R4427534
pH	8.29		0.10	pH		07-JAN-19	R4432731
L2216097-5 ELKRIVER DOWN STREAM							
Sampled By: HUNGRY BAYTALUKE on 02-JAN-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		07-JAN-19	R4430507
Orthophosphate-Dissolved (as P)	<0.010		0.010	mg/L		04-JAN-19	R4428652

* 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
L2216097-5 ELKRIVER DOWN STREAM							
Sampled By: HUNGRY BAYTALUKE on 02-JAN-19 @ 15:00							
Matrix: WATER							
Coliform Bacteria - Fecal	2		1	CFU/100mL		03-JAN-19	R4429074
Nitrate (as N)	1.63		0.020	mg/L		04-JAN-19	R4429300
Nitrite (as N)	<0.010		0.010	mg/L		04-JAN-19	R4429300
Phosphorus (P)-Total	<0.020		0.020	mg/L	05-JAN-19	06-JAN-19	R4429575
Total Suspended Solids	<3.0		3.0	mg/L		03-JAN-19	R4427534
pH	8.34		0.10	pH		07-JAN-19	R4432731

* 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).
RRV	Reported Result Verified By Repeat Analysis

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.

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colormetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

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-ED	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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-COL-ED	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
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
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 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.

ALS Environmental
ANALYTICAL CHEMISTRY & TESTING SERVICES

www.alsenviro.com

Vancouver BC, 1988 Triumph S
Fort St. John BC, Box 256, 983
Grand Prairie AB, 9595 - 111 S
Fort McMurray AB, Bay 1, 245
Edmonton AB, 9936 - 67th Ave
Calgary AB, Bay 7, 1313 - 44th
Saskatoon SK, 819 - 58th Stree

153-6700
513-2191
87-2311
: 403-291-0298
-668-8383

L2216097-COFC

CHAIN OF CUSTODY FORM

PAGE OF

SEND REPORT TO:

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669	FAX:	403 - 244 - 3774	SAMPLER:	Hungry Baytaluke
PROJECT NAME AND NO.:	F A R U C – Fall 2018 EMS wk # 5			QUOTE NO:	
PO NO.:		ALS CONTACT:	Nancy Sonompil@ALSGlobal.com		
REPORT FORMAT:	☒ HARD MAIL ☐ FAX ☒ PDF		pmajer@skircr.com		

ANALYSIS REQUESTED:

Ambient air - 2 °C

WO#	SAMPLE IDENTIFICATION		DATE / TIME COLLECTED YYYY-MM-DD	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD	NOTES (sample specific comments, due dates, etc.)
FOR LAB USE ONLY																
1	WWTP Influent Routine	1	2019 – 1– 2	14:00	Water		X	X								temp = 11.0 C
	WWTP Influent BOD	2	2019 – 1– 2	14:00	Water									X		temp = C
	WWTP Effluent Routine	3	2019 – 1– 2	14:15	Water		X	X							X	temp = C
2	WWTP Effluent BOD	4	2019 – 1– 2	14:15	Water									X		temp = 13.1 C
	WWTP Effluent Nutrient	5	2019 – 1– 2	14:15	Water				X	X	X	X	X			temp = C
	WWTP Effluent Bacti	6	2019 – 1– 2	14:15	Water	X										temp = C
	Elkriver Upstream Routine	7	2019 – 1– 2	14:30	Water		X	X								temp = 0.1 C
3	Elkriver Upstream Nutrient	8	2019 – 1– 2	14:30	Water				X	X	X	X	X			temp = C
	Elkriver Upstream Bacti	9	2019 – 1– 2	14:30	Water	X										temp = C
	Elkriver Outfall Routine	10	2019 – 1– 2	14:45	Water		X	X								temp = 3.9 C
4	Elkriver Outfall Nutrient	11	2019 – 1– 2	14:45	Water				X	X	X	X	X			temp = C
	Elkriver Outfall Bacti	12	2019 – 1– 2	14:45	Water	X										temp = C
	Elkriver downstream Routine	13	2019 – 1– 2	15:00	Water		X	X								temp = C
5	Elkriver downstream Nutrient	14	2019 – 1– 2	15:00	Water				X	X	X	X	X			temp = 0.2 C
	Elkriver downstream Bacti	15	2019 – 1– 2	15:00	Water	X										temp = C

TURN AROUND REQUIRED: ◉ REGULAR SPECIFY DATE: _____ (surcharge may apply)

SEND INVOICE TO: ☒ SAME AS REPORT

INVOICE FORMAT: ☐ HARD ☐ FAX ☐ PDF

SPECIAL INSTRUCTIONS: PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com

RELINQUISHED BY:	DATE:	2019– 1– 2	RECEIVED BY:	DATE:	1/3
Hungry Baytaluke	TIME:	5:00 pm		TIME:	9:40
RELINQUISHED BY:	DATE:		RECEIVED BY:	DATE:	
	TIME:			TIME:	

FOR LAB USE ONLY

Cooler Seal Intact?	Sample Temperature: 7 °C	Cooling Method?
___Yes ___No ___N/A	Frozen? ___Yes ___No	___Icepacks ___Ice ___None

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 10-JAN-19
Report Date: 17-JAN-19 15:39 (MT)
Version: FINAL

Client Phone: 800-258-7669

Certificate of Analysis

Lab Work Order #: L2218795

Project P.O. #: NOT SUBMITTED
Job Reference: F A R U C - FALL 2018 EMS WK # 6
C of C Numbers:
Legal Site Desc:

Justine Buma-a
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2218795-1 WWTP INFLUENT							
Sampled By: HUNGRY BAYTALUKE on 09-JAN-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	98		75	mg/L		10-JAN-19	R4448890
Total Suspended Solids	180	DLHC	9.0	mg/L		12-JAN-19	R4443411
pH	7.46		0.10	pH		16-JAN-19	R4450012
L2218795-2 WWTP EFFLUENT							
Sampled By: HUNGRY BAYTALUKE on 09-JAN-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		15-JAN-19	R4449308
Biochemical Oxygen Demand	<2.0		2.0	mg/L		10-JAN-19	R4448890
Chemical Oxygen Demand	11		10	mg/L		14-JAN-19	R4446389
Orthophosphate-Dissolved (as P)	0.113		0.010	mg/L		11-JAN-19	R4441769
Coliform Bacteria - Fecal	<1		1	CFU/100mL		10-JAN-19	R4441760
Nitrate (as N)	27.8	DLHC	0.10	mg/L		10-JAN-19	R4441548
Nitrite (as N)	<0.050	DLHC	0.050	mg/L		10-JAN-19	R4441548
Phosphorus (P)-Total	0.132		0.020	mg/L	16-JAN-19	17-JAN-19	R4452507
Total Suspended Solids	<3.0		3.0	mg/L		12-JAN-19	R4443411
pH	7.86		0.10	pH		16-JAN-19	R4450012
L2218795-3 ELKRIVER UPSTREAM							
Sampled By: HUNGRY BAYTALUKE on 09-JAN-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		15-JAN-19	R4449308
Orthophosphate-Dissolved (as P)	<0.010		0.010	mg/L		11-JAN-19	R4441769
Coliform Bacteria - Fecal	8		1	CFU/100mL		10-JAN-19	R4441760
Nitrate (as N)	1.66		0.020	mg/L		10-JAN-19	R4441548
Nitrite (as N)	<0.010		0.010	mg/L		10-JAN-19	R4441548
Phosphorus (P)-Total	<0.020		0.020	mg/L	16-JAN-19	17-JAN-19	R4452507
Total Suspended Solids	<3.0		3.0	mg/L		12-JAN-19	R4443411
pH	8.31		0.10	pH		16-JAN-19	R4450012
L2218795-4 ELKRIVER OUTFALL							
Sampled By: HUNGRY BAYTALUKE on 09-JAN-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		15-JAN-19	R4449308
Orthophosphate-Dissolved (as P)	0.012		0.010	mg/L		11-JAN-19	R4441769
Coliform Bacteria - Fecal	1		1	CFU/100mL		10-JAN-19	R4441760
Nitrate (as N)	0.049		0.020	mg/L		10-JAN-19	R4441548
Nitrite (as N)	<0.010		0.010	mg/L		10-JAN-19	R4441548
Phosphorus (P)-Total	<0.020		0.020	mg/L	16-JAN-19	17-JAN-19	R4452507
Total Suspended Solids	<3.0		3.0	mg/L		12-JAN-19	R4443411
pH	8.15		0.10	pH		16-JAN-19	R4450012
L2218795-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 09-JAN-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		15-JAN-19	R4449308
Orthophosphate-Dissolved (as P)	<0.010		0.010	mg/L		11-JAN-19	R4441769

* 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
L2218795-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 09-JAN-19 @ 15:00							
Matrix: WATER							
Coliform Bacteria - Fecal	5		1	CFU/100mL		10-JAN-19	R4441760
Nitrate (as N)	1.62		0.020	mg/L		10-JAN-19	R4441548
Nitrite (as N)	<0.010		0.010	mg/L		10-JAN-19	R4441548
Phosphorus (P)-Total	<0.020		0.020	mg/L	16-JAN-19	17-JAN-19	R4452507
Total Suspended Solids	<3.0		3.0	mg/L		12-JAN-19	R4443411
pH	8.32		0.10	pH		16-JAN-19	R4450012

* 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.

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colormetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

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-ED	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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-COL-ED	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
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
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 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.

L2218795-COFC

Vancouver BC, 1988 Triumph Street, V5L 1K5, Tel: 604-253-4188 Toll Free: 1-800-665-0243 Fax: 604-253-6700
Fort St. John BC, Box 256, 9831 - 98A Avenue, V1J 6W7, Tel: 250-261-5517 Fax: 250-261-5587
Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5196 Toll Free: 1-800-668-9878 Fax: 780-513-2191
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-791-1524 Fax: 780-791-1586
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free: 1-800-668-9878 Fax: 780-437-2311
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free: 1-800-668-9878 Fax: 403-291-0298
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-800-667-7645 Fax: 306-668-8383

CHAIN OF CUSTODY FORM

PAGE OF

SEND REPORT TO:

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669	FAX:	403 - 244 - 3774	SAMPLER:	Hungry Baytaluke
PROJECT NAME AND NO.:	F A R U C – Fall 2018 EMS wk # 6			QUOTE NO:	
PO NO.:		ALS CONTACT:	Nancy Sonompil@ALSGlobal.com		
REPORT FORMAT:	☒ HARDMAIL ☐ FAX ☒ PDF ☐ ( )		pmajer@skircr.com		

ANALYSIS REQUESTED:

WO#	SAMPLE IDENTIFICATION		DATE / TIME COLLECTED YYYY-MM-DD	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD	NOTES (sample specific comments, due dates, etc.)
FOR LAB USE ONLY																
1	WWTP Influent Routine	1	2019 – 1– 9	14:00	Water		X	X								temp = 10.8 C
	WWTP Influent BOD	2	2019 – 1– 9	14:00	Water									X		temp = C
2	WWTP Effluent Routine	3	2019 – 1– 9	14:15	Water		X	X							X	temp = C
	WWTP Effluent BOD	4	2019 – 1– 9	14:15	Water									X		temp = 7.1 C
	WWTP Effluent Nutrient	5	2019 – 1– 9	14:15	Water				X	X	X	X	X			temp = 12.1 C
	WWTP Effluent Bacti	6	2019 – 1– 9	14:15	Water	X										temp = 12.1 C
3	Elkriver Upstream Routine	7	2019 – 1– 9	14:30	Water		X	X								temp = C
	Elkriver Upstream Nutrient	8	2019 – 1– 9	14:30	Water				X	X	X	X	X			temp = 0.4 C
	Elkriver Upstream Bacti	9	2019 – 1– 9	14:30	Water	X										temp = 0.1 C
4	Elkriver Outfall Routine	10	2019 – 1– 9	14:45	Water		X	X								temp = C
	Elkriver Outfall Nutrient	11	2019 – 1– 9	14:45	Water				X	X	X	X	X			temp = 0.6 C
	Elkriver Outfall Bacti	12	2019 – 1– 9	14:45	Water	X										temp = 0.6 C
5	Elkriver downstream Routine	13	2019 – 1– 9	15:00	Water		X	X								temp = C
	Elkriver downstream Nutrient	14	2019 – 1– 9	15:00	Water				X	X	X	X	X			temp = 0.3 C
	Elkriver downstream Bacti	15	2019 – 1– 9	15:00	Water	X										temp = 0.3 C

TURN AROUND REQUIRED:	• ROUTINE	SPECIFY DATE: _____ (surcharge may apply)	RELINQUISHED BY: Hungry Baytaluke	DATE: 2019– 1– 9	RECEIVED BY:	DATE: 1/10	
SEND INVOICE TO:	☒ SAME ☐ DIFFERENT			TIME: 5:00 pm		TIME: 9:00	
INVOICE FORMAT:	☐ AZ ☐ PDF ☐		RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:	
				TIME:		TIME:	

SPECIAL INSTRUCTIONS: PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com

FOR LAB USE ONLY

Cooler Seal Intact?	Sample Temperature: 2 °C	Cooling Method?
___Yes ___No ___N/A	Frozen? ___Yes ___No	___Icepacks ___Ice ___None

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 30-JAN-19
Report Date: 07-FEB-19 16:21 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L2226648

Project P.O. #: NOT SUBMITTED
Job Reference: F A R U C - WINTER 2019 EMS WK # 1
C of C Numbers:
Legal Site Desc:

Justine Buma-a
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2226648-1 WWTP INFLUENT							
Sampled By: HUNGRY BAYTALUKE on 29-JAN-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	84	DLHC	75	mg/L		30-JAN-19	R4486569
Total Suspended Solids	148	DLHC	6.0	mg/L		30-JAN-19	R4480969
pH	7.60		0.10	pH		05-FEB-19	R4490368
L2226648-2 WWTP EFFLUENT							
Sampled By: HUNGRY BAYTALUKE on 29-JAN-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		06-FEB-19	R4492170
Biochemical Oxygen Demand	<2.0		2.0	mg/L		30-JAN-19	R4486569
Chemical Oxygen Demand	<10		10	mg/L		31-JAN-19	R4482015
Orthophosphate-Dissolved (as P)	0.207	DLHC	0.010	mg/L		30-JAN-19	R4479453
Coliform Bacteria - Fecal	<1		1	CFU/100mL		30-JAN-19	R4480588
Nitrate (as N)	38.5	DLHC	0.10	mg/L		30-JAN-19	R4479442
Nitrite (as N)	<0.050		0.050	mg/L		30-JAN-19	R4479442
Phosphorus (P)-Total	0.222		0.0050	mg/L		05-FEB-19	R4488988
Total Suspended Solids	<3.0		3.0	mg/L		30-JAN-19	R4480969
pH	7.54		0.10	pH		05-FEB-19	R4490368
L2226648-3 ELKRIVER UPSTREAM							
Sampled By: HUNGRY BAYTALUKE on 29-JAN-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		06-FEB-19	R4492170
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		30-JAN-19	R4479453
Coliform Bacteria - Fecal	<1		1	CFU/100mL		30-JAN-19	R4480588
Nitrate (as N)	1.95		0.020	mg/L		30-JAN-19	R4479442
Nitrite (as N)	<0.010		0.010	mg/L		30-JAN-19	R4479442
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		05-FEB-19	R4488988
Total Suspended Solids	3.0		3.0	mg/L		30-JAN-19	R4480969
pH	8.22		0.10	pH		05-FEB-19	R4490368
L2226648-4 ELKRIVER OUTFALL							
Sampled By: HUNGRY BAYTALUKE on 29-JAN-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		06-FEB-19	R4492170
Orthophosphate-Dissolved (as P)	0.0101	RRV	0.0050	mg/L		30-JAN-19	R4479453
Coliform Bacteria - Fecal	5		1	CFU/100mL		30-JAN-19	R4480588
Nitrate (as N)	0.096		0.020	mg/L		30-JAN-19	R4479442
Nitrite (as N)	<0.010		0.010	mg/L		30-JAN-19	R4479442
Phosphorus (P)-Total	0.0121		0.0050	mg/L		06-FEB-19	R4488988
Total Suspended Solids	<3.0		3.0	mg/L		30-JAN-19	R4480969
pH	8.35		0.10	pH		05-FEB-19	R4490368
L2226648-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 29-JAN-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		06-FEB-19	R4492170
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		30-JAN-19	R4479453

* 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
L2226648-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 29-JAN-19 @ 15:00							
Matrix: WATER							
Coliform Bacteria - Fecal	2		1	CFU/100mL		30-JAN-19	R4480588
Nitrate (as N)	1.92		0.020	mg/L		30-JAN-19	R4479442
Nitrite (as N)	<0.010		0.010	mg/L		30-JAN-19	R4479442
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		05-FEB-19	R4488988
Total Suspended Solids	67.0		3.0	mg/L		30-JAN-19	R4480969
pH	8.24		0.10	pH		05-FEB-19	R4490368

* 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).
RRV	Reported Result Verified By Repeat Analysis

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.

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colormetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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 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.

ALS Environmental
ANALYTICAL CHEMISTRY & TESTING SERVICES

www.alsenviro.com

Vancouver BC, 1988 Triumph Street, V5L 1K5, Tel: 604-253-4188 Toll Free: 1-800-665-0243 Fax: 604-253-6700
Fort St. John BC, Box 256, 9831 - 98A Avenue, V1J 6W7, Tel: 250-261-5517 Fax: 250-261-5587
Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5196 Toll Free: 1-800-668-9878 Fax: 780-513-2191
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-791-1524 Fax: 780-791-1586
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free: 1-800-668-9878 Fax: 780-437-2311
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free: 1-800-668-9878 Fax: 403-291-0298
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-800-667-7645 Fax: 306-668-8383

CHAIN OF CUSTODY FORM

SEND REPORT TO: PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669	FAX:	403 - 244 - 3774	SAMPLER:	Hungry Baytaluke
PROJECT NAME AND NO.:	F A R U C – Winter 2019 EMS wk # 1			QUOTE NO:	
PO NO.:		ALS CONTACT:	Nancy Sonompil@ALSGlobal.com		
REPORT FORMAT:	☒ HARD COPY ☒ EMAIL ☐ FAX ☐ EDD ( )		pmajer@skircr.com		

ANALYSIS REQUESTED:

L2226648-COFC

Ambient Air temp - 6 oc

WO#	SAMPLE IDENTIFICATION		DATE / TIME COLLECTED YYYY-MM-DD	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD				NOTES (sample specific comments, due dates, etc.)
FOR LAB USE ONLY	WWTP Influent Routine	1	2019 – 1– 29	14:00	Water		X	X											temp = 9.9 C
	WWTP Influent BOD	2	2019 – 1– 29	14:00	Water									X					temp = 9.1 C
	WWTP Effluent Routine	3	2019 – 1– 29	14:15	Water		X	X							X				temp = C
	WWTP Effluent BOD	4	2019 – 1– 29	14:15	Water									X					temp = 12.9 C
	WWTP Effluent Nutrient	5	2019 – 1– 29	14:15	Water				X	X	X	X	X						temp = 12.1 C
	WWTP Effluent Bacti	6	2019 – 1– 29	14:15	Water	X													temp = C
	Elkriver Upstream Routine	7	2019 – 1– 29	14:30	Water		X	X											temp = C
	Elkriver Upstream Nutrient	8	2019 – 1– 29	14:30	Water				X	X	X	X	X						temp = 10.6 C
	Elkriver Upstream Bacti	9	2019 – 1– 29	14:30	Water	X													temp = 10.6 C
	Elkriver Outfall Routine	10	2019 – 1– 29	14:45	Water		X	X											temp = C
	Elkriver Outfall Nutrient	11	2019 – 1– 29	14:45	Water				X	X	X	X	X						temp = 0.9 C
	Elkriver Outfall Bacti	12	2019 – 1– 29	14:45	Water	X													temp = 0.7 C
	Elkriver downstream Routine	13	2019 – 1– 29	15:00	Water		X	X											temp = C
	Elkriver downstream Nutrient	14	2019 – 1– 29	15:00	Water				X	X	X	X	X						temp = 0.4 C
	Elkriver downstream Bacti	15	2019 – 1– 29	15:00	Water	X													temp = 0.1 C

TURN AROUND REQUIRED: ◉ ROUTINE SPECIFY DATE: _____ (surcharge may apply)

SEND INVOICE TO: ☒ SAME AS REPORT TO ☐

INVOICE FORMAT: ☐ HARD COPY ☐ EMAIL ☐ FAX ☐ EDD

SPECIAL INSTRUCTIONS: PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com

RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
Hungry Baytaluke	TIME: 5:00 pm	DK	TIME:
RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
	TIME:		TIME:

FOR LAB USE ONLY

Cooler Seal Intact? ✓Yes ___No ___N/A | Sample Temperature: 4 °C Frozen? ___Yes ✓No | Cooling Method? ___Icepacks ___Ice ___None

2019/01/30 0940

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 06-FEB-19
Report Date: 14-FEB-19 16:31 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L2229499

Project P.O. #: NOT SUBMITTED
Job Reference: F A R U C - WINTER 2019 EMS WK # 2
C of C Numbers:
Legal Site Desc:

Justine Buma-a
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2229499-1 WWTP INFLUENT							
Sampled By: HB on 05-FEB-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	99	DLHC	75	mg/L		06-FEB-19	R4500727
Total Suspended Solids	168	DLHC	9.0	mg/L		10-FEB-19	R4499914
pH	7.77		0.10	pH		11-FEB-19	R4501849
L2229499-2 WWTP EFFLUENT							
Sampled By: HB on 05-FEB-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		12-FEB-19	R4503108
Biochemical Oxygen Demand	<2.0	BODQ	2.0	mg/L		06-FEB-19	R4500727
Chemical Oxygen Demand	<10		10	mg/L		08-FEB-19	R4497368
Orthophosphate-Dissolved (as P)	0.0670		0.0050	mg/L		06-FEB-19	R4494808
Coliform Bacteria - Fecal	<1		1	CFU/100mL		06-FEB-19	R4494429
Nitrate (as N)	29.1	DLHC	0.10	mg/L		06-FEB-19	R4494052
Nitrite (as N)	<0.050	DLHC	0.050	mg/L		06-FEB-19	R4494052
Phosphorus (P)-Total	0.0559		0.0050	mg/L		13-FEB-19	R4505451
Total Suspended Solids	<3.0		3.0	mg/L		10-FEB-19	R4499914
pH	7.64		0.10	pH		11-FEB-19	R4501849
L2229499-3 ELKRIVER UPSTREAM							
Sampled By: HB on 05-FEB-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		12-FEB-19	R4503108
Orthophosphate-Dissolved (as P)	0.0076		0.0050	mg/L		06-FEB-19	R4494808
Coliform Bacteria - Fecal	4		1	CFU/100mL		06-FEB-19	R4494429
Nitrate (as N)	0.876		0.020	mg/L		06-FEB-19	R4494052
Nitrite (as N)	<0.010		0.010	mg/L		06-FEB-19	R4494052
Phosphorus (P)-Total	0.0089		0.0050	mg/L		13-FEB-19	R4505451
Total Suspended Solids	4.7		3.0	mg/L		10-FEB-19	R4499914
pH	8.13		0.10	pH		11-FEB-19	R4501849
L2229499-4 ELKRIVER OUTFALL							
Sampled By: HB on 05-FEB-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		12-FEB-19	R4503108
Orthophosphate-Dissolved (as P)	0.0309		0.0050	mg/L		06-FEB-19	R4494808
Coliform Bacteria - Fecal	1		1	CFU/100mL		06-FEB-19	R4494429
Nitrate (as N)	4.19		0.020	mg/L		06-FEB-19	R4494052
Nitrite (as N)	<0.010		0.010	mg/L		06-FEB-19	R4494052
Phosphorus (P)-Total	0.0296		0.0050	mg/L		13-FEB-19	R4505451
Total Suspended Solids	<3.0		3.0	mg/L		10-FEB-19	R4499914
pH	7.98		0.10	pH		11-FEB-19	R4501849
L2229499-5 ELKRIVER DOWNSTREAM							
Sampled By: HB on 05-FEB-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		12-FEB-19	R4503108
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		06-FEB-19	R4494808

* 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
L2229499-5 ELKRIVER DOWNSTREAM							
Sampled By: HB on 05-FEB-19 @ 15:00							
Matrix: WATER							
Coliform Bacteria - Fecal	2		1	CFU/100mL		06-FEB-19	R4494429
Nitrate (as N)	1.73		0.020	mg/L		06-FEB-19	R4494052
Nitrite (as N)	<0.010		0.010	mg/L		06-FEB-19	R4494052
Phosphorus (P)-Total	0.0090		0.0050	mg/L		13-FEB-19	R4505451
Total Suspended Solids	3.3		3.0	mg/L		10-FEB-19	R4499914
pH	8.23		0.10	pH		11-FEB-19	R4501849

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
BODQ	BOD Qualification: Lab Control Sample outside standard 85-115% objective (see QC report). Sample(s) cannot be rerun due to hold time expiry.
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.

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colorimetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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 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.

L2229499-COFC

Vancouver BC, 1988 Triumph Street, V5L 1K5, Tel: 604-253-4188 Toll Free: 1-800-665-0243 Fax: 604-253-6700
Fort St. John BC, Box 256, 9831 - 98A Avenue, V1J 6W7, Tel: 250-261-5517 Fax: 250-261-5587
Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5196 Toll Free: 1-800-668-9878 Fax: 780-513-2191
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-791-1524 Fax: 780-791-1586
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free: 1-800-668-9878 Fax: 780-437-2311
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free: 1-800-668-9878 Fax: 403-291-0298
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-800-667-7645 Fax: 306-668-8383

CHAIN OF CUSTODY FORM

SEND REPORT TO:

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East
CITY:	CALGARY
PROV:	ALBERTA
POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669
FAX:	403 - 244 - 3774
SAMPLER:	Hungry Baytaluke
PROJECT NAME AND NO.:	F A R U C – Winter 2019 EMS wk # 2
QUOTE NO:	
PO NO.:	
ALS CONTACT:	Nancy Sonompil@ALSGlobal.com
REPORT FORMAT:	☒ ☒ ☐ ☐ ☒ ☐ pmajer@skircr.com

ANALYSIS REQUESTED:

Ambient Air -16 °C

WO#	SAMPLE IDENTIFICATION		DATE (YYYY-MM-DD)	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD	NOTES (sample specific comments, due dates, etc.)
1	WWTP Influent Routine	1	2019 – 2– 5	14:00	Water		X	X								temp = 8.0 C
	WWTP Influent BOD	2	2019 – 2– 5	14:00	Water									X		temp = C
2	WWTP Effluent Routine	3	2019 – 2– 5	14:15	Water		X	X							X	temp = C
	WWTP Effluent BOD	4	2019 – 2– 5	14:15	Water									X		temp = 10.9 C
	WWTP Effluent Nutrient	5	2019 – 2– 5	14:15	Water				X	X	X	X	X			temp = C
	WWTP Effluent Bacti	6	2019 – 2– 5	14:15	Water	X										temp = C
3	Elkriver Upstream Routine	7	2019 – 2– 5	14:30	Water		X	X								temp = C
	Elkriver Upstream Nutrient	8	2019 – 2– 5	14:30	Water				X	X	X	X	X			temp = 0.1 C
	Elkriver Upstream Bacti	9	2019 – 2– 5	14:30	Water	X										temp = C
4	Elkriver Outfall Routine	10	2019 – 2– 5	14:45	Water		X	X								temp = C
	Elkriver Outfall Nutrient	11	2019 – 2– 5	14:45	Water				X	X	X	X	X			temp = 0.9 C
	Elkriver Outfall Bacti	12	2019 – 2– 5	14:45	Water	X										temp = C
5	Elkriver downstream Routine	13	2019 – 2– 5	15:00	Water		X	X								temp = C
	Elkriver downstream Nutrient	14	2019 – 2– 5	15:00	Water				X	X	X	X	X			temp = 0.1 C
	Elkriver downstream Bacti	15	2019 – 2– 5	15:00	Water	X										temp = C

FOR LAB USE ONLY

TURN AROUND REQUIRED:	● SPECIFY DATE: (surcharge may apply)
SEND INVOICE TO:	☒ ☐
INVOICE FORMAT:	☐ ☐ ☐
SPECIAL INSTRUCTIONS:	PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com

RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
Hungry Baytaluke	2019– 2– 5 / TIME: 5:00 pm		2/6 / TIME: 10:00
RELINQUISHED BY:	DATE: / TIME:	RECEIVED BY:	DATE: / TIME:

FOR LAB USE ONLY

Cooler Seal Intact? __Yes __No __N/A

Sample Temperature 0 °C Frozen? __Yes __No

Cooling Method? __Icepacks __Ice __None

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 13-FEB-19
Report Date: 22-FEB-19 16:49 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L2232084

Project P.O. #: NOT SUBMITTED
Job Reference: F A R U C - WINTER 2019 EMS WK # 3
C of C Numbers:
Legal Site Desc:

Justine Buma-a
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2232084-1 WWTP INFLUENT							
Sampled By: HUNGRY BAYTALUKE on 12-FEB-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	180	DLHC	75	mg/L		14-FEB-19	R4516227
Total Suspended Solids	215	DLHC	11	mg/L		19-FEB-19	R4516150
pH	7.84		0.10	pH		20-FEB-19	R4516887
L2232084-2 WWTP EFFLUENT							
Sampled By: HUNGRY BAYTALUKE on 12-FEB-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	0.097		0.050	mg/L		20-FEB-19	R4519607
Biochemical Oxygen Demand	<2.0		2.0	mg/L		14-FEB-19	R4516227
Chemical Oxygen Demand	<10		10	mg/L		13-FEB-19	R4507110
Orthophosphate-Dissolved (as P)	0.114	RRV	0.0050	mg/L		14-FEB-19	R4510807
Coliform Bacteria - Fecal	<1		1	CFU/100mL		13-FEB-19	R4513151
Nitrate (as N)	33.6	DLHC	0.10	mg/L		13-FEB-19	R4507649
Nitrite (as N)	<0.050	DLHC	0.050	mg/L		13-FEB-19	R4507649
Phosphorus (P)-Total	0.0564	RRV	0.0050	mg/L		20-FEB-19	R4516714
Total Suspended Solids	<3.0		3.0	mg/L		19-FEB-19	R4516150
pH	8.04		0.10	pH		20-FEB-19	R4516887
L2232084-3 ELKRIVER UPSTREAM							
Sampled By: HUNGRY BAYTALUKE on 12-FEB-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		20-FEB-19	R4519607
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		14-FEB-19	R4510807
Coliform Bacteria - Fecal	1		1	CFU/100mL		13-FEB-19	R4513151
Nitrate (as N)	2.04		0.020	mg/L		13-FEB-19	R4507649
Nitrite (as N)	<0.010		0.010	mg/L		13-FEB-19	R4507649
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		20-FEB-19	R4516714
Total Suspended Solids	<3.0		3.0	mg/L		19-FEB-19	R4516150
pH	8.38		0.10	pH		20-FEB-19	R4516887
L2232084-4 ELKRIVER OUTFALL							
Sampled By: HUNGRY BAYTALUKE on 12-FEB-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		20-FEB-19	R4519607
Orthophosphate-Dissolved (as P)	0.0310	RRV	0.0050	mg/L		14-FEB-19	R4510807
Coliform Bacteria - Fecal	64		1	CFU/100mL		13-FEB-19	R4513151
Nitrate (as N)	5.39		0.020	mg/L		13-FEB-19	R4507649
Nitrite (as N)	<0.010		0.010	mg/L		13-FEB-19	R4507649
Phosphorus (P)-Total	0.0257	RRV	0.0050	mg/L		20-FEB-19	R4516714
Total Suspended Solids	<3.0		3.0	mg/L		19-FEB-19	R4516150
pH	8.34		0.10	pH		20-FEB-19	R4516887
L2232084-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 12-FEB-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	0.051		0.050	mg/L		20-FEB-19	R4519607
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		14-FEB-19	R4510807

* 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
L2232084-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 12-FEB-19 @ 15:00							
Matrix: WATER							
Coliform Bacteria - Fecal	2		1	CFU/100mL		13-FEB-19	R4513151
Nitrate (as N)	1.97		0.020	mg/L		13-FEB-19	R4507649
Nitrite (as N)	<0.010		0.010	mg/L		13-FEB-19	R4507649
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		20-FEB-19	R4516714
Total Suspended Solids	<3.0		3.0	mg/L		19-FEB-19	R4516150
pH	8.39		0.10	pH		20-FEB-19	R4516887

* 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).
RRV	Reported Result Verified By Repeat Analysis

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.

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colormetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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 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.

ALS Environmental
ANALYTICAL CHEMISTRY & TESTING SERVICES

www.alsenviro.com

Vancouver BC, 1988 Triumph Street, V5L 1K5, Tel: 604-253-4188 Toll Free: 1-800-665-0243 Fax: 604-253-6700
Fort St. John BC, Box 256, 9831 - 98A Avenue, V1J 6W7, Tel: 250-261-5517 Fax: 250-261-5587
Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5196 Toll Free: 1-800-668-9878 Fax: 780-513-2191
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-791-1524 Fax: 780-791-1586
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free: 1-800-668-9878 Fax: 780-437-2311
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free: 1-800-668-9878 Fax: 403-291-0298
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-800-667-7645 Fax: 306-668-8383

SEND REPORT TO:

CHAIN OF CUSTODY FORM

PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669	FAX:	403 - 244 - 3774	SAMPLER:	Hungry Baytaluke
PROJECT NAME AND NO.:	F A R U C – Winter 2019 EMS wk # 3			QUOTE NO:	
PO NO.:		ALS CONTACT:	Nancy Sonompil@ALSGlobal.com		
REPORT FORMAT:	☒ HARD COPY ☐ FAX ☒ EMAIL ☐ OTHER		pmajer@skircr.com		

ANALYSIS REQUESTED:

L2232084-COFC

Ambient Air Temp - 14°C

WO#	SAMPLE IDENTIFICATION		DATE / TIME COLLECTED YYYY-MM-DD	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD	NOTES (sample specific comments, due dates, etc.)
FOR LAB USE ONLY	WWTP Influent Routine	1	2019 – 2– 12	14:00	Water		X	X								temp = 8.6 C
	WWTP Influent BOD	2	2019 – 2– 12	14:00	Water									X		temp = 8.6 C
	WWTP Effluent Routine	3	2019 – 2– 12	14:15	Water		X	X							X	temp = C
	WWTP Effluent BOD	4	2019 – 2– 12	14:15	Water									X		temp = C
	WWTP Effluent Nutrient	5	2019 – 2– 12	14:15	Water				X	X	X	X	X			temp = 10.4 C
	WWTP Effluent Bacti	6	2019 – 2– 12	14:15	Water	X										temp = C
	Elkriver Upstream Routine	7	2019 – 2– 12	14:30	Water		X	X								temp = C
	Elkriver Upstream Nutrient	8	2019 – 2– 12	14:30	Water				X	X	X	X	X			temp = 0.7 C
	Elkriver Upstream Bacti	9	2019 – 2– 12	14:30	Water	X										temp = C
	Elkriver Outfall Routine	10	2019 – 2– 12	14:45	Water		X	X								temp = C
	Elkriver Outfall Nutrient	11	2019 – 2– 12	14:45	Water				X	X	X	X	X			temp = 0.9 C
	Elkriver Outfall Bacti	12	2019 – 2– 12	14:45	Water	X										temp = 0.1 C
	Elkriver downstream Routine	13	2019 – 2– 12	15:00	Water		X	X								temp = C
	Elkriver downstream Nutrient	14	2019 – 2– 12	15:00	Water				X	X	X	X	X			temp = 0.2 C
	Elkriver downstream Bacti	15	2019 – 2– 12	15:00	Water	X										temp = 0.2 C

TURN AROUND REQUIRED:	☐ RUSH	SPECIFY DATE: _____ (surcharge may apply)	RELINQUISHED BY:	DATE:	2019– 2– 12	RECEIVED BY:	DATE: 2/13
SEND INVOICE TO:	☒ SAME AS REPORT ☐ DIFFERENT		Hungry Baytaluke	TIME:	5:00 pm		TIME: 9:45
INVOICE FORMAT:	☐ HARD COPY ☐ FAX ☐ EMAIL		RELINQUISHED BY:	DATE:		RECEIVED BY:	DATE:
				TIME:			TIME:

SPECIAL INSTRUCTIONS: PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com

FOR LAB USE ONLY

Cooler Seal Intact?	Sample Temperature: 2 °C	Cooling Method?
___Yes ___No ___N/A	Frozen? ___Yes ___No	___Icepacks ___Ice ___None

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 20-FEB-19
Report Date: 28-FEB-19 11:21 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L2234579

Project P.O. #: NOT SUBMITTED
Job Reference: F A R U C - WINTER 2019 EMS WK # 4
C of C Numbers:
Legal Site Desc:

Justine Buma-a
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2234579-1 WWTP INFLUENT							
Sampled By: HUNGRY BAYTALUKE on 19-FEB-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	136	DLHC	75	mg/L		21-FEB-19	R4529028
Total Suspended Solids	235	DLHC	9.0	mg/L		22-FEB-19	R4527787
pH	7.58		0.10	pH		26-FEB-19	R4528608
L2234579-2 WWTP EFFLUENT							
Sampled By: HUNGRY BAYTALUKE on 19-FEB-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	0.057		0.050	mg/L		26-FEB-19	R4531371
Biochemical Oxygen Demand	2.1		2.0	mg/L		21-FEB-19	R4529028
Chemical Oxygen Demand	<10		10	mg/L		24-FEB-19	R4524027
Orthophosphate-Dissolved (as P)	0.314	DLHC	0.025	mg/L		20-FEB-19	R4517407
Coliform Bacteria - Fecal	94		1	CFU/100mL		20-FEB-19	R4519650
Nitrate (as N)	33.7	DLDS	0.10	mg/L		20-FEB-19	R4519149
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		20-FEB-19	R4519149
Phosphorus (P)-Total	0.410	DLHC	0.050	mg/L		25-FEB-19	R4528388
Total Suspended Solids	<3.0		3.0	mg/L		22-FEB-19	R4527787
pH	7.68		0.10	pH		26-FEB-19	R4528608
L2234579-3 ELKRIVER UPSTREAM							
Sampled By: HUNGRY BAYTALUKE on 19-FEB-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		26-FEB-19	R4531371
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		20-FEB-19	R4517407
Coliform Bacteria - Fecal	<1		1	CFU/100mL		20-FEB-19	R4519650
Nitrate (as N)	1.98		0.020	mg/L		20-FEB-19	R4519149
Nitrite (as N)	<0.010		0.010	mg/L		20-FEB-19	R4519149
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		25-FEB-19	R4528388
Total Suspended Solids	<3.0		3.0	mg/L		22-FEB-19	R4527787
pH	8.15		0.10	pH		26-FEB-19	R4528608
L2234579-4 ELKRIVER OUTFALL							
Sampled By: HUNGRY BAYTALUKE on 19-FEB-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		26-FEB-19	R4531371
Orthophosphate-Dissolved (as P)	0.173	DLHC	0.010	mg/L		20-FEB-19	R4517407
Coliform Bacteria - Fecal	49		1	CFU/100mL		20-FEB-19	R4519650
Nitrate (as N)	18.3		0.020	mg/L		20-FEB-19	R4519149
Nitrite (as N)	<0.010		0.010	mg/L		20-FEB-19	R4519149
Phosphorus (P)-Total	0.187	DLHC	0.025	mg/L		25-FEB-19	R4528388
Total Suspended Solids	<3.0		3.0	mg/L		22-FEB-19	R4527787
pH	7.95		0.10	pH		26-FEB-19	R4528608
L2234579-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 19-FEB-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		26-FEB-19	R4531371
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		20-FEB-19	R4517407

* 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
L2234579-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 19-FEB-19 @ 15:00							
Matrix: WATER							
Coliform Bacteria - Fecal	2		1	CFU/100mL		20-FEB-19	R4519650
Nitrate (as N)	1.96		0.020	mg/L		20-FEB-19	R4519149
Nitrite (as N)	<0.010		0.010	mg/L		20-FEB-19	R4519149
Phosphorus (P)-Total	0.0033		0.0020	mg/L		25-FEB-19	R4528388
Total Suspended Solids	<3.0		3.0	mg/L		22-FEB-19	R4527787
pH	8.17		0.10	pH		26-FEB-19	R4528608

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
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.

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colormetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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 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.

ALS Environmental
ANALYTICAL CHEMISTRY & TESTING SERVICES

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Vancouver BC, 1988 Triumph Street, V5L 1K5, Tel: 604-253-4188 Toll Free: 1-800-665-0243 Fax: 604-253-6700
Fort St. John BC, Box 256, 9831 - 98A Avenue, V1J 6W7, Tel: 250-261-5517 Fax: 250-261-5587
Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5196 Toll Free: 1-800-668-9878 Fax: 780-513-2191
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-791-1524 Fax: 780-791-1586
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free: 1-800-668-9878 Fax: 780-437-2311
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free: 1-800-668-9878 Fax: 403-291-0298
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-800-667-7645 Fax: 306-668-8383

CHAIN OF CUSTODY FORM

SEND REPORT TO: PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669	FAX:	403 - 244 - 3774	SAMPLER:	Hungry Baytaluke
PROJECT NAME AND NO.:	F A R U C – Winter 2019 EMS wk # 4			QUOTE NO:	
PO NO.:		ALS CONTACT:	Nancy Sonompil@ALSGlobal.com		
REPORT FORMAT:	☒ HARDMAIL ☐ FAX ☒ PDF ☐		pmajer@skircr.com		

L2234579-COFC

Ambient Air -16°C

WO#	SAMPLE IDENTIFICATION		DATE / TIME COLLECTED YYYY-MM-DD	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD	NOTES (sample specific comments, due dates, etc.)
FOR LAB USE ONLY	WWTP Influent Routine	1	2019 – 2– 19	14:00	Water		X	X								temp = 11.3 C
	WWTP Influent BOD	2	2019 – 2– 19	14:00	Water									X		temp = C
	WWTP Effluent Routine	3	2019 – 2– 19	14:15	Water		X	X							X	temp = C
	WWTP Effluent BOD	4	2019 – 2– 19	14:15	Water									X		temp = 13.2 C
	WWTP Effluent Nutrient	5	2019 – 2– 19	14:15	Water				X	X	X	X	X			temp = C
	WWTP Effluent Bacti	6	2019 – 2– 19	14:15	Water	X										temp = C
		7														
	Elkriver Upstream Routine		2019 – 2– 19	14:30	Water		X	X								temp = C
	Elkriver Upstream Nutrient	8	2019 – 2– 19	14:30	Water				X	X	X	X	X			temp = 0.2 C
	Elkriver Upstream Bacti	9	2019 – 2– 19	14:30	Water	X										temp = C
	Elkriver Outfall Routine	10	2019 – 2– 19	14:45	Water		X	X								temp = 3.4 C
	Elkriver Outfall Nutrient	11	2019 – 2– 19	14:45	Water				X	X	X	X	X			temp = 0.1 C
	Elkriver Outfall Bacti	12	2019 – 2– 19	14:45	Water	X										temp = C
	Elkriver downstream Routine	13	2019 – 2– 19	15:00	Water		X	X								temp = C
	Elkriver downstream Nutrient	14	2019 – 2– 19	15:00	Water				X	X	X	X	X			temp = 0.1 C
	Elkriver downstream Bacti	15	2019 – 2– 19	15:00	Water	X										temp = C

TURN AROUND REQUIRED: ● ROUTINE SPECIFY DATE: _____ (surcharge may apply)

SEND INVOICE TO: ☒ SAME AS ABOVE

INVOICE FORMAT: ☐ HARDCOPY ☐

SPECIAL INSTRUCTIONS: PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com

RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
Hungry Baytaluke	2019– 2– 19		2/20
	TIME: 5:00 pm		TIME: 9:30
RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
	TIME:		TIME:

FOR LAB USE ONLY

Cooler Seal Intact? ___Yes ___No ___N/A

Sample Temperature: 3 °C

Frozen? ___Yes ___No

Cooling Method? ___Icepacks ___Ice ___None

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 27-FEB-19
Report Date: 06-MAR-19 16:50 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L2237475

Project P.O. #: NOT SUBMITTED
Job Reference: F A R U C - WINTER 2019 EMS WK # 5
C of C Numbers:
Legal Site Desc:

Justine Buma-a
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2237475-1 WWTP INFLUENT							
Sampled By: HB on 26-FEB-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	190	DLHC	75	mg/L		27-FEB-19	R4542971
Total Suspended Solids	179	DLHC	9.0	mg/L		01-MAR-19	R4544110
pH	7.60		0.10	pH		01-MAR-19	R4537868
L2237475-2 WWTP EFFLUENT							
Sampled By: HB on 26-FEB-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		04-MAR-19	R4544030
Biochemical Oxygen Demand	<2.0		2.0	mg/L		27-FEB-19	R4542971
Chemical Oxygen Demand	13		10	mg/L		04-MAR-19	R4542320
Orthophosphate-Dissolved (as P)	0.238	DLHC	0.025	mg/L		27-FEB-19	R4531788
Coliform Bacteria - Fecal	1		1	CFU/100mL		27-FEB-19	R4534773
Nitrate (as N)	32.2	DLDS	0.10	mg/L		28-FEB-19	R4537809
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		28-FEB-19	R4537809
Phosphorus (P)-Total	0.285	DLHC	0.025	mg/L		04-MAR-19	R4540732
Total Suspended Solids	<3.0		3.0	mg/L		01-MAR-19	R4544110
pH	7.84		0.10	pH		01-MAR-19	R4537868
L2237475-3 ELKRIVER UPSTREAM							
Sampled By: HB on 26-FEB-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		04-MAR-19	R4544030
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		27-FEB-19	R4531788
Coliform Bacteria - Fecal	<1		1	CFU/100mL		27-FEB-19	R4534773
Nitrate (as N)	1.94		0.020	mg/L		28-FEB-19	R4537809
Nitrite (as N)	<0.010		0.010	mg/L		28-FEB-19	R4537809
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		04-MAR-19	R4540732
Total Suspended Solids	<3.0		3.0	mg/L		01-MAR-19	R4544110
pH	8.24		0.10	pH		01-MAR-19	R4537868
L2237475-4 ELKRIVER OUTFALL							
Sampled By: HB on 26-FEB-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		04-MAR-19	R4544030
Orthophosphate-Dissolved (as P)	0.199	DLHC	0.010	mg/L		27-FEB-19	R4531788
Coliform Bacteria - Fecal	14		1	CFU/100mL		27-FEB-19	R4534773
Nitrate (as N)	27.5	DLDS	0.10	mg/L		28-FEB-19	R4537809
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		28-FEB-19	R4537809
Phosphorus (P)-Total	0.214	DLHC	0.025	mg/L		04-MAR-19	R4540732
Total Suspended Solids	<3.0		3.0	mg/L		01-MAR-19	R4544110
pH	7.96		0.10	pH		01-MAR-19	R4537868
L2237475-5 ELKRIVER DOWNSTREAM							
Sampled By: HB on 26-FEB-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		04-MAR-19	R4544030
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		27-FEB-19	R4531788

* 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
L2237475-5 ELKRIVER DOWNSTREAM							
Sampled By: HB on 26-FEB-19 @ 15:00							
Matrix: WATER							
Coliform Bacteria - Fecal	<1		1	CFU/100mL		27-FEB-19	R4534773
Nitrate (as N)	2.00		0.020	mg/L		28-FEB-19	R4537809
Nitrite (as N)	<0.010		0.010	mg/L		28-FEB-19	R4537809
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		04-MAR-19	R4540732
Total Suspended Solids	<3.0		3.0	mg/L		01-MAR-19	R4544110
pH	8.25		0.10	pH		01-MAR-19	R4537868

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
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.

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colormetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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 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.

ALS Environmental
ANALYTICAL CHEMISTRY & TESTING SERVICES

www.alsenviro.com

Vancouver BC, 1988 Triumph Street, V5L 1K5, Tel: 604-253-4188 Toll Free: 1-800-665-0243 Fax: 604-253-6700
Fort St. John BC, Box 256, 9831 - 98A Avenue, V1J 6W7, Tel: 250-261-5517 Fax: 250-261-5587
Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5196 Toll Free: 1-800-668-9878 Fax: 780-513-2191
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-791-1524 Fax: 780-791-1586
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free: 1-800-668-9878 Fax: 780-437-2311
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free: 1-800-668-9878 Fax: 403-291-0298
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-800-667-7645 Fax: 306-668-8383

SEND REPORT TO:

CHAIN OF CUSTODY FORM

PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION		ATTN:	PATRICK MAJER	
ADDRESS:	1505 - 17TH Avenue South East				
CITY:	CALGARY	PROV: ALBERTA	POSTAL CODE:	T2T 0E2	
TEL:	1 - 800 - 258 - 7669	FAX: 403 - 244 - 3774	SAMPLER:	Hungry Baytaluke	
PROJECT NAME AND NO.:	F A R U C – Winter 2019 EMS wk #5 HU		QUOTE NO:		
PO NO.:		ALS CONTACT: Nancy Sonompil@ALSGlobal.com			
REPORT FORMAT:	☒ HARDMAIL ☐ FAX ☒ PDF ☐ ( )			pmajer@skircr.com	

ANALYSIS REQUESTED:

L2237475-COFC

	WO#	SAMPLE IDENTIFICATION		DATE / TIME COLLECTED YYYY-MM-DD	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD				NOTES (sample specific comments, due dates, etc.)
FOR LAB USE ONLY	1	WWTP Influent Routine	1	2019 – 2– 26	14:00	Water		X	X											temp = 9.3 C
		WWTP Influent BOD	2	2019 – 2– 26	14:00	Water									X					temp = 9.3 C
	2	WWTP Effluent Routine	3	2019 – 2– 26	14:15	Water		X	X							X				temp =
		WWTP Effluent BOD	4	2019 – 2– 26	14:15	Water									X					temp = 12.4 C
		WWTP Effluent Nutrient	5	2019 – 2– 26	14:15	Water				X	X	X	X	X						temp = 12.4 C
		WWTP Effluent Bacti	6	2019 – 2– 26	14:15	Water	X													temp = 12.4 C
	3	Elkriver Upstream Routine	7	2019 – 2– 26	14:30	Water		X	X											temp = 10.7 C
		Elkriver Upstream Nutrient	8	2019 – 2– 26	14:30	Water				X	X	X	X	X						temp = 10.7 C
		Elkriver Upstream Bacti	9	2019 – 2– 26	14:30	Water	X													temp = 10.7 C
	4	Elkriver Outfall Routine	10	2019 – 2– 26	14:45	Water		X	X											temp =
		Elkriver Outfall Nutrient	11	2019 – 2– 26	14:45	Water				X	X	X	X	X						temp = 5.9 C
		Elkriver Outfall Bacti	12	2019 – 2– 26	14:45	Water	X													temp = 5.9 C
	5	Elkriver downstream Routine	13	2019 – 2– 26	15:00	Water		X	X											temp =
		Elkriver downstream Nutrient	14	2019 – 2– 26	15:00	Water				X	X	X	X	X						temp = 10.5 C
		Elkriver downstream Bacti	15	2019 – 2– 26	15:00	Water	X													temp = 10.5 C

TURN AROUND REQUIRED: ● R(◊R SPECIFY DATE: _____ (surcharge may apply)

SEND INVOICE TO: ☒ SAMEDIFFERE

INVOICE FORMAT: ☐ HA ☐ P ☐

SPECIAL INSTRUCTIONS: PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com

RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
Hungry Baytaluke	TIME: 5:00 pm	dk	TIME: 2019/02/27 0903
RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
	TIME:		TIME:

FOR LAB USE ONLY

Cooler Seal Intact?	Sample Temperature 7 °C	Cooling Method?
___Yes ___No ___N/A	Frozen? ___Yes ✓No	___Icepacks ___Ice ___None

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 05-MAR-19
Report Date: 13-MAR-19 14:24 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L2239879

Project P.O. #: NOT SUBMITTED
Job Reference: F A R U C - WINTER 2019 EMS WK # 6
C of C Numbers:
Legal Site Desc:

Justine Buma-a
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2239879-1 WWTP INFLUENT							
Sampled By: HUNGRY BAYTALUKE on 04-MAR-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	129		75	mg/L		06-MAR-19	R4555989
Total Suspended Solids	182		10	mg/L		11-MAR-19	R4559627
pH	7.75		0.10	pH		08-MAR-19	R4552887
L2239879-2 WWTP EFFLUENT							
Sampled By: HUNGRY BAYTALUKE on 04-MAR-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		09-MAR-19	R4554209
Biochemical Oxygen Demand	<2.0		2.0	mg/L		06-MAR-19	R4555989
Chemical Oxygen Demand	<10		10	mg/L		05-MAR-19	R4545209
Orthophosphate-Dissolved (as P)	0.210	DLHC	0.025	mg/L		05-MAR-19	R4544147
Coliform Bacteria - Fecal	4		1	CFU/100mL		05-MAR-19	R4546968
Nitrate (as N)	42.9	DLHC	0.10	mg/L		07-MAR-19	R4552247
Nitrite (as N)	<0.050	DLHC	0.050	mg/L		07-MAR-19	R4552247
Phosphorus (P)-Total	0.260	DLHC	0.025	mg/L		06-MAR-19	R4545749
Total Suspended Solids	<3.0		3.0	mg/L		11-MAR-19	R4559627
pH	7.49		0.10	pH		08-MAR-19	R4552887
L2239879-3 ELKRIVER UPSTREAM							
Sampled By: HUNGRY BAYTALUKE on 04-MAR-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		09-MAR-19	R4554209
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		05-MAR-19	R4544147
Coliform Bacteria - Fecal	<1		1	CFU/100mL		05-MAR-19	R4546968
Nitrate (as N)	1.94		0.020	mg/L		07-MAR-19	R4552247
Nitrite (as N)	<0.010		0.010	mg/L		07-MAR-19	R4552247
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		06-MAR-19	R4545749
Total Suspended Solids	<3.0		3.0	mg/L		11-MAR-19	R4559627
pH	8.33		0.10	pH		08-MAR-19	R4552887
L2239879-4 ELKRIVER OUTFALL							
Sampled By: HUNGRY BAYTALUKE on 04-MAR-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		09-MAR-19	R4554209
Orthophosphate-Dissolved (as P)	0.0447	RRV	0.0050	mg/L		05-MAR-19	R4544147
Coliform Bacteria - Fecal	4		1	CFU/100mL		05-MAR-19	R4546968
Nitrate (as N)	9.88		0.020	mg/L		07-MAR-19	R4552247
Nitrite (as N)	<0.010		0.010	mg/L		07-MAR-19	R4552247
Phosphorus (P)-Total	0.0659		0.0050	mg/L		06-MAR-19	R4545749
Total Suspended Solids	12.0		3.0	mg/L		11-MAR-19	R4559627
pH	7.96		0.10	pH		08-MAR-19	R4552887
L2239879-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 04-MAR-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		09-MAR-19	R4554209
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		05-MAR-19	R4544147

* 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
L2239879-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 04-MAR-19 @ 15:00							
Matrix: WATER							
Coliform Bacteria - Fecal	<1		1	CFU/100mL		05-MAR-19	R4546968
Nitrate (as N)	2.00		0.020	mg/L		07-MAR-19	R4552247
Nitrite (as N)	<0.010		0.010	mg/L		07-MAR-19	R4552247
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		06-MAR-19	R4545749
Total Suspended Solids	<3.0		3.0	mg/L		11-MAR-19	R4559627
pH	8.16		0.10	pH		08-MAR-19	R4552887

* 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).
RRV	Reported Result Verified By Repeat Analysis

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.

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colormetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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 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.

ALS Environmental
ANALYTICAL CHEMISTRY & TESTING SERVICES

www.alsenviro.com

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Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5196 Toll Free: 1-800-668-9878 Fax: 780-513-2191
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-791-1524 Fax: 780-791-1586
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free: 1-800-668-9878 Fax: 780-437-2311
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free: 1-800-668-9878 Fax: 403-291-0298
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-800-667-7645 Fax: 306-668-8383

SEND REPORT TO:

CHAIN OF CUSTODY FORM

PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669	FAX:	403 - 244 - 3774	SAMPLER:	Hungry Baytaluke
PROJECT NAME AND NO.:	F A R U C – Winter 2019 EMS wk #6			QUOTE NO:	
PO NO.:		ALS CONTACT:	justine.bumaa@alsglobal.com		
REPORT FORMAT:	☒ HARD MAIL ☐ FAX ☒ PDF ☐ EXCEL		pmajer@skircr.com		

ANALYSIS REQUESTED:

L2239879-COFC

Ambient air -12°C

WO#	SAMPLE IDENTIFICATION		DATE / TIME COLLECTED YYYY-MM-DD	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD				NOTES (sample specific comments, due dates, etc.)
FOR LAB USE ONLY	WWTP Influent Routine	1	2019 – 3 – 4	14:00	Water		X	X											temp = 10.3 C
	WWTP Influent BOD	2	2019 – 3 – 4	14:00	Water									X					temp = C
	WWTP Effluent Routine	3	2019 – 3 – 4	14:15	Water		X	X							X				temp = C
	WWTP Effluent BOD	4	2019 – 3 – 4	14:15	Water									X					temp = 11.4 C
	WWTP Effluent Nutrient	5	2019 – 3 – 4	14:15	Water				X	X	X	X	X						temp = C
	WWTP Effluent Bacti	6	2019 – 3 – 4	14:15	Water	X													temp = C
	Elkriver Upstream Routine	7	2019 – 3 – 4	14:30	Water		X	X											temp = C
	Elkriver Upstream Nutrient	8	2019 – 3 – 4	14:30	Water				X	X	X	X	X						temp = 1.5 C
	Elkriver Upstream Bacti	9	2019 – 3 – 4	14:30	Water	X													temp = 1.8 C
	Elkriver Outfall Routine	10	2019 – 3 – 4	14:45	Water		X	X											temp = C
	Elkriver Outfall Nutrient	11	2019 – 3 – 4	14:45	Water				X	X	X	X	X						temp = 2.1 C
	Elkriver Outfall Bacti	12	2019 – 3 – 4	14:45	Water	X													temp = 2.1 C
	Elkriver downstream Routine	13	2019 – 3 – 4	15:00	Water		X	X											temp = C
	Elkriver downstream Nutrient	14	2019 – 3 – 4	15:00	Water				X	X	X	X	X						temp = 0.1 C
	Elkriver downstream Bacti	15	2019 – 3 – 4	15:00	Water	X													temp = 0.1 C

TURN AROUND REQUIRED:	• REGULAR	SPECIFY DATE: _____ (surcharge may apply)	RELINQUISHED BY:	DATE: 2019– 3 – 4	RECEIVED BY:	DATE: 3/5	
			Hungry Baytaluke	TIME: 5:00 pm		TIME: 9:00	
SEND INVOICE TO:	☒ SAME AS REPORT		RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:	
INVOICE FORMAT:	☐ HARD ☐ PDF ☐ EXCEL			TIME:		TIME:	

SPECIAL INSTRUCTIONS: PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com

FOR LAB USE ONLY

Cooler Seal Intact?	Sample Temperature: 6 °C	Cooling Method?
___Yes ___No ___N/A	Frozen? ___Yes ___No	___Icepacks ___Ice ___None

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 01-MAY-19
Report Date: 08-MAY-19 15:53 (MT)
Version: FINAL

Client Phone: 800-258-7669

Certificate of Analysis

Lab Work Order #: L2265545

Project P.O. #: NOT SUBMITTED
Job Reference: F A R U C - SPRING 2019 EMS WK #1
C of C Numbers:
Legal Site Desc:

Justine Buma-a
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2265545-1 WWTP INFLUENT							
Sampled By: HUNGRY BAYTALUKE on 30-APR-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	30.8	DLHC	6.0	mg/L		01-MAY-19	R4624929
Total Suspended Solids	48.7		3.0	mg/L		03-MAY-19	R4624107
pH	7.71		0.10	pH		05-MAY-19	R4625136
L2265545-2 WWTP EFFLUENT							
Sampled By: HUNGRY BAYTALUKE on 30-APR-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		07-MAY-19	R4628550
Biochemical Oxygen Demand	<2.0		2.0	mg/L		01-MAY-19	R4624929
Chemical Oxygen Demand	<10		10	mg/L		02-MAY-19	R4623466
Orthophosphate-Dissolved (as P)	0.205	DLHC	0.025	mg/L		01-MAY-19	R4621749
Coliform Bacteria - Fecal	1		1	CFU/100mL		01-MAY-19	R4621618
Nitrate (as N)	14.8		0.020	mg/L		01-MAY-19	R4620482
Nitrite (as N)	<0.010		0.010	mg/L		01-MAY-19	R4620482
Phosphorus (P)-Total	0.203	DLHC	0.010	mg/L		05-MAY-19	R4623068
Total Suspended Solids	<3.0		3.0	mg/L		03-MAY-19	R4624107
pH	8.04		0.10	pH		05-MAY-19	R4625136
L2265545-3 ELKRIVER UPSTREAM							
Sampled By: HUNGRY BAYTALUKE on 30-APR-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		07-MAY-19	R4628550
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		01-MAY-19	R4621749
Coliform Bacteria - Fecal	<1		1	CFU/100mL		01-MAY-19	R4621618
Nitrate (as N)	0.987		0.020	mg/L		01-MAY-19	R4620482
Nitrite (as N)	<0.010		0.010	mg/L		01-MAY-19	R4620482
Phosphorus (P)-Total	0.0112		0.0050	mg/L		05-MAY-19	R4623068
Total Suspended Solids	6.0		3.0	mg/L		03-MAY-19	R4624107
pH	8.27		0.10	pH		05-MAY-19	R4625136
L2265545-4 ELKRIVER OUTFALL							
Sampled By: HUNGRY BAYTALUKE on 30-APR-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		07-MAY-19	R4628550
Orthophosphate-Dissolved (as P)	0.0097		0.0050	mg/L		01-MAY-19	R4621749
Coliform Bacteria - Fecal	<1		1	CFU/100mL		01-MAY-19	R4621618
Nitrate (as N)	0.091		0.020	mg/L		01-MAY-19	R4620482
Nitrite (as N)	<0.010		0.010	mg/L		01-MAY-19	R4620482
Phosphorus (P)-Total	0.0135		0.0050	mg/L		05-MAY-19	R4623068
Total Suspended Solids	<3.0		3.0	mg/L		03-MAY-19	R4624107
pH	8.28		0.10	pH		05-MAY-19	R4625136
L2265545-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 30-APR-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		07-MAY-19	R4628550
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		01-MAY-19	R4621749

* 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
L2265545-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 30-APR-19 @ 15:00							
Matrix: WATER							
Coliform Bacteria - Fecal	1		1	CFU/100mL		01-MAY-19	R4621618
Nitrate (as N)	1.33		0.020	mg/L		01-MAY-19	R4620482
Nitrite (as N)	<0.010		0.010	mg/L		01-MAY-19	R4620482
Phosphorus (P)-Total	0.0066		0.0050	mg/L		05-MAY-19	R4623068
Total Suspended Solids	4.7		3.0	mg/L		03-MAY-19	R4624107
pH	8.28		0.10	pH		05-MAY-19	R4625136

* 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.

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colormetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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 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.

ALS Environmental
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CHAIN OF CUSTODY FORM

SEND REPORT TO: PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669	FAX:	403 - 244 - 3774	SAMPLER:	Hungry Baytaluke
PROJECT NAME AND NO.:	F A R U C – Spring 2019 EMS wk #1			QUOTE NO:	
PO NO.:		ALS CONTACT:	justine.bumaa@alsglobal.com		
REPORT FORMAT:	☒ HARDMAIL ☒ EMAIL ☐ FAX ☐ EXCEL ☒ PDF ☐ ( )		pmajer@skircr.com		

ANALYSIS REQUESTED:

WO#	SAMPLE IDENTIFICATION		DATE / TIME COLLECTED YYYY-MM-DD	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD	NOTES (sample specific comments, due dates, etc.)
	WWTP Influent Routine	1	2019 – 4 – 30	14:00	Water		X	X								temp = 7.5 C
	WWTP Influent BOD	2	2019 – 4 – 30	14:00	Water									X		temp = 7.5 C
	WWTP Effluent Routine	3	2019 – 4 – 30	14:15	Water		X	X							X	temp = 11.4 C
	WWTP Effluent BOD	4	2019 – 4 – 30	14:15	Water									X		temp = 11.4 C
	WWTP Effluent Nutrient	5	2019 – 4 – 30	14:15	Water				X	X	X	X	X			temp = 11.4 C
	WWTP Effluent Bacti	6	2019 – 4 – 30	14:15	Water	X										temp = C
	Elkriver Upstream Routine	7	2019 – 4 – 30	14:30	Water		X	X								temp = 5.7 C
	Elkriver Upstream Nutrient	8	2019 – 4 – 30	14:30	Water				X	X	X	X	X			temp = 5.7 C
	Elkriver Upstream Bacti	9	2019 – 4 – 30	14:30	Water	X										temp = C
	Elkriver Outfall Routine	10	2019 – 4 – 30	14:45	Water		X	X								temp = 6.2 C
	Elkriver Outfall Nutrient	11	2019 – 4 – 30	14:45	Water				X	X	X	X	X			temp = 6.2 C
	Elkriver Outfall Bacti	12	2019 – 4 – 30	14:45	Water	X										temp = 6.2 C
	Elkriver downstream Routine	13	2019 – 4 – 30	15:00	Water		X	X								temp = 5.4 C
	Elkriver downstream Nutrient	14	2019 – 4 – 30	15:00	Water				X	X	X	X	X			temp = 5.4 C
	Elkriver downstream Bacti	15	2019 – 4 – 30	15:00	Water	X										temp = 5.1 C

FOR LAB USE ONLY

Ambient air – 2°C

TURN AROUND REQUIRED:	◉ REGULAR	SPECIFY DATE: ____ (surcharge may apply)	RELINQUISHED BY: Hungry Baytaluke	DATE: 2019-4-30	RECEIVED BY:	DATE: 5/1	6°C
SEND INVOICE TO:	☒ SAME AS REPORT ☐ DIFFERENT			TIME: 5:00 pm		TIME: 0900	
INVOICE FORMAT:	☐ HARDMAIL ☐ EMAIL ☐ FAX		RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:	
SPECIAL INSTRUCTIONS:	PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com			TIME:		TIME:	

FOR LAB USE ONLY

Cooler Seal Intact?	Sample Temperature: 6 °C	Cooling Method?
✓Yes ___No ___N/A	Frozen? ___Yes ✓No	___Icepacks ___Ice ___None

G:/QUALITY/00_DOCUMENTS/10_AUTHORIZED/FORMS/Hungry's CoC for ALS full EMS.xls

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 09-MAY-19
Report Date: 16-MAY-19 16:57 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L2270303

Project P.O. #: NOT SUBMITTED
Job Reference: FARUC - SPRING 2019 EMS WK #2
C of C Numbers:
Legal Site Desc:

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2270303-2 WWTP INFLUENT							
Sampled By: HUNGRY BAYTALUKE on 08-MAY-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	65	DLHC	20	mg/L		10-MAY-19	R4635778
Total Suspended Solids	50.5	DLHC	5.0	mg/L		14-MAY-19	R4635669
pH	7.85		0.10	pH		14-MAY-19	R4635450
L2270303-6 WWTP EFFFLUENT							
Sampled By: HUNGRY BAYTALUKE on 08-MAY-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	0.083		0.050	mg/L		15-MAY-19	R4636109
Biochemical Oxygen Demand	<2.0		2.0	mg/L		10-MAY-19	R4635778
Chemical Oxygen Demand	<10		10	mg/L		13-MAY-19	R4634625
Orthophosphate-Dissolved (as P)	0.185	DLHC	0.050	mg/L		11-MAY-19	R4633307
Coliform Bacteria - Fecal	<1		1	CFU/100mL		09-MAY-19	R4630823
Nitrate (as N)	15.1		0.020	mg/L		11-MAY-19	R4632509
Nitrite (as N)	<0.010		0.010	mg/L		11-MAY-19	R4632509
Phosphorus (P)-Total	0.208	DLHC	0.025	mg/L		16-MAY-19	R4636502
Total Suspended Solids	<3.0		3.0	mg/L		14-MAY-19	R4635669
pH	8.09		0.10	pH		14-MAY-19	R4635450
L2270303-9 ELKRIVER UPSTREAM							
Sampled By: HUNGRY BAYTALUKE on 08-MAY-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		15-MAY-19	R4636109
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		11-MAY-19	R4633307
Coliform Bacteria - Fecal	2		1	CFU/100mL		09-MAY-19	R4630823
Nitrate (as N)	1.26		0.020	mg/L		11-MAY-19	R4632509
Nitrite (as N)	<0.010		0.010	mg/L		11-MAY-19	R4632509
Phosphorus (P)-Total	0.0086		0.0050	mg/L		16-MAY-19	R4636502
Total Suspended Solids	5.7		3.0	mg/L		14-MAY-19	R4635669
pH	8.40		0.10	pH		14-MAY-19	R4635450
L2270303-12 ELKRIVER OUTFALL							
Sampled By: HUNGRY BAYTALUKE on 08-MAY-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		15-MAY-19	R4636109
Orthophosphate-Dissolved (as P)	0.0112		0.0050	mg/L		11-MAY-19	R4633307
Coliform Bacteria - Fecal	1		1	CFU/100mL		09-MAY-19	R4630823
Nitrate (as N)	0.210		0.020	mg/L		11-MAY-19	R4632509
Nitrite (as N)	<0.010		0.010	mg/L		11-MAY-19	R4632509
Phosphorus (P)-Total	0.0197		0.0050	mg/L		16-MAY-19	R4636502
Total Suspended Solids	<3.0		3.0	mg/L		14-MAY-19	R4635669
pH	8.40		0.10	pH		14-MAY-19	R4635450
L2270303-15 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 08-MAY-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		15-MAY-19	R4636109
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		11-MAY-19	R4633307

* 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
L2270303-15 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 08-MAY-19 @ 15:00							
Matrix: WATER							
Coliform Bacteria - Fecal	1		1	CFU/100mL		09-MAY-19	R4630823
Nitrate (as N)	1.18		0.020	mg/L		11-MAY-19	R4632509
Nitrite (as N)	<0.010		0.010	mg/L		11-MAY-19	R4632509
Phosphorus (P)-Total	0.0098		0.0050	mg/L		16-MAY-19	R4636502
Total Suspended Solids	5.7		3.0	mg/L		14-MAY-19	R4635669
pH	8.39		0.10	pH		14-MAY-19	R4635450

* 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-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.

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colormetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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 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.

ALS Environmental
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Vancouver BC, 19 ... 13 Fax: 604-253-6700
Fort St. John BC, ... 5587
Grand Prairie AB, ... 78 Fax: 780-513-2191
Fort McMurray AB ... 586
Edmonton AB, 9 ... 3 Fax: 780-437-2311
Calgary AB, Bay ... 68-9878 Fax: 403-291-0298
Saskatoon SK, 819 ... 645 Fax: 306-668-8383

L2270303-COFC

CHAIN OF CUSTODY FORM

PAGE ___ OF ___

SEND REPORT TO:

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION	ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East		
CITY:	CALGARY PROV: ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669 FAX: 403 - 244 - 3774	SAMPLER:	Hungry Baytaluke
PROJECT NAME AND NO.:	F A R U C – Spring 2019 EMS wk #2	QUOTE NO:	
PO NO.:		ALS CONTACT:	justine.bumaa@alsglobal.com
REPORT FORMAT:	☒ H/ ☒ EMAI ☐ F ☐ F ☒ P ☐ (		pmajer@skircr.com

ANALYSIS REQUESTED:

Ambient air +5°C

WO#	SAMPLE IDENTIFICATION		DATE (YYYY-MM-DD)	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD	NOTES (sample specific comments, due dates, etc.)
	WWTP Influent Routine	1	2019 – 5 – 8	14:00	Water		X	X ✓								temp = 8.8 C
	WWTP Influent BOD	2	2019 – 5 – 8	14:00	Water									X		temp = C
	WWTP Effluent Routine	3	2019 – 5 – 8	14:15	Water		X	X ✓							X ✓	temp = C
	WWTP Effluent BOD	4	2019 – 5 – 8	14:15	Water									X		temp = 11.0 C
	WWTP Effluent Nutrient	5	2019 – 5 – 8	14:15	Water				X	X	X	X	X ✓			temp = C
	WWTP Effluent Bacti	6	2019 – 5 – 8	14:15	Water	X ✓										temp = C
	Elkriver Upstream Routine	7	2019 – 5 – 8	14:30	Water		X	X ✓								temp = C
	Elkriver Upstream Nutrient	8	2019 – 5 – 8	14:30	Water				X	X	X	X	X ✓			temp = 8.4 C
	Elkriver Upstream Bacti	9	2019 – 5 – 8	14:30	Water	X ✓										temp = C
	Elkriver Outfall Routine	10	2019 – 5 – 8	14:45	Water		X	X ✓								temp = C
	Elkriver Outfall Nutrient	11	2019 – 5 – 8	14:45	Water				X	X	X	X	X ✓			temp = 6.8 C
	Elkriver Outfall Bacti	12	2019 – 5 – 8	14:45	Water	X ✓										temp = C
	Elkriver downstream Routine	13	2019 – 5 – 8	15:00	Water		X	X								temp = C
	Elkriver downstream Nutrient	14	2019 – 5 – 8	15:00	Water				X	X	X	X	X ✓			temp = 8.2 C
	Elkriver downstream Bacti	15	2019 – 5 – 8	15:00	Water	X ✓										temp = C

FOR LAB USE ONLY

TURN AROUND REQUIRED: ◉ R(○ R SPECIFY DATE: ________ (surcharge may apply)

SEND INVOICE TO: ☒ SAI ☐ DIFFERE

INVOICE FORMAT: ☐ HA ☐ P ☐ F

SPECIAL INSTRUCTIONS: PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com

RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
Hungry Baytaluke	2019 – 5 – 8 / TIME: 5:00 pm	[signature]	5/9 / TIME: 920
RELINQUISHED BY:	DATE: / TIME:	RECEIVED BY:	DATE: / TIME:

FOR LAB USE ONLY
Cooler Seal Intact? ___Yes ___No ___N/A
Sample Temperature: 8 °C Frozen? ___Yes ___No
Cooling Method? ___Icepacks ___Ice ___None

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 16-MAY-19
Report Date: 24-MAY-19 15:53 (MT)
Version: FINAL

Client Phone: 800-258-7669

Certificate of Analysis

Lab Work Order #: L2274378

Project P.O. #: NOT SUBMITTED
Job Reference: FARUC- SPRING 2019 EMS WEEK #3
C of C Numbers:
Legal Site Desc:

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2274378-1 WWTP INFLUENT							
Sampled By: HUNGRY BAYTALUKE on 15-MAY-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	24.1	DLHC	6.0	mg/L		16-MAY-19	R4639881
Total Suspended Solids	38.7		3.0	mg/L		22-MAY-19	R4641239
pH	7.92		0.10	pH		21-MAY-19	R4640311
L2274378-2 WWTP EFFLUENT							
Sampled By: HUNGRY BAYTALUKE on 15-MAY-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		24-MAY-19	R4642761
Biochemical Oxygen Demand	<2.0		2.0	mg/L		16-MAY-19	R4639881
Chemical Oxygen Demand	<10		10	mg/L		23-MAY-19	R4641533
Orthophosphate-Dissolved (as P)	0.346	DLHC	0.050	mg/L		17-MAY-19	R4637491
Coliform Bacteria - Fecal	<1		1	CFU/100mL		16-MAY-19	R4637824
Nitrate (as N)	16.3		0.020	mg/L		16-MAY-19	R4641041
Nitrite (as N)	0.013		0.010	mg/L		16-MAY-19	R4641041
Phosphorus (P)-Total	0.343	DLHC	0.025	mg/L		23-MAY-19	R4641975
Total Suspended Solids	<3.0		3.0	mg/L		22-MAY-19	R4641239
pH	8.12		0.10	pH		21-MAY-19	R4640311
L2274378-3 ELKRIVER UPSTREAM							
Sampled By: HUNGRY BAYTALUKE on 15-MAY-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		24-MAY-19	R4642761
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		17-MAY-19	R4637491
Coliform Bacteria - Fecal	6		1	CFU/100mL		16-MAY-19	R4637824
Nitrate (as N)	0.974		0.020	mg/L		16-MAY-19	R4641041
Nitrite (as N)	<0.010		0.010	mg/L		16-MAY-19	R4641041
Phosphorus (P)-Total	0.0858		0.0050	mg/L		23-MAY-19	R4641975
Total Suspended Solids	68.0		3.0	mg/L		22-MAY-19	R4641239
pH	8.25		0.10	pH		21-MAY-19	R4640311
L2274378-4 ELKRIVER OUTFALL							
Sampled By: HUNGRY BAYTALUKE on 15-MAY-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		24-MAY-19	R4642761
Orthophosphate-Dissolved (as P)	0.0078		0.0050	mg/L		17-MAY-19	R4637491
Coliform Bacteria - Fecal	9		1	CFU/100mL		16-MAY-19	R4637824
Nitrate (as N)	0.686		0.020	mg/L		16-MAY-19	R4641041
Nitrite (as N)	<0.010		0.010	mg/L		16-MAY-19	R4641041
Phosphorus (P)-Total	0.0508		0.0050	mg/L		23-MAY-19	R4641975
Total Suspended Solids	32.7		3.0	mg/L		22-MAY-19	R4641239
pH	8.33		0.10	pH		21-MAY-19	R4640311
L2274378-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 15-MAY-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		24-MAY-19	R4642761
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		17-MAY-19	R4637491

* 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
L2274378-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 15-MAY-19 @ 15:00							
Matrix: WATER							
Coliform Bacteria - Fecal	<1		1	CFU/100mL		16-MAY-19	R4637824
Nitrate (as N)	0.916		0.020	mg/L		16-MAY-19	R4641041
Nitrite (as N)	<0.010		0.010	mg/L		16-MAY-19	R4641041
Phosphorus (P)-Total	0.0725		0.0050	mg/L		23-MAY-19	R4641975
Total Suspended Solids	52.7		3.0	mg/L		22-MAY-19	R4641239
pH	8.24		0.10	pH		21-MAY-19	R4640311

* 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.

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colormetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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 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.

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)-261-5587
8-9878 Fax: 780-513-2191
'91-1586
-9878 Fax: 780-437-2311
100-668-9878 Fax: 403-291-0298
67-7645 Fax: 306-668-8383

CHAIN OF CUSTODY FORM

SEND REPORT TO: PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669	FAX:	403 - 244 - 3774	SAMPLER:	Hungry Baytaluke
PROJECT NAME AND NO.:	F A R U C – Spring 2019 EMS wk #3			QUOTE NO:	
PO NO.:		ALS CONTACT:	justine.bumaa@alsglobal.com		
REPORT FORMAT:	☒ HARDMAIL ☐ EXCEL ☒ PDF ☐ ( )		pmajor@skircr.com		

ANALYSIS REQUESTED:

WO#	SAMPLE IDENTIFICATION		DATE / TIME COLLECTED YYYY-MM-DD	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD					NOTES (sample specific comments, due dates, etc.)
FOR LAB USE ONLY	WWTP Influent Routine	1	2019 – 5 – 15	14:00	Water		X	X												temp = 10.2 C
	WWTP Influent BOD	2	2019 – 5 – 15	14:00	Water									X						temp = C
	WWTP Effluent Routine	3	2019 – 5 – 15	14:15	Water		X	X							X					temp = C
	WWTP Effluent BOD	4	2019 – 5 – 15	14:15	Water									X						temp = 12.1 C
	WWTP Effluent Nutrient	5	2019 – 5 – 15	14:15	Water				X	X	X	X	X							temp = C
	WWTP Effluent Bacti	6	2019 – 5 – 15	14:15	Water	X														temp = C
	Elkriver Upstream Routine	7	2019 – 5 – 15	14:30	Water		X	X												temp = C
	Elkriver Upstream Nutrient	8	2019 – 5 – 15	14:30	Water				X	X	X	X	X							temp = 9.3 C
	Elkriver Upstream Bacti	9	2019 – 5 – 15	14:30	Water	X														temp = C
	Elkriver Outfall Routine	10	2019 – 5 – 15	14:45	Water		X	X												temp = C
	Elkriver Outfall Nutrient	11	2019 – 5 – 15	14:45	Water				X	X	X	X	X							temp = 10.2 C
	Elkriver Outfall Bacti	12	2019 – 5 – 15	14:45	Water	X														temp = C
	Elkriver downstream Routine	13	2019 – 5 – 15	15:00	Water		X	X												temp = C
	Elkriver downstream Nutrient	14	2019 – 5 – 15	15:00	Water				X	X	X	X	X							temp = 8.4 C
	Elkriver downstream Bacti	15	2019 – 5 – 15	15:00	Water	X														temp = C

Ambient air ~18°C Spring Freshet

TURN AROUND REQUIRED:	◉ ROUTINE	SPECIFY DATE: _____ (surcharge may apply)	RELINQUISHED BY: Hungry Baytaluke	DATE: 2019 – 5 – 15	TIME: 5:00 pm	RECEIVED BY: DLE	DATE: 5/16 TIME: 0900
SEND INVOICE TO:	☒ SAME ☐ DIFFERENT		RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE: TIME:
INVOICE FORMAT:	☐ AZURE ☐ ☐						
SPECIAL INSTRUCTIONS:	PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@sklfernie.com		FOR LAB USE ONLY				
			Cooler Seal Intact? ___Yes ___No ___N/A	Sample Temperature: ____°C Frozen? ___Yes ___No		Cooling Method? ___Icepacks ___Ice ___None	

10 °C

G:/QUALITY/00_DOCUMENTS/10_AUTHORIZED/FORMS/Hungry's CoC for ALS full EMS xls

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 24-MAY-19
Report Date: 03-JUN-19 17:33 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L2278811

Project P.O. #: NOT SUBMITTED
Job Reference: FARUC - SPRING 2019 EMS WK #4
C of C Numbers:
Legal Site Desc:

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2278811-1 WWTP INFLUENT							
Sampled By: KIRKLAND MATCHIM on 23-MAY-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	44	BODP	20	mg/L		24-MAY-19	R4649286
Total Suspended Solids	157	DLHC	5.0	mg/L		29-MAY-19	R4651008
pH	7.86		0.10	pH		30-MAY-19	R4653055
L2278811-2 WWTP EFFLUENT							
Sampled By: KIRKLAND MATCHIM on 23-MAY-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		02-JUN-19	R4653720
Biochemical Oxygen Demand	<2.0		2.0	mg/L		24-MAY-19	R4649286
Chemical Oxygen Demand	<10		10	mg/L		31-MAY-19	R4653157
Orthophosphate-Dissolved (as P)	0.164	DLHC	0.010	mg/L		25-MAY-19	R4644179
Coliform Bacteria - Fecal	<1		1	CFU/100mL		24-MAY-19	R4644273
Nitrate (as N)	30.3	HTD	0.10	mg/L		27-MAY-19	R4645578
Nitrite (as N)	<0.010		0.010	mg/L		25-MAY-19	R4645578
Phosphorus (P)-Total	0.270	DLHC	0.025	mg/L		30-MAY-19	R4651380
Total Suspended Solids	<3.0		3.0	mg/L		29-MAY-19	R4651008
pH	8.10		0.10	pH		30-MAY-19	R4653055
L2278811-3 ELKRIVER UPSTREAM							
Sampled By: KIRKLAND MATCHIM on 23-MAY-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		02-JUN-19	R4653720
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		25-MAY-19	R4644179
Coliform Bacteria - Fecal	<1		1	CFU/100mL		24-MAY-19	R4644273
Nitrate (as N)	1.13		0.020	mg/L		25-MAY-19	R4645578
Nitrite (as N)	<0.010		0.010	mg/L		25-MAY-19	R4645578
Phosphorus (P)-Total	0.0058		0.0050	mg/L		30-MAY-19	R4651380
Total Suspended Solids	3.7		3.0	mg/L		29-MAY-19	R4651008
pH	8.46		0.10	pH		30-MAY-19	R4653055
L2278811-4 ELKRIVER OUTFALL							
Sampled By: KIRKLAND MATCHIM on 23-MAY-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	0.092		0.050	mg/L		02-JUN-19	R4653720
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		25-MAY-19	R4644179
Coliform Bacteria - Fecal	<1		1	CFU/100mL		24-MAY-19	R4644273
Nitrate (as N)	0.835		0.020	mg/L		25-MAY-19	R4645578
Nitrite (as N)	<0.010		0.010	mg/L		25-MAY-19	R4645578
Phosphorus (P)-Total	0.0066		0.0050	mg/L		30-MAY-19	R4651380
Total Suspended Solids	3.7		3.0	mg/L		29-MAY-19	R4651008
pH	8.47		0.10	pH		30-MAY-19	R4653055
L2278811-5 ELKRIVER DOWNSTREAM							
Sampled By: KIRKLAND MATCHIM on 23-MAY-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	0.068		0.050	mg/L		02-JUN-19	R4653720
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		25-MAY-19	R4644179

* 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
L2278811-5 ELKRIVER DOWNSTREAM							
Sampled By: KIRKLAND MATCHIM on 23-MAY-19 @ 15:00							
Matrix: WATER							
Coliform Bacteria - Fecal	<1		1	CFU/100mL		24-MAY-19	R4644273
Nitrate (as N)	1.27		0.020	mg/L		25-MAY-19	R4645578
Nitrite (as N)	<0.010		0.010	mg/L		25-MAY-19	R4645578
Phosphorus (P)-Total	0.0082		0.0050	mg/L		30-MAY-19	R4651380
Total Suspended Solids	5.0		3.0	mg/L		29-MAY-19	R4651008
pH	8.47		0.10	pH		30-MAY-19	R4653055

* 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.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
HTD	Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.

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.

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colormetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

NH3-COL-ED	Water	Ammonia in Water by Colour	APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.

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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
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 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.

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Saskatoon SK, 819 - 58th Street East, S

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3

SEND REPORT TO:

CHAIN OF CUSTODY FORM

PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669	FAX:	403 - 244 - 3774	SAMPLER:	Kirkland Matchim
PROJECT NAME AND NO.:	F A R U C – Spring 2019 EMS wk #4			QUOTE NO:	
PO NO.:		ALS CONTACT:	justine.bumaa@alsglobal.com		
REPORT FORMAT:	☒ H/ ☒ E-MAI		pmajer@skircr.com		
	☐ E ☐ E ☒ P ☐ (				

ANALYSIS REQUESTED:

FOR LAB USE ONLY	WO#	SAMPLE IDENTIFICATION	DATE / TIME COLLECTED YYYY-MM-DD	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD					NOTES (sample specific comments, due dates, etc.)
	1	WWTP Influent Routine	2019 – 5 – 23	14:00	Water		X	X												temp = C
		WWTP Influent BOD	2019 – 5 – 23	14:00	Water									X						temp = C
		WWTP Effluent Routine	2019 – 5 – 23	14:15	Water		X	X							X					temp = C
	2	WWTP Effluent BOD	2019 – 5 – 23	14:15	Water									X						temp = C
		WWTP Effluent Nutrient	2019 – 5 – 23	14:15	Water				X	X	X	X	X							temp = C
		WWTP Effluent Bacti	2019 – 5 – 23	14:15	Water	X														temp = C
		Elkriver Upstream Routine	2019 – 5 – 23	14:30	Water		X	X												temp = C
	3	Elkriver Upstream Nutrient	2019 – 5 – 23	14:30	Water				X	X	X	X	X							temp = C
		Elkriver Upstream Bacti	2019 – 5 – 23	14:30	Water	X														temp = C
		Elkriver Outfall Routine	2019 – 5 – 23	14:45	Water		X	X												temp = C
	4	Elkriver Outfall Nutrient	2019 – 5 – 23	14:45	Water				X	X	X	X	X							temp = C
		Elkriver Outfall Bacti	2019 – 5 – 23	14:45	Water	X														temp = C
		Elkriver downstream Routine	2019 – 5 – 23	15:00	Water		X	X												temp = 10.7 C
	5	Elkriver downstream Nutrient	2019 – 5 – 23	15:00	Water				X	X	X	X	X							temp = 10.7 C
		Elkriver downstream Bacti	2019 – 5 – 23	15:00	Water	X														temp = 10.7 C

TURN AROUND REQUIRED:	◉ R(ϕ R	SPECIFY DATE:	(surcharge may apply)	RELINQUISHED BY:	DATE: 2019– 5 – 23	RECEIVED BY:	DATE: 5/24
				Kirkland Matchim	TIME: 5:00 pm		TIME: 9:00
SEND INVOICE TO:	☒ SAM ☐ DIFFERE			RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
INVOICE FORMAT:	☐ AZ ☐ ☐				TIME:		TIME:

SPECIAL INSTRUCTIONS: PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com

FOR LAB USE ONLY

Cooler Seal Intact?	Sample Temperature: 4 °C	Cooling Method?
___Yes ___No ___N/A	Frozen? ___Yes ___No	___Icepacks ___Ice ___None

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 30-MAY-19
Report Date: 06-JUN-19 14:15 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L2282086

Project P.O. #: NOT SUBMITTED
Job Reference: FARUC - SPRING 2019 EMS WK #5
C of C Numbers:
Legal Site Desc:

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2282086-1 WWTP INFLUENT							
Sampled By: HUNGRY PAYTALUKE on 29-MAY-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	69	DLHC	20	mg/L		30-MAY-19	R4659183
Total Suspended Solids	32.0	DLHC	9.0	mg/L		02-JUN-19	R4655327
pH	8.12		0.10	pH		06-JUN-19	R4660219
L2282086-2 WWTP EFFFLUENT							
Sampled By: HUNGRY PAYTALUKE on 29-MAY-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		02-JUN-19	R4653720
Biochemical Oxygen Demand	<2.0		2.0	mg/L		30-MAY-19	R4659183
Chemical Oxygen Demand	<10		10	mg/L		03-JUN-19	R4655257
Orthophosphate-Dissolved (as P)	0.192	DLHC	0.050	mg/L		31-MAY-19	R4653118
Coliform Bacteria - Fecal	<1		1	CFU/100mL		30-MAY-19	R4653117
Nitrate (as N)	29.3	DLHC	0.10	mg/L		31-MAY-19	R4653397
Nitrite (as N)	<0.050	DLHC	0.050	mg/L		31-MAY-19	R4653397
Phosphorus (P)-Total	0.306	DLHC	0.025	mg/L		05-JUN-19	R4659516
Total Suspended Solids	3.3		3.0	mg/L		02-JUN-19	R4655327
pH	8.14		0.10	pH		06-JUN-19	R4660219
L2282086-3 ELKRIVER UPSTREAM							
Sampled By: HUNGRY PAYTALUKE on 29-MAY-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		02-JUN-19	R4653720
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		31-MAY-19	R4653118
Coliform Bacteria - Fecal	14		1	CFU/100mL		30-MAY-19	R4653117
Nitrate (as N)	0.939		0.020	mg/L		31-MAY-19	R4653397
Nitrite (as N)	<0.010		0.010	mg/L		31-MAY-19	R4653397
Phosphorus (P)-Total	0.0172		0.0050	mg/L		05-JUN-19	R4659516
Total Suspended Solids	11.3		3.0	mg/L		02-JUN-19	R4655327
pH	8.47		0.10	pH		06-JUN-19	R4660219
L2282086-4 ELKRIVER OUTFALL							
Sampled By: HUNGRY PAYTALUKE on 29-MAY-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		02-JUN-19	R4653720
Orthophosphate-Dissolved (as P)	0.0091		0.0050	mg/L		31-MAY-19	R4653118
Coliform Bacteria - Fecal	19		1	CFU/100mL		30-MAY-19	R4653117
Nitrate (as N)	0.343		0.020	mg/L		31-MAY-19	R4653397
Nitrite (as N)	<0.010		0.010	mg/L		31-MAY-19	R4653397
Phosphorus (P)-Total	0.0138		0.0050	mg/L		05-JUN-19	R4659516
Total Suspended Solids	<3.0		3.0	mg/L		02-JUN-19	R4655327
pH	8.57		0.10	pH		06-JUN-19	R4660219
L2282086-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY PAYTALUKE on 29-MAY-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		02-JUN-19	R4653720
Orthophosphate-Dissolved (as P)	0.0071		0.0050	mg/L		31-MAY-19	R4653118

* 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
L2282086-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY PAYTALUKE on 29-MAY-19 @ 15:00							
Matrix: WATER							
Coliform Bacteria - Fecal	15		1	CFU/100mL		30-MAY-19	R4653117
Nitrate (as N)	0.949		0.020	mg/L		31-MAY-19	R4653397
Nitrite (as N)	<0.010		0.010	mg/L		31-MAY-19	R4653397
Phosphorus (P)-Total	0.0186		0.0050	mg/L		05-JUN-19	R4659516
Total Suspended Solids	12.0		3.0	mg/L		02-JUN-19	R4655327
pH	8.47		0.10	pH		06-JUN-19	R4660219

* 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.

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colormetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

NH3-COL-ED	Water	Ammonia in Water by Colour	APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.

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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
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 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.

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0-261-5587
58-9878 Fax: 780-513-2191
-791-1586
8-9878 Fax: 780-437-2311
-800-668-9878 Fax: 403-291-0298
667-7645 Fax: 306-668-8383

L2282086

CHAIN OF CUSTODY FORM

PAGE OF

SEND REPORT TO:

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669	FAX:	403 - 244 - 3774	SAMPLER:	Hungry Baytaluke
PROJECT NAME AND NO.:	F A R U C – Spring 2019 EMS wk #5			QUOTE NO:	
PO NO.:		ALS CONTACT:	justine.bumaa@alsglobal.com		
REPORT FORMAT:	☒ HARDMAIL ☐ FAX ☒ PDF ☐ EXCEL		pmajer@skircr.com		

ANALYSIS REQUESTED:

WO#	SAMPLE IDENTIFICATION	DATE / TIME COLLECTED YYYY-MM-DD	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD					NOTES (sample specific comments, due dates, etc.)
1	WWTP Influent Routine	2019 – 5 – 29	14:00	Water		X	X												temp = 12.8 C
2	WWTP Influent BOD	2019 – 5 – 29	14:00	Water									X						temp = C
3	WWTP Effluent Routine	2019 – 5 – 29	14:15	Water		X	X							X					temp = C
4	WWTP Effluent BOD	2019 – 5 – 29	14:15	Water									X						temp = 15.4 C
5	WWTP Effluent Nutrient	2019 – 5 – 29	14:15	Water				X	X	X	X	X							temp = C
6	WWTP Effluent Bacti	2019 – 5 – 29	14:15	Water	X														temp = C
7	Elkriver Upstream Routine	2019 – 5 – 29	14:30	Water		X	X												temp = C
8	Elkriver Upstream Nutrient	2019 – 5 – 29	14:30	Water				X	X	X	X	X							temp = 10 C
9	Elkriver Upstream Bacti	2019 – 5 – 29	14:30	Water	X														temp = C
10	Elkriver Outfall Routine	2019 – 5 – 29	14:45	Water		X	X												temp = C
11	Elkriver Outfall Nutrient	2019 – 5 – 29	14:45	Water				X	X	X	X	X							temp = 10.9 C
12	Elkriver Outfall Bacti	2019 – 5 – 29	14:45	Water	X														temp = C
13	Elkriver downstream Routine	2019 – 5 – 29	15:00	Water		X	X												temp = C
14	Elkriver downstream Nutrient	2019 – 5 – 29	15:00	Water				X	X	X	X	X							temp = 10.4 C
15	Elkriver downstream Bacti	2019 – 5 – 29	15:00	Water	X														temp = C

Ambient air + 18°C

FOR LAB USE ONLY

TURN AROUND REQUIRED:	◉ ROUTINE	SPECIFY DATE:	(surcharge may apply)	RELINQUISHED BY: Kirkland Matchim	DATE: 2019– 5 – 29	RECEIVED BY:	DATE: 5/30
SEND INVOICE TO:	☒ SAME AS REPORT				TIME: 5:00 pm		TIME: 9:15
INVOICE FORMAT:	☐ HARDMAIL ☐ FAX ☐ PDF			RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
SPECIAL INSTRUCTIONS:	PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com				TIME:		TIME:

FOR LAB USE ONLY

Cooler Seal Intact?	Sample Temperature: 10 °C	Cooling Method?
___Yes ___No ___N/A	Frozen? ___Yes ___No	___Icepacks ___Ice ___None

G:/QUALITY/00_DOCUMENTS/10_AUTHORIZED/FORMS/Hungry's CoC for ALS full EMS.xls

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 06-JUN-19
Report Date: 14-JUN-19 16:46 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L2286720

Project P.O. #: NOT SUBMITTED
Job Reference: FARUC - SPRING 2019 EMS WK #6
C of C Numbers:
Legal Site Desc:

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2286720-1 WWTP INFLUENT							
Sampled By: HB on 05-JUN-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	149	BODP	75	mg/L		06-JUN-19	R4663975
Total Suspended Solids	150	DLHC	9.0	mg/L		11-JUN-19	R4665076
pH	7.94		0.10	pH		12-JUN-19	R4669583
L2286720-2 WWTP EFFFLUENT							
Sampled By: HB on 05-JUN-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		12-JUN-19	R4668727
Biochemical Oxygen Demand	<2.0		2.0	mg/L		06-JUN-19	R4663975
Chemical Oxygen Demand	<10		10	mg/L		11-JUN-19	R4664233
Orthophosphate-Dissolved (as P)	0.159		0.0050	mg/L		07-JUN-19	R4661287
Coliform Bacteria - Fecal	<1		1	CFU/100mL		06-JUN-19	R4661804
Nitrate (as N)	32.8	DLHC	0.10	mg/L		07-JUN-19	R4663920
Nitrite (as N)	<0.050	DLHC	0.050	mg/L		07-JUN-19	R4663920
Phosphorus (P)-Total	0.197	DLHC	0.010	mg/L		11-JUN-19	R4663807
Total Suspended Solids	<3.0		3.0	mg/L		11-JUN-19	R4665076
pH	8.08		0.10	pH		12-JUN-19	R4669583
L2286720-3 ELKRIVER UPSTREAM							
Sampled By: HB on 05-JUN-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		12-JUN-19	R4668727
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		07-JUN-19	R4661287
Coliform Bacteria - Fecal	12		1	CFU/100mL		06-JUN-19	R4661804
Nitrate (as N)	0.917		0.020	mg/L		07-JUN-19	R4663920
Nitrite (as N)	<0.010		0.010	mg/L		07-JUN-19	R4663920
Phosphorus (P)-Total	0.0727		0.0050	mg/L		11-JUN-19	R4663807
Total Suspended Solids	54.7		3.0	mg/L		11-JUN-19	R4665076
pH	8.35		0.10	pH		12-JUN-19	R4669583
L2286720-4 ELKRIVER OUTFALL							
Sampled By: HB on 05-JUN-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		12-JUN-19	R4668727
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		07-JUN-19	R4661287
Coliform Bacteria - Fecal	19		1	CFU/100mL		06-JUN-19	R4661804
Nitrate (as N)	0.808		0.020	mg/L		07-JUN-19	R4663920
Nitrite (as N)	<0.010		0.010	mg/L		07-JUN-19	R4663920
Phosphorus (P)-Total	0.0636		0.0050	mg/L		11-JUN-19	R4663807
Total Suspended Solids	49.3		3.0	mg/L		11-JUN-19	R4665076
pH	8.34		0.10	pH		12-JUN-19	R4669583
L2286720-5 ELKRIVER DOWNSTREAM							
Sampled By: HB on 05-JUN-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		12-JUN-19	R4668727
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		07-JUN-19	R4661287

* 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
L2286720-5 ELKRIVER DOWNSTREAM							
Sampled By: HB on 05-JUN-19 @ 15:00							
Matrix: WATER							
Coliform Bacteria - Fecal	14		1	CFU/100mL		06-JUN-19	R4661804
Nitrate (as N)	0.924		0.020	mg/L		07-JUN-19	R4663920
Nitrite (as N)	<0.010		0.010	mg/L		07-JUN-19	R4663920
Phosphorus (P)-Total	0.0635		0.0050	mg/L		11-JUN-19	R4663807
Total Suspended Solids	52.7		3.0	mg/L		11-JUN-19	R4665076
pH	8.35		0.10	pH		12-JUN-19	R4669583

* 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.
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.

BOD-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.

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colormetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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.

ALS Environmental
ANALYTICAL CHEMISTRY & TESTING SERVICES

www.alsenviro.com

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Fort St. John BC, Box 256, 9831 - 98A Avenue, V1J 6W7, Tel: 250-261-5517 Fax: 250-261-5587
Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5196 Toll Free: 1-800-668-9878 Fax: 780-513-2191
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-791-1524 Fax: 780-791-1586
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free: 1-800-668-9878 Fax: 780-437-2311
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free: 1-300-668-9878 Fax: 403-291-0298
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-800-667-7645 Fax: 306-668-8383

CHAIN OF CUSTODY FORM

PAGE OF

SEND REPORT TO:

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669	FAX:	403 - 244 - 3774	SAMPLER:	Hungry Baytaluke
PROJECT NAME AND NO.:	F A R U C – Spring 2019 EMS wk #6			QUOTE NO:	
PO NO.:		ALS CONTACT:	patryk.wojciak@alsglobal.com		
REPORT FORMAT:	☒ HARDCOPY ☒ EMAIL ☐ FAX ☒ PDF ☐ EXCEL		pmajer@skircr.com		

ANALYSIS REQUESTED:

L2286720-COFC

Ambient env - 14°C

FOR LAB USE ONLY	WO#	SAMPLE IDENTIFICATION		DATE / TIME COLLECTED YYYY-MM-DD	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD	NOTES (sample specific comments, due dates, etc.)
		WWTP Influent Routine	1	2019 – 6 – 5	14:00	Water		X	X								temp = 12.7 C
	1	WWTP Influent BOD	2	2019 – 6 – 5	14:00	Water									X		temp = 12.7 C
		WWTP Effluent Routine	3	2019 – 6 – 5	14:15	Water		X	X							X	temp = C
	2	WWTP Effluent BOD	4	2019 – 6 – 5	14:15	Water									X		temp = 14.8 C
		WWTP Effluent Nutrient	5	2019 – 6 – 5	14:15	Water				X	X	X	X	X			temp = 14.8 C
		WWTP Effluent Bacti	6	2019 – 6 – 5	14:15	Water	X										temp = C
		Elkriver Upstream Routine	7	2019 – 6 – 5	14:30	Water		X	X								temp = C
	3	Elkriver Upstream Nutrient	8	2019 – 6 – 5	14:30	Water				X	X	X	X	X			temp = 9.1 C
		Elkriver Upstream Bacti	9	2019 – 6 – 5	14:30	Water	X										temp = 9.1 C
		Elkriver Outfall Routine	10	2019 – 6 – 5	14:45	Water		X	X								temp = C
	4	Elkriver Outfall Nutrient	11	2019 – 6 – 5	14:45	Water				X	X	X	X	X			temp = 9.5 C
		Elkriver Outfall Bacti	12	2019 – 6 – 5	14:45	Water	X										temp = 9.5 C
		Elkriver downstream Routine	13	2019 – 6 – 5	15:00	Water		X	X								temp = C
	5	Elkriver downstream Nutrient	14	2019 – 6 – 5	15:00	Water				X	X	X	X	X			temp = 9.1 C
		Elkriver downstream Bacti	15	2019 – 6 – 5	15:00	Water	X										temp = 9.1 C

TURN AROUND REQUIRED: ◉ ROUTINE SPECIFY DATE: _____ (surcharge may apply)

SEND INVOICE TO: ☒ SAME AS REPORT ☐

INVOICE FORMAT: ☐ HARDCOPY ☐ EXCEL ☐ PDF ☐

SPECIAL INSTRUCTIONS: PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com

RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
Kirkland Matchim	2019 – 6 – 5		6/6
	TIME: 5:00 pm		TIME: 8:50
RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
	TIME:		TIME:

FOR LAB USE ONLY

Cooler Seal Intact? ___Yes ___No ___N/A

Sample Temperature: 9 °C

Frozen? ___Yes ___No

Cooling Method? ___Icepacks ___Ice ___None

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 25-JUL-19
Report Date: 01-AUG-19 16:13 (MT)
Version: FINAL

Client Phone: 403-256-8473

Certificate of Analysis

Lab Work Order #: L2316700

Project P.O. #: NOT SUBMITTED
Job Reference: FERNIE ALPINE RESORT - MONTHLY EMS
C of C Numbers:
Legal Site Desc:

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2316700-1 WWTP INFLUENT							
Sampled By: HUNGRY BAYTALUKE on 24-JUL-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	78	DLHC	20	mg/L		25-JUL-19	R4730763
Total Suspended Solids	124	DLHC	8.0	mg/L		30-JUL-19	R4733577
pH	7.88		0.10	pH		29-JUL-19	R4730812
L2316700-2 WWTP EFFLUENT							
Sampled By: HUNGRY BAYTALUKE on 24-JUL-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		30-JUL-19	R4735192
Biochemical Oxygen Demand	<2.0		2.0	mg/L		25-JUL-19	R4730763
Orthophosphate-Dissolved (as P)	0.121		0.0050	mg/L		25-JUL-19	R4727612
Coliform Bacteria - Fecal	3		1	CFU/100mL		25-JUL-19	R4727967
Nitrate (as N)	22.0	DLHC	0.10	mg/L		25-JUL-19	R4727611
Nitrite (as N)	<0.050	DLHC	0.050	mg/L		25-JUL-19	R4727611
Phosphorus (P)-Total	0.216	DLHC	0.025	mg/L		26-JUL-19	R4727909
Total Suspended Solids	<3.0		3.0	mg/L		30-JUL-19	R4733577
pH	8.01		0.10	pH		29-JUL-19	R4730812

* 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-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.

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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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 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.

ALS Environmental
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Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5196 Toll Free: 1-800-668-9878 Fax: 780-513-2191
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-791-1524 Fax: 780-791-1566
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free: 1-800-668-9878 Fax: 780-437-2311
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free: 1-800-668-9878 Fax: 403-291-0298
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-800-667-7645 Fax: 306-668-8383

CHAIN OF CUSTODY FORM

PAGE OF

SEND REPORT TO:

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	2559 - 29TH Street North East				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	403 - 256 - 8473	FAX:	403 - 244 - 3774	SAMPLER:	Hungry Baytaluke
PROJECT NAME AND NO.:	Fernie Alpine Resort - Monthly EMS			QUOTE NO:	
PO NO.:		ALS CONTACT:	patryk.wojciak@alsglobal.com		
REPORT FORMAT:	☒ HARDMAIL ☒ EMAIL ☐ EXCEL ☒ PDF ☐ ( )		pmajer@skircr.com		

ANALYSIS REQUESTED:

WO#	SAMPLE IDENTIFICATION		DATE / TIME COLLECTED YYYY-MM-DD	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD	NOTES (sample specific comments, due dates, etc.)
1C	WWTP Influent Routine 500 ml	1	2019 - 7 - 24	14:00	Water		X	X								> 16.8 °C
	WWTP Influent BOD 1 litre	2	2019 - 7 - 24	14:00	Water									X		
2C	WWTP Effluent Routine 500 ml	3	2019 - 7 - 24	15:00	Water		X	X								> 17.1 °C 17.0
	WWTP Effluent BOD 500 ml	4	2019 - 7 - 24	15:15	Water									X		
	WWTP Effluent Nutrients 250 ml + H2SO4	5	2019 - 7 - 24	15:30	Water				X	X	X	X	X			
	WWTP Effluent Bacteriological 250 ml	6	2019 - 7 - 24	15:45	Water	X										

Ambient Air - 13°C

FOR LAB USE ONLY

L2316700-COFC

TURN AROUND REQUIRED:	◉ REGULAR	SPECIFY DATE: _____ (surcharge may apply)	RELINQUISHED BY:	DATE:	2019 - 7 - 24	RECEIVED BY:	DATE: 7/25
SEND INVOICE TO:	☐ SAME AS REPORT		HUNGRY BAYTALUKE	TIME:	5:00 pm		TIME: 9:00
INVOICE FORMAT:	☐ EXCEL ☐ PDF		RELINQUISHED BY:	DATE:		RECEIVED BY:	DATE:
				TIME:			TIME:

SPECIAL INSTRUCTIONS: PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com

FOR LAB USE ONLY

Cooler Seal Intact?	Sample Temperature: 7 °C	Cooling Method?
___Yes ___No ___N/A	Frozen? ___Yes ___No	___Icepacks ___Ice ___None

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 29-AUG-19
Report Date: 04-SEP-19 18:04 (MT)
Version: FINAL

Client Phone: 403-258-7669

Certificate of Analysis

Lab Work Order #: L2338350

Project P.O. #: NOT SUBMITTED
Job Reference: FARUC - FALL 2019 EMS WK #1
C of C Numbers:
Legal Site Desc:

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2338350-2 WWTP EFFFLUENT							
Sampled By: KIRKLAND MATCHIM on 28-AUG-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		30-AUG-19	R4782035
Biochemical Oxygen Demand	<2.0		2.0	mg/L		29-AUG-19	R4781887
Chemical Oxygen Demand	<10		10	mg/L		30-AUG-19	R4778970
Orthophosphate-Dissolved (as P)	0.0988		0.0050	mg/L		29-AUG-19	R4778146
Coliform Bacteria - Fecal	1		1	CFU/100mL		29-AUG-19	R4778874
Nitrate (as N)	35.1	DLDS	0.10	mg/L		30-AUG-19	R4781987
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		30-AUG-19	R4781987
Phosphorus (P)-Total	0.0905		0.0050	mg/L		03-SEP-19	R4782095
Total Suspended Solids	<3.0		3.0	mg/L		03-SEP-19	R4782887
pH	7.77		0.10	pH		30-AUG-19	R4779469
L2338350-3 ELKRIVER UPSTREAM							
Sampled By: KIRKLAND MATCHIM on 28-AUG-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		30-AUG-19	R4782035
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		29-AUG-19	R4778146
Coliform Bacteria - Fecal	1		1	CFU/100mL		29-AUG-19	R4778874
Nitrate (as N)	1.59		0.020	mg/L		30-AUG-19	R4781987
Nitrite (as N)	<0.010		0.010	mg/L		30-AUG-19	R4781987
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		03-SEP-19	R4782095
Total Suspended Solids	<3.0		3.0	mg/L		03-SEP-19	R4782887
pH	8.44		0.10	pH		30-AUG-19	R4779469
L2338350-4 ELKRIVER OUTFALL							
Sampled By: KIRKLAND MATCHIM on 28-AUG-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		30-AUG-19	R4782035
Orthophosphate-Dissolved (as P)	0.0226		0.0050	mg/L		29-AUG-19	R4778146
Coliform Bacteria - Fecal	15		1	CFU/100mL		29-AUG-19	R4778874
Nitrate (as N)	2.77		0.020	mg/L		30-AUG-19	R4781987
Nitrite (as N)	<0.010		0.010	mg/L		30-AUG-19	R4781987
Phosphorus (P)-Total	0.0237		0.0050	mg/L		03-SEP-19	R4782095
Total Suspended Solids	5.0		3.0	mg/L		03-SEP-19	R4782887
pH	8.12		0.10	pH		30-AUG-19	R4779469
L2338350-5 ELKRIVER DOWNSTREAM							
Sampled By: KIRKLAND MATCHIM on 28-AUG-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		30-AUG-19	R4782035
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		29-AUG-19	R4778146
Coliform Bacteria - Fecal	1		1	CFU/100mL		29-AUG-19	R4778874
Nitrate (as N)	1.60		0.020	mg/L		30-AUG-19	R4781987
Nitrite (as N)	<0.010		0.010	mg/L		30-AUG-19	R4781987
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		03-SEP-19	R4782095
Total Suspended Solids	<3.0		3.0	mg/L		03-SEP-19	R4782887
pH	8.45		0.10	pH		30-AUG-19	R4779469

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.

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.

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colormetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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 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.

ALS Environmental
ANALYTICAL CHEMISTRY & TESTING SERVICES

www.alsenviro.com

Vancouver BC, 1988 Triumph Street, V5L 1K5, Tel: 604-253-4188 Toll Free: 1-800-665-0243 Fax: 604-253-6700
Fort St. John BC, Box 256, 9831 - 98A Avenue, V1J 6W7, Tel: 250-261-5517 Fax: 250-261-5587
Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5195 Toll Free: 1-800-668-9878 Fax: 780-513-2191
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-791-1524 Fax: 780-791-1586
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free: 1-800-668-9878 Fax: 780-437-2311
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free: 1-800-668-9878 Fax: 403-291-0298
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-800-667-7645 Fax: 306-668-8383

CHAIN OF CUSTODY FORM

SEND REPORT TO: PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669	FAX:	403 - 244 - 3774	SAMPLER:	Kirkland Matchim
PROJECT NAME AND NO.:	F A R U C – Fall 2019 EMS wk #1			QUOTE NO:	
PO NO.:		ALS CONTACT:	patryk.wojciak@alsglobal.com		
REPORT FORMAT:	☒ HARDMAIL ☐ EXCEL ☒ PDF ☐		pmajer@skircr.com		

ANALYSIS REQUESTED:

L2338350-COFC

WO#	SAMPLE IDENTIFICATION	DATE / TIME COLLECTED YYYY-MM-DD	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD	NOTES (sample specific comments, due dates, etc.)
1	WWTP Influent Routine	2019 – 8 – 28	14:00	Water		X	X								temp = C
2	WWTP Influent BOD	2019 – 8 – 28	14:00	Water									X		temp = C
3	WWTP Effluent Routine	2019 – 8 – 28	14:15	Water		X	X							X	temp = C
4	WWTP Effluent BOD	2019 – 8 – 28	14:15	Water									X		temp = C
5	WWTP Effluent Nutrient	2019 – 8 – 28	14:15	Water				X	X	X	X	X			temp = C
6	WWTP Effluent Bacti	2019 – 8 – 28	14:15	Water	X										temp = C
7	Elkriver Upstream Routine	2019 – 8 – 28	14:30	Water		X	X								temp = C
8	Elkriver Upstream Nutrient	2019 – 8 – 28	14:30	Water				X	X	X	X	X			temp = C
9	Elkriver Upstream Bacti	2019 – 8 – 28	14:30	Water	X										temp = C
10	Elkriver Outfall Routine	2019 – 8 – 28	14:45	Water		X	X								temp = C
11	Elkriver Outfall Nutrient	2019 – 8 – 28	14:45	Water				X	X	X	X	X			temp = C
12	Elkriver Outfall Bacti	2019 – 8 – 28	14:45	Water	X										temp = C
13	Elkriver downstream Routine	2019 – 8 – 28	15:00	Water		X	X								temp = C
14	Elkriver downstream Nutrient	2019 – 8 – 28	15:00	Water				X	X	X	X	X			temp = C
15	Elkriver downstream Bacti	2019 – 8 – 28	15:00	Water	X										temp = C

FOR LAB USE ONLY

TURN AROUND REQUIRED: ◉ REGULAR SPECIFY DATE: _____ (surcharge may apply)

SEND INVOICE TO: ☒ SAME AS ABOVE ☐

INVOICE FORMAT: ☐ HARDCOPY ☐

SPECIAL INSTRUCTIONS: PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com

RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
Kirkland Matchim	2019– 8 –28		8/29
	TIME: 5:00 pm		TIME: 8:40
RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
	TIME:		TIME:

FOR LAB USE ONLY

Cooler Seal Intact?	Sample Temperature: 6 °C	Cooling Method?
___Yes ___No ___N/A	Frozen? ___Yes ___No	___Icepacks ___Ice ___None

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SE
CALGARY AB T2T 0E2

Date Received: 05-SEP-19
Report Date: 11-SEP-19 13:23 (MT)
Version: FINAL

Client Phone: 800-258-7699

Certificate of Analysis

Lab Work Order #: L2341667

Project P.O. #: NOT SUBMITTED
Job Reference: FARUC - FALL 2019 EMS WK#2
C of C Numbers:
Legal Site Desc:

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2341667-1 WWTP INFLUENT							
Sampled By: Hungry Baytaluke on 04-SEP-19 @ 14:00							
Matrix: Water							
Miscellaneous Parameters							
Biochemical Oxygen Demand	57	DLHC	20	mg/L		05-SEP-19	R4792830
Total Suspended Solids	112	DLHC	8.0	mg/L		06-SEP-19	R4789475
pH	8.10		0.10	pH		05-SEP-19	R4784875
L2341667-2 WWTP EFFLUENT							
Sampled By: Hungry Baytaluke on 04-SEP-19 @ 14:15							
Matrix: Water							
Miscellaneous Parameters							
Ammonia, Total (as N)	0.288		0.050	mg/L		07-SEP-19	R4793069
Biochemical Oxygen Demand	2.5		2.0	mg/L		05-SEP-19	R4792830
Chemical Oxygen Demand	19		10	mg/L		09-SEP-19	R4793088
Orthophosphate-Dissolved (as P)	0.257	DLHC	0.025	mg/L		05-SEP-19	R4784207
Coliform Bacteria - Fecal	57		1	CFU/100mL		05-SEP-19	R4784903
Phosphorus (P)-Total	0.664	DLHC	0.050	mg/L		07-SEP-19	R4787208
Total Suspended Solids	6.7		3.0	mg/L		06-SEP-19	R4789475
pH	8.07		0.10	pH		05-SEP-19	R4784875
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	25.0		0.020	mg/L		05-SEP-19	R4784895
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	25.0		0.022	mg/L		06-SEP-19	
Nitrite in Water by IC							
Nitrite (as N)	0.094		0.010	mg/L		05-SEP-19	R4784895
L2341667-3 ELKRIVER UPSTREAM							
Sampled By: Hungry Baytaluke on 04-SEP-19 @ 14:30							
Matrix: Water							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		07-SEP-19	R4793069
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		05-SEP-19	R4784207
Coliform Bacteria - Fecal	5		1	CFU/100mL		05-SEP-19	R4784903
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		07-SEP-19	R4787208
Total Suspended Solids	<3.0		3.0	mg/L		06-SEP-19	R4789475
pH	8.50		0.10	pH		05-SEP-19	R4784875
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	1.51		0.020	mg/L		05-SEP-19	R4784895
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.51		0.022	mg/L		06-SEP-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		05-SEP-19	R4784895
L2341667-4 ELKRIVER OUTFALL							
Sampled By: Hungry Baytaluke on 04-SEP-19 @ 14:45							
Matrix: Water							
Miscellaneous Parameters							
Ammonia, Total (as N)	0.160		0.050	mg/L		07-SEP-19	R4793069
Orthophosphate-Dissolved (as P)	0.0944		0.0050	mg/L		05-SEP-19	R4784207
Coliform Bacteria - Fecal	91000	HTD	1000	CFU/100mL		06-SEP-19	R4788675
Phosphorus (P)-Total	0.121	DLHC	0.010	mg/L		07-SEP-19	R4787208
Total Suspended Solids	<3.0		3.0	mg/L		06-SEP-19	R4789475

* 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
L2341667-4 ELKRIVER OUTFALL							
Sampled By: Hungry Baytaluke on 04-SEP-19 @ 14:45							
Matrix: Water							
pH	8.05		0.10	pH		08-SEP-19	R4789379
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	6.11		0.020	mg/L		05-SEP-19	R4784895
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	6.16		0.022	mg/L		06-SEP-19	
Nitrite in Water by IC							
Nitrite (as N)	0.052		0.010	mg/L		05-SEP-19	R4784895
L2341667-5 ELKRIVER DOWNSTREAM							
Sampled By: Hungry Baytaluke on 04-SEP-19 @ 15:00							
Matrix: Water							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		07-SEP-19	R4793069
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		05-SEP-19	R4784207
Coliform Bacteria - Fecal	5		1	CFU/100mL		05-SEP-19	R4784903
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		07-SEP-19	R4787208
Total Suspended Solids	3.3		3.0	mg/L		06-SEP-19	R4789475
pH	8.39		0.10	pH		08-SEP-19	R4789379
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	1.62		0.020	mg/L		05-SEP-19	R4784895
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.62		0.022	mg/L		06-SEP-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		05-SEP-19	R4784895

* 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).
HTD	Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.

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.

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colormetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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 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.

ALS Environmental
ANALYTICAL CHEMISTRY & TESTING SERVICES

www.alsenviro.com

Vancouver BC, 1988 Triumph Street, V5L 1K5, Tel: 604-253-4188 Toll Free: 1-800-665-0243 Fax
Fort St. John BC, Box 256, 9831 - 98A Avenue, V1J 6W7, Tel: 250-261-5517 Fax: 250-261-5587
Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5196 Toll Free: 1-800-668-9878 Fax
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-791-1524 Fax: 780-791-1586
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free: 1-800-668-9878 Fax:
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free: 1-800-668-987
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-800-667-7645 Fax

L2341667-COFC

SEND REPORT TO:

CHAIN OF CUSTODY FORM

PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669	FAX:	403 - 244 - 3774	SAMPLER:	Hungry Baytaluke
PROJECT NAME AND NO.:	F A R U C – Fall 2019 EMS wk #2			QUOTE NO:	
PO NO.:		ALS CONTACT:	patryk.wojciak@alsglobal.com		
REPORT FORMAT:	☒ H ☒ E M A ☐ E ☐ E ☒ P ☐ ( )		pmajer@skircr.com		

ANALYSIS REQUESTED:

Ambient Air - 16°C Thermometer broke

WO#	SAMPLE IDENTIFICATION		DATE / TIME COLLECTED YYYY-MM-DD	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD	NOTES (sample specific comments, due dates, etc.)
FOR LAB USE ONLY																
1	WWTP Influent Routine	1	2019 – 9 – 4	14:00	Water		X	X								temp = C
1	WWTP Influent BOD	2	2019 – 9 – 4	14:00	Water									X		temp = C
	WWTP Effluent Routine	3	2019 – 9 – 4	14:15	Water		X	X							X	temp = C
2	WWTP Effluent BOD	4	2019 – 9 – 4	14:15	Water									X		temp = C
2	WWTP Effluent Nutrient	5	2019 – 9 – 4	14:15	Water				X	X	X	X	X			temp = C
	WWTP Effluent Bacti	6	2019 – 9 – 4	14:15	Water	X										temp = C
	Elkriver Upstream Routine	7	2019 – 9 – 4	14:30	Water		X	X								temp = C
3	Elkriver Upstream Nutrient	8	2019 – 9 – 4	14:30	Water				X	X	X	X	X			temp = C
3	Elkriver Upstream Bacti	9	2019 – 9 – 4	14:30	Water	X										temp = C
	Elkriver Outfall Routine	10	2019 – 9 – 4	14:45	Water		X	X								temp = C
4	Elkriver Outfall Nutrient	11	2019 – 9 – 4	14:45	Water				X	X	X	X	X			temp = C
	Elkriver Outfall Bacti	12	2019 – 9 – 4	14:45	Water	X										temp = C
	Elkriver downstream Routine	13	2019 – 9 – 4	15:00	Water		X	X								temp = C
5	Elkriver downstream Nutrient	14	2019 – 9 – 4	15:00	Water				X	X	X	X	X			temp = C
5	Elkriver downstream Bacti	15	2019 – 9 – 4	15:00	Water	X										temp = C

TURN AROUND REQUIRED: ◉ R ( ) R SPECIFY DATE: _____ (surcharge may apply)

SEND INVOICE TO: ☒ SA ☐ DIFFERE

INVOICE FORMAT: ☐ H ☐ E ☐ P ☐

SPECIAL INSTRUCTIONS: PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com

RELINQUISHED BY:	DATE:	2019– 9 – 4	RECEIVED BY:	DATE:	9/5
Kirkland Matchim	TIME:	5:00 pm		TIME:	8AM
RELINQUISHED BY:	DATE:		RECEIVED BY:	DATE:	
	TIME:			TIME:	

FOR LAB USE ONLY

Cooler Seal Intact?	Sample Temperature: °C	Cooling Method?
___Yes ___No ___N/A	Frozen? ___Yes ___No	___Icepacks ___Ice ___None

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 12-SEP-19
Report Date: 19-SEP-19 16:22 (MT)
Version: FINAL

Client Phone: 403-256-8473

Certificate of Analysis

Lab Work Order #: L2346192

Project P.O. #: NOT SUBMITTED
Job Reference: FARUC - FALL 2019 EMS WK#3
C of C Numbers:
Legal Site Desc:

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2346192-1 WWTP INFLUENT							
Sampled By: HUNGRY BAYTALUKE on 11-SEP-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	29.0	DLHC	6.0	mg/L		12-SEP-19	R4814188
Total Suspended Solids	46.3		3.0	mg/L		17-SEP-19	R4814232
pH	8.02		0.10	pH		13-SEP-19	R4809453
L2346192-2 WWTP EFFLUENT							
Sampled By: HUNGRY BAYTALUKE on 11-SEP-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	<2.0		2.0	mg/L		12-SEP-19	R4814188
Total Suspended Solids	<3.0		3.0	mg/L		17-SEP-19	R4814232
pH	7.99		0.10	pH		13-SEP-19	R4809453
L2346192-3 ELKRIVER OUTFALL							
Sampled By: HUNGRY BAYTALUKE on 11-SEP-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		18-SEP-19	R4816175
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		12-SEP-19	R4803488
Coliform Bacteria - Fecal	3		1	CFU/100mL		12-SEP-19	R4806399
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		17-SEP-19	R4814410
Total Suspended Solids	<3.0		3.0	mg/L		17-SEP-19	R4814232
pH	8.44		0.10	pH		13-SEP-19	R4809453
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	1.40		0.020	mg/L		13-SEP-19	R4815513
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.40		0.022	mg/L		17-SEP-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		13-SEP-19	R4815513
L2346192-4 ELKRIVER UPSTREAM							
Sampled By: HUNGRY BAYTALUKE on 11-SEP-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		18-SEP-19	R4816175
Orthophosphate-Dissolved (as P)	0.0302		0.0050	mg/L		12-SEP-19	R4803488
Coliform Bacteria - Fecal	209		1	CFU/100mL		12-SEP-19	R4806399
Phosphorus (P)-Total	0.0251		0.0050	mg/L		17-SEP-19	R4814410
Total Suspended Solids	3.0		3.0	mg/L		17-SEP-19	R4814232
pH	8.36		0.10	pH		13-SEP-19	R4809453
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	2.88		0.020	mg/L		13-SEP-19	R4815513
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	2.88		0.022	mg/L		17-SEP-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		13-SEP-19	R4815513
L2346192-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 11-SEP-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							

* 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
L2346192-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 11-SEP-19 @ 15:00							
Matrix: WATER							
Ammonia, Total (as N)	<0.050		0.050	mg/L		18-SEP-19	R4816175
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		12-SEP-19	R4803488
Coliform Bacteria - Fecal	67		1	CFU/100mL		12-SEP-19	R4806399
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		17-SEP-19	R4814410
Total Suspended Solids	<3.0		3.0	mg/L		17-SEP-19	R4814232
pH	8.49		0.10	pH		13-SEP-19	R4809453
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	1.50		0.020	mg/L		13-SEP-19	R4815513
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.50		0.022	mg/L		17-SEP-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		13-SEP-19	R4815513

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

Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
NR:NR	No Bacti. Container received for WWTP Effluent. Fraction L2346192-2, No Amber Bottle given for WWTP Effluent, COD - No Result: Sample Not Received At Laboratory
SR:COC	Samples Elkriver Upstream and Elkriver Outfall switched up. - Sample Received, Not Listed on Submitted Chain of Custody / Analytical Request Form

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. 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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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 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.

ALS Environmental
ANALYTICAL CHEMISTRY & TESTING SERVICES

www.alsenviro.com

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Fort St. John B ... 261-5587
Grand Prairie A ... 9878 Fax: 780-513-2191
Fort McMurray ... n-1586
Edmonton AB, ... 1878 Fax: 780-437-2311
Calgary AB, ... 0-668-9878 Fax: 403-291-0298
Saskatoon SK, ... 7-7645 Fax: 306-668-8383

L2346192-COFC

CHAIN OF CUSTODY FORM

PAGE ___ OF ___

SEND REPORT TO:

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION	ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East		
CITY:	CALGARY PROV: ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669 FAX: 403 - 244 - 3774	SAMPLER:	Hungry Baytaluke
PROJECT NAME AND NO.:	F A R U C – Fall 2019 EMS wk #3	QUOTE NO:	
PO NO.:		ALS CONTACT:	patryk.wojciak@alsglobal.com
REPORT FORMAT:	☒ HA ☒ EMAIL ☐ F ☐ F ☒ P ☐ ()		pmajer@skircr.com

ANALYSIS REQUESTED:

Ambient air +10 °C

WO#	SAMPLE IDENTIFICATION	DATE (YYYY-MM-DD)	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD	NOTES (sample specific comments, due dates, etc.)
1	WWTP Influent Routine 1	2019 – 9 – 11	14:00	Water		X	X								temp = 14.8 C
	WWTP Influent BOD 2	2019 – 9 – 11	14:00	Water									X		temp = 14.8 C
2	WWTP Effluent Routine 3	2019 – 9 – 11	14:15	Water		X	X							X	temp = C
	WWTP Effluent BOD 4	2019 – 9 – 11	14:15	Water									X		temp = 16.6 C
	WWTP Effluent Nutrient 5	2019 – 9 – 11	14:15	Water				X	X	X	X	X			temp = C
	WWTP Effluent Bacti 6	2019 – 9 – 11	14:15	Water	X										temp = C
3	Elkriver ~~Upstream~~ Routine (outfall) 7	2019 – 9 – 11	14:30	Water		X	X								temp = C
	Elkriver ~~Upstream~~ Nutrient 8	2019 – 9 – 11	14:30	Water				X	X	X	X	X			temp = 12.9 C
	Elkriver ~~Upstream~~ Bacti 9	2019 – 9 – 11	14:30	Water	X										temp = C
4	Elkriver ~~Outfall~~ Routine (upstream) 10	2019 – 9 – 11	14:45	Water		X	X								temp = C
	Elkriver ~~Outfall~~ Nutrient 11	2019 – 9 – 11	14:45	Water				X	X	X	X	X			temp = 14.5 C
	Elkriver ~~Outfall~~ Bacti 12	2019 – 9 – 11	14:45	Water	X										temp = C
5	Elkriver downstream Routine 13	2019 – 9 – 11	15:00	Water		X	X								temp = C
	Elkriver downstream Nutrient 14	2019 – 9 – 11	15:00	Water				X	X	X	X	X			temp = 13.9 C
	Elkriver downstream Bacti 15	2019 – 9 – 11	15:00	Water	X										temp = C

FOR LAB USE ONLY

TURN AROUND REQUIRED:	◉ R ( ) R SPECIFY DATE: ______ (surcharge may apply)	RELINQUISHED BY: Kirkland Matchim	DATE: 2019 – 9 – 11	TIME: 5:00 pm	RECEIVED BY: [signature]	DATE: 9/12 TIME: 2:50
SEND INVOICE TO:	☒ SAME ☐ DIFFERENT	RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE: TIME:
INVOICE FORMAT:	☐ HA ☐ P ☐ F					
SPECIAL INSTRUCTIONS:	PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com					

FOR LAB USE ONLY

Cooler Seal Intact? __Yes __No __N/A | Sample Temperature: 9 °C | Frozen? __Yes __No | Cooling Method? __Icepacks __Ice __None

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 19-SEP-19
Report Date: 27-SEP-19 15:49 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L2350241

Project P.O. #: NOT SUBMITTED
Job Reference: FARUC - FALL 2019 EMS WK#4
C of C Numbers:
Legal Site Desc:

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2350241-1 WWTP INFLUENT							
Sampled By: HB on 18-SEP-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	51	DLHC	20	mg/L		19-SEP-19	R4835652
Total Suspended Solids	83.6		3.0	mg/L		24-SEP-19	R4839915
pH	8.05		0.10	pH		20-SEP-19	R4833233
L2350241-2 WWTP EFFLUENT							
Sampled By: HB on 18-SEP-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		26-SEP-19	R4846349
Biochemical Oxygen Demand	<2.0		2.0	mg/L		19-SEP-19	R4835652
Chemical Oxygen Demand	<10		10	mg/L		25-SEP-19	R4840779
Orthophosphate-Dissolved (as P)	0.0961		0.0050	mg/L		19-SEP-19	R4825150
Coliform Bacteria - Fecal	<1		1	CFU/100mL		19-SEP-19	R4828155
Phosphorus (P)-Total	0.0859		0.0050	mg/L		26-SEP-19	R4845914
Total Suspended Solids	<3.0		3.0	mg/L		24-SEP-19	R4839915
pH	7.87		0.10	pH		20-SEP-19	R4833233
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	31.1	DLHC	0.10	mg/L		20-SEP-19	R4834088
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	31.1		0.11	mg/L		23-SEP-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.050	DLHC	0.050	mg/L		20-SEP-19	R4834088
L2350241-3 ELKRIVER UPSTREAM							
Sampled By: HB on 18-SEP-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		26-SEP-19	R4846349
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		19-SEP-19	R4825150
Coliform Bacteria - Fecal	5		1	CFU/100mL		19-SEP-19	R4828155
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		26-SEP-19	R4845914
Total Suspended Solids	3.3		3.0	mg/L		24-SEP-19	R4839915
pH	8.41		0.10	pH		20-SEP-19	R4833233
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	1.66		0.020	mg/L		20-SEP-19	R4834088
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.66		0.022	mg/L		23-SEP-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		20-SEP-19	R4834088
L2350241-4 ELKRIVER OUTFALL							
Sampled By: HB on 18-SEP-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		26-SEP-19	R4846349
Orthophosphate-Dissolved (as P)	0.0317		0.0050	mg/L		19-SEP-19	R4825150
Coliform Bacteria - Fecal	82		1	CFU/100mL		19-SEP-19	R4828155
Phosphorus (P)-Total	0.0267		0.0050	mg/L		26-SEP-19	R4845914
Total Suspended Solids	<3.0		3.0	mg/L		24-SEP-19	R4839915

* 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
L2350241-4 ELKRIVER OUTFALL							
Sampled By: HB on 18-SEP-19 @ 14:45							
Matrix: WATER							
pH	8.18		0.10	pH		20-SEP-19	R4833233
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	3.55		0.020	mg/L		20-SEP-19	R4834088
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	3.55		0.022	mg/L		23-SEP-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		20-SEP-19	R4834088
L2350241-5 ELKRIVER DOWNSTREAM							
Sampled By: HB on 18-SEP-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		26-SEP-19	R4846349
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		19-SEP-19	R4825150
Coliform Bacteria - Fecal	2		1	CFU/100mL		19-SEP-19	R4828155
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		26-SEP-19	R4845914
Total Suspended Solids	<3.0		3.0	mg/L		24-SEP-19	R4839915
pH	8.40		0.10	pH		20-SEP-19	R4833233
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	1.72		0.020	mg/L		20-SEP-19	R4834088
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.72		0.022	mg/L		23-SEP-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		20-SEP-19	R4834088

* 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.

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colormetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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 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.

ALS Environmental
ANALYTICAL CHEMISTRY & TESTING SERVICES
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Vancouver BC, 1988 Triumph Street, V5L 1K5, Tel: 604-253-4188 Toll Free: 1-800-665-0243 Fax: 604-253-6700
Fort St. John BC, Box 256, 9831 - 98A Avenue, V1J 6W7, Tel: 250-261-5517 Fax: 250-261-5587
Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5196 Toll Free: 1-800-668-9878 Fax: 780-513-2191
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-791-1524 Fax: 780-791-1586
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free: 1-800-668-9878 Fax: 780-437-2311
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free: 1-800-668-9878 Fax: 403-291-0298
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-800-667-7645 Fax: 306-668-8383

CHAIN OF CUSTODY FORM

PAGE OF

SEND REPORT TO:

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION	ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East		
CITY:	CALGARY PROV: ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669 FAX: 403 - 244 - 3774	SAMPLER:	Hungry Baytaluke
PROJECT NAME AND NO.:	F A R U C – Fall 2019 EMS wk #4	QUOTE NO:	
PO NO.:		ALS CONTACT:	patryk.wojciak@alsglobal.com
REPORT FORMAT:	☒ [illegible] ☒ [illegible] ☐ [illegible] ☐ [illegible] ☒ [illegible] ☐ [illegible]		pmajer@skircr.com

ANALYSIS REQUESTED:

L2350241-COFC

PatryK: Please have shipping send 2 mid size styrofoam coolers with a complete set of EMS bottles in each Thx

WO#	SAMPLE IDENTIFICATION		DATE (YYYY-MM-DD)	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD					NOTES (sample specific comments, due dates, etc.)
1	WWTP Influent Routine	1	2019 – 9 – 18	14:00	Water		X	X												temp = 14.3 C
	WWTP Influent BOD	2	2019 – 9 – 18	14:00	Water									X						temp = C
	WWTP Effluent Routine	3	2019 – 9 – 18	14:15	Water		X	X							X					temp = C
2	WWTP Effluent BOD	4	2019 – 9 – 18	14:15	Water									X						temp = 16.1 C
	WWTP Effluent Nutrient	5	2019 – 9 – 18	14:15	Water				X	X	X	X	X							temp = C
	WWTP Effluent Bacti	6	2019 – 9 – 18	14:15	Water	X														temp = C
	Elkriver Upstream Routine	7	2019 – 9 – 18	14:30	Water		X	X												temp = C
3	Elkriver Upstream Nutrient	8	2019 – 9 – 18	14:30	Water				X	X	X	X	X							temp = 9.2 C
	Elkriver Upstream Bacti	9	2019 – 9 – 18	14:30	Water	X														temp = C
	Elkriver Outfall Routine	10	2019 – 9 – 18	14:45	Water		X	X												temp = C
4	Elkriver Outfall Nutrient	11	2019 – 9 – 18	14:45	Water				X	X	X	X	X							temp = 12.1 C
	Elkriver Outfall Bacti	12	2019 – 9 – 18	14:45	Water	X														temp = C
	Elkriver downstream Routine	13	2019 – 9 – 18	15:00	Water		X	X												temp = C
5	Elkriver downstream Nutrient	14	2019 – 9 – 18	15:00	Water				X	X	X	X	X							temp = 9.6 C
	Elkriver downstream Bacti	15	2019 – 9 – 18	15:00	Water	X														temp = C

FOR LAB USE ONLY

TURN AROUND REQUIRED:	◉ [illegible] ○ [illegible] SPECIFY DATE: ______ (surcharge may apply)	RELINQUISHED BY: Kirkland Matchim	DATE: 2019– 9 –18	TIME: 5:00 pm	RECEIVED BY: Dk	DATE: 9/19	TIME: 0900
SEND INVOICE TO:	☒ [illegible] ☐ [illegible]	RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:
INVOICE FORMAT:	☐ [illegible] ☐ [illegible] ☐ [illegible]						

10 °C

SPECIAL INSTRUCTIONS: PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com

FOR LAB USE ONLY

Cooler Seal Intact? __Yes __No __N/A | Sample Temperature: ____°C Frozen? __Yes __No | Cooling Method? __Icepacks _/_Ice __None

ALS Environmental
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www.alsenviro.com

Vancouver BC, 1988 Triumph Street, V5L 1K5, Tel: 604-253-4188 Toll Free: 1-800-665-0243 Fax: 604-253-6700
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Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5196 Toll Free: 1-800-668-9878 Fax: 780-513-2191
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-791-1524 Fax: 780-791-1586
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free: 1-800-668-9878 Fax: 780-437-2311
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free: 1-800-668-9878 Fax: 403-291-0298
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-800-667-7645 Fax: 306-668-8383

SEND REPORT TO:

CHAIN OF CUSTODY FORM

PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669	FAX:	403 - 244 - 3774	SAMPLER:	Hungry Baytaluke
PROJECT NAME AND NO.:	F A R U C – Fall 2019 EMS wk #4			QUOTE NO:	
PO NO.:		ALS CONTACT:	patryk.wojciak@alsglobal.com		
REPORT FORMAT:	☒ H/ ☒ F-MAI		pmajer@skircr.com		
	☐ F ☐ F ☒ P ☐				

ANALYSIS REQUESTED:

L2350241-COFC

WO#	SAMPLE IDENTIFICATION		DATE / TIME COLLECTED YYYY-MM-DD	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD	NOTES (sample specific comments, due dates, etc.)
FOR LAB USE ONLY																
1	WWTP Influent Routine	1	2019 – 9 – 18	14:00	Water		X	X								temp = 14.3 C
	WWTP Influent BOD	2	2019 – 9 – 18	14:00	Water									X		temp = C
	WWTP Effluent Routine	3	2019 – 9 – 18	14:15	Water		X	X							X	temp = C
2	WWTP Effluent BOD	4	2019 – 9 – 18	14:15	Water									X		temp = C
	WWTP Effluent Nutrient	5	2019 – 9 – 18	14:15	Water				X	X	X	X	X			temp = 16.1 C
	WWTP Effluent Bacti	6	2019 – 9 – 18	14:15	Water	X										temp = C
	Elkriver Upstream Routine	7	2019 – 9 – 18	14:30	Water		X	X								temp = C
3	Elkriver Upstream Nutrient	8	2019 – 9 – 18	14:30	Water				X	X	X	X	X			temp = 9.2 C
	Elkriver Upstream Bacti	9	2019 – 9 – 18	14:30	Water	X										temp = C
	Elkriver Outfall Routine	10	2019 – 9 – 18	14:45	Water		X	X								temp = C
4	Elkriver Outfall Nutrient	11	2019 – 9 – 18	14:45	Water				X	X	X	X	X			temp = 12.1 C
	Elkriver Outfall Bacti	12	2019 – 9 – 18	14:45	Water	X										temp = C
	Elkriver downstream Routine	13	2019 – 9 – 18	15:00	Water		X	X								temp = C
5	Elkriver downstream Nutrient	14	2019 – 9 – 18	15:00	Water				X	X	X	X	X			temp = 9.6 C
	Elkriver downstream Bacti	15	2019 – 9 – 18	15:00	Water	X										temp = C

Patryk: Please have shipping send 2 med size styrofoam coolers with a complete set of EMS bottles in each Thx

TURN AROUND REQUIRED:	◉ R(◉ R	SPECIFY DATE:	(surcharge may apply)	RELINQUISHED BY:	DATE: 2019– 9 –18	RECEIVED BY:	DATE: 9/19
SEND INVOICE TO:	☒ SAM ☐ DIFFERE			Kirkland Matchim	TIME: 5:00 pm	PK	TIME: 0900
INVOICE FORMAT:	☐ A/ ☐ P ☐			RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
					TIME:		TIME:

SPECIAL INSTRUCTIONS: PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com

FOR LAB USE ONLY

Cooler Seal Intact?	Sample Temperature: °C	Cooling Method?
Yes No N/A	Frozen? Yes No	Icepacks Ice None

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 03-OCT-19
Report Date: 09-OCT-19 16:48 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L2359186

Project P.O. #: NOT SUBMITTED
Job Reference: FARUC - FALL 2019 EMS WK#5
C of C Numbers:
Legal Site Desc:

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2359186-1 WWTP INFLUENT							
Sampled By: HB on 02-OCT-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	59	DLHC	20	mg/L		04-OCT-19	R4863624
Total Suspended Solids	103	DLHC	8.0	mg/L		07-OCT-19	R4861966
pH	7.88		0.10	pH		07-OCT-19	R4861453
L2359186-2 WWTP EFFLUENT							
Sampled By: HB on 02-OCT-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		08-OCT-19	R4862062
Biochemical Oxygen Demand	<2.0		2.0	mg/L		04-OCT-19	R4863624
Chemical Oxygen Demand	11		10	mg/L		03-OCT-19	R4858265
Orthophosphate-Dissolved (as P)	0.0379		0.0050	mg/L		03-OCT-19	R4858558
Coliform Bacteria - Fecal	<1		1	CFU/100mL		03-OCT-19	R4859197
Phosphorus (P)-Total	0.0375		0.0050	mg/L		06-OCT-19	R4860423
Total Suspended Solids	<3.0		3.0	mg/L		07-OCT-19	R4861966
pH	7.97		0.10	pH		07-OCT-19	R4861453
Total Coliforms and E. Coli by MPN							
MPN - E. Coli	<1		1	MPN/100mL		03-OCT-19	R4859183
MPN - Total Coliforms	1	OCR	1	MPN/100mL		03-OCT-19	R4859183
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	25.6	DLHC	0.10	mg/L		03-OCT-19	R4860814
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	25.6		0.11	mg/L		07-OCT-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.050	DLHC	0.050	mg/L		03-OCT-19	R4860814
L2359186-3 ELKRIVER UPSTREAM							
Sampled By: HB on 02-OCT-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		08-OCT-19	R4862062
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		03-OCT-19	R4858558
Coliform Bacteria - Fecal	<1		1	CFU/100mL		03-OCT-19	R4859197
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		06-OCT-19	R4860423
Total Suspended Solids	<3.0		3.0	mg/L		07-OCT-19	R4861966
pH	8.40		0.10	pH		07-OCT-19	R4861453
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	1.70		0.020	mg/L		03-OCT-19	R4860814
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.70		0.022	mg/L		07-OCT-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		03-OCT-19	R4860814
L2359186-4 ELKRIVER OUTFALL							
Sampled By: HB on 02-OCT-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		08-OCT-19	R4862062
Orthophosphate-Dissolved (as P)	0.0071		0.0050	mg/L		03-OCT-19	R4858558
Coliform Bacteria - Fecal	10		1	CFU/100mL		03-OCT-19	R4859197

* 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
L2359186-4 ELKRIVER OUTFALL							
Sampled By: HB on 02-OCT-19 @ 14:45							
Matrix: WATER							
Phosphorus (P)-Total	0.0082		0.0050	mg/L		06-OCT-19	R4860423
Total Suspended Solids	<3.0		3.0	mg/L		07-OCT-19	R4861966
pH	8.42		0.10	pH		07-OCT-19	R4861453
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	0.046		0.020	mg/L		03-OCT-19	R4860814
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.046		0.022	mg/L		07-OCT-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		03-OCT-19	R4860814
L2359186-5 ELKRIVER DOWNSTREAM							
Sampled By: HB on 02-OCT-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		08-OCT-19	R4862062
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		03-OCT-19	R4858558
Coliform Bacteria - Fecal	1		1	CFU/100mL		03-OCT-19	R4859197
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		06-OCT-19	R4860423
Total Suspended Solids	<3.0		3.0	mg/L		07-OCT-19	R4861966
pH	8.40		0.10	pH		07-OCT-19	R4861453
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	1.70		0.020	mg/L		03-OCT-19	R4860814
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.70		0.022	mg/L		07-OCT-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		03-OCT-19	R4860814

* 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.

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colormetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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.

TC-EC-MPN-CL	Water	Total Coliforms and E. Coli by MPN	APHA METHOD 9223

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.

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 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.

ALS Environmental
ANALYTICAL CHEMISTRY & TESTING SERVICES

www.alsenviro.com

Vancouver BC, 1988 Triumph Street, V5L 1K5, Tel: 604-253-4188 Toll Free: 1-800-665-0243 Fax: 604-253-6700
Fort St. John BC, Box 256, 9831 - 98A Avenue, V1J 6W7, Tel: 250-261-5517 Fax: 250-261-5587
Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5195 Toll Free: 1-800-668-9878 Fax: 780-513-2191
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-791-1524 Fax: 780-791-1586
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free: 1-800-668-9878 Fax: 780-437-2311
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free: 1-800-668-9878 Fax: 403-291-0298
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-800-667-7645 Fax: 306-668-8383

CHAIN OF CUSTODY FORM

PAGE ____ OF ____

SEND REPORT TO:

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION		ATTN:	PATRICK MAJER	
ADDRESS:	1505 - 17TH Avenue South East				
CITY:	CALGARY	PROV: ALBERTA	POSTAL CODE:	T2T 0E2	
TEL:	1 - 800 - 258 - 7669	FAX: 403 - 244 - 3774	SAMPLER:	Hungry Baytaluke	
PROJECT NAME AND NO.:	F A R U C – Fall 2019 EMS wk #5		QUOTE NO:		
PO NO.:		ALS CONTACT:	patryk.wojciak@alsglobal.com		
REPORT FORMAT:	☒ HARDMAIL ☐ FAX ☒ PDF ☐		pmajer@skircr.com		

ANALYSIS REQUESTED:

L2359186-COFC

ambient air temp 4°C

FOR LAB USE ONLY	WO#	SAMPLE IDENTIFICATION		DATE / TIME COLLECTED YYYY-MM-DD	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD	NOTES (sample specific comments, due dates, etc.)
	1	WWTP Influent Routine	1	2019 – 10 – 2	14:00	Water		X	X								temp = 12.3 C
		WWTP Influent BOD	2	2019 – 10 – 2	14:00	Water									X		temp = 12.3 C
	2	WWTP Effluent Routine	3	2019 – 10 – 2	14:15	Water		X	X							X	temp = 16.1 C
		WWTP Effluent BOD	4	2019 – 10 – 2	14:15	Water									X		temp = 16.1 C
		WWTP Effluent Nutrient	5	2019 – 10 – 2	14:15	Water				X	X	X	X	X			temp = 16.1 C
		WWTP Effluent Bacti	6	2019 – 10 – 2	14:15	Water	X										temp = 16.1 C
	3	Elkriver Upstream Routine	7	2019 – 10 – 2	14:30	Water		X	X								temp = 6.0 C
		Elkriver Upstream Nutrient	8	2019 – 10 – 2	14:30	Water				X	X	X	X	X			temp = 6.0 C
		Elkriver Upstream Bacti	9	2019 – 10 – 2	14:30	Water	X										temp = 6.0 C
	4	Elkriver Outfall Routine	10	2019 – 10 – 2	14:45	Water		X	X								temp = 5.9 C
		Elkriver Outfall Nutrient	11	2019 – 10 – 2	14:45	Water				X	X	X	X	X			temp = 5.9 C
		Elkriver Outfall Bacti	12	2019 – 10 – 2	14:45	Water	X										temp = 5.9 C
	5	Elkriver downstream Routine	13	2019 – 10 – 2	15:00	Water		X	X								temp = 5.5 C
		Elkriver downstream Nutrient	14	2019 – 10 – 2	15:00	Water				X	X	X	X	X			temp = 5.5 C
		Elkriver downstream Bacti	15	2019 – 10 – 2	15:00	Water	X										temp = 5.5 C

TURN AROUND REQUIRED:	◉ RUSH	SPECIFY DATE: ____ (surcharge may apply)	RELINQUISHED BY: Hungry Baytaluke	DATE: 2019-10-2	RECEIVED BY:	DATE:	10/3
				TIME: 5:00 pm		TIME:	1102
SEND INVOICE TO:	☒ SAME ☐		RELINQUISHED BY: Kirkland Mathieu	DATE:	RECEIVED BY:	DATE:	
INVOICE FORMAT:	☐ HARDCOPY ☐			TIME: 5:00pm		TIME:	
SPECIAL INSTRUCTIONS:	PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com		FOR LAB USE ONLY				
			Cooler Seal Intact? ___Yes ___No ___N/A	Sample Temperature: ___°C Frozen? ___Yes ___No		Cooling Method? ___Icepacks ___Ice ___None	

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 10-OCT-19
Report Date: 21-OCT-19 13:44 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L2363531

Project P.O. #: NOT SUBMITTED
Job Reference: FARUC - FALL 2019 EMS WK#6
C of C Numbers:
Legal Site Desc:

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2363531-1 WWTP INFLUENT							
Sampled By: HB on 09-OCT-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	44	DLHC	20	mg/L		10-OCT-19	R4869377
Total Suspended Solids	65.0		3.0	mg/L		13-OCT-19	R4869066
pH	8.04		0.10	pH		11-OCT-19	R4869467
L2363531-2 WWTP EFFLUENT							
Sampled By: HB on 09-OCT-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		20-OCT-19	R4875988
Biochemical Oxygen Demand	<2.0		2.0	mg/L		10-OCT-19	R4869377
Chemical Oxygen Demand	13		10	mg/L		10-OCT-19	R4867516
Orthophosphate-Dissolved (as P)	0.185	DLHC	0.010	mg/L		10-OCT-19	R4866794
Coliform Bacteria - Fecal	1		1	CFU/100mL		10-OCT-19	R4867670
Nitrate (as N)	13.2		0.020	mg/L		11-OCT-19	R4868044
Nitrite (as N)	<0.010		0.010	mg/L		11-OCT-19	R4868044
Phosphorus (P)-Total	0.472	DLHC	0.025	mg/L		11-OCT-19	R4867300
Total Suspended Solids	4.3		3.0	mg/L		13-OCT-19	R4869066
pH	8.16		0.10	pH		11-OCT-19	R4869467
L2363531-3 ELKRIVER UPSTREAM							
Sampled By: HB on 09-OCT-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		20-OCT-19	R4875988
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		10-OCT-19	R4866794
Coliform Bacteria - Fecal	6		1	CFU/100mL		10-OCT-19	R4867670
Nitrate (as N)	1.22		0.020	mg/L		12-OCT-19	R4873442
Nitrite (as N)	<0.010		0.010	mg/L		12-OCT-19	R4873442
Phosphorus (P)-Total	0.0078		0.0050	mg/L		11-OCT-19	R4867300
Total Suspended Solids	<3.0		3.0	mg/L		13-OCT-19	R4869066
pH	8.32		0.10	pH		11-OCT-19	R4869467
L2363531-4 ELKRIVER OUTFALL							
Sampled By: HB on 09-OCT-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		20-OCT-19	R4875988
Orthophosphate-Dissolved (as P)	0.0107		0.0050	mg/L		10-OCT-19	R4866794
Coliform Bacteria - Fecal	26		1	CFU/100mL		10-OCT-19	R4867670
Nitrate (as N)	0.065		0.020	mg/L		12-OCT-19	R4873442
Nitrite (as N)	<0.010		0.010	mg/L		12-OCT-19	R4873442
Phosphorus (P)-Total	0.0161		0.0050	mg/L		11-OCT-19	R4867300
Total Suspended Solids	3.7		3.0	mg/L		13-OCT-19	R4869066
pH	8.37		0.10	pH		11-OCT-19	R4869467
L2363531-5 ELKRIVER DOWNSTREAM							
Sampled By: HB on 09-OCT-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		20-OCT-19	R4875988
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		10-OCT-19	R4866794

* 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
L2363531-5 ELKRIVER DOWNSTREAM							
Sampled By: HB on 09-OCT-19 @ 15:00							
Matrix: WATER							
Coliform Bacteria - Fecal	4		1	CFU/100mL		10-OCT-19	R4867670
Nitrate (as N)	1.35		0.020	mg/L		12-OCT-19	R4873442
Nitrite (as N)	<0.010		0.010	mg/L		12-OCT-19	R4873442
Phosphorus (P)-Total	0.0053		0.0050	mg/L		11-OCT-19	R4867300
Total Suspended Solids	3.0		3.0	mg/L		13-OCT-19	R4869066
pH	8.39		0.10	pH		11-OCT-19	R4869467

* 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.

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colormetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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 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.

ALS Environmental
ANALYTICAL CHEMISTRY & TESTING SERVICES

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Vancouver BC, 1988 Triumph Street, V5L 1K5, Tel: 604-253-4188 Toll Free: 1-800-665-0243 Fax: 604-253-6700
Fort St. John BC, Box 256, 9831 - 98A Avenue, V1J 6W7, Tel: 250-261-5517 Fax: 250-261-5587
Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5196 Toll Free: 1-800-668-9878 Fax: 780-513-2191
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-791-1524 Fax: 780-791-1586
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free: 1-800-668-9878 Fax: 780-437-2311
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free: 1-800-668-9878 Fax: 403-291-0298
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-800-667-7645 Fax: 306-668-8383

CHAIN OF CUSTODY FORM

PAGE OF

SEND REPORT TO:

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669	FAX:	403 - 244 - 3774	SAMPLER:	Hungry Baytaluke
PROJECT NAME AND NO.:	F A R U C – Fall 2019 EMS wk #6			QUOTE NO:	
PO NO.:		ALS CONTACT:	patryk.wojciak@alsglobal.com		
REPORT FORMAT:	☒ HARDMAIL ☐ FAX ☒ PDF ☐ ( )		pmajer@skircr.com		

ANALYSIS REQUESTED:

L2363531-COFC

Ambient air temp - 6°C

WO#	SAMPLE IDENTIFICATION		DATE / TIME COLLECTED YYYY-MM-DD	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD	NOTES (sample specific comments, due dates, etc.)
FOR LAB USE ONLY																
1	WWTP Influent Routine	1	2019 – 10 – 9	14:00	Water		X	X								temp = 12.2 C
	WWTP Influent BOD	2	2019 – 10 – 9	14:00	Water									X		temp = C
2	WWTP Effluent Routine	3	2019 – 10 – 9	14:15	Water		X	X							X	temp = C
	WWTP Effluent BOD	4	2019 – 10 – 9	14:15	Water									X		temp = 13.6 C
	WWTP Effluent Nutrient	5	2019 – 10 – 9	14:15	Water				X	X	X	X	X			temp = C
	WWTP Effluent Bacti	6	2019 – 10 – 9	14:15	Water	X										temp = C
3	Elkriver Upstream Routine	7	2019 – 10 – 9	14:30	Water		X	X								temp = 3.1 C
	Elkriver Upstream Nutrient	8	2019 – 10 – 9	14:30	Water				X	X	X	X	X			temp = C
	Elkriver Upstream Bacti	9	2019 – 10 – 9	14:30	Water	X										temp = C
4	Elkriver Outfall Routine	10	2019 – 10 – 9	14:45	Water		X	X								temp = 4.1 C
	Elkriver Outfall Nutrient	11	2019 – 10 – 9	14:45	Water				X	X	X	X	X			temp = C
	Elkriver Outfall Bacti	12	2019 – 10 – 9	14:45	Water	X										temp = C
5	Elkriver downstream Routine	13	2019 – 10 – 9	15:00	Water		X	X								temp = 3.2 C
	Elkriver downstream Nutrient	14	2019 – 10 – 9	15:00	Water				X	X	X	X	X			temp = C
	Elkriver downstream Bacti	15	2019 – 10 – 9	15:00	Water	X										temp = C

TURN AROUND REQUIRED:	◉ ROUTINE	SPECIFY DATE:	(surcharge may apply)	RELINQUISHED BY:	DATE: 2019– 10 – 9	RECEIVED BY:	DATE: 10/10
SEND INVOICE TO:	☒ SAME AS REPORT			Hungry Baytaluke	TIME: 5:00 pm		TIME: 9:16
INVOICE FORMAT:	☐ HARDMAIL ☐ FAX ☐ PDF			RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
					TIME:		TIME:

SPECIAL INSTRUCTIONS: PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com

FOR LAB USE ONLY

Cooler Seal Intact?	Sample Temperature: °C	Cooling Method?
___Yes ___No ___N/A	Frozen? ___Yes ___No	___Icepacks ___Ice ___None

3

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 28-NOV-19
Report Date: 05-DEC-19 09:57 (MT)
Version: FINAL

Client Phone: 800-258-7669

Certificate of Analysis

Lab Work Order #: L2389021

Project P.O. #: NOT SUBMITTED
Job Reference: FARUC - WINTER 2019 EMS WK#1
C of C Numbers:
Legal Site Desc:

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2389021-1 WWTP INFLUENT							
Sampled By: HUNGRY BAYTALUKE on 27-NOV-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	52	DLHC	20	mg/L		29-NOV-19	R4935348
Total Suspended Solids	77.0		3.0	mg/L		02-DEC-19	R4930829
pH	7.81		0.10	pH		28-NOV-19	R4928557
L2389021-2 WWTP EFFLUENT							
Sampled By: HUNGRY BAYTALUKE on 27-NOV-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	0.147		0.050	mg/L		28-NOV-19	R4928321
Biochemical Oxygen Demand	<2.0		2.0	mg/L		29-NOV-19	R4935348
Chemical Oxygen Demand	11		10	mg/L		28-NOV-19	R4928824
Orthophosphate-Dissolved (as P)	0.0549	RRV	0.0050	mg/L		28-NOV-19	R4928424
Coliform Bacteria - Fecal	5		1	CFU/100mL		28-NOV-19	R4929837
Phosphorus (P)-Total	0.087	DLM	0.030	mg/L		29-NOV-19	R4928653
Total Suspended Solids	<3.0		3.0	mg/L		02-DEC-19	R4930829
pH	7.71		0.10	pH		28-NOV-19	R4928557
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	20.7		0.020	mg/L		28-NOV-19	R4928441
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	20.7		0.022	mg/L		29-NOV-19	
Nitrite in Water by IC							
Nitrite (as N)	0.046		0.010	mg/L		28-NOV-19	R4928441
L2389021-3 ELKRIVER UPSTREAM							
Sampled By: HUNGRY BAYTALUKE on 27-NOV-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		28-NOV-19	R4928321
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		28-NOV-19	R4928424
Coliform Bacteria - Fecal	2		1	CFU/100mL		28-NOV-19	R4929837
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		29-NOV-19	R4928653
Total Suspended Solids	<3.0		3.0	mg/L		02-DEC-19	R4930829
pH	8.24		0.10	pH		28-NOV-19	R4928557
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	1.41		0.020	mg/L		28-NOV-19	R4928441
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.41		0.022	mg/L		29-NOV-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		28-NOV-19	R4928441
L2389021-4 ELKRIVER OUTFALL							
Sampled By: HUNGRY BAYTALUKE on 27-NOV-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		28-NOV-19	R4928321
Orthophosphate-Dissolved (as P)	0.0094		0.0050	mg/L		28-NOV-19	R4928424
Coliform Bacteria - Fecal	3		1	CFU/100mL		28-NOV-19	R4929837
Phosphorus (P)-Total	0.0083		0.0050	mg/L		29-NOV-19	R4928653
Total Suspended Solids	<3.0		3.0	mg/L		02-DEC-19	R4930829

* 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
L2389021-4 ELKRIVER OUTFALL							
Sampled By: HUNGRY BAYTALUKE on 27-NOV-19 @ 14:45							
Matrix: WATER							
pH	8.24		0.10	pH		28-NOV-19	R4928557
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	0.451		0.020	mg/L		28-NOV-19	R4928441
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.451		0.022	mg/L		29-NOV-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		28-NOV-19	R4928441
L2389021-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 27-NOV-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		28-NOV-19	R4928321
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		28-NOV-19	R4928424
Coliform Bacteria - Fecal	<1		1	CFU/100mL		28-NOV-19	R4929837
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		29-NOV-19	R4928653
Total Suspended Solids	<3.0		3.0	mg/L		02-DEC-19	R4930829
pH	8.23		0.10	pH		28-NOV-19	R4928557
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	1.58		0.020	mg/L		28-NOV-19	R4928441
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.58		0.022	mg/L		29-NOV-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		28-NOV-19	R4928441

* 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).
OCR	Parameter is out of client specific range.
RRV	Reported Result Verified By Repeat Analysis

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.

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colormetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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 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.

ALS Environmental
ANALYTICAL CHEMISTRY & TESTING SERVICES
www.alsenviro.com

Vancouver BC, 1988 Triumph Street, V5L 1K5, Tel: 604-253-4188 Toll Free: 1-800-665-0243 Fax: 604-253-6700
Fort St. John BC, Box 256, 9831 - 98A Avenue, V1J 6W7, Tel: 250-261-5517 Fax: 250-261-5587
Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5196 Toll Free: 1-800-668-9878 Fax: 780-513-2191
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-791-1524 Fax: 780-791-1586
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free: 1-800-668-9878 Fax: 780-437-2311
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free: 1-800-668-9878 Fax: 403-291-0298
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-800-667-7645 Fax: 306-668-8383

CHAIN OF CUSTODY FORM

SEND REPORT TO: PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION	ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East		
CITY:	CALGARY PROV: ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669 FAX: 403 - 244 - 3774	SAMPLER:	Hungry Baytaluke
PROJECT NAME AND NO.:	F A R U C – Winter 2019 EMS wk #1	QUOTE NO:	
PO NO.:	ALS CONTACT:		patryk.wojciak@alsglobal.com
REPORT FORMAT:	☒ H/ ☒ EMAI ☐ F ☐ F ☒ P ☐ ( )		pmajer@skircr.com

ANALYSIS REQUESTED:

L2389021-COFC

Ambient Air -8°c

WO#	SAMPLE IDENTIFICATION		DATE (YYYY-MM-DD)	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD	NOTES (sample specific comments, due dates, etc.)
	WWTP Influent Routine	1	2019 – 11 –27	14:00	Water		X	X								temp = 8.3 C
	WWTP Influent BOD	2	2019 – 11 –27	14:00	Water									X		temp = C
	WWTP Effluent Routine	3	2019 – 11 –27	14:15	Water		X	X							X	temp = C
	WWTP Effluent BOD	4	2019 – 11 –27	14:15	Water									X		temp = 12.9 C
	WWTP Effluent Nutrient	5	2019 – 11 –27	14:15	Water				X	X	X	X	X			temp = C
	WWTP Effluent Bacti	6	2019 – 11 –27	14:15	Water	X										temp = C
	Elkriver Upstream Routine	7	2019 – 11 –27	14:30	Water		X	X								temp = C
	Elkriver Upstream Nutrient	8	2019 – 11 –27	14:30	Water				X	X	X	X	X			temp = -0.3 C
	Elkriver Upstream Bacti	9	2019 – 11 –27	14:30	Water	X										temp = C
	Elkriver Outfall Routine	10	2019 – 11 –27	14:45	Water		X	X								temp = C
	Elkriver Outfall Nutrient	11	2019 – 11 –27	14:45	Water				X	X	X	X	X			temp = -0.1 C
	Elkriver Outfall Bacti	12	2019 – 11 –27	14:45	Water	X										temp = C
	Elkriver downstream Routine	13	2019 – 11 –27	15:00	Water		X	X								temp = C
	Elkriver downstream Nutrient	14	2019 – 11 –27	15:00	Water				X	X	X	X	X			temp = -0.3 C
	Elkriver downstream Bacti	15	2019 – 11 –27	15:00	Water	X										temp = C

FOR LAB USE ONLY

TURN AROUND REQUIRED: ◉ R ( ) R SPECIFY DATE: ________ (surcharge may apply)

SEND INVOICE TO: ☒ SA ☐ DIFFERE

INVOICE FORMAT: ☐ H/ ☐ P ☐ F

SPECIAL INSTRUCTIONS: PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com

RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
Hungry Baytaluke	2019– 11 –27 TIME: 5:00 pm	[signature]	11/28 TIME: 0900
RELINQUISHED BY:	DATE: TIME: 40	RECEIVED BY:	DATE: TIME:

FOR LAB USE ONLY
Cooler Seal Intact? ✓ Yes ___No ___N/A
Sample Temperature: ___°C Frozen? ___Yes ✓ No
Cooling Method? ✓ Icepacks ___Ice ___None

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 05-DEC-19
Report Date: 12-DEC-19 15:44 (MT)
Version: FINAL

Client Phone: 800-258-7669

Certificate of Analysis

Lab Work Order #: L2392345

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

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2392345-1 WWTP INFLUENT							
Sampled By: HUNGRY BAYTALUKE on 04-DEC-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	68	DLHC	20	mg/L		05-DEC-19	R4941106
Total Suspended Solids	138	DLHC	9.0	mg/L		10-DEC-19	R4942100
pH	7.89		0.10	pH		06-DEC-19	R4940590
L2392345-2 WWTP EFFLUENT							
Sampled By: HUNGRY BAYTALUKE on 04-DEC-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		10-DEC-19	R4940547
Biochemical Oxygen Demand	<2.0		2.0	mg/L		05-DEC-19	R4941106
Chemical Oxygen Demand	<10		10	mg/L		05-DEC-19	R4936425
Orthophosphate-Dissolved (as P)	0.107	DLHC	0.010	mg/L		05-DEC-19	R4936690
Coliform Bacteria - Fecal	<1		1	CFU/100mL		05-DEC-19	R4936610
Nitrate (as N)	21.9	DLHC	0.10	mg/L		06-DEC-19	R4940780
Nitrite (as N)	<0.050	DLHC	0.050	mg/L		06-DEC-19	R4940780
Phosphorus (P)-Total	0.14	DLM	0.10	mg/L		09-DEC-19	R4938246
Total Suspended Solids	<3.0		3.0	mg/L		10-DEC-19	R4942100
pH	8.10		0.10	pH		06-DEC-19	R4940590
L2392345-3 ELKRIVER UPSTREAM							
Sampled By: HUNGRY BAYTALUKE on 04-DEC-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		10-DEC-19	R4940547
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		05-DEC-19	R4936690
Coliform Bacteria - Fecal	<1		1	CFU/100mL		05-DEC-19	R4936610
Nitrate (as N)	1.78		0.020	mg/L		06-DEC-19	R4940780
Nitrite (as N)	<0.010		0.010	mg/L		06-DEC-19	R4940780
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		09-DEC-19	R4938246
Total Suspended Solids	3.3		3.0	mg/L		10-DEC-19	R4942100
pH	8.28		0.10	pH		06-DEC-19	R4940590
L2392345-4 ELKRIVER OUTFALL							
Sampled By: HUNGRY BAYTALUKE on 04-DEC-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		10-DEC-19	R4940547
Orthophosphate-Dissolved (as P)	0.0120		0.0050	mg/L		05-DEC-19	R4936690
Coliform Bacteria - Fecal	33		1	CFU/100mL		05-DEC-19	R4936610
Nitrate (as N)	0.262		0.020	mg/L		06-DEC-19	R4940780
Nitrite (as N)	<0.010		0.010	mg/L		06-DEC-19	R4940780
Phosphorus (P)-Total	0.028	DLM	0.020	mg/L		09-DEC-19	R4938246
Total Suspended Solids	8.0		3.0	mg/L		10-DEC-19	R4942100
pH	8.30		0.10	pH		06-DEC-19	R4940590
L2392345-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 04-DEC-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		10-DEC-19	R4940547
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		05-DEC-19	R4936690

* 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
L2392345-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 04-DEC-19 @ 15:00							
Matrix: WATER							
Coliform Bacteria - Fecal	1		1	CFU/100mL		05-DEC-19	R4936610
Nitrate (as N)	1.87		0.020	mg/L		06-DEC-19	R4940780
Nitrite (as N)	<0.010		0.010	mg/L		06-DEC-19	R4940780
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		09-DEC-19	R4938246
Total Suspended Solids	3.3		3.0	mg/L		10-DEC-19	R4942100
pH	8.29		0.10	pH		06-DEC-19	R4940590

* 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-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.

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colormetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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 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.

ALS Environmental
ANALYTICAL CHEMISTRY & TESTING SERVICES

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Calgary AB, Bay 7, 1313 - 44th Ave
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2191
311
3-291-0298
3-8383

L2392345-COFC

CHAIN OF CUSTODY FORM

PAGE OF

SEND REPORT TO:

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669	FAX:	403 - 244 - 3774	SAMPLER:	Hungry Baytaluke
PROJECT NAME AND NO.:	F A R U C – Winter 2019 EMS wk #2			QUOTE NO:	
PO NO.:		ALS CONTACT:	patryk.wojciak@alsglobal.com		
REPORT FORMAT:	☒ HARDMAIL ☒ EMAIL ☐ FAX ☐ EXCEL ☒ PDF ☐ ( )		pmajer@skircr.com		

ANALYSIS REQUESTED:

WO#	SAMPLE IDENTIFICATION		DATE / TIME COLLECTED YYYY-MM-DD	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD	NOTES (sample specific comments, due dates, etc.)
	WWTP Influent Routine	1	2019 – 12 – 4	14:00	Water		X	X								temp = 5.2 C
	WWTP Influent BOD	2	2019 – 12 – 4	14:00	Water									X		temp = 5.2 C
	WWTP Effluent Routine	3	2019 – 12 – 4	14:15	Water		X	X							X	temp = C
	WWTP Effluent BOD	4	2019 – 12 – 4	14:15	Water									X		temp = 12.2 C
	WWTP Effluent Nutrient	5	2019 – 12 – 4	14:15	Water				X	X	X	X	X			temp = 12.2 C
	WWTP Effluent Bacti	6	2019 – 12 – 4	14:15	Water	X										temp = 12.2 C
	Elkriver Upstream Routine	7	2019 – 12 – 4	14:30	Water		X	X								temp = 0.9 C
	Elkriver Upstream Nutrient	8	2019 – 12 – 4	14:30	Water				X	X	X	X	X			temp = 0.9 C
	Elkriver Upstream Bacti	9	2019 – 12 – 4	14:30	Water	X										temp = 0.1 C
	Elkriver Outfall Routine	10	2019 – 12 – 4	14:45	Water		X	X								temp = 0.8 C
	Elkriver Outfall Nutrient	11	2019 – 12 – 4	14:45	Water				X	X	X	X	X			temp = 0.8 C
	Elkriver Outfall Bacti	12	2019 – 12 – 4	14:45	Water	X										temp = 0.8 C
	Elkriver downstream Routine	13	2019 – 12 – 4	15:00	Water		X	X								temp = 0.7 C
	Elkriver downstream Nutrient	14	2019 – 12 – 4	15:00	Water				X	X	X	X	X			temp = 0.7 C
	Elkriver downstream Bacti	15	2019 – 12 – 4	15:00	Water	X										temp = 0.7 C

FOR LAB USE ONLY

TURN AROUND REQUIRED: ◉ ROUTINE SPECIFY DATE: _____ (surcharge may apply)

SEND INVOICE TO: ☒ SAME AS REPORT TO

INVOICE FORMAT: ☐ HARDMAIL ☐ EMAIL ☐ FAX

SPECIAL INSTRUCTIONS: PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com

RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
Hungry Baytaluke	2019– 12– 4		12/5
	TIME: 5:00 pm		TIME: 9:00
RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
	TIME:		TIME:

FOR LAB USE ONLY

Cooler Seal Intact?	Sample Temperature: 4 °C	Cooling Method?
___Yes ___No ___N/A	Frozen? ___Yes ___No	___Icepacks ___Ice ___None

G:/QUALITY/00_DOCUMENTS/10_AUTHORIZED/FORMS/Hungry's CoC for ALS full EMS.xls

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 12-DEC-19
Report Date: 19-DEC-19 12:47 (MT)
Version: FINAL

Client Phone: 800-258-7669

Certificate of Analysis

Lab Work Order #: L2395446

Project P.O. #: NOT SUBMITTED
Job Reference: FARUC - WINTER 2019 EMS WK#3 HB
C of C Numbers:
Legal Site Desc:

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2395446-1 WWTP INFLUENT							
Sampled By: HUNGRY BAYTALUKE on 11-DEC-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	69	BODP	20	mg/L		12-DEC-19	R4944792
Total Suspended Solids	124	DLHC	6.0	mg/L		18-DEC-19	R4946222
pH	7.88		0.10	pH		12-DEC-19	R4942964
L2395446-2 WWTP EFFLUENT							
Sampled By: HUNGRY BAYTALUKE on 11-DEC-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		18-DEC-19	R4946158
Biochemical Oxygen Demand	4.8	BODP	2.0	mg/L		12-DEC-19	R4944792
Chemical Oxygen Demand	<10		10	mg/L		15-DEC-19	R4943555
Orthophosphate-Dissolved (as P)	0.111	DLHC	0.010	mg/L		14-DEC-19	R4943502
Coliform Bacteria - Fecal	<1		1	CFU/100mL		12-DEC-19	R4943413
Nitrate (as N)	18.4		0.020	mg/L		12-DEC-19	R4943241
Nitrite (as N)	0.012		0.010	mg/L		12-DEC-19	R4943241
Phosphorus (P)-Total	0.161	DLHC	0.010	mg/L		15-DEC-19	R4943778
Total Suspended Solids	<3.0		3.0	mg/L		17-DEC-19	R4945472
pH	8.11		0.10	pH		12-DEC-19	R4942964
L2395446-3 ELKRIVER UPSTREAM							
Sampled By: HUNGRY BAYTALUKE on 11-DEC-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		18-DEC-19	R4946158
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		14-DEC-19	R4943502
Coliform Bacteria - Fecal	<1		1	CFU/100mL		12-DEC-19	R4943413
Nitrate (as N)	1.64		0.020	mg/L		12-DEC-19	R4943241
Nitrite (as N)	<0.010		0.010	mg/L		12-DEC-19	R4943241
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		15-DEC-19	R4943778
Total Suspended Solids	<3.0		3.0	mg/L		17-DEC-19	R4945472
pH	8.31		0.10	pH		12-DEC-19	R4942964
L2395446-4 ELKRIVER OUTFALL							
Sampled By: HUNGRY BAYTALUKE on 11-DEC-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		18-DEC-19	R4946158
Orthophosphate-Dissolved (as P)	0.0099		0.0050	mg/L		14-DEC-19	R4943502
Coliform Bacteria - Fecal	1		1	CFU/100mL		12-DEC-19	R4943413
Nitrate (as N)	0.090		0.020	mg/L		12-DEC-19	R4943241
Nitrite (as N)	<0.010		0.010	mg/L		12-DEC-19	R4943241
Phosphorus (P)-Total	0.0116		0.0050	mg/L		15-DEC-19	R4943778
Total Suspended Solids	<3.0		3.0	mg/L		17-DEC-19	R4945472
pH	8.31		0.10	pH		12-DEC-19	R4942964
L2395446-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 11-DEC-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		18-DEC-19	R4946158
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		14-DEC-19	R4943502

* 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
L2395446-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 11-DEC-19 @ 15:00							
Matrix: WATER							
Coliform Bacteria - Fecal	1		1	CFU/100mL		12-DEC-19	R4943413
Nitrate (as N)	1.87		0.020	mg/L		12-DEC-19	R4943241
Nitrite (as N)	<0.010		0.010	mg/L		12-DEC-19	R4943241
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		15-DEC-19	R4943778
Total Suspended Solids	<3.0		3.0	mg/L		17-DEC-19	R4945472
pH	8.32		0.10	pH		12-DEC-19	R4942964

* 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.
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-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.

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colormetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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 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.

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Calgary AB, Bay ... 668-9878 Fax: 403-291-0298
Saskatoon SK, E ... 7645 Fax: 306-668-8383

L2395446-COFC

CHAIN OF CUSTODY FORM

PAGE ___ OF ___

SEND REPORT TO:

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION	ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East		
CITY:	CALGARY PROV: ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669 FAX: 403 - 244 - 3774	SAMPLER:	Hungry Baytaluke
PROJECT NAME AND NO.:	F A R U C – Winter 2019 EMS wk #3 HB	QUOTE NO:	
PO NO.:		ALS CONTACT:	patryk.wojciak@alsglobal.com
REPORT FORMAT:	☒ HA ☒ EMAI ☐ F ☐ F ☒ P ☐ (		pmajer@skircr.com

ANALYSIS REQUESTED:

Ambient air -7°C

WO#	SAMPLE IDENTIFICATION	YYYY-MM-DD	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD					NOTES (sample specific comments, due dates, etc.)
	WWTP Influent Routine 1	2019 – 12 – 11	14:00	Water		X	X												temp = 9.8° C
1	WWTP Influent BOD 2	2019 – 12 – 11	14:00	Water									X						temp = C
	WWTP Effluent Routine 3	2019 – 12 – 11	14:15	Water		X	X							X					temp = C
2	WWTP Effluent BOD 4	2019 – 12 – 11	14:15	Water									X						temp = 11.9° C
	WWTP Effluent Nutrient 5	2019 – 12 – 11	14:15	Water				X	X	X	X	X							temp = C
	WWTP Effluent Bacti 6	2019 – 12 – 11	14:15	Water	X														temp = C
	Elkriver Upstream Routine 7	2019 – 12 – 11	14:30	Water		X	X												temp = C
3	Elkriver Upstream Nutrient 8	2019 – 12 – 11	14:30	Water				X	X	X	X	X							temp = 1.0° C
	Elkriver Upstream Bacti 9	2019 – 12 – 11	14:30	Water	X														temp = C
	Elkriver Outfall Routine 10	2019 – 12 – 11	14:45	Water		X	X												temp = C
4	Elkriver Outfall Nutrient 11	2019 – 12 – 11	14:45	Water				X	X	X	X	X							temp = 1.7° C
	Elkriver Outfall Bacti 12	2019 – 12 – 11	14:45	Water	X														temp = C
	Elkriver downstream Routine 13	2019 – 12 – 11	15:00	Water		X	X												temp = C
5	Elkriver downstream Nutrient 14	2019 – 12 – 11	15:00	Water				X	X	X	X	X							temp = 0.8 C
	Elkriver downstream Bacti 15	2019 – 12 – 11	15:00	Water	X														temp = C

FOR LAB USE ONLY

TURN AROUND REQUIRED: ● R(ϕ R SPECIFY DATE: ____________ (surcharge may apply)

SEND INVOICE TO: ☒ SAI ☐ DIFFERE

INVOICE FORMAT: ☐ HA ☐ P ☐ F

SPECIAL INSTRUCTIONS: PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com

RELINQUISHED BY:	DATE: 2019– 12–11	RECEIVED BY:	DATE: 12/12
Hungry Baytaluke	TIME: 5:00 pm	BL	TIME: 0850
RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
	TIME:		TIME:

FOR LAB USE ONLY

Cooler Seal Intact? ✓ Yes __ No __ N/A | Sample Temperature: 3 °C | Frozen? __ Yes ✗ No | Cooling Method? __ Icepacks __ Ice __ None

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 19-DEC-19
Report Date: 30-DEC-19 14:17 (MT)
Version: FINAL

Client Phone: 800-258-7669

Certificate of Analysis

Lab Work Order #: L2398549

Project P.O. #: NOT SUBMITTED
Job Reference: F A R U C - WINTER 2019 EMS WK #4
C of C Numbers:
Legal Site Desc:

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2398549-1 WWTP INFLUENT							
Sampled By: HUNGRY BAYTALUKE on 18-DEC-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	96	DLHC	20	mg/L		19-DEC-19	R4954963
Total Suspended Solids	38.7		3.0	mg/L		24-DEC-19	R4955293
pH	7.96		0.10	pH		19-DEC-19	R4949046
L2398549-2 WWTP EFFLUENT							
Sampled By: HUNGRY BAYTALUKE on 18-DEC-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		23-DEC-19	R4957138
Biochemical Oxygen Demand	<2.0		2.0	mg/L		19-DEC-19	R4954963
Chemical Oxygen Demand	<10		10	mg/L		27-DEC-19	R4955379
Orthophosphate-Dissolved (as P)	0.135	DLHC	0.025	mg/L		19-DEC-19	R4947210
Coliform Bacteria - Fecal	6		1	CFU/100mL		19-DEC-19	R4949257
Nitrate (as N)	33.2	RRV	0.020	mg/L		19-DEC-19	R4954206
Nitrite (as N)	0.018		0.010	mg/L		19-DEC-19	R4954206
Phosphorus (P)-Total	0.164	DLHC	0.010	mg/L		20-DEC-19	R4949226
Total Suspended Solids	<3.0		3.0	mg/L		24-DEC-19	R4955293
pH	7.92		0.10	pH		19-DEC-19	R4949046
L2398549-3 ELKRIVER UPSTREAM							
Sampled By: HUNGRY BAYTALUKE on 18-DEC-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		23-DEC-19	R4957138
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		19-DEC-19	R4947210
Coliform Bacteria - Fecal	<1		1	CFU/100mL		19-DEC-19	R4949257
Nitrate (as N)	1.47		0.020	mg/L		19-DEC-19	R4954206
Nitrite (as N)	<0.010		0.010	mg/L		19-DEC-19	R4954206
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		20-DEC-19	R4949226
Total Suspended Solids	<3.0		3.0	mg/L		24-DEC-19	R4955293
pH	8.29		0.10	pH		19-DEC-19	R4949046
L2398549-4 ELKRIVER OUTFALL							
Sampled By: HUNGRY BAYTALUKE on 18-DEC-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		23-DEC-19	R4957138
Orthophosphate-Dissolved (as P)	0.0092		0.0050	mg/L		19-DEC-19	R4947210
Coliform Bacteria - Fecal	<1		1	CFU/100mL		19-DEC-19	R4949257
Nitrate (as N)	0.173		0.020	mg/L		19-DEC-19	R4954206
Nitrite (as N)	<0.010		0.010	mg/L		19-DEC-19	R4954206
Phosphorus (P)-Total	0.0117		0.0050	mg/L		20-DEC-19	R4949226
Total Suspended Solids	<3.0		3.0	mg/L		24-DEC-19	R4955293
pH	8.38		0.10	pH		19-DEC-19	R4949046
L2398549-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 18-DEC-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		23-DEC-19	R4957138
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		19-DEC-19	R4947210

* 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
L2398549-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 18-DEC-19 @ 15:00							
Matrix: WATER							
Coliform Bacteria - Fecal	<1		1	CFU/100mL		19-DEC-19	R4949257
Nitrate (as N)	1.55		0.020	mg/L		19-DEC-19	R4954206
Nitrite (as N)	<0.010		0.010	mg/L		19-DEC-19	R4954206
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		20-DEC-19	R4949226
Total Suspended Solids	<3.0		3.0	mg/L		24-DEC-19	R4955293
pH	8.33		0.10	pH		19-DEC-19	R4949046

* 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).
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

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

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colormetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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 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.

ALS Environmental
ANALYTICAL CHEMISTRY & TESTING SERVICES

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Calgary AB, Ba 0-668-9878 Fax: 403-291-0298
Saskatoon SK, Tel: 306-668-8370 Toll Free: 1-800-667-7645 Fax: 306-668-8383

L2398549-COFC

CHAIN OF CUSTODY FORM

PAGE OF

SEND REPORT TO:

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION	ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East		
CITY:	CALGARY PROV: ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669 FAX: 403 - 244 - 3774	SAMPLER:	Hungry Baytaluke
PROJECT NAME AND NO.:	F A R U C – Winter 2019 EMS wk #4	QUOTE NO:	
PO NO.:		ALS CONTACT:	patryk.wojciak@alsglobal.com
REPORT FORMAT:	☒ H/ ☒ EMAI ☐ ☐ ☒ ☐		pmajer@skircr.com

ANALYSIS REQUESTED: Ambient air -1°C

WO#	SAMPLE IDENTIFICATION		DATE (YYYY-MM-DD)	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD					NOTES (sample specific comments, due dates, etc.)
1	WWTP Influent Routine	1	2019 – 12 – 18	14:00	Water		X	X												temp = 10.2 C
	WWTP Influent BOD	2	2019 – 12 – 18	14:00	Water									X						temp = C
2	WWTP Effluent Routine	3	2019 – 12 – 18	14:15	Water		X	X							X					temp = 12.9 C
	WWTP Effluent BOD	4	2019 – 12 – 18	14:15	Water									X						temp = C
	WWTP Effluent Nutrient	5	2019 – 12 – 18	14:15	Water				X	X	X	X	X							temp = C
	WWTP Effluent Bacti	6	2019 – 12 – 18	14:15	Water	X														temp = C
3	Elkriver Upstream Routine	7	2019 – 12 – 18	14:30	Water		X	X												temp = 0.5 C
	Elkriver Upstream Nutrient	8	2019 – 12 – 18	14:30	Water				X	X	X	X	X							temp = C
	Elkriver Upstream Bacti	9	2019 – 12 – 18	14:30	Water	X														temp = C
4	Elkriver Outfall Routine	10	2019 – 12 – 18	14:45	Water		X	X												temp = 1.0 C
	Elkriver Outfall Nutrient	11	2019 – 12 – 18	14:45	Water				X	X	X	X	X							temp = C
	Elkriver Outfall Bacti	12	2019 – 12 – 18	14:45	Water	X														temp = C
5	Elkriver downstream Routine	13	2019 – 12 – 18	15:00	Water		X	X												temp = 0.5 C
	Elkriver downstream Nutrient	14	2019 – 12 – 18	15:00	Water				X	X	X	X	X							temp = C
	Elkriver downstream Bacti	15	2019 – 12 – 18	15:00	Water	X														temp = C

FOR LAB USE ONLY

TURN AROUND REQUIRED:	◉ RI ◯ R SPECIFY DATE: ______ (surcharge may apply)
SEND INVOICE TO:	☒ SAN ☐ DIFFERE
INVOICE FORMAT:	☐ H/ ☐ ☐
SPECIAL INSTRUCTIONS:	PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com

RELINQUISHED BY:	DATE:		RECEIVED BY:	DATE:	
Hungry Baytaluke	TIME:	2019– 12–18 5:00 pm	Dk	TIME:	12/19 0840
RELINQUISHED BY:	DATE:		RECEIVED BY:	DATE:	
	TIME:			TIME:	

FOR LAB USE ONLY

Cooler Seal Intact? X Yes __No __N/A
Sample Temperature: 7 °C
Frozen? __Yes X No
Cooling Method? X Icepacks __Ice __None

FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN: PATRICK MAJER
1505 - 17TH AVENUE SW
CALGARY AB T2T 0E2

Date Received: 24-DEC-19
Report Date: 02-JAN-20 14:41 (MT)
Version: FINAL

Client Phone: 800-258-7669

Certificate of Analysis

Lab Work Order #: L2400117

Project P.O. #: NOT SUBMITTED
Job Reference: FARUC - WINTER 2019 EMS WK #5
C of C Numbers:
Legal Site Desc:

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2400117-1 WWTP INFLUENT							
Sampled By: HUNGRY BAYTALUKE on 23-DEC-19 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	170	DLHC	75	mg/L		24-DEC-19	R4956626
Total Suspended Solids	151	DLHC	5.0	mg/L		30-DEC-19	R4958015
pH	7.82		0.10	pH		30-DEC-19	R4958137
L2400117-2 WWTP EFFLUENT							
Sampled By: HUNGRY BAYTALUKE on 23-DEC-19 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		31-DEC-19	R4958324
Biochemical Oxygen Demand	<2.0		2.0	mg/L		24-DEC-19	R4956626
Chemical Oxygen Demand	12		10	mg/L		30-DEC-19	R4957916
Orthophosphate-Dissolved (as P)	0.183	DLHC	0.010	mg/L		24-DEC-19	R4955084
Coliform Bacteria - Fecal	139		1	CFU/100mL		24-DEC-19	R4956888
Nitrate (as N)	17.0		0.020	mg/L		24-DEC-19	R4957366
Nitrite (as N)	<0.010		0.010	mg/L		24-DEC-19	R4957366
Phosphorus (P)-Total	0.243	DLHC	0.025	mg/L		27-DEC-19	R4955311
Total Suspended Solids	<3.0		3.0	mg/L		30-DEC-19	R4958015
pH	7.66		0.10	pH		30-DEC-19	R4958137
L2400117-3 ELKRIVER UPSTREAM							
Sampled By: HUNGRY BAYTALUKE on 23-DEC-19 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		31-DEC-19	R4958324
Orthophosphate-Dissolved (as P)	0.0063		0.0050	mg/L		24-DEC-19	R4955084
Coliform Bacteria - Fecal	4		1	CFU/100mL		24-DEC-19	R4956888
Nitrate (as N)	1.14		0.020	mg/L		24-DEC-19	R4957366
Nitrite (as N)	<0.010		0.010	mg/L		24-DEC-19	R4957366
Phosphorus (P)-Total	0.0177		0.0050	mg/L		27-DEC-19	R4955311
Total Suspended Solids	5.3		3.0	mg/L		30-DEC-19	R4958015
pH	8.20		0.10	pH		30-DEC-19	R4958137
L2400117-4 ELKRIVER OUTFALL							
Sampled By: HUNGRY BAYTALUKE on 23-DEC-19 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		31-DEC-19	R4958324
Orthophosphate-Dissolved (as P)	0.0130		0.0050	mg/L		24-DEC-19	R4955084
Coliform Bacteria - Fecal	1		1	CFU/100mL		24-DEC-19	R4956888
Nitrate (as N)	0.105		0.020	mg/L		24-DEC-19	R4957366
Nitrite (as N)	<0.010		0.010	mg/L		24-DEC-19	R4957366
Phosphorus (P)-Total	0.0258		0.0050	mg/L		27-DEC-19	R4955311
Total Suspended Solids	6.7		3.0	mg/L		30-DEC-19	R4958015
pH	8.20		0.10	pH		30-DEC-19	R4958137
L2400117-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 23-DEC-19 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		31-DEC-19	R4958324
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		24-DEC-19	R4955084

* 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
L2400117-5 ELKRIVER DOWNSTREAM							
Sampled By: HUNGRY BAYTALUKE on 23-DEC-19 @ 15:00							
Matrix: WATER							
Coliform Bacteria - Fecal	5		1	CFU/100mL		24-DEC-19	R4956888
Nitrate (as N)	1.28		0.020	mg/L		24-DEC-19	R4957366
Nitrite (as N)	<0.010		0.010	mg/L		24-DEC-19	R4957366
Phosphorus (P)-Total	0.0143		0.0050	mg/L		27-DEC-19	R4955311
Total Suspended Solids	4.0		3.0	mg/L		30-DEC-19	R4958015
pH	8.20		0.10	pH		30-DEC-19	R4958137

* 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-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.

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

The Chemical Oxygen Demand (COD) test is used to estimate the amount of organic matter in the water. The sample is added to COD tubes, which contain a premixed volume of reagents. The sample is then heated for two hours on the COD reactor with a strong oxidizing agent, potassium dichromate. The COD reagents also contain silver and mercury ions. Silver is used as a catalyst and mercury is used to complex chloride interference. Oxidizable organic compounds react, reducing the dichromate ion to green chromic ion. For samples in the 10 - 150 mg/L range the remaining Cr6+ is measured colormetrically and a decrease in absorbance at 420 nm is proportional to the COD. Samples with concentrations > 150 mg/L can be diluted into the linear range.

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.

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.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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 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.

ALS Environmental
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Toll Free: 1-800-667-7645 Fax: 306-668-8383

L2400117-COFC

CHAIN OF CUSTODY FORM

PAGE OF

SEND REPORT TO:

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH Avenue South East				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	1 - 800 - 258 - 7669	FAX:	403 - 244 - 3774	SAMPLER:	Hungry Baytaluke
PROJECT NAME AND NO.:	F A R U C – Winter 2019 EMS wk #5			QUOTE NO:	
PO NO.:		ALS CONTACT:	patryk.wojciak@alsglobal.com		
REPORT FORMAT:	☒ HARDMAIL ☐ FAX ☒ PDF ☐		pmaier@skircr.com		

ANALYSIS REQUESTED:

WO#	SAMPLE IDENTIFICATION		DATE / TIME COLLECTED YYYY-MM-DD	TIME	MATRIX	Fecal Coliforms	TSS	pH	Ortho P	Total P	NH3-N	NO3-N	NO2-N	BOD5	COD	NOTES (sample specific comments, due dates, etc.)
1	WWTP Influent Routine	1	2019 – 12 –23	14:00	Water		X	X								temp = 9.9 C
	WWTP Influent BOD	2	2019 – 12 –23	14:00	Water									X		temp = 9.9 C
2																
	WWTP Effluent Routine	3	2019 – 12 –23	14:15	Water		X	X							X	temp = C
	WWTP Effluent BOD	4	2019 – 12 –23	14:15	Water									X		temp = 11.6 C
	WWTP Effluent Nutrient	5	2019 – 12 –23	14:15	Water				X	X	X	X	X			temp = C
	WWTP Effluent Bacti	6	2019 – 12 –23	14:15	Water	X										temp = C
3	Elkriver Upstream Routine	7	2019 – 12 –23	14:30	Water		X	X								temp = 7.1 C
	Elkriver Upstream Nutrient	8	2019 – 12 –23	14:30	Water				X	X	X	X	X			temp = 7.1 C
	Elkriver Upstream Bacti	9	2019 – 12 –23	14:30	Water	X										temp = 7.1 C
4	Elkriver Outfall Routine	10	2019 – 12 –23	14:45	Water		X	X								temp = 3.1 C
	Elkriver Outfall Nutrient	11	2019 – 12 –23	14:45	Water				X	X	X	X	X			temp = 3.1 C
	Elkriver Outfall Bacti	12	2019 – 12 –23	14:45	Water	X										temp = 3.1 C
5	Elkriver downstream Routine	13	2019 – 12 –23	15:00	Water		X	X								temp = 2.3 C
	Elkriver downstream Nutrient	14	2019 – 12 –23	15:00	Water				X	X	X	X	X			temp = 2.3 C
	Elkriver downstream Bacti	15	2019 – 12 –23	15:00	Water	X										temp = 2.3 C

FOR LAB USE ONLY

Ambient air -2 oc

TURN AROUND REQUIRED: ◉ ROUTINE SPECIFY DATE: _____ (surcharge may apply)

SEND INVOICE TO: ☒ SAME AS ABOVE ☐ DIFFERENT

INVOICE FORMAT: ☐ HARDMAIL ☐ FAX ☐ PDF

SPECIAL INSTRUCTIONS: PLEASE FAX A COPY OF THE RESULTS TO 250-423-4652 OR E-MAIL TO wastewater@skifernie.com

RELINQUISHED BY:	DATE: 2019– 12–23	RECEIVED BY:	DATE: 12/24
Hungry Baytaluke	TIME: 5:00 pm		TIME: 9:20
RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
	TIME:		TIME:

FOR LAB USE ONLY

Cooler Seal Intact? ___Yes ___No ___N/A	Sample Temperature: 6 °C Frozen? ___Yes ___No	Cooling Method? ___Icepacks ___Ice ___None