ENVIRONMENTAL DIAGNOSTICS INC.

2016 SEWAGE TREATMENT PLANT ANNUAL REPORT

Prepared for:

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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 calendar year 2016.

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 was a slight decrease in ortho phosphorus levels and a slight increase in total phosphorus levels this year. There one sample out of twenty-two which were above the MSR discharge limit for ortho phosphorus and one sample out of twenty-two which were above the MSR discharge limit for total phosphorus. 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 until all the total phosphorus concentrations are within 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. 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.

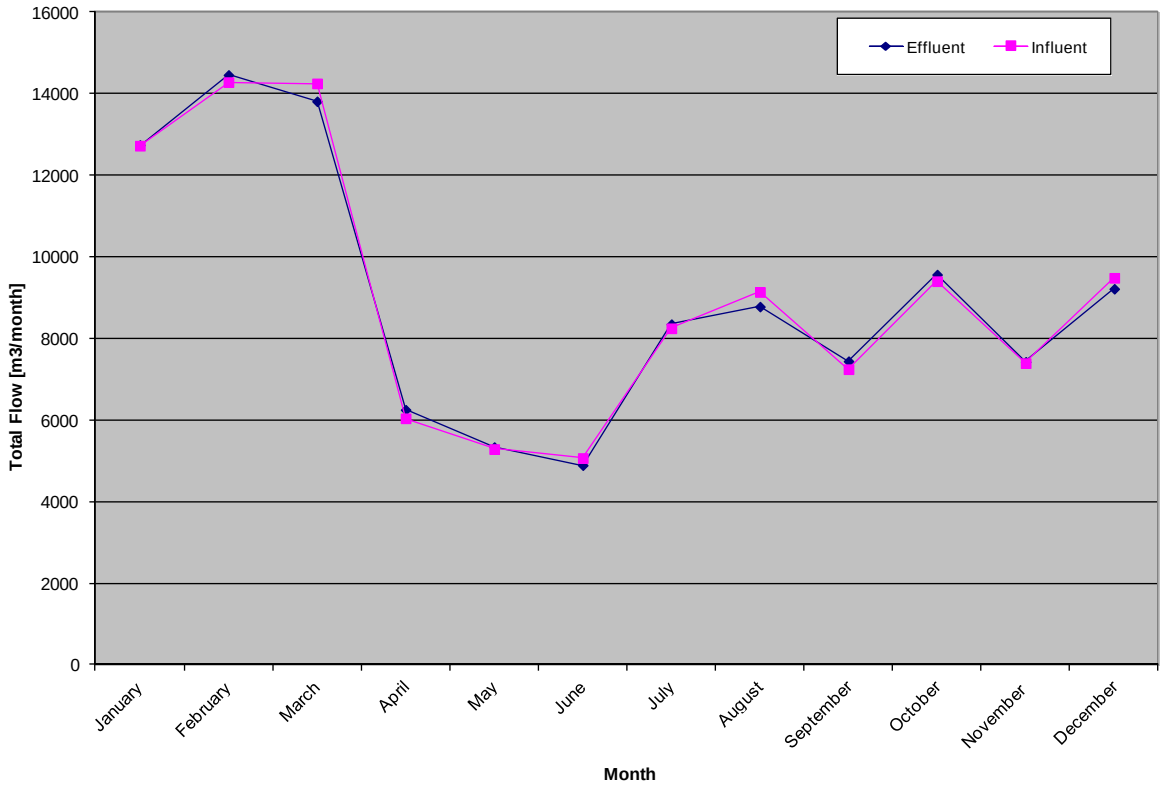
3.0 SEWAGE FLOW RECORDS

This section provides data and analysis regarding plant influent and effluent flows, and compares 2016 data to previous years.

Total effluent flow from the WWTP for all of 2016 was recorded from the effluent weir type flow meter as 108,326 m^3 and the average was 296 m^3 per day. This year, the graph below shows that total effluent is very similar to the total influent for the plant.

Available monthly total effluent flow meter records for 2016 are provided in Figure 1.

Figure 1
Effluent and Influent Flow Meter Monthly Flow Totals



The ski resort operates with higher winter and late spring sewage flows than during any other period. The average daily plant flow through January, February and March of 2016 was 452 m^3/day. The average daily flow was 378 m^3 per day in 2015, 484 m^3 per day in 2014, 485 m^3 per day in 2013, the average daily flow could not be calculated in 2012 but it was 479 m^3 per day for the same time period in 2011, compared to 412 m^3/day over the same period in 2010. Peak flow for the year reached 844 m^3/day on February 14th, 2016, which was 34% below the allowable daily limit of 1,280 m^3/day. The peak flow was lower than that of 2015 (1,058 m^3/day), 2014 (1,036 m^3/day), 2013 (1,181 m^3/day) and 2009 (1,178 m^3/day), 2011 (989 m^3/day), but higher than of 2012 (811 m^3/day) and 2010 (823 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 2016 is provided in Table 3 and Figures 2 and 3:

Table 3

2003 – 2016 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

* 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 2016

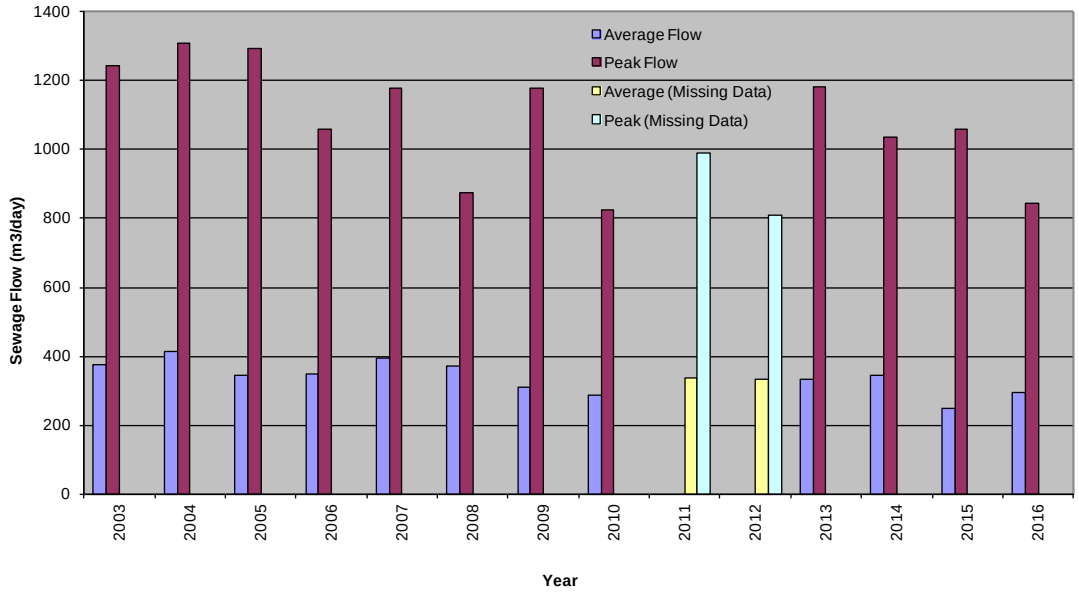
The average flow for 2016 has increased slightly compared to 2015 at 296 m^3/day vs 250 m^3/day; however, there are no instances where the flow exceeded the plant maximum allowable flow and daily discharge of 1,280 m^3/day. The peak flow has decreased compared to 2015 (844 m^3/day vs 1,036 m^3/day) and it was lower than in 2014, 2013 and 2011; however, it was comparable to 2010 and 2012. Please note that the peak flows from 2011 and 2012 may not be representative as there was data missing for both years.

As seen in previous years, the highest peak flow was in February; high peak flows also occurred systematically in January, March and December, which is consistent with the facility operations. The highest month in 2016 for average flows was in February, in which the peak flow was also observed.

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

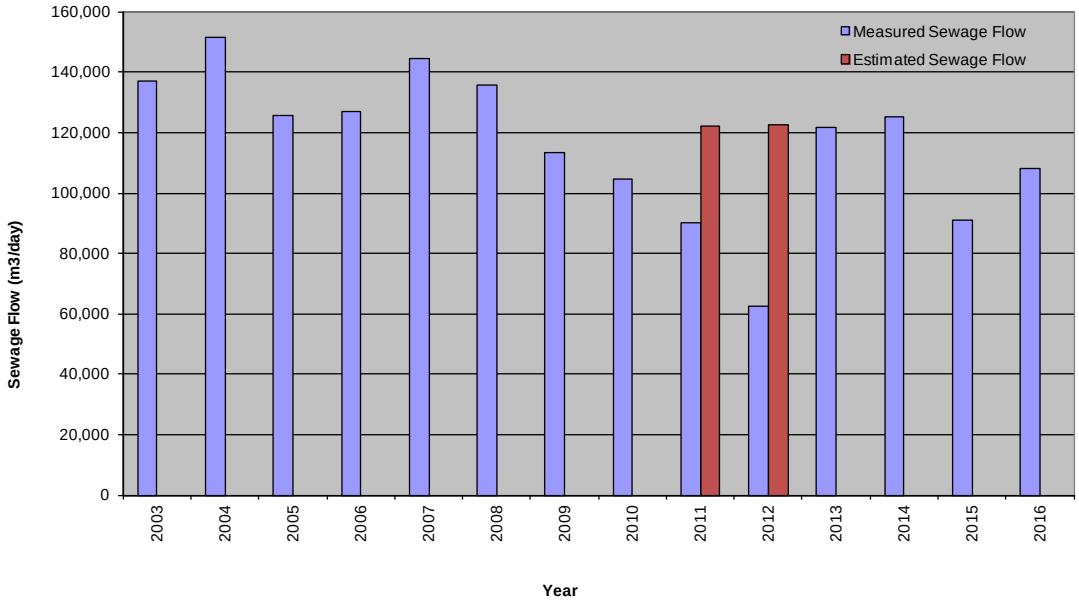
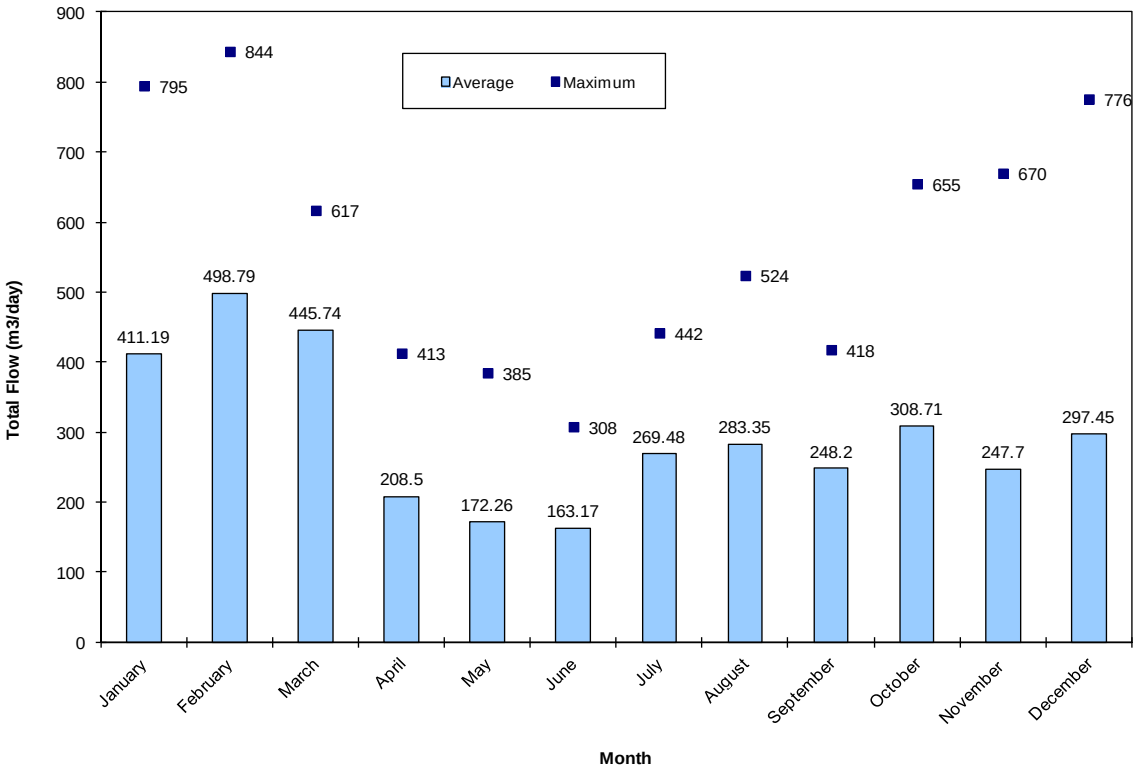


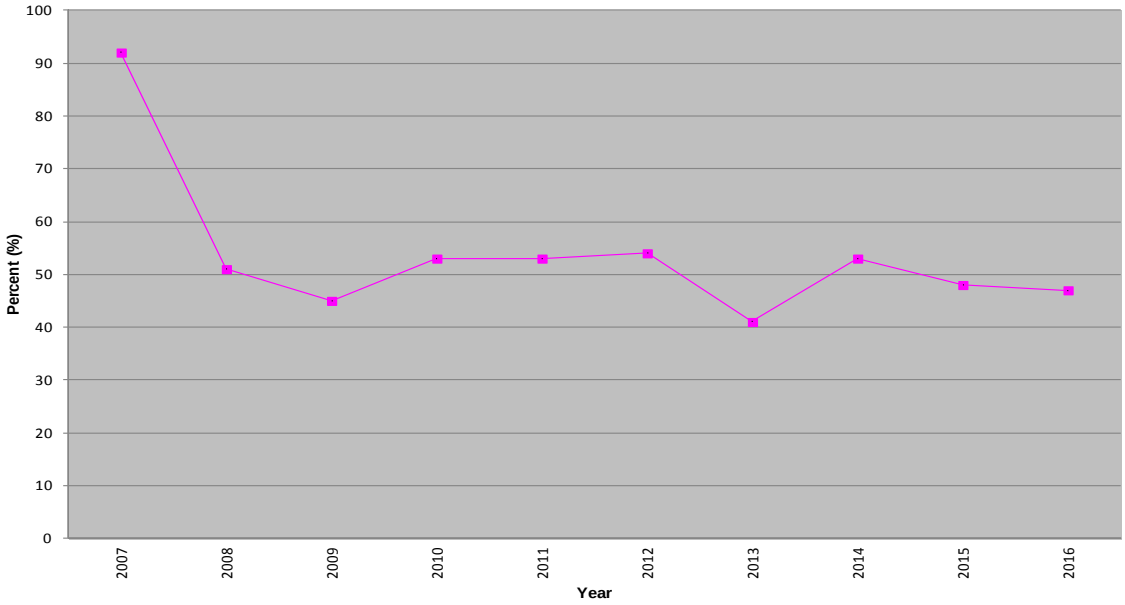
Figure 4
2016 Sewage Effluent Average and Peak Flows by Month



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.

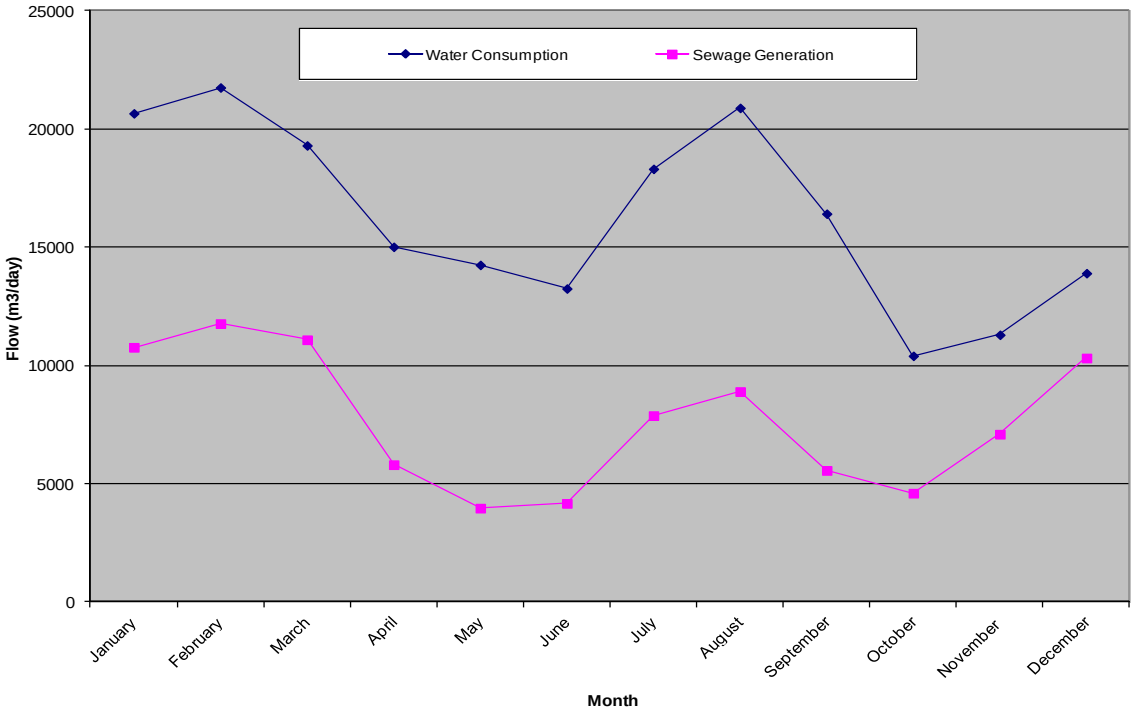
Note that there is an overall decreasing trend in % of return flow vs total water usage since 2007. The percent sewage flow vs the water production for each year since 2007 has been plotted in Figure 5 below.

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 2016.

Figure 6
2016 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 2016 based on current development plans and provides an estimate of remaining plant capacity as calculated and tabulated in the 2006 yearly report.

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 the last five years (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 and 2015 respectively, the correction factors were 1.20, 0.89, 1.14, 0.65, 0.76, 0.62, 0.91, 0.80 and 0.81 which showed that the resort had reduced the impact of both stormwater infiltration and reduced peak flows. The correction factor was 0.65 in 2016.

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 and 2017 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 stormwater infiltration program, flow restrictive devices, and other water consumption measures.

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

Even with additional expansion, 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. Sewage discharge rates will be monitored and an application will be submitted to increase the maximum daily discharge when warranted.

Based on the 2016 flow data, the plant has an unused capacity of 436 m^3/day due to the flow saving measures. This still needs to be closely monitored during 2017 and further considered when adding additional development.

Table 4
Projected Peak Flows: 2007-2017

	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**
Estimated Wastewater Flow (m^3/day)	1302.3	1302.3	1302.3	1302.3	1302.3
Actual and Corrected (m^3/day)	1181 (a)	1036 (a)	1058 (a)	844 (a)	1094 (b)

(a) actual peak flow

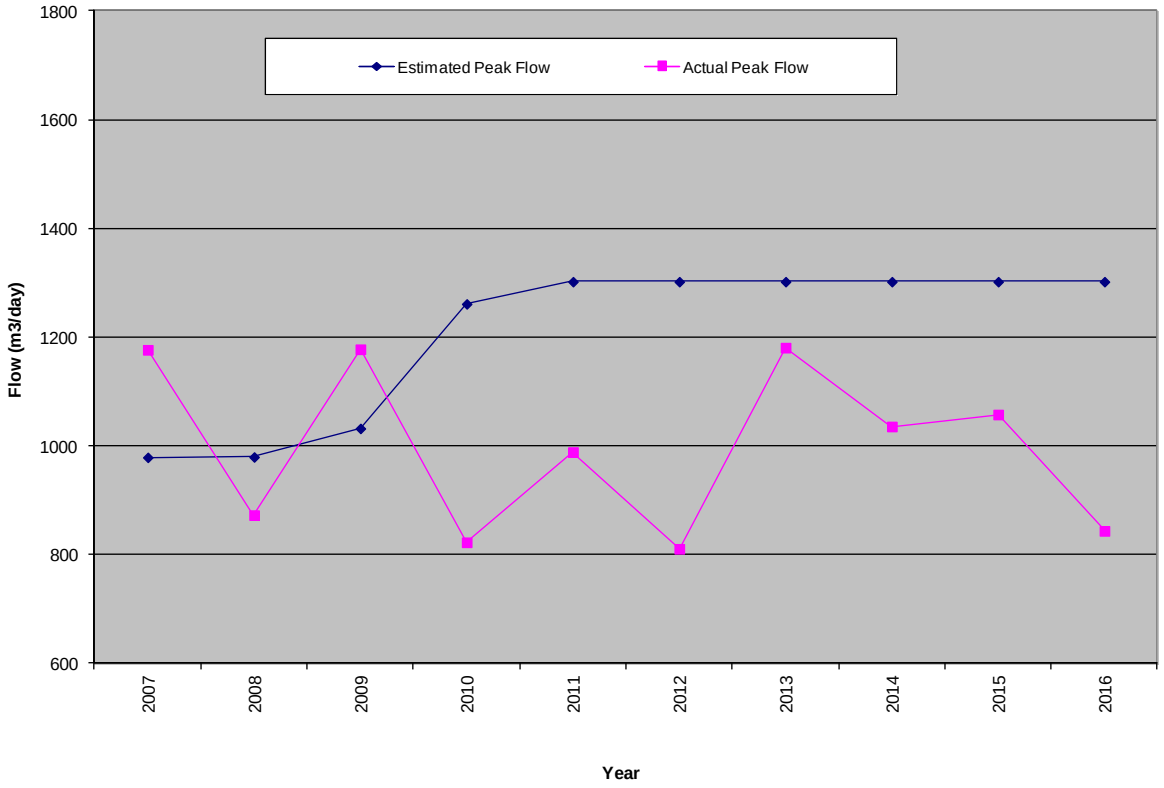
(b) corrected daily peak flows by the averaged correction faction for 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 and correction factor

2007	correction factor of	1177/979.2 = 1.20
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 = 0.80
2015		1058/1302.3 = 0.81
2016		844/1302.3 = 0.65
	AVERAGE	**= 0.84**

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

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

Figure 7
Estimated vs Actual Peak Flows (Historical)



5.0 OVERVIEW OF ELK RIVER SAMPLE RESULTS

This section provides data and analysis for the Elk River samples taken during 2016.

Table 5 provides a summary record of the Elk River test results for the time period from January 6th, 2016 to December 28th, 2016.

No significant changes were observed in pH, phosphorous or nitrogen concentrations during any of the river sample periods. In general, ortho phosphorus was highest in the outfall but all the results from down-stream were consistently below laboratory detection limits. Low levels of nitrate and nitrite were observed upstream, at the outfall and down-stream throughout the year. Elevated levels of TSS were observed on May 5th in the upstream, outfall and in the downstream samples. TSS in the effluent was below laboratory detection limits on the same day. Elevated coliforms were found in the upstream and down-stream samples on May 5th and in the upstream, outfall and down-stream samples on May 19th. Coliforms in the effluent were less than laboratory detection limits on the same days.

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.

Table 5
2016 Elk River Sample Results

Sample Date	NH_3			Ortho-P			Coliform			Total P mg/L		
(yyyy-mm-dd)	UP	IDZ	DN	UP	IDZ	DN	UP	IDZ	DN	UP	IDZ	DN
2016-01-06	0.05	0.05	0.05	0.005	0.013	0.005	1	5	1	0.007	0.015	0.008
2016-01-13	0.05	0.05	0.05	0.005	0.011	0.005	3	1	3	0.005	0.014	0.005
2016-01-21	0.05	0.05	0.05	0.005	0.014	0.005	1	1	1	0.005	0.018	0.005
2016-01-27	0.05	0.05	0.05	0.005	0.014	0.005	4	12	2	0.005	0.014	0.005
2016-02-04	0.05	0.05	0.05	0.005	0.010	0.005	4	3	2	0.005	0.014	0.005
2016-04-28	0.05	0.05	0.05	0.007	0.008	0.007	4	2	3	0.026	0.024	0.024
2016-05-05	0.05	0.05	0.05	0.011	0.010	0.009	20	9	14	0.041	0.047	0.060
2016-05-12	0.05	0.05	0.05	0.005	0.005	0.005	3	9	4	0.020	0.023	0.023
2016-05-19	0.05	0.05	0.05	0.005	0.005	0.005	37	44	38	0.023	0.025	0.018
2016-05-26	0.05	0.05	0.05	0.005	0.005	0.005	4	4	2	0.020	0.021	0.022
2016-06-02	0.05	0.05	0.05	0.005	0.005	0.005	2	8	2	0.018	0.017	0.013
2016-09-29	0.05	0.05	0.05	0.005	0.005	0.005	1	1	1	0.005	0.007	0.006
2016-10-06	0.05	0.05	0.05	0.005	0.006	0.005	1	2	1	0.005	0.008	0.005
2016-10-12	0.05	0.05	0.05	0.005	0.007	0.005	3	10	2	0.008	0.012	0.007
2016-10-19	0.05	0.05	0.05	0.006	0.010	0.007	9	7	8	0.017	0.025	0.013
2016-10-26	0.05	0.05	0.05	0.005	0.010	0.005	1	11	1	0.005	0.014	0.005
2016-11-02	0.05	0.05	0.05	0.006	0.015	0.005	9	6	7	0.015	0.025	0.012
2016-12-21	0.05	0.05	0.05	0.007	0.018	0.005	1	2	1	0.011	0.023	0.017
2016-12-28	0.05	0.08	0.05	0.006	0.144	0.005	1	12	1	0.010	0.161	0.006
# Samples	19	19	19	19	19	19	19	19	19	19	19	19
Average	0.05	0.05	0.05	0.006	0.017	0.005	6	8	5	0.013	0.027	0.014
Maximum	0.05	0.08	0.05	0.011	0.144	0.009	37	44	38	0.041	0.161	0.060
Minimum	0.05	0.05	0.05	0.005	0.005	0.005	1	1	1	0.005	0.007	0.005

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
2016-01-06	3.0	3.0	3.0	8.22	8.25	8.26	1.99	2.43	2.07	0.01	0.01	0.01
2016-01-13	3.00	3.00	3.00	8.07	8.10	8.16	2.10	3.27	2.21	0.01	0.01	0.01
2016-01-21	3.00	3.00	3.00	8.12	8.12	8.23	2.05	2.58	2.16	0.01	0.01	0.01
2016-01-27	3.00	3.00	3.00	8.24	8.19	8.33	2.21	2.36	2.36	0.01	0.01	0.01
2016-02-04	3.00	4.0	3.00	8.15	8.14	8.22	1.89	0.34	2.12	0.01	0.01	0.01
2016-04-28	14.3	13.7	13.7	8.09	8.18	8.20	1.18	1.09	1.24	0.01	0.01	0.01
2016-05-05	24.7	29.3	34.7	8.19	8.23	8.18	1.00	0.94	1.06	0.01	0.01	0.01
2016-05-12	7.3	8.7	11.3	8.20	8.23	8.23	1.13	1.07	1.21	0.01	0.01	0.01
2016-05-19	17.0	16.3	15.0	8.34	8.34	8.34	1.01	0.97	1.07	0.01	0.01	0.01
2016-05-26	9.3	9.3	9.3	8.34	8.32	8.33	0.97	0.94	1.04	0.01	0.01	0.01
2016-06-02	3.00	3.00	3.00	8.31	8.33	8.32	1.04	0.98	1.09	0.01	0.01	0.01
2016-09-29	3.00	3.00	3.00	8.38	8.30	8.37	1.73	1.73	1.82	0.01	0.01	0.01
2016-10-06	3.00	3.00	3.00	8.41	8.38	8.49	1.75	1.53	1.82	0.01	0.01	0.01
2016-10-12	3.00	3.00	3.00	8.27	8.20	8.30	1.45	0.83	1.51	0.01	0.01	0.01
2016-10-19	7.7	8.3	5.7	8.32	8.25	8.31	0.91	0.52	1.05	0.01	0.01	0.01
2016-10-26	3.00	3.00	3.00	8.39	8.22	8.43	1.32	0.46	1.41	0.01	0.01	0.01
2016-11-02	6.7	6.7	4.7	8.26	8.22	8.26	0.99	0.08	1.13	0.01	0.01	0.01
2016-12-21	3.00	3.00	12.3	8.03	8.05	8.17	1.22	0.69	1.78	0.01	0.01	0.01
2016-12-28	3.00	3.7	3.00	8.19	8.30	8.27	1.48	4.94	2.11	0.01	0.01	0.01
# Samples	19	19	19	19	19	19	19	19	19	19	19	19
Average	6.5	6.8	7.4	8.24	8.23	8.28	1.44	1.46	1.59	0.01	0.01	0.01
Maximum	24.7	29.3	34.7	8.41	8.38	8.49	2.21	4.94	2.36	0.01	0.01	0.01
Minimum	3.0	3.0	3.0	8.03	8.05	8.16	0.91	0.08	1.04	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

6.0 OVERVIEW OF INFLUENT TEST RESULTS

This section provides data and analysis for the plant influent (raw sewage) samples taken during 2016.

Table 6 provides a summary record of the influent test results for the period January 6th, 2016 to December 28th, 2016.

Table 6
2016 Influent Results

Date	2016 Influent Results Summary					
	Flow	Temp	pH	TSS	BOD	COD
(yyyy/mm/dd)	m^3/d	C		mg/L	mg/L	mg/L
2016-01-06	313	-8.0	7.87	27.3	197	-
2016-01-13	245	0.0	7.67	132	96	-
2016-01-21	189	-2.0	7.76	51	266	-
2016-01-27	371	2.0	7.84	49	109	-
2016-02-04	330	-8.0	7.95	286	157	-
2016-03-30	332	-4.0	7.54	180	138	-
2016-04-28	169	6.0	7.87	93.5	65	-
2016-05-05	89	10.0	7.68	30.8	51	-
2016-05-12	175	7.0	7.46	68.3	71	-
2016-05-19	123	8.0	7.44	141	51	-
2016-05-26	214	10.0	7.54	34	22.9	-
2016-06-02	131	8.0	7.74	33.7	37	-
2016-07-21	206	9.0	7.86	143	124	-
2016-08-18	320	20.0	7.56	385	88	-
2016-09-29	114	7.0	7.52	19.3	49	-
2016-10-06	162	5.0	7.82	49.2	33.9	-
2016-10-12	203	-6.0	7.74	61.3	36	-
2016-10-19	633	3.0	7.95	42.3	25.7	-
2016-10-26	201	1.0	7.61	39.7	36	-
2016-11-02	458	5.0	8.16	36	22.8	-
2016-12-21	350	-2.0	7.53	278	275	-
2016-12-28	548	-6.0	7.69	219	157	-
# Samples	22	22	22	22	22	0
Average	267	3.0	7.7	109.1	95.8	-
High	633	20	8	385	275	0
Low	89	-8	7	19	23	0

A total of 22 BOD and TSS samples were analyzed. Inlet BOD ranged from 23 mg/l to 275 mg/L with an average of 95.8 mg/L. The average influent sewage strength was measured at 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 waste water BOD is in the range of 250 mg/l, it is assumed that the average BOD is still below the expected level. This can be caused by infiltration, leaking flow fixtures and so on. For that reason the flow saving measures effort should continue.

7.0 OVERVIEW OF EFFLUENT RESULTS

This section provides data and analysis for the effluent (treated) samples and plant flows for 2016.

A total of 388 effluent samples were collected and analyzed for TSS, 22 out of 388 samples were laboratory tested for BOD5, 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 2016.

Table 7
2016 Effluent Results

Date	2016 Effluent Results Summary											
	Flow	Temp	NH_3-N	BOD	COD	P-OP04	Coliforms	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
2016-01-06	302	-8.0	0.05	2.0	19	0.387	300	0.473	3.0	8.00	27.1	0.05
2016-01-13	238	0.0	0.05	2.0	14	0.169	34	0.213	3.0	7.63	39.2	0.05
2016-01-21	149	-2.0	0.05	2.0	12	0.139	1	0.190	3.0	7.73	38.4	0.086
2016-01-27	367	2.0	0.05	2.0	15	0.175	186	0.204	3.0	7.87	35.0	0.05
2016-02-04	478	-8.0	0.05	2.0	10	0.137	1	0.175	3.0	7.84	28.8	0.01
2016-03-30	346	-4.0	0.05	2.0	-	0.290	14	0.314	3.0	7.56	21.7	0.013
2016-04-28	177	6.0	0.05	2.0	10	0.271	1	0.312	3.0	7.97	32.7	0.019
2016-05-05	109	10.0	0.05	2.0	10	0.131	1	0.180	3.0	7.84	28.1	0.04
2016-05-12	167	7.0	0.05	2.0	10	0.178	1	0.192	3.0	7.77	29.4	0.021
2016-05-19	127	8.0	0.05	2.0	10	0.171	1	0.174	3.0	8.06	25.9	0.021
2016-05-26	192	10.0	0.05	2.0	10	0.126	12	0.166	3.0	8.19	10.8	0.01
2016-06-02	147	8.0	0.05	2.0	10	0.171	1	0.200	3.0	8.02	20.3	0.028
2016-07-21	185	9.0	0.05	2.0	-	0.380	1	0.394	3.0	7.97	21.6	0.023
2016-08-18	228	20.0	0.05	2.0	-	0.192	1	0.212	3.0	7.66	19.8	0.017
2016-09-29	138	7.0	0.05	2.0	10	0.091	1	0.102	3.0	7.93	18.3	0.038
2016-10-06	165	5.0	0.05	2.0	10	0.197	1	0.220	3.0	7.75	31.1	0.023
2016-10-12	225	-6.0	0.05	2.0	10	0.204	1	0.223	3.0	7.89	18.3	0.016
2016-10-19	655	3.0	0.05	2.0	15	0.069	1	0.086	3.0	8.10	4.7	0.01
2016-10-26	205	1.0	0.05	2.0	10	0.048	1	0.044	3.0	7.92	12.3	0.017
2016-11-02	480	5.0	0.05	2.0	10	0.126	1	0.204	3.0	8.27	5.7	0.01
2016-12-21	354	-2.0	0.05	2.0	17	0.415	43	0.446	3.0	7.64	35.9	0.013
2016-12-28	540	-6.0	0.674	2.0	18	1.220	39	1.300	3.0	7.69	47.1	0.104
# Samples	22	22	22	22	19	22	22	22	22	22	22	22
Average	272	3	0.08	2.0	12	0.240	29	0.3	3	7.88	25.1	0.03
High	655	20	0.67	2.0	19	1.220	300	1.3	3	8.27	47.1	0.10
Low	109	-8	0.05	2.0	10	0.048	1	0.0	3	7.56	4.7	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	1	1	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

The average BOD in the effluent was <2.0 mg/L, which was slightly lower than the previous years. This is the same as for 2015, 2014, 2013, 2012, 2011, 2010, 2009 and 2008. Laboratory tests indicated TSS samples averaged <3.0 mg/L with all the results being below laboratory detection limits.

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 December 30th at 7.0 mg/L with an average throughout the year of 0.96 mg/L. The plant provides excellent BOD_5 and TSS treatment with average removals of 100%.

Due to the relatively low levels of TSS, UV disinfection was able to effectively control the amount of coliform concentration found in the effluent. In general, the UV disinfection was able to keep the coliform levels well below the acceptable limits for recreational waters with the exception of one day, on January 6th, the levels of coliforms were measured at 300 cfu/100mL which exceeds the MSR discharge limits of 200 cfu/100mL. A new UV unit was installed in 2011. Although elevated coliforms were observed in the effluent on January 6th the levels were low in the Elk River on the same day. The days where coliforms were elevated in the Elk River, the levels were low in the effluent which indicates no measurable impact of the effluent discharge on the river.

Effluent ammonia concentrations are consistently low. 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 2016 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
2016/01/22	Pass
2016/05/27	Pass
2016/10/27	Pass

One sample out of twenty-two for ortho phosphorus was slightly above MSR discharge limits (1.22 mg/L vs limit of 0.5 mg/L). One sample out of twenty-two for total phosphorus was slightly above MSR discharge limits (1.3 mg/L vs limit of 1.0 mg/L).

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
2016 MSR Parameter Compliance

Parameter	Unit	MSR Limit	No. of Samples	Average Value	Max. Value	Samples Over Limit
Flow	m^3/day	1280	365	296	844	0
BOD_5	mg/l	45	22	<2.0	<2.0	0
TSS	mg/l	45	388	0.96	7.0	0
Total Phosphorous	mg/l	1	22	0.3	1.3	1
Ortho Phosphate	mg/l	0.5	22	0.240	1.220	1
Fecal Coliforms*	cfu/100ml	200	22	29	300	1
96 hr LC_{50} Bioassay	/	Non-toxic	3.0	/	/	0

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

The highest fecal coliforms recorded were on January 6th and were measured at 300 cfu/100 mL; and this value exceeds the MSR discharge limits. The Elk River showed low levels of coliforms on the same day. The level was slightly elevated at the outlet (5 cfu/100mL) and low up-stream and down-stream (1 and 1 cfu/100mL respectively) which indicates no measurable impact of the effluent discharge on the river.

The cause of the elevated coliforms is being reviewed to try to prevent elevated coliforms in the future.

8.0 SLUDGE PRODUCTION AND DISPOSAL

This section provides data regarding the disposal of bio-solids (sludge) from the treatment facility in 2016.

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
2016 Bagged Solids Data

Month	Vol. Bagged (m^3)
January	201.00
February	175.80
March	140.70
April	128.90
May	105.10
June	101.10
July	92.60
August	133.80
September	78.30
October	110.60
November	33.20
December	73.00
Total	**1,374.1**

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 2016.

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 2016.

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.

At the time this report was prepared, there were no major plant improvements anticipated for 2017; however, the plant is being assessed to accommodate more development and depending on the final report, some upgrades may be required.

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 will 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.

Figure 8
Total Phosphorus Levels 2007-2016

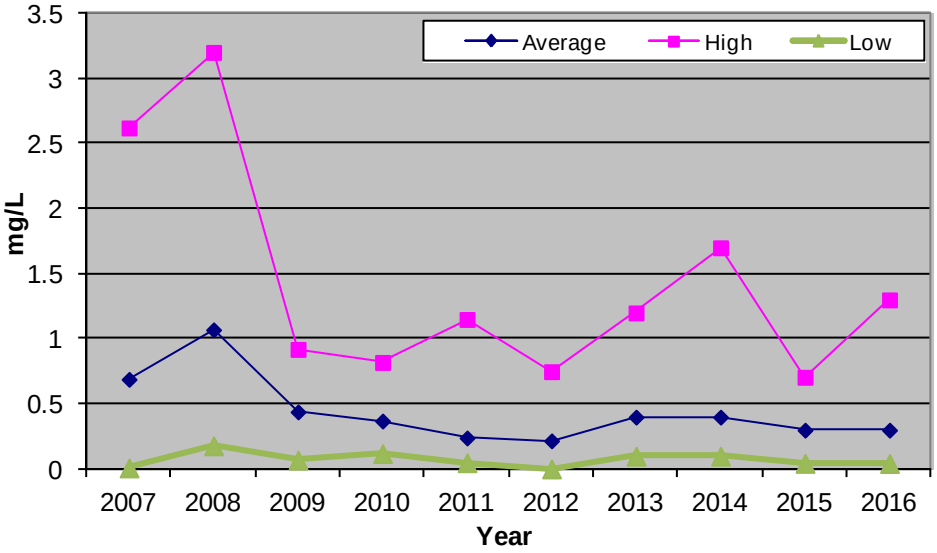


Figure 9
Ortho Phosphorus Levels 2007-2016

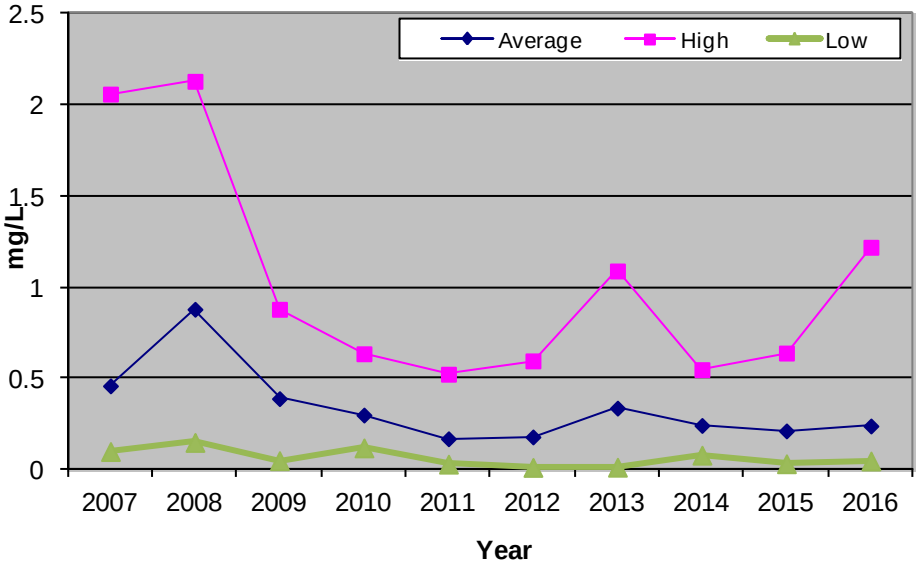
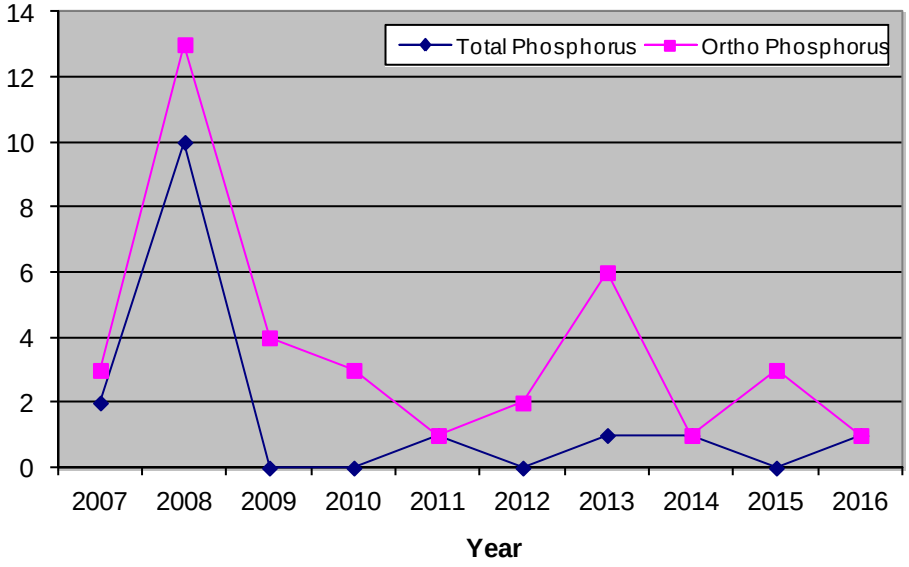


Figure 10
Days over Limit 2007-2016



12.0 ASSESSMENT SUMMARY

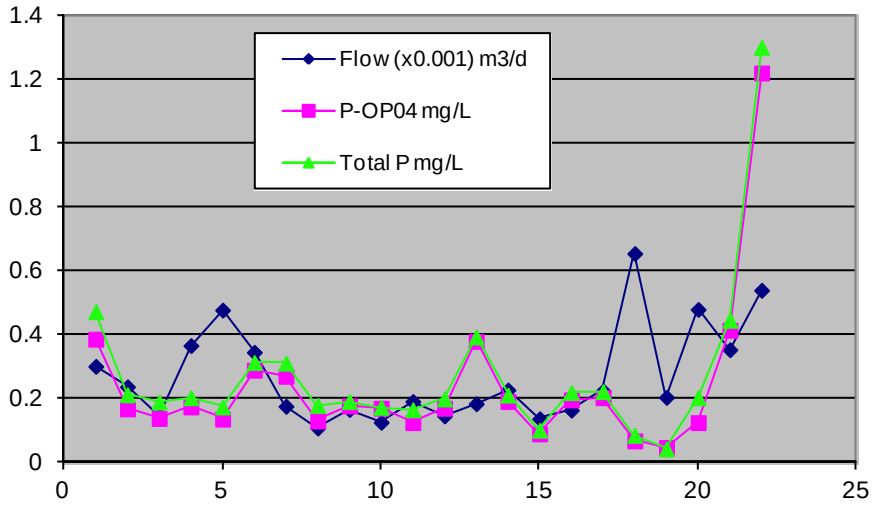
The plant has produced high quality effluent with BOD_5 normally below the regulated limit of 45 mg/l and for all instances at less than 2 mg/L. TSS was less than laboratory detection limit for all samples. Both TSS and BOD were below the MSR limits.

Nitrogen (ammonia-n, nitrate-n and nitrite-n) results indicate that the plant functioned well again in 2016.

The highest fecal coliforms recorded were on January 6th and were measured at 300 cfu/100 mL; and this value exceeds the MSR discharge limits. The Elk River showed low levels of coliforms on the same day. The level was slightly elevated at the outlet (5 cfu/100mL) and low up-stream and down-stream (1 and 1 cfu/100mL respectively) which indicates no measurable impact of the effluent discharge on the river.

The average total phosphorus and ortho phosphorus for 2016 were the same for total phosphorus and slightly higher for ortho phosphorus than in 2015. 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 at 23% on December 28th. There has been no measurable impact of phosphorus releases from the plant on Elk River background nutrient concentrations. Phosphorus concentrations were plotted against the flow level in the graph below. There is a correlation between the flow level with respect to the elevated phosphorus levels.

Figure 11
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 (Timberlanding) has been applied for and is currently under review by the Regional District of the East Kootenay and the Ministry of Transportation. Initial comments received from RCR include capacity confirmation for both the water and wastewater systems.

Details of the subdivision include 48 single family lots and 2 multi-family lots, each with an allowable density of approximately 56 units. There is also 4 infill lots being proposed on lower Timberline.

While preliminary analysis indicates sufficient capacity in the existing systems to accommodate the development, it is anticipated some improvements will be required such as the upgrade of the sludge bagger to a more efficient system such as a centrifuge or press.

It should be noted that when the WWTP was upgraded in 2005, additional capacity was built into the plant which would allow it to operate to a maximum of 1760 m^3 of daily flow. In order to utilize this additional capacity, a license amendment to increase the maximum allowable daily discharge from 1280 m^3 to 1760 m^3 would need to be made.

In summary, the activated sludge treatment process functioned well in 2015 with only, although significantly improved, phosphorus concerns outstanding. A program was installed in the summer of 2007 to address effluent phosphorous concentrations and will continue until positive results are consistently achieved.

13.0 AUTHORITIZATION AND CLOSING

This report, titled *2016 Sewage Treatment Plant Annual Report,* was prepared for FARUC by Environmental Diagnostics Inc. The material in this report reflects the best judgement of Environmental Diagnostics 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. Environmental Diagnostics 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.

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J:jobs/water/2017/W28001-RCR/Fernie/Wastewater/2016Annual Report

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)
Griz Inn	1136	45	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
Cornerstone	1136	26	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
Polar Peaks (4-Plex Units)	1136	24	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
	Subtotal	**246**	**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)
Timberline Infills	1022	141	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
Timberline Infills	1022	106	108.3	108.3	108.3	108.3	108.3	108.3	108.3
Timberlanding Multifamily	1022	45	59.97	59.97	59.97	59.97	59.97	59.97	59.97
Timberlanding Single Family	1363	32.5	42.92	42.92	42.92	42.92	42.92	42.92	42.92
Highline Infill	1022	26	26.6	26.6	26.6	26.6	26.6	26.6	26.6
	Subtotal	**352.5**	**384.59**	**384.59**	**384.59**	**384.59**	**384.59**	**384.59**	**384.59**

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)
Single Family	1363	49	66.8	66.8	66.8	66.8	66.8	66.8	66.8
Duplexes	1363	10	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
Parcel 32-Duplex	1363	16	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
Parcel 37-Townhouses	1363	8	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
Parcel 3-Condominium	1363	12	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
	Subtotal	**322**	**269.5**	**269.5**	**269.5**	**269.5**	**269.5**	**269.5**	**269.5**

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)
Skiers	36	700	252	252	252	252	252	252	252
	Subtotal	**700**	**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)
Lizard Creek - Dining	97	54.7	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
Kelseys - Dining	97	204.4	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
Daylodge - Dining	97	358.6	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
Mean Bean	97	26.8	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
Powder House Inn	97	232.2	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
	Subtotal	**1439**	**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
Corrected Daily Peak Flow Projections**	989 (actual)	811***(actual)	1181 (actual)	1036 (actual)	1058 (actual)	844 (actual)	1094 (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

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 (ppm)
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: 24-DEC-15
Report Date: 05-JAN-16 10:51 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1718225

Project P.O. #: NOT SUBMITTED
Job Reference: FERNIE ALPINE RESORT - WINTER 15/16 EMS WK 1
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1718225-1 WWTP INFLUENT							
Sampled By: Bo Choroszewski on 22-DEC-15 @ 15:45							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	271	DLHC	75	mg/L		24-DEC-15	R3349198
Total Suspended Solids	52.7		3.0	mg/L		29-DEC-15	R3352740
pH	7.94		0.10	pH		24-DEC-15	R3347813
L1718225-2 WWTP EFFLUENT							
Sampled By: Bo Choroszewski on 22-DEC-15 @ 15:40							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		29-DEC-15	R3350175
Biochemical Oxygen Demand	<2.0		2.0	mg/L		24-DEC-15	R3349198
Chemical Oxygen Demand	18		10	mg/L		31-DEC-15	R3352616
Orthophosphate-Dissolved (as P)	0.616	DLA	0.050	mg/L		24-DEC-15	R3347135
Coliform Bacteria - Fecal	1300	DLA	100	CFU/100mL		24-DEC-15	R3349040
Nitrate (as N)	47.1	HTD	0.20	mg/L		29-DEC-15	R3349254
Nitrate and Nitrite (as N)	47.1		0.20	mg/L		29-DEC-15	
Nitrite (as N)	<0.010		0.010	mg/L		24-DEC-15	R3349254
Phosphorus (P)-Total	0.706	DLHC	0.050	mg/L		02-JAN-16	R3353836
Total Suspended Solids	<3.0		3.0	mg/L		29-DEC-15	R3352740
pH	7.78		0.10	pH		24-DEC-15	R3347813
L1718225-3 ELK RIVER UPSTREAM							
Sampled By: Bo Choroszewski on 22-DEC-15 @ 15:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		29-DEC-15	R3350175
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		24-DEC-15	R3347135
Coliform Bacteria - Fecal	1	OCR	1	CFU/100mL		24-DEC-15	R3349040
Nitrate (as N)	1.89		0.020	mg/L		24-DEC-15	R3349254
Nitrate and Nitrite (as N)	1.89		0.050	mg/L		29-DEC-15	
Nitrite (as N)	<0.010		0.010	mg/L		24-DEC-15	R3349254
Phosphorus (P)-Total	0.0057		0.0050	mg/L		02-JAN-16	R3353836
Total Suspended Solids	<3.0		3.0	mg/L		29-DEC-15	R3352740
pH	8.31		0.10	pH		24-DEC-15	R3347813
L1718225-4 ELK RIVER OUTFALL							
Sampled By: Bo Choroszewski on 22-DEC-15 @ 15:20							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		29-DEC-15	R3350175
Orthophosphate-Dissolved (as P)	0.0093		0.0050	mg/L		24-DEC-15	R3347135
Coliform Bacteria - Fecal	8	OCR	1	CFU/100mL		24-DEC-15	R3349040
Nitrate (as N)	1.68		0.020	mg/L		24-DEC-15	R3349254
Nitrate and Nitrite (as N)	1.68		0.050	mg/L		29-DEC-15	
Nitrite (as N)	<0.010		0.010	mg/L		24-DEC-15	R3349254
Phosphorus (P)-Total	0.0096		0.0050	mg/L		02-JAN-16	R3353836
Total Suspended Solids	<3.0		3.0	mg/L		29-DEC-15	R3352740
pH	8.27		0.10	pH		24-DEC-15	R3347813
L1718225-5 ELK RIVER DOWNSTREAM							
Sampled By: Bo Choroszewski on 22-DEC-15 @ 15:10							
Matrix: WATER							

* 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
L1718225-5 ELK RIVER DOWNSTREAM							
Sampled By: Bo Choroszewski on 22-DEC-15 @ 15:10							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		29-DEC-15	R3350175
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		24-DEC-15	R3347135
Coliform Bacteria - Fecal	3	OCR	1	CFU/100mL		24-DEC-15	R3349040
Nitrate (as N)	2.00		0.020	mg/L		24-DEC-15	R3349254
Nitrate and Nitrite (as N)	2.00		0.050	mg/L		29-DEC-15	
Nitrite (as N)	<0.010		0.010	mg/L		24-DEC-15	R3349254
Phosphorus (P)-Total	0.0050		0.0050	mg/L		02-JAN-16	R3353836
Total Suspended Solids	<3.0		3.0	mg/L		29-DEC-15	R3352740
pH	8.33		0.10	pH		24-DEC-15	R3347813

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

Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
EHR	FECAL COLIFORMS - Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested

Sample Parameter Qualifier Key:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
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.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
OCR	Parameter is out of client specific range.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
COD-CL	Water	Chemical Oxygen Demand	APHA 5220 D -Closed Reflux, Colorimetric
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
NH4-CL	Water	Ammonia-N	APHA 4500 NH3F-Colorimetry
Ammonia is determined using the Phenate colorimetric method. Result includes both ionized (NH4+) and un-ionized (NH3) ammonia present in the sample.			
NO2-BC-IC-CL	Water	Nitrite in Water by IC	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.			
NO3-BC-IC-CL	Water	Nitrate (as N)	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.			
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
PO4-DO-COL-CL	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.			

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

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

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

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1718225 Report Date: 05-JAN-16

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

Contact: PATRICK MAJER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BOD-BC-CL	**Water**							
Batch R3349198								
WG2238630-4 DUP		**L1718170-2**						
Biochemical Oxygen Demand		<2.0	<2.0	RPD-NA	mg/L	N/A	20	24-DEC-15
WG2238630-2 LCS								
Biochemical Oxygen Demand			94.2		%		85-115	24-DEC-15
WG2238630-1 MB								
Biochemical Oxygen Demand			<2.0		mg/L		2	24-DEC-15
COD-CL	**Water**							
Batch R3352616								
WG2239811-3 DUP		**L1718892-2**						
Chemical Oxygen Demand		24	24		mg/L	1.3	20	31-DEC-15
WG2239811-2 LCS								
Chemical Oxygen Demand			100.5		%		85-115	31-DEC-15
WG2239811-1 MB								
Chemical Oxygen Demand			<10		mg/L		10	31-DEC-15
WG2239811-4 MS		**L1718892-2**						
Chemical Oxygen Demand			103.7		%		70-130	31-DEC-15
FCC-MF-CL	**Water**							
Batch R3349040								
WG2238645-2 DUP		**L1718225-3**						
Coliform Bacteria - Fecal		1	1		CFU/100mL	0.0	65	24-DEC-15
WG2238645-1 MB								
Coliform Bacteria - Fecal			<1		CFU/100mL		1	24-DEC-15
NH4-CL	**Water**							
Batch R3350175								
WG2239044-3 DUP		**L1717608-2**						
Ammonia, Total (as N)		0.108	0.108		mg/L	0.0	20	29-DEC-15
WG2239044-2 LCS								
Ammonia, Total (as N)			103.0		%		85-115	29-DEC-15
WG2239044-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	29-DEC-15
WG2239044-4 MS		**L1718225-3**						
Ammonia, Total (as N)			98.4		%		75-125	29-DEC-15
NO2-BC-IC-CL	**Water**							
Batch R3349254								
WG2238724-3 DUP		**L1718225-5**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	24-DEC-15
WG2238724-2 LCS								

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-BC-IC-CL	**Water**							
Batch R3349254								
WG2238724-2 LCS								
Nitrite (as N)			105.7		%		85-115	24-DEC-15
WG2238724-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	24-DEC-15
WG2238724-4 MS		**L1718225-5**						
Nitrite (as N)			102.2		%		75-125	24-DEC-15
NO3-BC-IC-CL	**Water**							
Batch R3349254								
WG2238724-3 DUP		**L1718225-5**						
Nitrate (as N)		2.00	2.01		mg/L	0.4	20	24-DEC-15
WG2238724-2 LCS								
Nitrate (as N)			102.0		%		85-115	24-DEC-15
WG2238724-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	24-DEC-15
WG2238724-4 MS		**L1718225-5**						
Nitrate (as N)			92.0		%		75-125	24-DEC-15
P-T-COL-CL	**Water**							
Batch R3353836								
WG2240200-11 DUP		**L1719374-1**						
Phosphorus (P)-Total		0.0720	0.0701		mg/L	2.6	20	02-JAN-16
WG2240200-7 DUP		**L1718225-5**						
Phosphorus (P)-Total		0.0050	<0.0050	RPD-NA	mg/L	N/A	20	02-JAN-16
WG2240200-9 DUP		**L1718892-5**						
Phosphorus (P)-Total		0.0058	<0.0050	RPD-NA	mg/L	N/A	20	02-JAN-16
WG2240200-4 LCS								
Phosphorus (P)-Total			106.4		%		80-120	02-JAN-16
WG2240200-5 LCS								
Phosphorus (P)-Total			107.0		%		80-120	02-JAN-16
WG2240200-6 LCS								
Phosphorus (P)-Total			108.9		%		80-120	02-JAN-16
WG2240200-1 MB								
Phosphorus (P)-Total			<0.0050		mg/L		0.005	02-JAN-16
WG2240200-2 MB								
Phosphorus (P)-Total			<0.0050		mg/L		0.005	02-JAN-16
WG2240200-3 MB								
Phosphorus (P)-Total			<0.0050		mg/L		0.005	02-JAN-16
WG2240200-10 MS		**L1718892-5**						
Phosphorus (P)-Total			97.8		%		70-130	02-JAN-16

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-COL-CL	**Water**							
Batch R3353836								
WG2240200-12 MS		**L1719374-1**						
Phosphorus (P)-Total			N/A	MS-B	%		-	02-JAN-16
WG2240200-8 MS		**L1718225-5**						
Phosphorus (P)-Total			100.8		%		70-130	02-JAN-16
PH-CL	**Water**							
Batch R3347813								
WG2238302-2 LCS								
pH			6.92		pH		6.9-7.1	24-DEC-15
PO4-DO-COL-CL	**Water**							
Batch R3347135								
WG2238068-5 DUP		**L1718225-4**						
Orthophosphate-Dissolved (as P)		0.0093	0.0096		mg/L	3.0	20	24-DEC-15
WG2238068-2 LCS								
Orthophosphate-Dissolved (as P)			97.8		%		80-120	24-DEC-15
WG2238068-1 MB								
Orthophosphate-Dissolved (as P)			<0.0050		mg/L		0.005	24-DEC-15
WG2238068-6 MS		**L1718225-5**						
Orthophosphate-Dissolved (as P)			105.4		%		70-130	24-DEC-15
TSS-CL	**Water**							
Batch R3352740								
WG2239869-3 DUP		**L1718074-1**						
Total Suspended Solids		455	470		mg/L	3.2	20	29-DEC-15
WG2239869-2 LCS								
Total Suspended Solids			90.7		%		85-115	29-DEC-15
WG2239869-1 MB								
Total Suspended Solids			<3.0		mg/L		3	29-DEC-15

Quality Control Report

Workorder: L1718225 Report Date: 05-JAN-16

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

Legend:

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

Sample Parameter Qualifier Definitions:

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

Quality Control Report

Workorder: L1718225 Report Date: 05-JAN-16

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

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH							
	1	22-DEC-15 15:45	24-DEC-15 00:00	0.25	32	hours	EHTR-FM
	2	22-DEC-15 15:40	24-DEC-15 00:00	0.25	32	hours	EHTR-FM
	3	22-DEC-15 15:30	24-DEC-15 00:00	0.25	32	hours	EHTR-FM
	4	22-DEC-15 15:20	24-DEC-15 00:00	0.25	33	hours	EHTR-FM
	5	22-DEC-15 15:10	24-DEC-15 00:00	0.25	33	hours	EHTR-FM
Anions and Nutrients							
Nitrate (as N)							
	2	22-DEC-15 15:40	29-DEC-15 13:00	3	7	days	EHT
Bacteriological Tests							
Fecal Coliform Count-MF							
	2	22-DEC-15 15:40	24-DEC-15 11:00	30	43	hours	EHTR
	3	22-DEC-15 15:30	24-DEC-15 11:00	30	43	hours	EHTR
	4	22-DEC-15 15:20	24-DEC-15 11:00	30	44	hours	EHTR
	5	22-DEC-15 15:10	24-DEC-15 11:00	30	44	hours	EHTR

Legend & Qualifier Definitions:

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

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1718225 were received on 24-DEC-15 09:23.

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

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

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

ALS Environmental

www.alsenviro.com

L1718225

Vancouver BC, 1988 Triumph St
Fort St. John BC, Box 256, 983
Grand Prairie AB
Fort McMurray AB, Bay 1
Edmonton AB, 6703 - 67th Ave
Calgary AB, Bay 7, 1313 - 44th
Saskatoon SK, 819 - 58th Street

L1718225-COFC

CHAIN OF CUSTODY FORM

PAGE OF

SEND REPORT TO:

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION	ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST		
CITY:	CALGARY PROV: ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	403 - 256 - 8473 FAX: 403 - 244 - 3774	SAMPLER:	Bo Choroszewski
PROJECT NAME AND NO.:	Fernie Alpine Resort- Winter 15/16 EMS wk 1	QUOTE NO:	
PO NO.:	ALS CONTACT: Lyudmyla Shvets		
REPORT FORMAT:	☑ HARDCOPY ☑ EMAIL - ADDRESS: pmajer@skircr.com ☐ FAX ☐ EXCEL ☑ PDF ☐ OTHER:		

ANALYSIS REQUESTED:

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	2015-12-22	15:45	Water		X	X												12.2 °C
	WWTP Influent BOD 2	2015-12-22	15:45	Water									X						12.2 °C
2	WWTP Effluent Routine 3	2015-12-22	15:40	Water		X	X							X					12.9 °C
	WWTP Effluent BOD 4	2015-12-22	15:40	Water									X						12.9 °C
	WWTP Effluent Nutrients 5	2015-12-22	15:40	Water				X	X	X	X	X							12.9 °C
	WWTP Effluent Bacteriological 6	2015-12-22	15:40	Water	X														12.9 °C
3	Elk River Upstream Routine 7	2015-12-22	15:30	Water		X	X												-0.5 °C
	Elk River Upstream Nutrients 8	2015-12-22	15:30	Water				X	X	X	X	X							-0.5 °C
	Elk River Upstream Bacteriological 9	2015-12-22	15:30	Water	X														-0.5 °C
4	Elk River @ Outfall Routine 10	2015-12-22	15:20	Water		X	X												0.0 °C
	Elk River @ Outfall Nutrients 11	2015-12-22	15:20	Water				X	X	X	X	X							0.0 °C
	Elk River @ Outfall Bacteriological 12	2015-12-22	15:20	Water	X														0.0 °C
5	Elk River Downstream Routine 13	2015-12-22	15:10	Water		X	X												0.2 °C
	Elk River Downstream Nutrients 14	2015-12-22	15:10	Water				X	X	X	X	X							0.2 °C
	Elk River Downstream Bacteriological 15	2015-12-22	15:10	Water	X														0.2 °C

FOR LAB USE ONLY

TURN AROUND REQUIRED: ◉ ROUTINE ○ RUSH SPECIFY DATE: ____ (surcharge may apply)

SEND INVOICE TO: ☐ SAME AS REPORT ☐ DIFFERENT FROM REPORT (provide details below)

INVOICE FORMAT: ☐ HARDCOPY ☐ PDF ☐ FAX

SPECIAL INSTRUCTIONS: PLEASE FAX A COPY OF THE RESULTS TO 250-423-4052 OR E-MAIL TO wastewater@skifernie.com

RELINQUISHED BY:	DATE: / TIME:	RECEIVED BY: Bm	DATE: Dec 24 / TIME: 9:23
RELINQUISHED BY: Bo Choroszewski	DATE: 2015-12-22 / TIME: 16:00	RECEIVED BY:	DATE: / TIME:

FOR LAB USE ONLY

Cooler Seal Intact? __Yes __No __N/A

Sample Temperature: 7 °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: 30-DEC-15
Report Date: 06-JAN-16 16:30 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1718892

Project P.O. #: NOT SUBMITTED
Job Reference: FERNIE ALPINE RESORT - WINTER 15/16 EMS WK 2
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1718892-1 WWTP INFLUENT							
Sampled By: BC on 29-DEC-15 @ 15:10							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	225		2.0	mg/L		30-DEC-15	R3355099
Total Suspended Solids	313	DLHC	15	mg/L		31-DEC-15	R3356344
pH	7.86		0.10	pH		30-DEC-15	R3352443
L1718892-2 WWTP EFFLUENT							
Sampled By: BC on 29-DEC-15 @ 15:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	3.27	DLA	0.50	mg/L		06-JAN-16	R3358937
Biochemical Oxygen Demand	<2.0		2.0	mg/L		30-DEC-15	R3355099
Chemical Oxygen Demand	24		10	mg/L		31-DEC-15	R3352616
Orthophosphate-Dissolved (as P)	1.15	DLA	0.050	mg/L		31-DEC-15	R3352836
Coliform Bacteria - Fecal	11400	DLA	100	CFU/100mL		30-DEC-15	R3353040
Phosphorus (P)-Total	1.31	DLHC	0.10	mg/L		02-JAN-16	R3353836
Total Suspended Solids	<3.0		3.0	mg/L		31-DEC-15	R3356344
pH	7.71		0.10	pH		30-DEC-15	R3352443
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	44.7	DLHC	0.10	mg/L		31-DEC-15	R3352417
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	45.2		0.10	mg/L		31-DEC-15	
Nitrite in Water by IC							
Nitrite (as N)	0.481		0.010	mg/L		30-DEC-15	R3352417
L1718892-3 ELK RIVER UPSTREAM							
Sampled By: BC on 29-DEC-15 @ 15:25							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		06-JAN-16	R3358937
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		31-DEC-15	R3352836
Coliform Bacteria - Fecal	2	OCR	1	CFU/100mL		30-DEC-15	R3353040
Phosphorus (P)-Total	0.0051		0.0050	mg/L		02-JAN-16	R3353836
Total Suspended Solids	<3.0		3.0	mg/L		31-DEC-15	R3356344
pH	8.20		0.10	pH		30-DEC-15	R3352443
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.91		0.020	mg/L		30-DEC-15	R3352417
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.91		0.050	mg/L		31-DEC-15	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		30-DEC-15	R3352417
L1718892-4 ELK RIVER @ OUTFALL							
Sampled By: BC on 29-DEC-15 @ 15:35							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	0.290		0.050	mg/L		06-JAN-16	R3358937
Orthophosphate-Dissolved (as P)	0.0844		0.0050	mg/L		31-DEC-15	R3352836
Coliform Bacteria - Fecal	2100	DLA	100	CFU/100mL		30-DEC-15	R3353040
Phosphorus (P)-Total	0.0803		0.0050	mg/L		02-JAN-16	R3353836
Total Suspended Solids	<3.0		3.0	mg/L		31-DEC-15	R3356344

* 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
L1718892-4 ELK RIVER @ OUTFALL							
Sampled By: BC on 29-DEC-15 @ 15:35							
Matrix: WATER							
pH	8.18		0.10	pH		30-DEC-15	R3352443
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	4.44		0.020	mg/L		30-DEC-15	R3352417
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	4.48		0.050	mg/L		31-DEC-15	
Nitrite in Water by IC							
Nitrite (as N)	0.042		0.010	mg/L		30-DEC-15	R3352417
L1718892-5 ELK RIVER DOWNSTREAM							
Sampled By: BC on 29-DEC-15 @ 15:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		06-JAN-16	R3358937
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		31-DEC-15	R3352836
Coliform Bacteria - Fecal	17	OCR	1	CFU/100mL		30-DEC-15	R3353040
Phosphorus (P)-Total	0.0058		0.0050	mg/L		02-JAN-16	R3353836
Total Suspended Solids	<3.0		3.0	mg/L		31-DEC-15	R3356344
pH	8.32		0.10	pH		30-DEC-15	R3352443
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	2.05		0.020	mg/L		30-DEC-15	R3352417
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	2.05		0.050	mg/L		31-DEC-15	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		30-DEC-15	R3352417

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

Reference Information

Sample Parameter Qualifier Key:

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

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

COD-CL	Water	Chemical Oxygen Demand	APHA 5220 D -Closed Reflux, Colorimetric

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
NH4-CL	Water	Ammonia-N	APHA 4500 NH3F-Colorimetry

Ammonia is determined using the Phenate colorimetric method. Result includes both ionized (NH4+) and un-ionized (NH3) ammonia present in the sample.

NO2-BC-IC-CL	Water	Nitrite in Water by IC	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

NO3-BC-IC-CL	Water	Nitrate (as N)	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

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
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

www.alsenviro.com

Vancouver BC, 1988 Triumph Street, V5L ... Tel 604-2... Toll Free 1-800-...
Fort St. John BC, Box 250 ... 9831 - 98A Avenue V1J ... Tel 250 261-5517 Fax 2...
Grand Prairie AB, 9535 ... Street, T8V 5W1, Tel: 780 539-5196 Toll Free: 1-800-...
Fort McMurray AB, Bay 1, 245 Macdonald Cr. T9H 4B5 Tel: 780-791-1524 Fax: 780...
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free: 1-800 6...
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free: 1...
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-800-667-7645 Fax: ...

L1718892-COFC

SEND REPORT TO:

CHAIN OF CUSTODY FORM

PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION	ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST		
CITY:	CALGARY PROV: ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	403 - 256 - 8473 FAX: 403 - 244 - 3774	SAMPLER:	Bo Choroszewski
PROJECT NAME AND NO.:	Fernie Alpine Resort- Winter 15/16 EMS wk 2	QUOTE NO:	
PO NO.:	ALS CONTACT: Lyudmyla Shvets		
REPORT FORMAT:	☑ HARDCOPY ☑ EMAIL - ADDRESS: pmajer@skircr.com ☐ FAX ☐ EXCEL ☑ PDF ☐ OTHER:		

ANALYSIS REQUESTED:

WO# (FOR LAB USE ONLY)	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	2015-12-29	15:10	Water		X	X								12.2°C
	WWTP Influent BOD 2	2015-12-29	15:10	Water									X		12.2°C
2	WWTP Effluent Routine 3	2015-12-29	15:15	Water		X	X							X	13.8°C
	WWTP Effluent BOD 4	2015-12-29	15:15	Water									X		13.8°C
	WWTP Effluent Nutrients 5	2015-12-29	15:15	Water				X	X	X	X	X			13.8°C
	WWTP Effluent Bacteriological 6	2015-12-29	15:15	Water	X										13.8°C
3	Elk River Upstream Routine 7	2015-12-29	15:25	Water		X	X								-0.5°C
	Elk River Upstream Nutrients 8	2015-12-29	15:25	Water				X	X	X	X	X			-0.5°C
	Elk River Upstream Bacteriological 9	2015-12-29	15:25	Water	X										-0.5°C
4	Elk River @ Outfall Routine 10	2015-12-29	15:35	Water		X	X								+0.4°C
	Elk River @ Outfall Nutrients 11	2015-12-29	15:35	Water				X	X	X	X	X			+0.4°C
	Elk River @ Outfall Bacteriological 12	2015-12-29	15:35	Water	X										+0.4°C
5	Elk River Downstream Routine 13	2015-12-29	15:45	Water		X	X								-0.5°C
	Elk River Downstream Nutrients 14	2015-12-29	15:45	Water				X	X	X	X	X			-0.5°C
	Elk River Downstream Bacteriological 15	2015-12-29	15:45	Water	X										-0.5°C

TURN AROUND REQUIRED:	◉ ROUTINE ○ RUSH SPECIFY DATE: (surcharge may apply)	RELINQUISHED BY:	DATE: / TIME:	RECEIVED BY: JK	DATE: 12/30 TIME: 9:40 am
SEND INVOICE TO:	☐ SAME AS REPORT ☐ DIFFERENT FROM REPORT (provide details below)	RELINQUISHED BY: Bo Choroszewski	DATE: 2015-12-29 TIME: 16:00	RECEIVED BY:	DATE: / TIME:
INVOICE FORMAT:	☐ HARDCOPY ☐ PDF ☐ FAX				
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: 1 °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: 08-JAN-16
Report Date: 14-JAN-16 16:30 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1721496

Project P.O. #: NOT SUBMITTED
Job Reference: FARNIE ALPINE RESORT - WINTER 15/16 EMS WK 2
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1721496-1 WWTP INFLUENT							
Sampled By: BO CHOROSZEWSKI on 06-JAN-16 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	197	DLHC	75	mg/L		08-JAN-16	R3367660
Total Suspended Solids	27.3		3.0	mg/L		13-JAN-16	R3370477
pH	7.87		0.10	pH		09-JAN-16	R3363783
L1721496-2 WWTP EFFLUENT							
Sampled By: BO CHOROSZEWSKI on 06-JAN-16 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		08-JAN-16	R3364555
Biochemical Oxygen Demand	<2.0		2.0	mg/L		08-JAN-16	R3367660
Chemical Oxygen Demand	19		10	mg/L		12-JAN-16	R3367114
Orthophosphate-Dissolved (as P)	0.387		0.025	mg/L		08-JAN-16	R3362896
Coliform Bacteria - Fecal	300	DLA	100	CFU/100mL		08-JAN-16	R3364531
Phosphorus (P)-Total	0.473	DLA	0.025	mg/L		11-JAN-16	R3365273
Total Suspended Solids	<3.0		3.0	mg/L		13-JAN-16	R3370477
pH	8.00		0.10	pH		09-JAN-16	R3363783
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	27.1	DLHC	0.10	mg/L		09-JAN-16	R3368453
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	27.1		0.11	mg/L		13-JAN-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.050	DLHC	0.050	mg/L		09-JAN-16	R3368453
L1721496-3 ELK RIVER UPSTREAM							
Sampled By: BO CHOROSZEWSKI on 06-JAN-16 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		08-JAN-16	R3364555
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		08-JAN-16	R3362896
Coliform Bacteria - Fecal	1	OCR	1	CFU/100mL		08-JAN-16	R3364531
Phosphorus (P)-Total	0.0068		0.0050	mg/L		11-JAN-16	R3365273
Total Suspended Solids	<3.0		3.0	mg/L		13-JAN-16	R3370477
pH	8.22		0.10	pH		09-JAN-16	R3363783
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.99		0.020	mg/L		09-JAN-16	R3368453
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.99		0.050	mg/L		13-JAN-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		09-JAN-16	R3368453
L1721496-4 ELK RIVER @ OUTFALL							
Sampled By: BO CHOROSZEWSKI on 06-JAN-16 @ 14:25							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		08-JAN-16	R3364555
Orthophosphate-Dissolved (as P)	0.0125		0.0050	mg/L		08-JAN-16	R3362896
Coliform Bacteria - Fecal	5	OCR	1	CFU/100mL		08-JAN-16	R3364531
Phosphorus (P)-Total	0.0151		0.0050	mg/L		11-JAN-16	R3365273
Total Suspended Solids	<3.0		3.0	mg/L		13-JAN-16	R3370477

* 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
L1721496-4 ELK RIVER @ OUTFALL							
Sampled By: BO CHOROSZEWSKI on 06-JAN-16 @ 14:25							
Matrix: WATER							
pH	8.25		0.10	pH		09-JAN-16	R3363783
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	2.43		0.020	mg/L		09-JAN-16	R3368453
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	2.43		0.050	mg/L		13-JAN-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		09-JAN-16	R3368453
L1721496-5 ELK RIVER DOWNSTREAM							
Sampled By: BO CHOROSZEWSKI on 06-JAN-16 @ 14:35							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		08-JAN-16	R3364555
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		08-JAN-16	R3362896
Coliform Bacteria - Fecal	1	OCR	1	CFU/100mL		08-JAN-16	R3364531
Phosphorus (P)-Total	0.0080		0.0050	mg/L		11-JAN-16	R3365273
Total Suspended Solids	<3.0		3.0	mg/L		13-JAN-16	R3370477
pH	8.26		0.10	pH		09-JAN-16	R3363783
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	2.07		0.020	mg/L		09-JAN-16	R3368453
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	2.07		0.050	mg/L		13-JAN-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		09-JAN-16	R3368453

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

Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
EHR	Fecal Coliform - Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested

Sample Parameter Qualifier Key:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
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-CL	Water	Chemical Oxygen Demand	APHA 5220 D -Closed Reflux, Colorimetric

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
NH4-CL	Water	Ammonia-N	APHA 4500 NH3F-Colorimetry

Ammonia is determined using the Phenate colorimetric method. Result includes both ionized (NH4+) and un-ionized (NH3) ammonia present in the sample.

NO2-BC-IC-CL	Water	Nitrite in Water by IC	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

NO3-BC-IC-CL	Water	Nitrate (as N)	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

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
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.

Quality Control Report

Workorder: L1721496 Report Date: 14-JAN-16

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

Contact: PATRICK MAJER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BOD-BC-CL	**Water**							
Batch R3367660								
WG2244467-4 DUP		**L1721496-2**						
Biochemical Oxygen Demand		<2.0	<2.0	RPD-NA	mg/L	N/A	20	08-JAN-16
WG2244467-2 LCS								
Biochemical Oxygen Demand			92.5		%		85-115	08-JAN-16
WG2244467-1 MB								
Biochemical Oxygen Demand			<2.0		mg/L		2	08-JAN-16
COD-CL	**Water**							
Batch R3367114								
WG2244275-3 DUP		**L1720541-2**						
Chemical Oxygen Demand		75	74		mg/L	1.3	20	12-JAN-16
WG2244275-2 LCS								
Chemical Oxygen Demand			101.6		%		85-115	12-JAN-16
WG2244275-1 MB								
Chemical Oxygen Demand			<10		mg/L		10	12-JAN-16
WG2244275-4 MS		**L1720541-2**						
Chemical Oxygen Demand			109.6		%		70-130	12-JAN-16
FCC-MF-CL	**Water**							
Batch R3364531								
WG2243417-2 DUP		**L1721496-3**						
Coliform Bacteria - Fecal		1	1		CFU/100mL	0.0	65	08-JAN-16
WG2243417-1 MB								
Coliform Bacteria - Fecal			<1		CFU/100mL		1	08-JAN-16
NH4-CL	**Water**							
Batch R3364555								
WG2242908-7 DUP		**L1721261-2**						
Ammonia, Total (as N)		0.232	0.231		mg/L	0.2	20	08-JAN-16
WG2242908-2 LCS								
Ammonia, Total (as N)			101.2		%		85-115	08-JAN-16
WG2242908-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	08-JAN-16
WG2242908-5 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	08-JAN-16
WG2242908-8 MS		**L1721496-5**						
Ammonia, Total (as N)			93.2		%		75-125	08-JAN-16
NO2-BC-IC-CL	**Water**							

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-BC-IC-CL	**Water**							
Batch R3368453								
WG2244646-2 LCS								
Nitrite (as N)			107.1		%		85-115	09-JAN-16
WG2244646-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	09-JAN-16
NO3-BC-IC-CL	**Water**							
Batch R3368453								
WG2244646-2 LCS								
Nitrate (as N)			100.2		%		85-115	09-JAN-16
WG2244646-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	09-JAN-16
P-T-COL-CL	**Water**							
Batch R3365273								
WG2243660-3 DUP		**L1721496-5**						
Phosphorus (P)-Total		0.0080	0.0081		mg/L	0.9	20	11-JAN-16
WG2243660-2 LCS								
Phosphorus (P)-Total			101.9		%		80-120	11-JAN-16
WG2243660-1 MB								
Phosphorus (P)-Total			<0.0050		mg/L		0.005	11-JAN-16
WG2243660-4 MS		**L1721496-5**						
Phosphorus (P)-Total			104.0		%		70-130	11-JAN-16
PH-CL	**Water**							
Batch R3363783								
WG2243127-3 DUP		**L1721496-5**						
pH		8.26	8.24	J	pH	0.02	0.2	09-JAN-16
WG2243127-2 LCS								
pH			6.99		pH		6.9-7.1	09-JAN-16
PO4-DO-COL-CL	**Water**							
Batch R3362896								
WG2242846-3 DUP		**L1721496-4**						
Orthophosphate-Dissolved (as P)		0.0125	0.0135		mg/L	7.8	20	08-JAN-16
WG2242846-2 LCS								
Orthophosphate-Dissolved (as P)			99.0		%		80-120	08-JAN-16
WG2242846-1 MB								
Orthophosphate-Dissolved (as P)			<0.0050		mg/L		0.005	08-JAN-16
WG2242846-4 MS		**L1721496-5**						
Orthophosphate-Dissolved (as P)			98.2		%		70-130	08-JAN-16
TSS-CL	**Water**							

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TSS-CL	**Water**							
Batch R3370477								
WG2245448-3 DUP		**L1721259-2**						
Total Suspended Solids		6.0	6.0		mg/L	0.0	20	13-JAN-16
WG2245448-2 LCS								
Total Suspended Solids			98.7		%		85-115	13-JAN-16
WG2245448-1 MB								
Total Suspended Solids			<3.0		mg/L		3	13-JAN-16

Quality Control Report

Workorder: L1721496 Report Date: 14-JAN-16

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

Legend:

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

Sample Parameter Qualifier Definitions:

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

Quality Control Report

Workorder: L1721496 Report Date: 14-JAN-16

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

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH							
	1	06-JAN-16 14:00	09-JAN-16 00:00	0.25	58	hours	EHTR-FM
	2	06-JAN-16 14:45	09-JAN-16 00:00	0.25	57	hours	EHTR-FM
	3	06-JAN-16 14:15	09-JAN-16 00:00	0.25	58	hours	EHTR-FM
	4	06-JAN-16 14:25	09-JAN-16 00:00	0.25	58	hours	EHTR-FM
	5	06-JAN-16 14:35	09-JAN-16 00:00	0.25	57	hours	EHTR-FM
Anions and Nutrients							
Diss. Orthophosphate in Water by Colour							
	3	06-JAN-16 14:15	08-JAN-16 14:54	48	49	hours	EHTR
Bacteriological Tests							
Fecal Coliform Count-MF							
	2	06-JAN-16 14:45	08-JAN-16 13:00	30	46	hours	EHTR
	3	06-JAN-16 14:15	08-JAN-16 13:00	30	47	hours	EHTR
	4	06-JAN-16 14:25	08-JAN-16 13:00	30	47	hours	EHTR
	5	06-JAN-16 14:35	08-JAN-16 13:00	30	46	hours	EHTR

Legend & Qualifier Definitions:

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

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1721496 were received on 08-JAN-16 21:53.

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

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

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

ALS Environmental
ANALYTICAL CHEMISTRY & TESTING SERVICES

www.alsenviro.com

L1721496

Vancouver BC, ... 604-253-6700
Fort St. John BC, Box 256, ...
Grand Prairie AB, 9505 ... 780-513-2191
Fort McMurray AB, Bay 1, 240 ...
Edmonton AB, 9936 - 67th Av ... 780-437-2311
Calgary AB, Bay 7, 1313 - 44th ... Fax: 403-291-0298
Saskatoon SK, 819 - 58th Stre... 306-668-8383

L1721496-COFC

CHAIN OF CUSTODY FORM

SEND REPORT TO: PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION
ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST
CITY:	CALGARY
PROV:	ALBERTA
POSTAL CODE:	T2T 0E2
TEL:	403 - 256 - 8473
FAX:	403 - 244 - 3774
SAMPLER:	Bo Choroszewski
PROJECT NAME AND NO.:	Fernie Alpine Resort- Winter 15/16 EMS wk 2
QUOTE NO:	
PO NO.:	
ALS CONTACT:	Lyudmyla Shvets
REPORT FORMAT:	☑ HARDCOPY ☑ EMAIL - ADDRESS: pmajer@skircr.com ☐ FAX ☐ EXCEL ☑ PDF ☐ OTHER:

ANALYSIS REQUESTED:

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	2016-01-06	14:00	Water		X	X								10.7°C
	WWTP Influent BOD 2	2016-01-06	14:00	Water									X		10.7°C
	WWTP Effluent Routine 3	2016-01-06	14:45	Water		X	X							X	12.2°C
	WWTP Effluent BOD 4	2016-01-06	14:45	Water									X		12.2°C
	WWTP Effluent Nutrients 5	2016-01-06	14:45	Water				X	X	X	X	X			12.2°C
	WWTP Effluent Bacteriological 6	2016-01-06	14:45	Water	X										12.2°C
	Elk River Upstream Routine 7	2016-01-06	14:15	Water		X	X								-0.5°C
	Elk River Upstream Nutrients 8	2016-01-06	14:15	Water				X	X	X	X	X			-0.5°C
	Elk River Upstream Bacteriological 9	2016-01-06	14:15	Water	X										-0.5°C
	Elk River @ Outfall Routine 10	2016-01-06	14:25	Water		X	X								-0.4°C
	Elk River @ Outfall Nutrients 11	2016-01-06	14:25	Water				X	X	X	X	X			-0.4°C
	Elk River @ Outfall Bacteriological 12	2016-01-06	14:25	Water	X										-0.4°C
	Elk River Downstream Routine 13	2016-01-06	14:35	Water		X	X								-0.4°C
	Elk River Downstream Nutrients 14	2016-01-06	14:35	Water				X	X	X	X	X			-0.4°C
	Elk River Downstream Bacteriological 15	2016-01-06	14:35	Water	X										-0.4°C

FOR LAB USE ONLY

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

SEND INVOICE TO: ☐ SAME AS REPORT ☐ DIFFERENT FROM REPORT (provide details below)

INVOICE FORMAT: ☐ HARDCOPY ☐ PDF ☐ 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: Jan 8
	TIME:		TIME: 9:32am
RELINQUISHED BY: Bo Choroszewski	DATE: 2016-01-06	RECEIVED BY:	DATE:
	TIME: 15:00		TIME:

FOR LAB USE ONLY

Cooler Seal Intact? __ Yes __ No __ N/A | Sample Temperature: 4 °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: 14-JAN-16
Report Date: 21-JAN-16 16:04 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1723219

Project P.O. #: NOT SUBMITTED
Job Reference: FERNIE ALPINE RESORT - WINTER 15/16 EMS WK 4
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1723219-1 WWTP INFLUENT							
Sampled By: BC on 13-JAN-16 @ 14:55							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	96	DLHC	75	mg/L		14-JAN-16	R3375330
Total Suspended Solids	132	DLHC	6.0	mg/L		19-JAN-16	R3378233
pH	7.67		0.10	pH		14-JAN-16	R3371353
L1723219-2 WWTP EFFLUENT							
Sampled By: BC on 13-JAN-16 @ 14:50							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		17-JAN-16	R3372970
Biochemical Oxygen Demand	<2.0		2.0	mg/L		14-JAN-16	R3375330
Chemical Oxygen Demand	14		10	mg/L		21-JAN-16	R3379934
Orthophosphate-Dissolved (as P)	0.169	DLA	0.010	mg/L		14-JAN-16	R3370600
Coliform Bacteria - Fecal	34	OCR	1	CFU/100mL		14-JAN-16	R3373808
Phosphorus (P)-Total	0.213	DLA	0.010	mg/L		19-JAN-16	R3376198
Total Suspended Solids	<3.0		3.0	mg/L		19-JAN-16	R3378233
pH	7.63		0.10	pH		14-JAN-16	R3371353
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	39.2	DLHC	0.10	mg/L		14-JAN-16	R3375597
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	39.2		0.11	mg/L		19-JAN-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.050	DLHC	0.050	mg/L		14-JAN-16	R3375597
L1723219-3 ELK RIVER UPSTREAM							
Sampled By: BC on 13-JAN-16 @ 15:05							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		17-JAN-16	R3372970
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		14-JAN-16	R3370600
Coliform Bacteria - Fecal	3	OCR	1	CFU/100mL		14-JAN-16	R3373808
Phosphorus (P)-Total	0.0053		0.0050	mg/L		19-JAN-16	R3376198
Total Suspended Solids	<3.0		3.0	mg/L		19-JAN-16	R3378233
pH	8.07		0.10	pH		14-JAN-16	R3371353
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	2.10		0.020	mg/L		14-JAN-16	R3375597
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	2.10		0.050	mg/L		19-JAN-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		14-JAN-16	R3375597
L1723219-4 ELK RIVER @ OUTFALL							
Sampled By: BC on 13-JAN-16 @ 15:10							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		17-JAN-16	R3372970
Orthophosphate-Dissolved (as P)	0.0106		0.0050	mg/L		14-JAN-16	R3370600
Coliform Bacteria - Fecal	1	OCR	1	CFU/100mL		14-JAN-16	R3373808
Phosphorus (P)-Total	0.0135		0.0050	mg/L		19-JAN-16	R3376198
Total Suspended Solids	<3.0		3.0	mg/L		19-JAN-16	R3378233

* 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
L1723219-4 ELK RIVER @ OUTFALL							
Sampled By: BC on 13-JAN-16 @ 15:10							
Matrix: WATER							
pH	8.10		0.10	pH		14-JAN-16	R3371353
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	3.27		0.020	mg/L		14-JAN-16	R3375597
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	3.27		0.050	mg/L		19-JAN-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		14-JAN-16	R3375597
L1723219-5 ELK RIVER DOWNSTREAM							
Sampled By: BC on 13-JAN-16 @ 15:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		17-JAN-16	R3372970
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		14-JAN-16	R3370600
Coliform Bacteria - Fecal	3	OCR	1	CFU/100mL		14-JAN-16	R3373808
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		19-JAN-16	R3376198
Total Suspended Solids	<3.0		3.0	mg/L		19-JAN-16	R3378233
pH	8.16		0.10	pH		14-JAN-16	R3371353
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	2.21		0.020	mg/L		14-JAN-16	R3375597
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	2.21		0.050	mg/L		19-JAN-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		14-JAN-16	R3375597

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
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-CL	Water	Chemical Oxygen Demand	APHA 5220 D -Closed Reflux, Colorimetric

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
NH4-CL	Water	Ammonia-N	APHA 4500 NH3F-Colorimetry

Ammonia is determined using the Phenate colorimetric method. Result includes both ionized (NH4+) and un-ionized (NH3) ammonia present in the sample.

NO2-BC-IC-CL	Water	Nitrite in Water by IC	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

NO3-BC-IC-CL	Water	Nitrate (as N)	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

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
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 & TECHNICAL SERVICES

www.alsenviro.com

Vancouver BC, [illegible] St [illegible] V5T 0K5, Tel: 604-253-4188 Toll Free: 1-800-665-0243 Fax: 604-253-6700
Fort St John BC, Bay 9831 - 94A Avenue, V1J 6W7, Tel:
Grand Prairie AB, [illegible] 1 Street, T8V 5W1, Tel: 780-539-
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 7
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-52
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668

L1723219-COFC

SEND REPORT TO:

CHAIN OF CUSTODY

PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	403 - 256 - 8473	FAX:	403 - 244 - 3774	SAMPLER:	Bo Choroszewski
PROJECT NAME AND NO.:	Fernie Alpine Resort- Winter 15/16 EMS wk 4			QUOTE NO.:	
PO NO.:		ALS CONTACT:	Lyudmyla Shvets		
REPORT FORMAT:	☑ HARDCOPY ☑ EMAIL - ADDRESS: pmajer@skiroc.com ☐ FAX ☐ EXCEL ☑ PDF ☐ OTHER:				

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	2016-01-13	14:55	Water		X	X								9.6°C
		WWTP Influent BOD 2	2016-01-13	14:55	Water									X		9.6°C
	2	WWTP Effluent Routine 3	2016-01-13	14:50	Water		X	X							X	11.9°C
		WWTP Effluent BOD 4	2016-01-13	14:50	Water									X		11.9°C
		WWTP Effluent Nutrients 5	2016-01-13	14:50	Water				X	X	X	X	X			11.9°C
		WWTP Effluent Bacteriological 6	2016-01-13	14:50	Water	X										11.9°C
	3	Elk River Upstream Routine 7	2016-01-13	15:05	Water		X	X								-0.5°C
		Elk River Upstream Nutrients 8	2016-01-13	15:05	Water				X	X	X	X	X			-0.5°C
		Elk River Upstream Bacteriological 9	2016-01-13	15:05	Water	X										-0.5°C
	4	Elk River @ Outfall Routine 10	2016-01-13	15:10	Water		X	X								0.1°C
		Elk River @ Outfall Nutrients 11	2016-01-13	15:10	Water				X	X	X	X	X			0.1°C
		Elk River @ Outfall Bacteriological 12	2016-01-13	15:10	Water	X										0.1°C
	5	Elk River Downstream Routine 13	2016-01-13	15:15	Water		X	X								-0.3°C
		Elk River Downstream Nutrients 14	2016-01-13	15:15	Water				X	X	X	X	X			-0.3°C
		Elk River Downstream Bacteriological 15	2016-01-13	15:15	Water	X										-0.3°C

TURN AROUND REQUIRED:	◉ ROUTINE ○ RUSH SPECIFY DATE: ____ (surcharge may apply)	RELINQUISHED BY:	DATE:		RECEIVED BY:	DATE:	14/01
			TIME:			TIME:	8:50 am
SEND INVOICE TO:	☐ SAME AS REPORT ☐ DIFFERENT FROM REPORT (provide details below)	RELINQUISHED BY:	DATE:	2016-01-13	RECEIVED BY:	DATE:	
INVOICE FORMAT:	☐ HARDCOPY ☐ PDF ☐ FAX	Bo Choroszewski	TIME:	16:00		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: 22-JAN-16
Report Date: 29-JAN-16 09:14 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1726251

Project P.O. #: NOT SUBMITTED
Job Reference: FERNIE ALPINE RESORT - WINTER 15/16 EMS WK 5
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1726251-1 WWTP INFLUENT							
Sampled By: BO CHOROSZEWSKI on 21-JAN-16 @ 14:20							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	266	DLHC	75	mg/L		22-JAN-16	R3386697
Total Suspended Solids	51.0	DLHC	5.0	mg/L		27-JAN-16	R3389156
pH	7.76		0.10	pH		22-JAN-16	R3383513
L1726251-2 WWTP EFFLUENT							
Sampled By: BO CHOROSZEWSKI on 21-JAN-16 @ 14:25							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		25-JAN-16	R3384134
Biochemical Oxygen Demand	<2.0		2.0	mg/L		22-JAN-16	R3386697
Chemical Oxygen Demand	12		10	mg/L		26-JAN-16	R3386906
Orthophosphate-Dissolved (as P)	0.139	DLA	0.010	mg/L		22-JAN-16	R3382295
Coliform Bacteria - Fecal	1	OCR	1	CFU/100mL		22-JAN-16	R3382644
Phosphorus (P)-Total	0.190	DLA	0.010	mg/L		26-JAN-16	R3385502
Total Suspended Solids	<3.0		3.0	mg/L		27-JAN-16	R3389156
pH	7.73		0.10	pH		22-JAN-16	R3383513
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	38.4	DLHC	0.10	mg/L		22-JAN-16	R3387123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	38.4		0.11	mg/L		27-JAN-16	
Nitrite in Water by IC							
Nitrite (as N)	0.086	DLHC	0.050	mg/L		22-JAN-16	R3387123
L1726251-3 ELK RIVER UPSTREAM							
Sampled By: BO CHOROSZEWSKI on 21-JAN-16 @ 14:40							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		25-JAN-16	R3384134
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		22-JAN-16	R3382295
Coliform Bacteria - Fecal	<1		1	CFU/100mL		22-JAN-16	R3382644
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		26-JAN-16	R3385502
Total Suspended Solids	<3.0		3.0	mg/L		27-JAN-16	R3389156
pH	8.12		0.10	pH		22-JAN-16	R3383513
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	2.05		0.020	mg/L		22-JAN-16	R3387123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	2.05		0.050	mg/L		27-JAN-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		22-JAN-16	R3387123
L1726251-4 ELK RIVER @ OUTFALL							
Sampled By: BO CHOROSZEWSKI on 21-JAN-16 @ 14:50							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		25-JAN-16	R3384134
Orthophosphate-Dissolved (as P)	0.0136		0.0050	mg/L		22-JAN-16	R3382295
Coliform Bacteria - Fecal	1	OCR	1	CFU/100mL		22-JAN-16	R3382644
Phosphorus (P)-Total	0.0181		0.0050	mg/L		26-JAN-16	R3385502
Total Suspended Solids	<3.0		3.0	mg/L		27-JAN-16	R3389156

* 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
L1726251-4 ELK RIVER @ OUTFALL							
Sampled By: BO CHOROSZEWSKI on 21-JAN-16 @ 14:50							
Matrix: WATER							
pH	8.12		0.10	pH		22-JAN-16	R3383513
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	2.58		0.020	mg/L		22-JAN-16	R3387123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	2.58		0.050	mg/L		27-JAN-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		22-JAN-16	R3387123
L1726251-5 ELK RIVER DOWNSTREAM							
Sampled By: BO CHOROSZEWSKI on 21-JAN-16 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		25-JAN-16	R3384134
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		22-JAN-16	R3382295
Coliform Bacteria - Fecal	1	OCR	1	CFU/100mL		22-JAN-16	R3382644
Phosphorus (P)-Total	0.0054		0.0050	mg/L		26-JAN-16	R3385502
Total Suspended Solids	<3.0		3.0	mg/L		27-JAN-16	R3389156
pH	8.23		0.10	pH		22-JAN-16	R3383513
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	2.16		0.020	mg/L		22-JAN-16	R3387123
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	2.16		0.050	mg/L		27-JAN-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		22-JAN-16	R3387123

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
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-CL	Water	Chemical Oxygen Demand	APHA 5220 D -Closed Reflux, Colorimetric

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
NH4-CL	Water	Ammonia-N	APHA 4500 NH3F-Colorimetry

Ammonia is determined using the Phenate colorimetric method. Result includes both ionized (NH4+) and un-ionized (NH3) ammonia present in the sample.

NO2-BC-IC-CL	Water	Nitrite in Water by IC	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

NO3-BC-IC-CL	Water	Nitrate (as N)	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

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
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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L1726251-COFC

L1726251

SEND REPORT TO:

CHAIN OF CUSTODY FORM

PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	403 - 256 - 8473	FAX:	403 - 244 - 3774	SAMPLER:	Bo Choroszewski
PROJECT NAME AND NO.:	Fernie Alpine Resort- Winter 15/16 EMS wk 5			QUOTE NO:	
PO NO.:		ALS CONTACT:	Lyudmyla Shvets		

REPORT FORMAT: ☑ HARDCOPY ☑ EMAIL - ADDRESS: pmajer@skircr.com ☐ FAX ☐ EXCEL ☑ PDF ☐ OTHER:

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.)
	WWTP Influent Routine 1	2016-01-21	14:20	Water		X	X								9.8°C
	WWTP Influent BOD 2	2016-01-21	14:20	Water									X		9.8 °C
	WWTP Effluent Routine 3	2016-01-21	14:25	Water		X	X							X	12.6°C
	WWTP Effluent BOD 4	2016-01-21	14:25	Water									X		12.6 °C
	WWTP Effluent Nutrients 5	2016-01-21	14:25	Water				X	X	X	X	X			12.6 °C
	WWTP Effluent Bacteriological 6	2016-01-21	14:25	Water	X										12.6 °C
	Elk River Upstream Routine 7	2016-01-21	14:40	Water		X	X								-0.4°C -0.3°C
	Elk River Upstream Nutrients 8	2016-01-21	14:40	Water				X	X	X	X	X			-0.5°C BC -0.3°C
	Elk River Upstream Bacteriological 9	2016-01-21	14:40	Water	X										-0.5°C -0.3°C
	Elk River @ Outfall Routine 10	2016-01-21	14:50	Water		X	X								0.9°C
	Elk River @ Outfall Nutrients 11	2016-01-21	14:50	Water				X	X	X	X	X			0.9°C
	Elk River @ Outfall Bacteriological 12	2016-01-21	14:50	Water	X										0.9°C
	Elk River Downstream Routine 13	2016-01-21	15:00	Water		X	X								-0.2°C
	Elk River Downstream Nutrients 14	2016-01-21	15:00	Water				X	X	X	X	X			-0.2°C
	Elk River Downstream Bacteriological 15	2016-01-21	15:00	Water	X										-0.2°C

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

SEND INVOICE TO: ☐ SAME AS REPORT ☐ DIFFERENT FROM REPORT (provide details below)

INVOICE FORMAT: ☐ HARDCOPY ☐ PDF ☐ 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: 1/22
	TIME:		TIME: 8:55
RELINQUISHED BY:	DATE:	2016-01-21	RECEIVED BY: DATE:
Bo Choroszewski	TIME:	16:09	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: 28-JAN-16
Report Date: 04-FEB-16 14:05 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1728262

Project P.O. #: NOT SUBMITTED
Job Reference: FERNIE ALPINE RESORT - WINTER 15/16 EMS WK 6
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1728262-1 WWTP INFLUENT							
Sampled By: BO CHOROSZEWSKI on 27-JAN-16 @ 10:30							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	109	DLHC	75	mg/L		28-JAN-16	R3393813
Total Suspended Solids	49.0	DLHC	5.0	mg/L		03-FEB-16	R3395243
pH	7.84		0.10	pH		28-JAN-16	R3390572
L1728262-2 WWTP EFFLUENT							
Sampled By: BO CHOROSZEWSKI on 27-JAN-16 @ 10:40							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		29-JAN-16	R3391474
Biochemical Oxygen Demand	<2.0		2.0	mg/L		28-JAN-16	R3393813
Chemical Oxygen Demand	15		10	mg/L		29-JAN-16	R3391373
Orthophosphate-Dissolved (as P)	0.175	DLA	0.010	mg/L		29-JAN-16	R3390823
Coliform Bacteria - Fecal	186	OCR	1	CFU/100mL		28-JAN-16	R3390760
Phosphorus (P)-Total	0.204	DLA	0.010	mg/L		01-FEB-16	R3393261
Total Suspended Solids	<3.0		3.0	mg/L		03-FEB-16	R3395243
pH	7.87		0.10	pH		28-JAN-16	R3390572
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	35.0	DLHC	0.10	mg/L		28-JAN-16	R3394247
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	35.0		0.11	mg/L		02-FEB-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.050		0.050	mg/L		28-JAN-16	R3394247
L1728262-3 ELK RIVER UPSTREAM							
Sampled By: BO CHOROSZEWSKI on 27-JAN-16 @ 10:50							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		29-JAN-16	R3391474
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		29-JAN-16	R3390823
Coliform Bacteria - Fecal	4	OCR	1	CFU/100mL		28-JAN-16	R3390760
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		01-FEB-16	R3393261
Total Suspended Solids	<3.0		3.0	mg/L		03-FEB-16	R3395243
pH	8.24		0.10	pH		28-JAN-16	R3390572
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	2.21		0.020	mg/L		28-JAN-16	R3394247
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	2.21		0.050	mg/L		02-FEB-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		28-JAN-16	R3394247
L1728262-4 ELK RIVER @ OUTFALL							
Sampled By: BO CHOROSZEWSKI on 27-JAN-16 @ 11:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		29-JAN-16	R3391474
Orthophosphate-Dissolved (as P)	0.0136		0.0050	mg/L		29-JAN-16	R3390823
Coliform Bacteria - Fecal	12	OCR	1	CFU/100mL		28-JAN-16	R3390760
Phosphorus (P)-Total	0.0139		0.0050	mg/L		01-FEB-16	R3393261
Total Suspended Solids	<3.0		3.0	mg/L		03-FEB-16	R3395243

* 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
L1728262-4 ELK RIVER @ OUTFALL							
Sampled By: BO CHOROSZEWSKI on 27-JAN-16 @ 11:00							
Matrix: WATER							
pH	8.19		0.10	pH		28-JAN-16	R3390572
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	2.36		0.020	mg/L		28-JAN-16	R3394247
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	2.36		0.050	mg/L		02-FEB-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		28-JAN-16	R3394247
L1728262-5 ELK RIVER DOWNSTREAM							
Sampled By: BO CHOROSZEWSKI on 27-JAN-16 @ 11:10							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		29-JAN-16	R3391474
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		29-JAN-16	R3390823
Coliform Bacteria - Fecal	2	OCR	1	CFU/100mL		28-JAN-16	R3390760
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		01-FEB-16	R3393261
Total Suspended Solids	<3.0		3.0	mg/L		03-FEB-16	R3395243
pH	8.33		0.10	pH		28-JAN-16	R3390572
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	2.36		0.020	mg/L		28-JAN-16	R3394247
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	2.36		0.050	mg/L		02-FEB-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		28-JAN-16	R3394247

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
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-CL	Water	Chemical Oxygen Demand	APHA 5220 D -Closed Reflux, Colorimetric

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
NH4-CL	Water	Ammonia-N	APHA 4500 NH3F-Colorimetry

Ammonia is determined using the Phenate colorimetric method. Result includes both ionized (NH4+) and un-ionized (NH3) ammonia present in the sample.

NO2-BC-IC-CL	Water	Nitrite in Water by IC	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

NO3-BC-IC-CL	Water	Nitrate (as N)	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

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
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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Fort McMurray AB, Bay 1, 245 Macdonald C
Edmonton AB, 9936 - 67th Avenue, T6E 0P5
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T
Saskatoon SK, 819 - 58th Street East, S7K 6

L1728262-COFC

1298

L1728262

SEND REPORT TO:

CHAIN OF CUSTODY FORM

PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	403 - 256 - 8473	FAX:	403 - 244 - 3774	SAMPLER:	Bo Choroszewski
PROJECT NAME AND NO.:	Fernie Alpine Resort- Winter 15/16 EMS wk 6			QUOTE NO:	[redacted]
PO NO.:		ALS CONTACT:	Lyudmyla Shvets		
REPORT FORMAT:	☑ HARDCOPY ☑ EMAIL - ADDRESS: pmajer@skircr.com ☐ FAX ☐ EXCEL ☑ PDF ☐ OTHER:				

ANALYSIS REQUESTED:

WO#	SAMPLE IDENTIFICATION	DATE 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	2016-01-27	10:30 AM	Water		X	X												9.8°C
	WWTP Influent BOD	2016-01-27	10:30	Water									X						9.8°C
	WWTP Effluent Routine	2016-01-27	10:40	Water		X	X							X					12.5°C
	WWTP Effluent BOD	2016-01-27	10:40	Water									X						12.5°C
	WWTP Effluent Nutrients	2016-01-27	10:40	Water				X	X	X	X	X							12.5°C
	WWTP Effluent Bacteriological	2016-01-27	10:40	Water	X														12.5°C
	Elk River Upstream Routine	2016-01-27	10:50	Water		X	X												0.7°C
	Elk River Upstream Nutrients	2016-01-27	10:50	Water				X	X	X	X	X							0.7°C
	Elk River Upstream Bacteriological	2016-01-27	10:50	Water	X														0.7°C
	Elk River @ Outfall Routine	2016-01-27	11:00	Water		X	X												1.1°C
	Elk River @ Outfall Nutrients	2016-01-27	11:00	Water				X	X	X	X	X							1.1°C
	Elk River @ Outfall Bacteriological	2016-01-27	11:00	Water	X														1.1°C
	Elk River Downstream Routine	2016-01-27	11:10	Water		X	X												1.1°C
	Elk River Downstream Nutrients	2016-01-27	11:10	Water				X	X	X	X	X							1.1°C
	Elk River Downstream Bacteriological	2016-01-27	11:10	Water	X														1.1°C

FOR LAB USE ONLY

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

SEND INVOICE TO: ☐ SAME AS REPORT ☐ DIFFERENT FROM REPORT (provide details below)

INVOICE FORMAT: ☐ HARDCOPY ☐ PDF ☐ 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:	28/01
	TIME:			TIME:	8:50 am
RELINQUISHED BY: Bo Choroszewski	DATE:	2016-01-27	RECEIVED BY:	DATE:	
	TIME:	12:00		TIME:	

FOR LAB USE ONLY

Cooler Seal Intact? __Yes __No __N/A

Sample Temperature: 5°C 7°C

Frozen? __Yes __No

Cooling Method? __Icepacks __Ice __None

G:/QUALITY/00_DOCUMENTS/10_AUTHORIZED/FORMS/CoC for ALS EMS.xls

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

Date Received: 05-FEB-16
Report Date: 11-FEB-16 09:04 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1731403

Project P.O. #: NOT SUBMITTED
Job Reference: FERNIE ALPINE RESORT - WINTER 15/16 EMS WK 7
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1731403-1 WWTP INFLUENT							
Sampled By: BC on 04-FEB-16 @ 12:15							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	157		2.0	mg/L		05-FEB-16	R3399302
Total Suspended Solids	286	DLHC	9.0	mg/L		09-FEB-16	R3399474
pH	7.95		0.10	pH		05-FEB-16	R3396502
L1731403-2 WWTP EFFLUENT							
Sampled By: BC on 04-FEB-16 @ 12:20							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		07-FEB-16	R3397395
Biochemical Oxygen Demand	<2.0		2.0	mg/L		05-FEB-16	R3399302
Chemical Oxygen Demand	10		10	mg/L		08-FEB-16	R3398577
Orthophosphate-Dissolved (as P)	0.137		0.0050	mg/L		05-FEB-16	R3396132
Coliform Bacteria - Fecal	<1		1	CFU/100mL		05-FEB-16	R3397473
Phosphorus (P)-Total	0.175	DLHC	0.010	mg/L		09-FEB-16	R3398823
Total Suspended Solids	<3.0		3.0	mg/L		09-FEB-16	R3399474
pH	7.84		0.10	pH		05-FEB-16	R3396502
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	28.8	HTD	0.50	mg/L		06-FEB-16	R3396778
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	28.8		0.50	mg/L		07-FEB-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		05-FEB-16	R3396778
L1731403-3 ELK RIVER UPSTREAM							
Sampled By: BC on 04-FEB-16 @ 12:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		07-FEB-16	R3397395
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		05-FEB-16	R3396132
Coliform Bacteria - Fecal	4	OCR	1	CFU/100mL		05-FEB-16	R3397473
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		09-FEB-16	R3398823
Total Suspended Solids	<3.0		3.0	mg/L		09-FEB-16	R3399474
pH	8.15		0.10	pH		05-FEB-16	R3396502
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.89		0.020	mg/L		05-FEB-16	R3396778
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.89		0.050	mg/L		07-FEB-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		05-FEB-16	R3396778
L1731403-4 ELK RIVER @OUTFALL							
Sampled By: BC on 04-FEB-16 @ 12:40							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		07-FEB-16	R3397395
Orthophosphate-Dissolved (as P)	0.0103		0.0050	mg/L		05-FEB-16	R3396132
Coliform Bacteria - Fecal	3	OCR	1	CFU/100mL		05-FEB-16	R3397473
Phosphorus (P)-Total	0.0138		0.0050	mg/L		09-FEB-16	R3398823
Total Suspended Solids	4.0		3.0	mg/L		09-FEB-16	R3399474

* 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
L1731403-4 ELK RIVER @OUTFALL							
Sampled By: BC on 04-FEB-16 @ 12:40							
Matrix: WATER							
pH	8.14		0.10	pH		05-FEB-16	R3396502
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	0.336		0.020	mg/L		05-FEB-16	R3396778
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.336		0.050	mg/L		07-FEB-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		05-FEB-16	R3396778
L1731403-5 ELK RIVER DOWNSTREAM							
Sampled By: BC on 04-FEB-16 @ 12:50							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		07-FEB-16	R3397395
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		05-FEB-16	R3396132
Coliform Bacteria - Fecal	2	OCR	1	CFU/100mL		05-FEB-16	R3397473
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		09-FEB-16	R3398823
Total Suspended Solids	<3.0		3.0	mg/L		09-FEB-16	R3399474
pH	8.22		0.10	pH		05-FEB-16	R3396502
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	2.12		0.020	mg/L		05-FEB-16	R3396778
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	2.12		0.050	mg/L		07-FEB-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		05-FEB-16	R3396778

* 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.
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-CL	Water	Chemical Oxygen Demand	APHA 5220 D -Closed Reflux, Colorimetric

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
NH4-CL	Water	Ammonia-N	APHA 4500 NH3F-Colorimetry

Ammonia is determined using the Phenate colorimetric method. Result includes both ionized (NH4+) and un-ionized (NH3) ammonia present in the sample.

NO2-BC-IC-CL	Water	Nitrite in Water by IC	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

NO3-BC-IC-CL	Water	Nitrate (as N)	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

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
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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Fort McMurray AB, Bay 1, 245 Macdonald Cr T9H 4B5, Tel: 780-791-1524 Fax: [illegible]
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free: 1-8[illegible]
Calgary AB, Bay 7, 1313 - 44th Avenue NE T2E 6L5, Tel: 403-291-9897 Toll Free: [illegible]
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-[illegible]

L1731403-COFC

SEND REPORT TO:

CHAIN OF CUSTODY FORM

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	403 - 256 - 8473	FAX:	403 - 244 - 3774	SAMPLER:	Bo Choroszewski
PROJECT NAME AND NO.:	Fernie Alpine Resort- Winter 15/16 EMS wk 7			QUOTE NO:	
PO NO.:		ALS CONTACT:	Lyudmyla Shvets		

REPORT FORMAT: ☑ HARDCOPY ☑ EMAIL - ADDRESS: pmajer@skircr.com ☐ FAX ☐ EXCEL ☑ PDF ☐ OTHER:

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	2016-02-04	12:15 PM	Water		X	X								9.4°C
	WWTP Influent BOD	2016-02-04	12:15	Water									X		9.4°C
	WWTP Effluent Routine	2016-02-04	12:20	Water		X	X							X	11.1°C
	WWTP Effluent BOD	2016-02-04	12:20	Water									X		11.1°C
2	WWTP Effluent Nutrients	2016-02-04	12:20	Water				X	X	X	X	X			11.1°C
	WWTP Effluent Bacteriological	2016-02-04	12:20	Water	X										11.1°C
	Elk River Upstream Routine	2016-02-04	12:30	Water		X	X								0.0°C
3	Elk River Upstream Nutrients	2016-02-04	12:30	Water				X	X	X	X	X			0.0°C
	Elk River Upstream Bacteriological	2016-02-04	12:30	Water	X										0.0°C
	Elk River @ Outfall Routine	2016-02-04	12:40	Water		X	X								0.3°C
4	Elk River @ Outfall Nutrients	2016-02-04	12:40	Water				X	X	X	X	X			0.3°C
	Elk River @ Outfall Bacteriological	2016-02-04	12:40	Water	X										0.3°C
	Elk River Downstream Routine	2016-02-04	12:50	Water		X	X								-0.3°C
5	Elk River Downstream Nutrients	2016-02-04	12:50	Water				X	X	X	X	X			-0.3°C
	Elk River Downstream Bacteriological	2016-02-04	12:50	Water	X										-0.3°C

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

SEND INVOICE TO: ☐ SAME AS REPORT ☐ DIFFERENT FROM REPORT (provide details below)

INVOICE FORMAT: ☐ HARDCOPY ☐ PDF ☐ 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: 2/5
	TIME:		TIME: 9:50
RELINQUISHED BY: Bo Choroszowski	DATE:	2016-02-04	RECEIVED BY: DATE:
	TIME:	14:00	TIME:

FOR LAB USE ONLY

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

G:\QUALITY\00_DOCUMENTS\0_AUTHORIZED FORMS\CoC for ALS EMS.xls

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

Date Received: 31-MAR-16
Report Date: 06-APR-16 17:22 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1750357

Project P.O. #: NOT SUBMITTED
Job Reference: WASTEWATER - MARCH 2016 MONTHLY EMS
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1750357-1 WWTP INFLUENT							
Sampled By: BC on 30-MAR-16 @ 15:15							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	138	DLHC	75	mg/L		31-MAR-16	R3430188
Total Suspended Solids	180	DLHC	9.0	mg/L		04-APR-16	R3431593
pH	7.54		0.10	pH		05-APR-16	R3430993
L1750357-2 WWTP EFFLUENT							
Sampled By: BC on 30-MAR-16 @ 15:20							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		31-MAR-16	R3428872
Biochemical Oxygen Demand	<2.0		2.0	mg/L		31-MAR-16	R3430188
Orthophosphate-Dissolved (as P)	0.290	DLA	0.025	mg/L		01-APR-16	R3428775
Coliform Bacteria - Fecal	14	OCR	1	CFU/100mL		31-MAR-16	R3428947
Phosphorus (P)-Total	0.314		0.0050	mg/L		01-APR-16	R3428711
Total Suspended Solids	<3.0		3.0	mg/L		04-APR-16	R3431593
pH	7.56		0.10	pH		05-APR-16	R3430993
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	31.7	HTD	0.10	mg/L		06-APR-16	R3432293
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	31.7		0.10	mg/L		06-APR-16	
Nitrite in Water by IC							
Nitrite (as N)	0.013		0.010	mg/L		01-APR-16	R3432293

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
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.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
OCR	Parameter is out of client specific range.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
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
NH4-CL	Water	Ammonia-N	APHA 4500 NH3F-Colorimetry
Ammonia is determined using the Phenate colorimetric method. Result includes both ionized (NH4+) and un-ionized (NH3) ammonia present in the sample.			
NO2-BC-IC-CL	Water	Nitrite in Water by IC	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.			
NO3-BC-IC-CL	Water	Nitrate (as N)	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.			
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
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: 6
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: 7
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free: 1-800-668-9878
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-800-667-7645 Fax:

L1750357-COFC

SEND REPORT TO:

CHAIN OF CUSTODY FORM

PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	403 - 256 - 8473	FAX:	403 - 244 - 3774	SAMPLER:	Bo Choroszewski
PROJECT NAME AND NO.:	Wastewater -March 2016 Monthly EMS			QUOTE NO:	
PO NO.:		ALS CONTACT:	Lyudmyla Shvets		
REPORT FORMAT:	☑ HARDCOPY ☑ EMAIL - ADDRESS: pmajer@skircr.com				
	☐ FAX ☐ EXCEL ☑ PDF ☐ OTHER:				

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	2016-03-30	15:15	Water		X	X								
	WWTP Influent BOD	2016-03-30	15:15	Water									X		
2	WWTP Effluent Routine	2016-03-30	15:20	Water		X	X								
	WWTP Effluent BOD	2016-03-30	15:20	Water									X		
	WWTP Effluent Nutrients	2016-03-30	15:20	Water				X	X	X	X	X			
	WWTP Effluent Bacteriological	2016-03-30	15:20	Water	X										

FOR LAB USE ONLY

ANALYSIS REQUESTED:

TURN AROUND REQUIRED:	◉ ROUTINE ○ RUSH SPECIFY DATE: _____ (surcharge may apply)	RELINQUISHED BY: HUNGRY BAYTALUKE	DATE: TIME:	RECEIVED BY:	DATE: 3/31 TIME: 10:47
SEND INVOICE TO:	☐ SAME AS REPORT ☐ DIFFERENT FROM REPORT (provide details below)	RELINQUISHED BY: BO CHOROSZEWSKI	DATE: 2016-03-30 TIME: 15:30	RECEIVED BY:	DATE: TIME:
INVOICE FORMAT:	☐ HARDCOPY ☐ PDF ☐ FAX				
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: 6 °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: 29-APR-16
Report Date: 05-MAY-16 16:43 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1761962

Project P.O. #: NOT SUBMITTED
Job Reference: FERNIE ALPINE RESORT - SPRING 2016 EMS WK 1
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1761962-1 WWTP INFLUENT							
Sampled By: BC on 28-APR-16 @ 11:45							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	65	DLHC	20	mg/L		29-APR-16	R3451153
Total Suspended Solids	93.5	DLHC	5.0	mg/L		04-MAY-16	R3451750
pH	7.87		0.10	pH		04-MAY-16	R3451445
L1761962-2 WWTP EFFLUENT							
Sampled By: BC on 28-APR-16 @ 11:50							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		02-MAY-16	R3450005
Biochemical Oxygen Demand	<2.0		2.0	mg/L		29-APR-16	R3451153
Chemical Oxygen Demand	10		10	mg/L		03-MAY-16	R3451035
Orthophosphate-Dissolved (as P)	0.271	DLA	0.025	mg/L		29-APR-16	R3448370
Coliform Bacteria - Fecal	<1		1	CFU/100mL		29-APR-16	R3449634
Phosphorus (P)-Total	0.312	DLA	0.025	mg/L		02-MAY-16	R3449807
Total Suspended Solids	<3.0		3.0	mg/L		04-MAY-16	R3451750
pH	7.97		0.10	pH		04-MAY-16	R3451445
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	32.7	HTD	0.10	mg/L		30-APR-16	R3450798
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	32.7		0.10	mg/L		04-MAY-16	
Nitrite in Water by IC							
Nitrite (as N)	0.019		0.010	mg/L		29-APR-16	R3450798
L1761962-3 ELK RIVER UPSTREAM							
Sampled By: BC on 28-APR-16 @ 12:05							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		02-MAY-16	R3450005
Orthophosphate-Dissolved (as P)	0.0072		0.0050	mg/L		29-APR-16	R3448370
Coliform Bacteria - Fecal	4	OCR	1	CFU/100mL		29-APR-16	R3449634
Phosphorus (P)-Total	0.0257		0.0050	mg/L		02-MAY-16	R3449807
Total Suspended Solids	14.3		3.0	mg/L		04-MAY-16	R3451750
pH	8.09		0.10	pH		04-MAY-16	R3451445
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.18		0.020	mg/L		29-APR-16	R3450798
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.18		0.050	mg/L		04-MAY-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		29-APR-16	R3450798
L1761962-4 ELK RIVER @ OUTFALL							
Sampled By: BC on 28-APR-16 @ 12:10							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		02-MAY-16	R3450005
Orthophosphate-Dissolved (as P)	0.0079		0.0050	mg/L		29-APR-16	R3448370
Coliform Bacteria - Fecal	2	OCR	1	CFU/100mL		29-APR-16	R3449634
Phosphorus (P)-Total	0.0244		0.0050	mg/L		02-MAY-16	R3449807
Total Suspended Solids	13.7		3.0	mg/L		04-MAY-16	R3451750

* 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
L1761962-4 ELK RIVER @ OUTFALL							
Sampled By: BC on 28-APR-16 @ 12:10							
Matrix: WATER							
pH	8.18		0.10	pH		04-MAY-16	R3451445
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.09		0.020	mg/L		29-APR-16	R3450798
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.09		0.050	mg/L		04-MAY-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		29-APR-16	R3450798
L1761962-5 ELK RIVER DOWNSTREAM							
Sampled By: BC on 28-APR-16 @ 12:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		02-MAY-16	R3450005
Orthophosphate-Dissolved (as P)	0.0073		0.0050	mg/L		29-APR-16	R3448370
Coliform Bacteria - Fecal	3	OCR	1	CFU/100mL		29-APR-16	R3449634
Phosphorus (P)-Total	0.0238		0.0050	mg/L		02-MAY-16	R3449807
Total Suspended Solids	13.7		3.0	mg/L		04-MAY-16	R3451750
pH	8.20		0.10	pH		04-MAY-16	R3451445
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.24		0.020	mg/L		29-APR-16	R3450798
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.24		0.050	mg/L		04-MAY-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		29-APR-16	R3450798

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
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.
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
NH4-CL	Water	Ammonia-N	APHA 4500 NH3F-Colorimetry
Ammonia is determined using the Phenate colorimetric method. Result includes both ionized (NH4+) and un-ionized (NH3) ammonia present in the sample.			
NO2-BC-IC-CL	Water	Nitrite in Water by IC	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.			
NO3-BC-IC-CL	Water	Nitrate (as N)	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.			
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
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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Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-791-1524
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free:
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 T
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Fre.

L1761962-COFC

SEND REPORT TO:

CHAIN OF CUSTODY FORM

PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	403 - 256 - 8473	FAX:	403 - 244 - 3774	SAMPLER:	Bo Choroszewski
PROJECT NAME AND NO.:	Fernie Alpine Resort- Spring 2016 EMS wk 1			QUOTE NO:	
PO NO.:		ALS CONTACT:	Lyudmyla Shvets		
REPORT FORMAT:	☑ HARDCOPY ☑ EMAIL - ADDRESS: pmajer@skircr.com ☐ FAX ☐ EXCEL ☑ PDF ☐ OTHER:				

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, duo dates, etc.)
	1	WWTP Influent Routine 1	2016-04-28	11:45	Water		X	X											7.8 °C
		WWTP Influent BOD 2	2016-04-28	11:45	Water									X					9.8°C
		WWTP Effluent Routine 3	2016-04-28	11:50	Water		X	X							X				12.6°C
		WWTP Effluent BOD 4	2016-04-28	11:50	Water									X					12.6°C
	2	WWTP Effluent Nutrients 5	2016-04-28	11:50	Water				X	X	X	X	X						12.6°C
		WWTP Effluent Bacteriological 6	2016-04-28	11:50	Water	X													12.6°C
	3	Elk River Upstream Routine 7	2016-04-28	12:05	Water		X	X											5.9°C
		Elk River Upstream Nutrients 8	2016-04-28	12:05	Water				X	X	X	X	X						5.9°C
		Elk River Upstream Bacteriological 9	2016-04-28	12:05	Water	X													5.9°C
	4	Elk River @ Outfall Routine 10	2016-04-28	12:10	Water		X	X											5.4°C
		Elk River @ Outfall Nutrients 11	2016-04-28	12:10	Water				X	X	X	X	X						5.4°C
		Elk River @ Outfall Bacteriological 12	2016-04-28	12:10	Water	X													5.4°C
	5	Elk River Downstream Routine 13	2016-04-28	12:15	Water		X	X											5.4°C
		Elk River Downstream Nutrients 14	2016-04-28	12:15	Water				X	X	X	X	X						5.4°C
		Elk River Downstream Bacteriological 15	2016-04-28	12:15	Water	X													5.4°C

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

SEND INVOICE TO: ☐ SAME AS REPORT ☐ DIFFERENT FROM REPORT (provide details below)

INVOICE FORMAT: ☐ HARDCOPY ☐ PDF ☐ 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: 4/29
	TIME:		TIME: 9:29
RELINQUISHED BY:	DATE:	2016-04-28	RECEIVED BY: DATE:
Bo Choroszewski	TIME:	13:15	TIME:

FOR LAB USE ONLY

Cooler Seal Intact? ✓ Yes ___ No ___ N/A | Sample Temperature: 4 °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: 06-MAY-16
Report Date: 13-MAY-16 13:39 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1765183

Project P.O. #: NOT SUBMITTED
Job Reference: FERNIE ALPINE RESORT - SPRING 2016 EMS WK 2
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1765183-1 WWTP INFLUENT							
Sampled By: BC on 05-MAY-16 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	51	DLHC	20	mg/L		06-MAY-16	R3456078
Total Suspended Solids	30.8	DLHC	4.0	mg/L		11-MAY-16	R3456580
pH	7.68		0.10	pH		12-MAY-16	R3457025
L1765183-2 WWTP EFFLUENT							
Sampled By: BC on 05-MAY-16 @ 14:20							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		09-MAY-16	R3454520
Biochemical Oxygen Demand	<2.0		2.0	mg/L		06-MAY-16	R3456078
Chemical Oxygen Demand	<10		10	mg/L		07-MAY-16	R3453558
Orthophosphate-Dissolved (as P)	0.131	DLHC	0.010	mg/L		07-MAY-16	R3453373
Coliform Bacteria - Fecal	<1		1	CFU/100mL		06-MAY-16	R3453261
Phosphorus (P)-Total	0.18	DLA	0.10	mg/L		10-MAY-16	R3455069
Total Suspended Solids	<3.0		3.0	mg/L		11-MAY-16	R3456580
pH	7.84		0.10	pH		12-MAY-16	R3457025
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	28.1	HTD	0.10	mg/L		09-MAY-16	R3453730
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	28.1		0.10	mg/L		09-MAY-16	
Nitrite in Water by IC							
Nitrite (as N)	0.040		0.010	mg/L		06-MAY-16	R3453730
L1765183-3 ELK RIVER UPSTREAM							
Sampled By: BC on 05-MAY-16 @ 14:10							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		09-MAY-16	R3454520
Orthophosphate-Dissolved (as P)	0.0111		0.0050	mg/L		07-MAY-16	R3453373
Coliform Bacteria - Fecal	20	OCR	1	CFU/100mL		06-MAY-16	R3453261
Phosphorus (P)-Total	0.0406		0.0050	mg/L		10-MAY-16	R3455069
Total Suspended Solids	24.7		3.0	mg/L		11-MAY-16	R3456580
pH	8.19		0.10	pH		12-MAY-16	R3457025
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	0.998		0.020	mg/L		06-MAY-16	R3453730
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.998		0.050	mg/L		09-MAY-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		06-MAY-16	R3453730
L1765183-4 ELK RIVER @ OUTFALL							
Sampled By: BC on 05-MAY-16 @ 14:05							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		09-MAY-16	R3454520
Orthophosphate-Dissolved (as P)	0.0103		0.0050	mg/L		07-MAY-16	R3453373
Coliform Bacteria - Fecal	9	OCR	1	CFU/100mL		06-MAY-16	R3453261
Phosphorus (P)-Total	0.0472		0.0050	mg/L		10-MAY-16	R3455069
Total Suspended Solids	29.3		3.0	mg/L		11-MAY-16	R3456580

* 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
L1765183-4 ELK RIVER @ OUTFALL							
Sampled By: BC on 05-MAY-16 @ 14:05							
Matrix: WATER							
pH	8.23		0.10	pH		12-MAY-16	R3457025
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	0.937		0.020	mg/L		06-MAY-16	R3453730
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.937		0.050	mg/L		09-MAY-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		06-MAY-16	R3453730
L1765183-5 ELK RIVER DOWNSTREAM							
Sampled By: BC on 05-MAY-16 @ 14:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		09-MAY-16	R3454520
Orthophosphate-Dissolved (as P)	0.0088		0.0050	mg/L		07-MAY-16	R3453373
Coliform Bacteria - Fecal	14	OCR	1	CFU/100mL		06-MAY-16	R3453261
Phosphorus (P)-Total	0.0603		0.0050	mg/L		10-MAY-16	R3455069
Total Suspended Solids	34.7		3.0	mg/L		11-MAY-16	R3456580
pH	8.18		0.10	pH		12-MAY-16	R3457025
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.06		0.020	mg/L		06-MAY-16	R3453730
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.06		0.050	mg/L		09-MAY-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		06-MAY-16	R3453730

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
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.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
OCR	Parameter is out of client specific range.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
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
NH4-CL	Water	Ammonia-N	APHA 4500 NH3F-Colorimetry
Ammonia is determined using the Phenate colorimetric method. Result includes both ionized (NH4+) and un-ionized (NH3) ammonia present in the sample.			
NO2-BC-IC-CL	Water	Nitrite in Water by IC	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.			
NO3-BC-IC-CL	Water	Nitrate (as N)	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.			
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
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-f
Fort St. John BC, Box 256, 9831 - 98A Avenue, V1J 6W7, Tel: 250-261-5517 Fax: :
Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5196 Toll Free: 1-800-
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-791-1524 Fax: 78
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free: 1-800-6
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free:
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-80

L1765183-COFC

SEND REPORT TO:

CHAIN OF CUSTODY FORM

PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION		ATTN:	PATRICK MAJER	
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST				
CITY:	CALGARY	PROV: ALBERTA	POSTAL CODE:	T2T 0E2	
TEL:	403 - 256 - 8473	FAX: 403 - 244 - 3774	SAMPLER:	Bo Choroszewski	
PROJECT NAME AND NO.:	Fernie Alpine Resort- Spring 2016 EMS wk 2		QUOTE NO:		
PO NO.:		ALS CONTACT: Lyudmyla Shvets			
REPORT FORMAT:	☑ HARDCOPY ☑ EMAIL - ADDRESS: pmajer@skircr.com				
	☐ FAX ☐ EXCEL ☑ PDF ☐ OTHER:				

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 1	2016-05-05	14:15	Water		X	X											13.4°C
		WWTP Influent BOD 2	2016-05-05	14:15	Water									X					13.4°C
2		WWTP Effluent Routine 3	2016-05-05	14:20	Water		X	X							X				13.1°C
		WWTP Effluent BOD 4	2016-05-05	14:20	Water									X					13.1°C
		WWTP Effluent Nutrients 5	2016-05-05	14:20	Water				X	X	X	X	X						13.1°C
		WWTP Effluent Bacteriological 6	2016-05-05	14:20	Water	X													13.1°C
3		Elk River Upstream Routine 7	2016-05-05	14:10	Water		X	X											8.4°C
		Elk River Upstream Nutrients 8	2016-05-05	14:10	Water				X	X	X	X	X						8.4°C
		Elk River Upstream Bacteriological 9	2016-05-05	14:10	Water	X													8.4°C
4		Elk River @ Outfall Routine 10	2016-05-05	14:05	Water		X	X											7.8°C
		Elk River @ Outfall Nutrients 11	2016-05-05	14:05	Water				X	X	X	X	X						7.8°C
		Elk River @ Outfall Bacteriological 12	2016-05-05	14:05	Water	X													7.8°C
5		Elk River Downstream Routine 13	2016-05-05	14:00	Water		X	X											7.6°C
		Elk River Downstream Nutrients 14	2016-05-05	14:00	Water				X	X	X	X	X						7.6°C
		Elk River Downstream Bacteriological 15	2016-05-05	14:00	Water	X													7.6°C

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

SEND INVOICE TO: ☐ SAME AS REPORT ☐ DIFFERENT FROM REPORT (provide details below)

INVOICE FORMAT: ☐ HARDCOPY ☐ PDF ☐ 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:
	TIME:		TIME: 05/06 11:15am
RELINQUISHED BY:	DATE: 2016-05-05	RECEIVED BY:	DATE:
Bo Choroszewski	TIME: 14:30		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/CoC for ALS EMS.xls

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

Date Received: 13-MAY-16
Report Date: 19-MAY-16 16:34 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1768365

Project P.O. #: NOT SUBMITTED
Job Reference: FERNIE ALPINE RESORT - SPRING 2016 EMS WEEK 3
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1768365-1 WWTP INFLUENT							
Sampled By: BC on 12-MAY-16 @ 12:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	71	DLHC	50	mg/L		13-MAY-16	R3460039
Total Suspended Solids	68.3	DLHC	4.0	mg/L		17-MAY-16	R3460895
pH	7.46		0.10	pH		17-MAY-16	R3459972
L1768365-2 WWTP EFFLUENT							
Sampled By: BC on 12-MAY-16 @ 12:10							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		18-MAY-16	R3461247
Biochemical Oxygen Demand	<2.0		2.0	mg/L		13-MAY-16	R3460039
Chemical Oxygen Demand	<10		10	mg/L		16-MAY-16	R3460022
Orthophosphate-Dissolved (as P)	0.178	DLA	0.010	mg/L		14-MAY-16	R3460417
Coliform Bacteria - Fecal	<1		1	CFU/100mL		13-MAY-16	R3459630
Phosphorus (P)-Total	0.192	DLA	0.010	mg/L		17-MAY-16	R3459753
Total Suspended Solids	<3.0		3.0	mg/L		17-MAY-16	R3460895
pH	7.77		0.10	pH		17-MAY-16	R3459972
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	29.4	HTD	0.10	mg/L		14-MAY-16	R3457774
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	29.4		0.10	mg/L		15-MAY-16	
Nitrite in Water by IC							
Nitrite (as N)	0.021		0.010	mg/L		13-MAY-16	R3457774
L1768365-3 ELK RIVER UPSTREAM							
Sampled By: BC on 12-MAY-16 @ 12:25							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		18-MAY-16	R3461247
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		18-MAY-16	R3460417
Coliform Bacteria - Fecal	3	OCR	1	CFU/100mL		13-MAY-16	R3459630
Phosphorus (P)-Total	0.0201		0.0050	mg/L		17-MAY-16	R3459753
Total Suspended Solids	7.3		3.0	mg/L		17-MAY-16	R3460895
pH	8.20		0.10	pH		17-MAY-16	R3459972
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.13		0.020	mg/L		13-MAY-16	R3457774
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.13		0.050	mg/L		15-MAY-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		13-MAY-16	R3457774
L1768365-4 ELK RIVER @OUTFALL							
Sampled By: BC on 12-MAY-16 @ 12:35							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		18-MAY-16	R3461247
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		14-MAY-16	R3460417
Coliform Bacteria - Fecal	9	OCR	1	CFU/100mL		13-MAY-16	R3459630
Phosphorus (P)-Total	0.0230		0.0050	mg/L		17-MAY-16	R3459753
Total Suspended Solids	8.7		3.0	mg/L		17-MAY-16	R3460895

* 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
L1768365-4 ELK RIVER @OUTFALL							
Sampled By: BC on 12-MAY-16 @ 12:35							
Matrix: WATER							
pH	8.23		0.10	pH		17-MAY-16	R3459972
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.07		0.020	mg/L		13-MAY-16	R3457774
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.07		0.050	mg/L		15-MAY-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		13-MAY-16	R3457774
L1768365-5 ELK RIVER DOWNSTREAM							
Sampled By: BC on 12-MAY-16 @ 12:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		18-MAY-16	R3461247
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		14-MAY-16	R3460417
Coliform Bacteria - Fecal	4	OCR	1	CFU/100mL		13-MAY-16	R3459630
Phosphorus (P)-Total	0.0227		0.0050	mg/L		17-MAY-16	R3459753
Total Suspended Solids	11.3		3.0	mg/L		17-MAY-16	R3460895
pH	8.23		0.10	pH		17-MAY-16	R3459972
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.21		0.020	mg/L		13-MAY-16	R3457774
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.21		0.050	mg/L		15-MAY-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		13-MAY-16	R3457774

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects.
HTD	Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
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
NH4-CL	Water	Ammonia-N	APHA 4500 NH3F-Colorimetry

Ammonia is determined using the Phenate colorimetric method. Result includes both ionized (NH4+) and un-ionized (NH3) ammonia present in the sample.

NO2-BC-IC-CL	Water	Nitrite in Water by IC	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

NO3-BC-IC-CL	Water	Nitrate (as N)	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

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
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

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-[illegible] Fax: 250-261-5587
Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5196
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-7
Edmonton AB, 9938 - 67th Avenue, T6E 0P5, Tel: 780-413-5227
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-837

L1768365-COFC

SEND REPORT TO:

CHAIN OF CUSTODY F(

OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION		ATTN:	PATRICK MAJER	
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST				
CITY:	CALGARY	PROV: ALBERTA	POSTAL CODE:	T2T 0E2	
TEL:	403 - 256 - 8473	FAX: 403 - 244 - 3774	SAMPLER:	Bo Choroszewski	
PROJECT NAME AND NO.:	Fernie Alpine Resort- Spring 2016 EMS wk 3		QUOTE NO:		
PO NO.:		ALS CONTACT: Lyudmyla Shvets			

REPORT FORMAT: ☑ HARDCOPY ☑ EMAIL - ADDRESS: pmajer@skircr.com ☐ FAX ☐ EXCEL ☑ PDF ☐ OTHER:

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	2016-05-12	12:30	Water		X	X												10.3 °C
	WWTP Influent BOD 2	2016-05-12	12:30	Water									X						10.3 °C
	WWTP Effluent Routine 3	2016-05-12	12:10	Water		X	X							X					12.6 °C
2	WWTP Effluent BOD 4	2016-05-12	12:10	Water									X						12.6 °C
	WWTP Effluent Nutrients 5	2016-05-12	12:10	Water				X	X	X	X	X							12.6 °C
	WWTP Effluent Bacteriological 6	2016-05-12	12:10	Water	X														12.6 °C
3	Elk River Upstream Routine 7	2016-05-12	12:25	Water		X	X												5.6 °C
	Elk River Upstream Nutrients 8	2016-05-12	12:25	Water				X	X	X	X	X							5.6 °C
	Elk River Upstream Bacteriological 9	2016-05-12	12:25	Water	X														5.6 °C
4	Elk River @ Outfall Routine 10	2016-05-12	12:35	Water		X	X												5.4 °C
	Elk River @ Outfall Nutrients 11	2016-05-12	12:35	Water				X	X	X	X	X							5.4 °C
	Elk River @ Outfall Bacteriological 12	2016-05-12	12:35	Water	X														5.4 °C
5	Elk River Downstream Routine 13	2016-05-12	12:45	Water		X	X												5.8 °C
	Elk River Downstream Nutrients 14	2016-05-12	12:45	Water				X	X	X	X	X							5.8 °C
	Elk River Downstream Bacteriological 15	2016-05-12	12:45	Water	X														5.8 °C

FOR LAB USE ONLY

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

SEND INVOICE TO: ☐ SAME AS REPORT ☐ DIFFERENT FROM REPORT (provide details below)

INVOICE FORMAT: ☐ HARDCOPY ☐ PDF ☐ 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:	05/13
	TIME:			TIME:	10:00
RELINQUISHED BY:	DATE:	2016-05-12	RECEIVED BY:	DATE:	
Bo Choroszewski	TIME:	13:15		TIME:	

FOR LAB USE ONLY

Cooler Seal Intact? ✓ Yes ___ No ___ N/A | Sample Temperature: 4 °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: 20-MAY-16
Report Date: 30-MAY-16 16:43 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1771839

Project P.O. #: NOT SUBMITTED
Job Reference: FERNIE ALPINE RESORT - SPRING 2016 EMS WK 4
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771839-1 WWTP INFLUENT							
Sampled By: B.C. on 19-MAY-16 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	51	DLHC	20	mg/L		20-MAY-16	R3464854
Total Suspended Solids	141	DLHC	8.0	mg/L		24-MAY-16	R3464671
pH	7.44		0.10	pH		26-MAY-16	R3466211
L1771839-2 WWTP EFFLUENT							
Sampled By: B.C. on 19-MAY-16 @ 14:20							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		27-MAY-16	R3466346
Biochemical Oxygen Demand	<2.0		2.0	mg/L		20-MAY-16	R3464854
Chemical Oxygen Demand	<10		10	mg/L		29-MAY-16	R3467232
Orthophosphate-Dissolved (as P)	0.171	DLA	0.010	mg/L		21-MAY-16	R3465738
Coliform Bacteria - Fecal	<1		1	CFU/100mL		20-MAY-16	R3463188
Phosphorus (P)-Total	0.174	DLA	0.010	mg/L		30-MAY-16	R3467734
Total Suspended Solids	<3.0		3.0	mg/L		24-MAY-16	R3464671
pH	8.06		0.10	pH		25-MAY-16	R3465257
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	25.9		0.020	mg/L		21-MAY-16	R3467311
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	26.0		0.050	mg/L		30-MAY-16	
Nitrite in Water by IC							
Nitrite (as N)	0.021		0.010	mg/L		21-MAY-16	R3467311
L1771839-3 ELK RIVER UPSTREAM							
Sampled By: B.C. on 19-MAY-16 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		27-MAY-16	R3466346
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		21-MAY-16	R3465738
Coliform Bacteria - Fecal	37	OCR	1	CFU/100mL		20-MAY-16	R3463188
Phosphorus (P)-Total	0.0231		0.0050	mg/L		30-MAY-16	R3467734
Total Suspended Solids	17.0		3.0	mg/L		24-MAY-16	R3464671
pH	8.34		0.10	pH		25-MAY-16	R3465257
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	1.01		0.020	mg/L		21-MAY-16	R3467311
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.01		0.050	mg/L		30-MAY-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		21-MAY-16	R3467311
L1771839-4 ELK RIVER @ OUTFALL							
Sampled By: B.C. on 19-MAY-16 @ 14:40							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		27-MAY-16	R3466346
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		21-MAY-16	R3465738
Coliform Bacteria - Fecal	44	OCR	1	CFU/100mL		20-MAY-16	R3463188
Phosphorus (P)-Total	0.0254		0.0050	mg/L		30-MAY-16	R3467734
Total Suspended Solids	16.3		3.0	mg/L		24-MAY-16	R3464671

* 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
L1771839-4 ELK RIVER @ OUTFALL							
Sampled By: B.C. on 19-MAY-16 @ 14:40							
Matrix: WATER							
pH	8.34		0.10	pH		25-MAY-16	R3465257
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	0.973		0.020	mg/L		21-MAY-16	R3467311
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.973		0.050	mg/L		30-MAY-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		21-MAY-16	R3467311
L1771839-5 ELK RIVER DOWNSTREAM							
Sampled By: B.C. on 19-MAY-16 @ 14:50							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		27-MAY-16	R3466346
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		21-MAY-16	R3465738
Coliform Bacteria - Fecal	38	OCR	1	CFU/100mL		20-MAY-16	R3463188
Phosphorus (P)-Total	0.0184		0.0050	mg/L		30-MAY-16	R3467734
Total Suspended Solids	15.0		3.0	mg/L		24-MAY-16	R3464671
pH	8.34		0.10	pH		25-MAY-16	R3465257
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	1.07		0.020	mg/L		21-MAY-16	R3467311
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.07		0.050	mg/L		30-MAY-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		21-MAY-16	R3467311

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects.
LCS-ND	Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
OCR	Parameter is out of client specific range.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
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
NH4-CL	Water	Ammonia-N	APHA 4500 NH3F-Colorimetry
Ammonia is determined using the Phenate colorimetric method. Result includes both ionized (NH4+) and un-ionized (NH3) ammonia present in the sample.			
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
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
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Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5196 Toll Free: 1-800-668-9878 F
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 Fa
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free: 1-800-668-9
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-800-667-7645

L1771839-COFC

SEND REPORT TO:

CHAIN OF CUSTODY FORM

PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION		ATTN:	PATRICK MAJER	
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST				
CITY:	CALGARY	PROV: ALBERTA	POSTAL CODE:	T2T 0E2	
TEL:	403 - 256 - 8473	FAX: 403 - 244 - 3774	SAMPLER:	Bo Choroszewski	
PROJECT NAME AND NO.:	Fernie Alpine Resort- Spring 2016 EMS wk 4		QUOTE NO:		
PO NO.:		ALS CONTACT: Lyudmyla Shvets			
REPORT FORMAT:	☑ HARDCOPY ☑ EMAIL - ADDRESS: pmajer@skircr.com				
	☐ FAX ☐ EXCEL ☑ PDF ☐ OTHER:				

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	2016-05-19	14:15	Water		X	X												11.7
	WWTP Influent BOD 2	2016-05-19	14:15	Water									X						11.7
	WWTP Effluent Routine 3	2016-05-19	14:20	Water		X	X							X					13.5
	WWTP Effluent BOD 4	2016-05-19	14:20	Water									X						13.5
	WWTP Effluent Nutrients 5	2016-05-19	14:30	Water				X	X	X	X	X							13.5
	WWTP Effluent Bacteriological 6	2016-05-19	14:20	Water	X														13.5
	Elk River Upstream Routine 7	2016-05-19	14:30	Water		X	X												7.9
	Elk River Upstream Nutrients 8	2016-05-19	14:30	Water				X	X	X	X	X							7.9
	Elk River Upstream Bacteriological 9	2016-05-19	14:30	Water	X														7.9
	Elk River @ Outfall Routine 10	2016-05-19	14:40	Water		X	X												7.5
	Elk River @ Outfall Nutrients 11	2016-05-19	14:40	Water				X	X	X	X	X							7.5
	Elk River @ Outfall Bacteriological 12	2016-05-19	14:40	Water	X														7.5
	Elk River Downstream Routine 13	2016-05-19	14:50	Water		X	X												7.8
	Elk River Downstream Nutrients 14	2016-05-19	14:50	Water				X	X	X	X	X							7.8
	Elk River Downstream Bacteriological 15	2016-05-19	14:50	Water	X														7.8

TURN AROUND REQUIRED:	◉ ROUTINE ○ RUSH SPECIFY DATE: _____ (surcharge may apply)	RELINQUISHED BY:	DATE:		RECEIVED BY:	DATE:	5/20/16
			TIME:			TIME:	11:42
SEND INVOICE TO:	☐ SAME AS REPORT ☐ DIFFERENT FROM REPORT (provide details below)	RELINQUISHED BY:	DATE:	2016-05-19	RECEIVED BY:	DATE:	
INVOICE FORMAT:	☐ HARDCOPY ☐ PDF ☐ FAX	Bo Choroszewski	TIME:	15:15		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: 5 °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: 27-MAY-16
Report Date: 06-JUN-16 16:59 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1774612

Project P.O. #: NOT SUBMITTED
Job Reference: FERNIE ALPINE RESORT - SPRING 2016 EMS WK5
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1774612-1 WWTP INFLUENT							
Sampled By: BO C. on 26-MAY-16 @ 14:40							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	22.9		2.0	mg/L		27-MAY-16	R3471606
Total Suspended Solids	34.0	DLHC	5.0	mg/L		02-JUN-16	R3471748
pH	7.54		0.10	pH		01-JUN-16	R3470815
L1774612-2 WWTP EFFLUENT							
Sampled By: BO C. on 26-MAY-16 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		04-JUN-16	R3472556
Biochemical Oxygen Demand	<2.0		2.0	mg/L		27-MAY-16	R3471606
Chemical Oxygen Demand	<10		10	mg/L		06-JUN-16	R3473771
Orthophosphate-Dissolved (as P)	0.126		0.0050	mg/L		28-MAY-16	R3466593
Coliform Bacteria - Fecal	12	OCR	1	CFU/100mL		27-MAY-16	R3466747
Phosphorus (P)-Total	0.166	DLA	0.010	mg/L		06-JUN-16	R3473765
Total Suspended Solids	<3.0		3.0	mg/L		02-JUN-16	R3471748
pH	8.19		0.10	pH		01-JUN-16	R3470815
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	10.8		0.020	mg/L		28-MAY-16	R3471590
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	10.8		0.050	mg/L		03-JUN-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		28-MAY-16	R3471590
L1774612-3 ELK RIVER UPSTREAM							
Sampled By: BO C. on 26-MAY-16 @ 14:55							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		04-JUN-16	R3472556
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		28-MAY-16	R3466593
Coliform Bacteria - Fecal	4	OCR	1	CFU/100mL		27-MAY-16	R3466747
Phosphorus (P)-Total	0.0195		0.0050	mg/L		06-JUN-16	R3473765
Total Suspended Solids	9.3		3.0	mg/L		02-JUN-16	R3471748
pH	8.34		0.10	pH		01-JUN-16	R3470815
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	0.970		0.020	mg/L		28-MAY-16	R3471590
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.970		0.050	mg/L		03-JUN-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		28-MAY-16	R3471590
L1774612-4 ELK RIVER @ OUTFALL							
Sampled By: BO C. on 26-MAY-16 @ 15:05							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		04-JUN-16	R3472556
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		28-MAY-16	R3466593
Coliform Bacteria - Fecal	4	OCR	1	CFU/100mL		27-MAY-16	R3466747
Phosphorus (P)-Total	0.0211		0.0050	mg/L		06-JUN-16	R3473765
Total Suspended Solids	9.3		3.0	mg/L		02-JUN-16	R3471748

* 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
L1774612-4 ELK RIVER @ OUTFALL							
Sampled By: BO C. on 26-MAY-16 @ 15:05							
Matrix: WATER							
pH	8.32		0.10	pH		01-JUN-16	R3470815
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	0.937		0.020	mg/L		28-MAY-16	R3471590
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.937		0.050	mg/L		03-JUN-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		28-MAY-16	R3471590
L1774612-5 ELK RIVER DOWNSTREAM							
Sampled By: BO C. on 26-MAY-16 @ 15:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		04-JUN-16	R3472556
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		28-MAY-16	R3466593
Coliform Bacteria - Fecal	2	OCR	1	CFU/100mL		27-MAY-16	R3466747
Phosphorus (P)-Total	0.0217		0.0050	mg/L		06-JUN-16	R3473765
Total Suspended Solids	9.3		3.0	mg/L		02-JUN-16	R3471748
pH	8.33		0.10	pH		01-JUN-16	R3470815
NO2, NO3 and Sum of NO2/NO3							
Nitrate in Water by IC							
Nitrate (as N)	1.04		0.020	mg/L		28-MAY-16	R3471590
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.04		0.050	mg/L		03-JUN-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		28-MAY-16	R3471590

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

Reference Information

Sample Parameter Qualifier Key:

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

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

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
NH4-CL	Water	Ammonia-N	APHA 4500 NH3F-Colorimetry

Ammonia is determined using the Phenate colorimetric method. Result includes both ionized (NH4+) and un-ionized (NH3) ammonia present in the sample.

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
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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Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5196 Toll Free: 1-800-668-9
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-791-1524 Fax: 780-791
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free: 1-800-668-98
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free: 1-800
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-800-667-

L1774612-COFC

SEND REPORT TO:

CHAIN OF CUSTODY FORM

PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION		ATTN:	PATRICK MAJER	
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST				
CITY:	CALGARY	PROV: ALBERTA	POSTAL CODE:	T2T 0E2	
TEL:	403 - 256 - 8473	FAX: 403 - 244 - 3774	SAMPLER:	Bo Choroszewski	
PROJECT NAME AND NO.:	Fernie Alpine Resort- Spring 2016 EMS wk 5		QUOTE NO:		
PO NO.:		ALS CONTACT: Lyudmyla Shvets			
REPORT FORMAT:	☑ HARDCOPY ☑ EMAIL - ADDRESS: pmajer@skircr.com				
	☐ FAX ☐ EXCEL ☑ PDF ☐ OTHER:				

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.)
	WWTP Influent Routine	2016-05-26	14:40	Water		X	X												
	WWTP Influent BOD	2016-05-26	14:40	Water									X						
	WWTP Effluent Routine	2016-05-26	14:45	Water		X	X							X					
	WWTP Effluent BOD	2016-05-26	14:45	Water									X						
	WWTP Effluent Nutrients	2016-05-26	14:45	Water				X	X	X	X	X							
	WWTP Effluent Bacteriological	2016-05-26	14:45	Water	X														
	Elk River Upstream Routine	2016-05-26	14:55	Water		X	X												
	Elk River Upstream Nutrients	2016-05-26	14:55	Water				X	X	X	X	X							
	Elk River Upstream Bacteriological	2016-05-26	14:55	Water	X														
	Elk River @ Outfall Routine	2016-05-26	15:05	Water		X	X												
	Elk River @ Outfall Nutrients	2016-05-26	15:05	Water				X	X	X	X	X							
	Elk River @ Outfall Bacteriological	2016-05-26	15:05	Water	X														
	Elk River Downstream Routine	2016-05-26	15:15	Water		X	X												
	Elk River Downstream Nutrients	2016-05-26	15:15	Water				X	X	X	X	X							
	Elk River Downstream Bacteriological	2016-05-26	15:15	Water	X														

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

SEND INVOICE TO: ☐ SAME AS REPORT ☐ DIFFERENT FROM REPORT (provide details below)

INVOICE FORMAT: ☐ HARDCOPY ☐ PDF ☐ 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:	
	TIME:			TIME:	
RELINQUISHED BY:	DATE:	2016-05-26	RECEIVED BY:	DATE:	May 27
Bo Choroszewski	TIME:	15:45		TIME:	11:50

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: 03-JUN-16
Report Date: 10-JUN-16 16:45 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1778078

Project P.O. #: NOT SUBMITTED
Job Reference: FERNIE ALPINE RESORT - SPRING 2016 EMS WK 6
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1778078-1 WWTP INFLUENT							
Sampled By: BO CHOROSZEWSKI on 02-JUN-16 @ 15:10							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	37	DLHC	20	mg/L		03-JUN-16	R3474861
Total Suspended Solids	33.7		3.0	mg/L		08-JUN-16	R3476088
pH	7.74		0.10	pH		09-JUN-16	R3476722
L1778078-2 WWTP EFFLUENT							
Sampled By: BO CHOROSZEWSKI on 02-JUN-16 @ 15:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		05-JUN-16	R3473862
Biochemical Oxygen Demand	<2.0		2.0	mg/L		03-JUN-16	R3474861
Chemical Oxygen Demand	<10		10	mg/L		09-JUN-16	R3476474
Orthophosphate-Dissolved (as P)	0.171	DLA	0.010	mg/L		04-JUN-16	R3471993
Coliform Bacteria - Fecal	<1		1	CFU/100mL		03-JUN-16	R3473435
Phosphorus (P)-Total	0.200	DLA	0.010	mg/L		10-JUN-16	R3476638
Total Suspended Solids	<3.0		3.0	mg/L		08-JUN-16	R3476088
pH	8.02		0.10	pH		09-JUN-16	R3476722
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	20.3		0.020	mg/L		03-JUN-16	R3475649
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	20.3		0.050	mg/L		09-JUN-16	
Nitrite in Water by IC							
Nitrite (as N)	0.028		0.010	mg/L		03-JUN-16	R3475649
L1778078-3 ELK RIVER UPSTREAM							
Sampled By: BO CHOROSZEWSKI on 02-JUN-16 @ 15:25							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		05-JUN-16	R3473862
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		04-JUN-16	R3471993
Coliform Bacteria - Fecal	2	OCR	1	CFU/100mL		03-JUN-16	R3473435
Phosphorus (P)-Total	0.0182		0.0050	mg/L		10-JUN-16	R3476638
Total Suspended Solids	<3.0		3.0	mg/L		08-JUN-16	R3476088
pH	8.31		0.10	pH		09-JUN-16	R3476722
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.04		0.020	mg/L		04-JUN-16	R3475649
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.04		0.050	mg/L		09-JUN-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		04-JUN-16	R3475649
L1778078-4 ELK RIVER @ OUTFALL							
Sampled By: BO CHOROSZEWSKI on 02-JUN-16 @ 15:35							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		05-JUN-16	R3473862
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		04-JUN-16	R3471993
Coliform Bacteria - Fecal	8	OCR	1	CFU/100mL		03-JUN-16	R3473435
Phosphorus (P)-Total	0.0168		0.0050	mg/L		10-JUN-16	R3476638
Total Suspended Solids	<3.0		3.0	mg/L		08-JUN-16	R3476088

* 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
L1778078-4 ELK RIVER @ OUTFALL							
Sampled By: BO CHOROSZEWSKI on 02-JUN-16 @ 15:35							
Matrix: WATER							
pH	8.33		0.10	pH		09-JUN-16	R3476722
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	0.976		0.020	mg/L		04-JUN-16	R3475649
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.976		0.050	mg/L		09-JUN-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		04-JUN-16	R3475649
L1778078-5 ELK RIVER DOWNSTREAM							
Sampled By: BO CHOROSZEWSKI on 02-JUN-16 @ 15:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		05-JUN-16	R3473862
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		04-JUN-16	R3471993
Coliform Bacteria - Fecal	2	OCR	1	CFU/100mL		03-JUN-16	R3473435
Phosphorus (P)-Total	0.0126		0.0050	mg/L		10-JUN-16	R3476638
Total Suspended Solids	<3.0		3.0	mg/L		08-JUN-16	R3476088
pH	8.32		0.10	pH		09-JUN-16	R3476722
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.09		0.020	mg/L		04-JUN-16	R3475649
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.09		0.050	mg/L		09-JUN-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		04-JUN-16	R3475649

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
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
NH4-CL	Water	Ammonia-N	APHA 4500 NH3F-Colorimetry

Ammonia is determined using the Phenate colorimetric method. Result includes both ionized (NH4+) and un-ionized (NH3) ammonia present in the sample.

NO2-BC-IC-CL	Water	Nitrite in Water by IC	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

NO3-BC-IC-CL	Water	Nitrate (as N)	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

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
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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8 Fax: 780-513-2191
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Fax: 780-437-2311
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L1778078-COFC

L1778078

SEND REPORT TO:

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PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION		ATTN:	PATRICK MAJER	
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST				
CITY:	CALGARY	PROV: ALBERTA	POSTAL CODE:	T2T 0E2	
TEL:	403 - 256 - 8473	FAX: 403 - 244 - 3774	SAMPLER:	Bo Choroszewski	
PROJECT NAME AND NO.:	Fernie Alpine Resort- Spring 2016 EMS wk 6		QUOTE NO:		
PO NO.:		ALS CONTACT: Lyudmyla Shvets			
REPORT FORMAT:	☑ HARDCOPY ☑ EMAIL - ADDRESS: pmajer@skircr.com				
	☐ FAX ☐ EXCEL ☑ PDF ☐ OTHER:				

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	2016-06-02	15:10	Water		X	X											12.2 °C
		2	WWTP Influent BOD	2016-06-02	15:10	Water									X					12.2 °C
		3	WWTP Effluent Routine	2016-06-02	15:15	Water		X	X							X				14.0 °C
		4	WWTP Effluent BOD	2016-06-02	15:15	Water									X					14.0 °C
		5	WWTP Effluent Nutrients	2016-06-02	15:15	Water				X	X	X	X	X						14.0 °C
		6	WWTP Effluent Bacteriological	2016-06-02	15:15	Water	X													14.0 °C
		7	Elk River Upstream Routine	2016-06-02	15:25	Water		X	X											8.9 °C
		8	Elk River Upstream Nutrients	2016-06-02	15:25	Water				X	X	X	X	X						8.9 °C
		9	Elk River Upstream Bacteriological	2016-06-02	15:25	Water	X													8.9 °C
		10	Elk River @ Outfall Routine	2016-06-02	15:35	Water		X	X											8.8 °C
		11	Elk River @ Outfall Nutrients	2016-06-02	15:35	Water				X	X	X	X	X						8.8 °C
		12	Elk River @ Outfall Bacteriological	2016-06-02	15:35	Water	X													8.8 °C
		13	Elk River Downstream Routine	2016-06-02	15:45	Water		X	X											8.9 °C
		14	Elk River Downstream Nutrients	2016-06-02	15:45	Water				X	X	X	X	X						8.9 °C
		15	Elk River Downstream Bacteriological	2016-06-02	15:45	Water	X													8.9 °C

TURN AROUND REQUIRED:	◉ ROUTINE ○ RUSH SPECIFY DATE: _____ (surcharge may apply)	RELINQUISHED BY:	DATE:		RECEIVED BY:	DATE: June 3 8°C		
			TIME:			TIME: 11:30		
SEND INVOICE TO:	☐ SAME AS REPORT ☐ DIFFERENT FROM REPORT (provide details below)	RELINQUISHED BY:	DATE:	2016-06-02	RECEIVED BY:	DATE:		
INVOICE FORMAT:	☐ HARDCOPY ☐ PDF ☐ FAX	Bo Choroszewski	TIME:	15:30		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: 22-JUL-16
Report Date: 29-JUL-16 14:17 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1802344

Project P.O. #: NOT SUBMITTED
Job Reference: WASTEWATER - JULY 2016 MONTHLY EMS
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1802344-1 WWTP INFLUENT							
Sampled By: BC on 21-JUL-16 @ 14:50							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	124	BODQ	20	mg/L		22-JUL-16	R3513062
Total Suspended Solids	143		5.0	mg/L		26-JUL-16	R3513236
pH	7.86		0.10	pH		25-JUL-16	R3511857
L1802344-2 WWTP EFFLUENT							
Sampled By: BC on 21-JUL-16 @ 14:55							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		28-JUL-16	R3514176
Biochemical Oxygen Demand	<2.0		2.0	mg/L		22-JUL-16	R3513062
Orthophosphate-Dissolved (as P)	0.380	DLA	0.025	mg/L		22-JUL-16	R3510332
Coliform Bacteria - Fecal	<1		1	CFU/100mL		22-JUL-16	R3511013
Phosphorus (P)-Total	0.394	DLA	0.025	mg/L		28-JUL-16	R3514430
Total Suspended Solids	<3.0		3.0	mg/L		26-JUL-16	R3513236
pH	7.97		0.10	pH		25-JUL-16	R3511857
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	21.6		0.020	mg/L		22-JUL-16	R3511272
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	21.6		0.050	mg/L		25-JUL-16	
Nitrite in Water by IC							
Nitrite (as N)	0.023		0.010	mg/L		22-JUL-16	R3511272

* 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.
DLA	Detection Limit adjusted for required dilution
LCS-ND	Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
FCC-MF-CL	Water	Fecal Coliform Count-MF	APHA 9222D
This analysis is carried out using procedures adapted from APHA Method 9222 "Membrane Filter Technique for Members of the Coliform Group". Coliform bacteria is enumerated by culturing and colony counting. A known sample volume is filtered through a 0.45 micron membrane filter. The test involves an initial 24 hour incubation at 44.5 degrees C of the filter with the appropriate growth medium. This method is specific for thermotolerant bacteria (Fecal) and is used for non-turbid water with a low background bacteria level.			
N2N3-CALC-CL	Water	Nitrate+Nitrite	CALCULATION
NH4-CL	Water	Ammonia-N	Grasshof NH3 1999
Ammonia is determined using the Phenate colorimetric method. Result includes both ionized (NH4+) and un-ionized (NH3) ammonia present in the sample.			
NO2-BC-IC-CL	Water	Nitrite in Water by IC	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.			
NO3-BC-IC-CL	Water	Nitrate (as N)	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.			
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
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 F
Fort St. John BC, Box 256, 9831 - 98A Avenue, V1J 6W7, Tel: 250-261-5517 Fax: 250-261-55
Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5196 Toll Free: 1-800-668-9878
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-791-1524 Fax: 780-791-158(
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free: 1-800-668-9878 F
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free: 1-800-668-
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-800-667-7645

L1802344-COFC

SEND REPORT TO:

CHAIN OF CUSTODY FORM

PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION		ATTN:	PATRICK MAJER	
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST				
CITY:	CALGARY	PROV: ALBERTA	POSTAL CODE:	T2T 0E2	
TEL:	403 - 256 - 8473	FAX: 403 - 244 - 3774	SAMPLER:	Bo Choroszewski	
PROJECT NAME AND NO.:	Wastewater -July 2016 Monthly EMS		QUOTE NO:		
PO NO.:		ALS CONTACT: Lyudmyla Shvets			
REPORT FORMAT:	☑ HARDCOPY ☑ EMAIL - ADDRESS: pmajer@skircr.com				
	☐ FAX ☐ EXCEL ☑ PDF ☐ OTHER:				

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	2016-06-21	14:50	Water		X	X											17.2 °C
2	WWTP Influent BOD	2016-06-21	14:50	Water									X					17.2 °C
	WWTP Effluent Routine 3	2016-06-21	14:55	Water		X	X											17.0 °C
2	WWTP Effluent BOD 4	2016-06-21	14:55	Water									X					17.0 °C
	WWTP Effluent Nutrients 5	2016-06-21	14:55	Water				X	X	X	X	X						17.0 °C
	WWTP Effluent Bacteriological 6	2016-06-21	14:55	Water	X													17.0 °C

FOR LAB USE ONLY

TURN AROUND REQUIRED:	◉ ROUTINE ○ RUSH SPECIFY DATE: _____ (surcharge may apply)	RELINQUISHED BY: HUNGRY BAYTALUKE	DATE:		RECEIVED BY: mm	DATE: 22-July-16	
			TIME:			TIME: 10:45	
SEND INVOICE TO:	☐ SAME AS REPORT ☐ DIFFERENT FROM REPORT (provide details below)	RELINQUISHED BY: BO CHOROSZEWSKI	DATE:	2016-06-21	RECEIVED BY:	DATE:	
INVOICE FORMAT:	☐ HARDCOPY ☐ PDF ☐ FAX		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? ✓Yes ___No ___N/A	Sample Temperature: 5 °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-AUG-16
Report Date: 26-AUG-16 11:32 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1816133

Project P.O. #: NOT SUBMITTED
Job Reference: WASTEWATER - AUGUST 2016 MONTHLY EMS
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1816133-1 WWTP INFLUENT							
Sampled By: BO CHOROSZEWSKI on 18-AUG-16 @ 15:05							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	88	DLHC	20	mg/L		20-AUG-16	R3533740
Total Suspended Solids	385	DLHC	8.0	mg/L		24-AUG-16	R3533932
pH	7.56		0.10	pH		19-AUG-16	R3530760
L1816133-2 WWTP EFFLUENT							
Sampled By: BO CHOROSZEWSKI on 18-AUG-16 @ 15:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		19-AUG-16	R3530789
Biochemical Oxygen Demand	<2.0		2.0	mg/L		20-AUG-16	R3533740
Orthophosphate-Dissolved (as P)	0.192	DLA	0.010	mg/L		20-AUG-16	R3529858
Coliform Bacteria - Fecal	<1		1	CFU/100mL		19-AUG-16	R3530081
Phosphorus (P)-Total	0.212	DLA	0.025	mg/L		20-AUG-16	R3529919
Total Suspended Solids	<3.0		3.0	mg/L		24-AUG-16	R3533932
pH	7.66		0.10	pH		19-AUG-16	R3530760
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	19.8		0.020	mg/L		19-AUG-16	R3530922
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	19.9		0.050	mg/L		22-AUG-16	
Nitrite in Water by IC							
Nitrite (as N)	0.017		0.010	mg/L		19-AUG-16	R3530922

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

Reference Information

Sample Parameter Qualifier Key:

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

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

FCC-MF-CL	Water	Fecal Coliform Count-MF	APHA 9222D

This analysis is carried out using procedures adapted from APHA Method 9222 "Membrane Filter Technique for Members of the Coliform Group". Coliform bacteria is enumerated by culturing and colony counting. A known sample volume is filtered through a 0.45 micron membrane filter. The test involves an initial 24 hour incubation at 44.5 degrees C of the filter with the appropriate growth medium. This method is specific for thermotolerant bacteria (Fecal) and is used for non-turbid water with a low background bacteria level.

N2N3-CALC-CL	Water	Nitrate+Nitrite	CALCULATION
NH4-CL	Water	Ammonia-N	Grasshof NH3 1999

Ammonia is determined using the Phenate colorimetric method. Result includes both ionized (NH4+) and un-ionized (NH3) ammonia present in the sample.

NO2-BC-IC-CL	Water	Nitrite in Water by IC	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

NO3-BC-IC-CL	Water	Nitrate (as N)	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

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
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 El
ANALYTICAL CHE

L1816133-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: 780-539-5195 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: 1-800-666-9878 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

L1816133

CHAIN OF CUSTODY FORM

PAGE OF

SEND REPORT TO:

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION		ATTN:	PATRICK MAJER	
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST				
CITY:	CALGARY	PROV: ALBERTA	POSTAL CODE:	T2T 0E2	
TEL:	403 - 256 - 8473	FAX: 403 - 244 - 3774	SAMPLER:	Bo Choroszewski	
PROJECT NAME AND NO.:	Wastewater -August 2016 Monthly EMS		QUOTE NO:		
PO NO.:		ALS CONTACT: Lyudmyla Shvets			
REPORT FORMAT:	☑ HARDCOPY ☑ EMAIL - ADDRESS: pmajer@skircr.com				
	☐ FAX ☐ EXCEL ☑ PDF ☐ OTHER:				

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	2016-08-18	15:05	Water		X	X												17.3°C
	WWTP Influent BOD	2016-08-18	15:05	Water									X						17.8°C
	WWTP Effluent Routine	2016-08-18	15:15	Water		X	X												18.4°C
	WWTP Effluent BOD	2016-08-18	15:15	Water									X						18.4°C
	WWTP Effluent Nutrients	2016-08-18	15:15	Water				X	X	X	X	X							18.4°C
	WWTP Effluent Bacteriological	2016-08-18	15:15	Water	X														18.4°C

FOR LAB USE ONLY

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

SEND INVOICE TO: ☐ SAME AS REPORT ☐ DIFFERENT FROM REPORT (provide details below)

INVOICE FORMAT: ☐ HARDCOPY ☐ PDF ☐ 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:	8/19
HUNGRY BAYTALUKE	TIME:			TIME:	10:[illegible]
RELINQUISHED BY:	DATE:	2016-08-18	RECEIVED BY:	DATE:	
BO CHOROSZEWSKI	TIME:	15:30		TIME:	

FOR LAB USE ONLY

Cooler Seal Intact? ___Yes ___No ___N/A | Sample Temperature: 6 °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: 30-SEP-16
Report Date: 07-OCT-16 14:28 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1836835

Project P.O. #: NOT SUBMITTED
Job Reference: FERNIE ALPINE RESORT - FALL 2016 EMS WK 1
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1836835-1 WWTP INFLUENT							
Sampled By: BO CHOROSZEWSKI on 29-SEP-16 @ 14:40							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	49	BODQ	20	mg/L		30-SEP-16	R3564209
Total Suspended Solids	19.3		3.0	mg/L		04-OCT-16	R3564594
pH	7.52		0.10	pH		04-OCT-16	R3564200
L1836835-2 WWTP EFFLUENT							
Sampled By: BO CHOROSZEWSKI on 29-SEP-16 @ 14:50							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		06-OCT-16	R3566328
Biochemical Oxygen Demand	<2.0	BODQ	2.0	mg/L		30-SEP-16	R3564209
Chemical Oxygen Demand	<10		10	mg/L		04-OCT-16	R3563623
Orthophosphate-Dissolved (as P)	0.0908		0.0050	mg/L		30-SEP-16	R3560502
Coliform Bacteria - Fecal	<1		1	CFU/100mL		30-SEP-16	R3561514
Phosphorus (P)-Total	0.102		0.0050	mg/L		05-OCT-16	R3564437
Total Suspended Solids	<3.0		3.0	mg/L		04-OCT-16	R3564594
pH	7.93		0.10	pH		04-OCT-16	R3564200
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	18.3		0.020	mg/L		30-SEP-16	R3562568
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	18.3		0.050	mg/L		03-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	0.038		0.010	mg/L		30-SEP-16	R3562568
L1836835-3 ELK RIVER UPSTREAM							
Sampled By: BO CHOROSZEWSKI on 29-SEP-16 @ 14:35							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		06-OCT-16	R3566328
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		30-SEP-16	R3560502
Coliform Bacteria - Fecal	<1		1	CFU/100mL		30-SEP-16	R3561514
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		05-OCT-16	R3564437
Total Suspended Solids	<3.0		3.0	mg/L		04-OCT-16	R3564594
pH	8.38		0.10	pH		04-OCT-16	R3564200
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.73		0.020	mg/L		30-SEP-16	R3562568
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.73		0.050	mg/L		03-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		30-SEP-16	R3562568
L1836835-4 ELK RIVER @ OUTFALL							
Sampled By: BO CHOROSZEWSKI on 29-SEP-16 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		06-OCT-16	R3566328
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		30-SEP-16	R3560502
Coliform Bacteria - Fecal	<1		1	CFU/100mL		30-SEP-16	R3561514
Phosphorus (P)-Total	0.0065		0.0050	mg/L		05-OCT-16	R3564437
Total Suspended Solids	<3.0		3.0	mg/L		04-OCT-16	R3564594

* 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
L1836835-4 ELK RIVER @ OUTFALL							
Sampled By: BO CHOROSZEWSKI on 29-SEP-16 @ 14:30							
Matrix: WATER							
pH	8.30		0.10	pH		04-OCT-16	R3564200
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.73		0.020	mg/L		30-SEP-16	R3562568
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.73		0.050	mg/L		03-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		30-SEP-16	R3562568
L1836835-5 ELK RIVER DOWNSTREAM							
Sampled By: BO CHOROSZEWSKI on 29-SEP-16 @ 14:20							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		06-OCT-16	R3566328
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		30-SEP-16	R3560502
Coliform Bacteria - Fecal	<1		1	CFU/100mL		30-SEP-16	R3561514
Phosphorus (P)-Total	0.0061		0.0050	mg/L		05-OCT-16	R3564437
Total Suspended Solids	<3.0		3.0	mg/L		04-OCT-16	R3564594
pH	8.37		0.10	pH		04-OCT-16	R3564200
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.82		0.020	mg/L		30-SEP-16	R3562568
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.82		0.050	mg/L		03-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		30-SEP-16	R3562568

* 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.
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 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-COL-CL	Water	Ammonia, Total (as N)	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 phenate colourimetric method.

NO2-BC-IC-CL	Water	Nitrite in Water by IC	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

NO3-BC-IC-CL	Water	Nitrate (as N)	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

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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L1836835-COFC

L 1K5, Tel: 604-253-4188 Toll Free: 1-800-665-0243 Fax: 604-253-6700
venue, V1J 6W7, Tel: 250-261-5517 Fax: 250-261-5587
5W1, Tel: 780-539-5196 Toll Free: 1-800-668-9878 Fax: 780-513-2191
d Cr, T9H 4B5, Tel: 780-791-1524 Fax: 780-791-1586
0P5, Tel: 780-413-5227 Toll Free: 1-800-668-9878 Fax: 780-437-2311
IE, T2E 6L5, Tel: 403-291-9897 Toll Free: 1-800-668-9878 Fax: 403-291-0298
7K 6X5, Tel: 306-668-8370 Toll Free: 1-800-667-7645 Fax: 306-668-8383

L1836835

SEND REPORT TO:

CHAIN OF CUSTODY FORM

PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	403 - 256 - 8473	FAX:	403 - 244 - 3774	SAMPLER:	Bo Choroszewski
PROJECT NAME AND NO.:	Fernie Alpine Resort- Fall 2016 EMS wk 1			QUOTE NO:	
PO NO.:		ALS CONTACT:	Lyudmyla Shvets		
REPORT FORMAT:	☑ HARDCOPY ☑ EMAIL - ADDRESS: pmajer@skircr.com				
	☐ FAX ☐ EXCEL ☑ PDF ☐ OTHER:				

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.)
	WWTP Influent Routine	2016-09-29	14:40	Water		X	X												14.8°C
	WWTP Influent BOD	2016-09-29	14:40	Water									X						14.8°C
	WWTP Effluent Routine	2016-09-29	14:50	Water		X	X							X					15.1°C
	WWTP Effluent BOD	2016-09-29	14:50	Water									X						15.1°C
	WWTP Effluent Nutrients	2016-09-29	14:50	Water				X	X	X	X	X							15.1°C
	WWTP Effluent Bacteriological	2016-09-29	14:50	Water	X														15.1°C
	Elk River Upstream Routine	2016-09-29	14:35	Water		X	X												10.7°C
	Elk River Upstream Nutrients	2016-09-29	14:35	Water				X	X	X	X	X							10.9°C
	Elk River Upstream Bacteriological	2016-09-29	14:35	Water	X														10.9°C
	Elk River @ Outfall Routine	2016-09-29	14:30	Water		X	X												10.7°C
	Elk River @ Outfall Nutrients	2016-09-29	14:30	Water				X	X	X	X	X							10.7°C
	Elk River @ Outfall Bacteriological	2016-09-29	14:30	Water	X														10.7°C
	Elk River Downstream Routine	2016-09-29	14:20	Water		X	X												10.0°C
	Elk River Downstream Nutrients	2016-09-29	14:20	Water				X	X	X	X	X							10.0°C
	Elk River Downstream Bacteriological	2016-09-29	14:20	Water	X														10.0°C

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

SEND INVOICE TO: ☐ SAME AS REPORT ☐ DIFFERENT FROM REPORT (provide details below)

INVOICE FORMAT: ☐ HARDCOPY ☐ PDF ☐ 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: 9/30
	TIME:		TIME: 10:54a
RELINQUISHED BY:	DATE:	2016-09-29	RECEIVED BY: DATE:
Bo Choroszewski	TIME:	15:30	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: 07-OCT-16
Report Date: 12-OCT-16 14:34 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1840625

Project P.O. #: NOT SUBMITTED
Job Reference: FERNIE ALPINE RESORT - FALL 2016 EMS WK 2
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1840625-1 WWTP INFLUENT							
Sampled By: BC on 06-OCT-16 @ 15:05							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	33.9	BODQ	6.0	mg/L		07-OCT-16	R3568978
Total Suspended Solids	49.2		3.0	mg/L		11-OCT-16	R3569000
pH	7.82		0.10	pH		07-OCT-16	R3566979
L1840625-2 WWTP EFFLUENT							
Sampled By: BC on 06-OCT-16 @ 15:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		09-OCT-16	R3567488
Biochemical Oxygen Demand	<2.0	BODQ	2.0	mg/L		07-OCT-16	R3568978
Chemical Oxygen Demand	<10		10	mg/L		08-OCT-16	R3566987
Orthophosphate-Dissolved (as P)	0.197	DLA	0.010	mg/L		07-OCT-16	R3566326
Coliform Bacteria - Fecal	<1		1	CFU/100mL		07-OCT-16	R3567547
Phosphorus (P)-Total	0.220	DLA	0.025	mg/L		08-OCT-16	R3567083
Total Suspended Solids	<3.0		3.0	mg/L		11-OCT-16	R3569000
pH	7.75		0.10	pH		07-OCT-16	R3566979
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	31.1	HTD	0.10	mg/L		08-OCT-16	R3567124
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	31.1		0.10	mg/L		08-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	0.023		0.010	mg/L		07-OCT-16	R3567124
L1840625-3 ELK RIVER UPSTREAM							
Sampled By: BC on 06-OCT-16 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		09-OCT-16	R3567488
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		07-OCT-16	R3566326
Coliform Bacteria - Fecal	<1		1	CFU/100mL		07-OCT-16	R3567547
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		08-OCT-16	R3567083
Total Suspended Solids	<3.0		3.0	mg/L		11-OCT-16	R3569000
pH	8.41		0.10	pH		07-OCT-16	R3566979
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.75		0.020	mg/L		07-OCT-16	R3567124
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.75		0.050	mg/L		08-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		07-OCT-16	R3567124
L1840625-4 ELK RIVER @ OUTFALL							
Sampled By: BC on 06-OCT-16 @ 14:40							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		09-OCT-16	R3567488
Orthophosphate-Dissolved (as P)	0.0064		0.0050	mg/L		07-OCT-16	R3566326
Coliform Bacteria - Fecal	2	OCR	1	CFU/100mL		07-OCT-16	R3567547
Phosphorus (P)-Total	0.0077		0.0050	mg/L		08-OCT-16	R3567083
Total Suspended Solids	<3.0		3.0	mg/L		11-OCT-16	R3569000

* 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
L1840625-4 ELK RIVER @ OUTFALL							
Sampled By: BC on 06-OCT-16 @ 14:40							
Matrix: WATER							
pH	8.38		0.10	pH		07-OCT-16	R3566979
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.53		0.020	mg/L		07-OCT-16	R3567124
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.53		0.050	mg/L		08-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		07-OCT-16	R3567124
L1840625-5 ELK RIVER DOWNSTREAM							
Sampled By: BC on 06-OCT-16 @ 14:50							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		09-OCT-16	R3567488
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		07-OCT-16	R3566326
Coliform Bacteria - Fecal	<1		1	CFU/100mL		07-OCT-16	R3567547
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		08-OCT-16	R3567083
Total Suspended Solids	<3.0		3.0	mg/L		11-OCT-16	R3569000
pH	8.49		0.10	pH		07-OCT-16	R3566979
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.82		0.020	mg/L		07-OCT-16	R3567124
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.82		0.050	mg/L		08-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		07-OCT-16	R3567124

* 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.
DLA	Detection Limit adjusted for required dilution
HTD	Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.
LCS-ND	Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.
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-COL-CL	Water	Ammonia, Total (as N)	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 phenate colourimetric method.			
NO2-BC-IC-CL	Water	Nitrite in Water by IC	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.			
NO3-BC-IC-CL	Water	Nitrate (as N)	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.			
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:

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.

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Fort St. John BC, Box 256, 9831 - ... 517 Fax: 250-261-5587
Grand ... e: 1-800-668-9878 Fax: 780-513-2191
Fort ... Fax: 780-791-1586
Edm... 1-800-668-9878 Fax: 780-437-2311
Calg... oll Free: 1-800-668-9878 Fax: 403-291-0298
Sask... e: 1-800-667-7645 Fax: 306-668-8383

L1840625-COFC

SEND REPORT TO: PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	403 - 256 - 8473	FAX:	403 - 244 - 3774	SAMPLER:	Bo Choroszewski
PROJECT NAME AND NO.:	Fernie Alpine Resort- Fall 2016 EMS wk 2			QUOTE NO:	
PO NO.:		ALS CONTACT:	Lyudmyla Shvets		
REPORT FORMAT:	☑ HARDCOPY	☑ EMAIL - ADDRESS: pmajer@skircr.com	☐ FAX	☐ EXCEL	☑ PDF ☐ OTHER:

ANALYSIS REQUESTED:

WO# (FOR LAB USE ONLY)	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	2016-10-06	15:05	Water		X	X								13.1°C
	WWTP Influent BOD 2	2016-10-06	15:05	Water									X		13.1°C
	WWTP Effluent Routine 3	2016-10-06	15:15	Water		X	X							X	14.1°C
2	WWTP Effluent BOD 4	2016-10-06	15:15	Water									X		14.1°C
	WWTP Effluent Nutrients 5	2016-10-06	15:15	Water				X	X	X	X	X			14.1°C
	WWTP Effluent Bacteriological 6	2016-10-06	15:15	Water	X										14.1°C
	Elk River Upstream Routine 7	2016-10-06	14:30	Water		X	X								8.3°C
3	Elk River Upstream Nutrients 8	2016-10-06	14:30	Water				X	X	X	X	X			8.3°C
	Elk River Upstream Bacteriological 9	2016-10-06	14:30	Water	X										8.3°C
4	Elk River @ Outfall Routine 10	2016-10-06	14:40	Water		X	X								8.0°C
	Elk River @ Outfall Nutrients 11	2016-10-06	14:40	Water				X	X	X	X	X			8.0°C
	Elk River @ Outfall Bacteriological 12	2016-10-06	14:40	Water	X										8.0°C
	Elk River Downstream Routine 13	2016-10-06	14:50	Water		X	X								7.7°C
5	Elk River Downstream Nutrients 14	2016-10-06	14:50	Water				X	X	X	X	X			7.7°C
	Elk River Downstream Bacteriological 15	2016-10-06	14:50	Water	X										7.7°C

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

SEND INVOICE TO: ☐ SAME AS REPORT ☐ DIFFERENT FROM REPORT (provide details below)

INVOICE FORMAT: ☐ HARDCOPY ☐ PDF ☐ 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:	10/7
	TIME:			TIME:	12:10
RELINQUISHED BY: Bo Choroszewski	DATE:	2016-10-06	RECEIVED BY:	DATE:	
	TIME:	15:32		TIME:	

FOR LAB USE ONLY
Cooler Seal Intact? ✓ __Yes __No __N/A
Sample Temperature: 8 °C
Frozen? __Yes ✓ No
Cooling Method? ✓ Icepacks __Ice __None

G:/QUALITY/00_DOCUMENTS/10_AUTHORIZED/FORMS/CoC for ALS EMS.xls

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

Date Received: 13-OCT-16
Report Date: 21-OCT-16 14:03 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1842663

Project P.O. #: NOT SUBMITTED
Job Reference: FERNIE ALPINE RESORT - FALL 2016 EMS WK 3
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1842663-1 WWTP INFLUENT							
Sampled By: BO CHOROSZEWSKI on 12-OCT-16 @ 14:40							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	>36	BODP	2.0	mg/L		13-OCT-16	R3573673
Total Suspended Solids	61.3		3.0	mg/L		14-OCT-16	R3572750
pH	7.74		0.10	pH		13-OCT-16	R3570894
L1842663-2 WWTP EFFLUENT							
Sampled By: BO CHOROSZEWSKI on 12-OCT-16 @ 14:45							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		13-OCT-16	R3570470
Biochemical Oxygen Demand	<2.0		2.0	mg/L		13-OCT-16	R3573673
Chemical Oxygen Demand	<10		10	mg/L		15-OCT-16	R3572111
Orthophosphate-Dissolved (as P)	0.204	DLA	0.010	mg/L		13-OCT-16	R3570332
Coliform Bacteria - Fecal	<1		1	CFU/100mL		13-OCT-16	R3571357
Phosphorus (P)-Total	0.223	DLA	0.025	mg/L		16-OCT-16	R3572060
Total Suspended Solids	<3.0		3.0	mg/L		14-OCT-16	R3572750
pH	7.89		0.10	pH		13-OCT-16	R3570894
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	18.3		0.020	mg/L		13-OCT-16	R3571339
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	18.3		0.050	mg/L		14-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	0.016		0.010	mg/L		13-OCT-16	R3571339
L1842663-3 ELK RIVER UPSTREAM							
Sampled By: BO CHOROSZEWSKI on 12-OCT-16 @ 14:10							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		13-OCT-16	R3570470
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		13-OCT-16	R3570332
Coliform Bacteria - Fecal	3	OCR	1	CFU/100mL		13-OCT-16	R3571357
Phosphorus (P)-Total	0.0076		0.0050	mg/L		16-OCT-16	R3572060
Total Suspended Solids	<3.0		3.0	mg/L		14-OCT-16	R3572750
pH	8.27		0.10	pH		13-OCT-16	R3570894
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.45		0.020	mg/L		13-OCT-16	R3571339
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.45		0.050	mg/L		14-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		13-OCT-16	R3571339
L1842663-4 ELK RIVER @ OUTFALL							
Sampled By: BO CHOROSZEWSKI on 12-OCT-16 @ 14:20							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		13-OCT-16	R3570470
Orthophosphate-Dissolved (as P)	0.0070		0.0050	mg/L		13-OCT-16	R3570332
Coliform Bacteria - Fecal	10	OCR	1	CFU/100mL		13-OCT-16	R3571357
Phosphorus (P)-Total	0.0118		0.0050	mg/L		16-OCT-16	R3572060
Total Suspended Solids	<3.0		3.0	mg/L		14-OCT-16	R3572750

* 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
L1842663-4 ELK RIVER @ OUTFALL							
Sampled By: BO CHOROSZEWSKI on 12-OCT-16 @ 14:20							
Matrix: WATER							
pH	8.20		0.10	pH		13-OCT-16	R3570894
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	0.831		0.020	mg/L		13-OCT-16	R3571339
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.831		0.050	mg/L		14-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		13-OCT-16	R3571339
L1842663-5 ELK RIVER DOWNSTREAM							
Sampled By: BO CHOROSZEWSKI on 12-OCT-16 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		13-OCT-16	R3570470
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		13-OCT-16	R3570332
Coliform Bacteria - Fecal	2	OCR	1	CFU/100mL		13-OCT-16	R3571357
Phosphorus (P)-Total	0.0069		0.0050	mg/L		16-OCT-16	R3572060
Total Suspended Solids	<3.0		3.0	mg/L		14-OCT-16	R3572750
pH	8.30		0.10	pH		13-OCT-16	R3570894
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.51		0.020	mg/L		13-OCT-16	R3571339
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.51		0.050	mg/L		14-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		13-OCT-16	R3571339

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
BODP	BOD dilution results differed by more than 30% RPD. Precision of reported BOD result may be less than usual.
DLA	Detection Limit adjusted for required dilution
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-COL-CL	Water	Ammonia, Total (as N)	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 phenate colourimetric method.

NO2-BC-IC-CL	Water	Nitrite in Water by IC	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

NO3-BC-IC-CL	Water	Nitrate (as N)	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

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: 1-800-665-0
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Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5196 Toll Free: 1-800-668-9
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-791-1524 Fax: 780-791
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free: 1-800-668-98
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free: 1-800-
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-800-667-7

L1842663-COFC

SEND REPORT TO:

CHAIN OF CUSTODY FORM

PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION		ATTN:	PATRICK MAJER	
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST				
CITY:	CALGARY	PROV: ALBERTA	POSTAL CODE:	T2T 0E2	
TEL:	403 - 256 - 8473	FAX: 403 - 244 - 3774	SAMPLER:	Bo Choroszewski	
PROJECT NAME AND NO.:	Fernie Alpine Resort- Fall 2016 EMS wk 3		QUOTE NO:		
PO NO.:		ALS CONTACT:	Lyudmyla Shvets		
REPORT FORMAT:	☑ HARDCOPY ☑ EMAIL - ADDRESS: pmajer@skircr.com				
	☐ FAX ☐ EXCEL ☑ PDF ☐ OTHER:				

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	2016-10-12	14:40	Water		X	X												13.0 °C
	WWTP Influent BOD 2	2016-10-12	14:40	Water									X						13.0 °C
	WWTP Effluent Routine 3	2016-10-12	14:45	Water		X	X							X					13.2 °C
	WWTP Effluent BOD 4	2016-10-12	14:45	Water									X						13.2 °C
	WWTP Effluent Nutrients 5	2016-10-12	14:45	Water				X	X	X	X	X							13.2 °C
	WWTP Effluent Bacteriological 6	2016-10-12	14:45	Water	X														13.2 °C
	Elk River Upstream Routine 7	2016-10-12	14:10	Water		X	X												4.3 °C
	Elk River Upstream Nutrients 8	2016-10-12	14:10	Water				X	X	X	X	X							4.3 °C
	Elk River Upstream Bacteriological 9	2016-10-12	14:10	Water	X														4.3 °C
	Elk River @ Outfall Routine 10	2016-10-12	14:20	Water		X	X												4.3 °C
	Elk River @ Outfall Nutrients 11	2016-10-12	14:20	Water				X	X	X	X	X							4.3 °C
	Elk River @ Outfall Bacteriological 12	2016-10-12	14:20	Water	X														4.3 °C
	Elk River Downstream Routine 13	2016-10-12	14:30	Water		X	X												4.1 °C
	Elk River Downstream Nutrients 14	2016-10-12	14:30	Water				X	X	X	X	X							4.1 °C
	Elk River Downstream Bacteriological 15	2016-10-12	14:30	Water	X														4.1 °C

ANALYSIS REQUESTED:

TURN AROUND REQUIRED:	◉ ROUTINE ○ RUSH SPECIFY DATE: _____ (surcharge may apply)			
SEND INVOICE TO:	☐ SAME AS REPORT ☐ DIFFERENT FROM REPORT (provide details below)			
INVOICE FORMAT:	☐ HARDCOPY ☐ PDF ☐ 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: 13-Oct-16
	TIME:	MM	TIME: 11:40
RELINQUISHED BY:	DATE: 2016-10-12	RECEIVED BY:	DATE:
Bo Choroszewski	TIME: 15:00		TIME:

FOR LAB USE ONLY

Cooler Seal Intact? ✓Yes __No __N/A	Sample Temperature: 2 °C Frozen? __Yes ✓No	Cooling Method? ✓Icepacks __Ice __None

G:/QUALITY/QC_DOCUMENTS/10_AUTHORIZED/FORMS/CoC for ALS EMS.xls

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

Date Received: 20-OCT-16
Report Date: 27-OCT-16 16:46 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1846209

Project P.O. #: NOT SUBMITTED
Job Reference: FERNIE ALPINE RESORT - FALL 2016 EMS WK 4
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1846209-1 WWTP INFLUENT							
Sampled By: BC on 19-OCT-16 @ 15:45							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	25.7	BODQ	6.0	mg/L		20-OCT-16	R3579271
Total Suspended Solids	42.3		3.0	mg/L		25-OCT-16	R3580345
pH	7.95		0.10	pH		27-OCT-16	R3581059
L1846209-2 WWTP EFFLUENT							
Sampled By: BC on 19-OCT-16 @ 15:55							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		24-OCT-16	R3579134
Biochemical Oxygen Demand	<2.0	BODQ	2.0	mg/L		20-OCT-16	R3579271
Chemical Oxygen Demand	15		10	mg/L		26-OCT-16	R3580516
Orthophosphate-Dissolved (as P)	0.0688		0.0050	mg/L		21-OCT-16	R3576818
Coliform Bacteria - Fecal	1	OCR	1	CFU/100mL		20-OCT-16	R3576795
Phosphorus (P)-Total	0.0861		0.0050	mg/L		21-OCT-16	R3576754
Total Suspended Solids	<3.0		3.0	mg/L		25-OCT-16	R3580345
pH	8.10		0.10	pH		27-OCT-16	R3581059
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	4.65		0.020	mg/L		20-OCT-16	R3578355
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	4.65		0.050	mg/L		24-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		20-OCT-16	R3578355
L1846209-3 ELK RIVER UPSTREAM							
Sampled By: BC on 19-OCT-16 @ 16:10							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		24-OCT-16	R3579134
Orthophosphate-Dissolved (as P)	0.0064		0.0050	mg/L		21-OCT-16	R3576818
Coliform Bacteria - Fecal	9	OCR	1	CFU/100mL		20-OCT-16	R3576795
Phosphorus (P)-Total	0.0167		0.0050	mg/L		21-OCT-16	R3576754
Total Suspended Solids	7.7		3.0	mg/L		25-OCT-16	R3580345
pH	8.32		0.10	pH		27-OCT-16	R3581059
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	0.907		0.020	mg/L		20-OCT-16	R3578355
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.907		0.050	mg/L		24-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		20-OCT-16	R3578355
L1846209-4 ELK RIVER @ OUTFALL							
Sampled By: BC on 19-OCT-16 @ 16:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		24-OCT-16	R3579134
Orthophosphate-Dissolved (as P)	0.0103		0.0050	mg/L		21-OCT-16	R3576818
Coliform Bacteria - Fecal	7	OCR	1	CFU/100mL		20-OCT-16	R3576795
Phosphorus (P)-Total	0.0247		0.0050	mg/L		21-OCT-16	R3576754
Total Suspended Solids	8.3		3.0	mg/L		25-OCT-16	R3580345

* 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
L1846209-4 ELK RIVER @ OUTFALL							
Sampled By: BC on 19-OCT-16 @ 16:30							
Matrix: WATER							
pH	8.25		0.10	pH		27-OCT-16	R3581059
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	0.520		0.020	mg/L		20-OCT-16	R3578355
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.520		0.050	mg/L		24-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		20-OCT-16	R3578355
L1846209-5 ELK RIVER DOWNSTREAM							
Sampled By: BC on 19-OCT-16 @ 16:20							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		24-OCT-16	R3579134
Orthophosphate-Dissolved (as P)	0.0070		0.0050	mg/L		21-OCT-16	R3576818
Coliform Bacteria - Fecal	8	OCR	1	CFU/100mL		20-OCT-16	R3576795
Phosphorus (P)-Total	0.0133		0.0050	mg/L		21-OCT-16	R3576754
Total Suspended Solids	5.7		3.0	mg/L		25-OCT-16	R3580345
pH	8.31		0.10	pH		27-OCT-16	R3581059
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.05		0.020	mg/L		20-OCT-16	R3578355
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.05		0.050	mg/L		24-OCT-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		20-OCT-16	R3578355

* 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.
LCS-ND	Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.
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-ED	Water	Chemical Oxygen Demand	APHA 5220 D-Micro Colorimetry

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

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-COL-CL	Water	Ammonia, Total (as N)	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 phenate colourimetric method.

NO2-BC-IC-CL	Water	Nitrite in Water by IC	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

NO3-BC-IC-CL	Water	Nitrate (as N)	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

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.

ALS Environmental
ANALYTICAL CHEMISTRY & TESTING SERVICES

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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 Fa

L1846209-COFC

CHAIN OF CUSTODY FORM

SEND REPORT TO: PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION	ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST		
CITY:	CALGARY PROV: ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	403 - 256 - 8473 FAX: 403 - 244 - 3774	SAMPLER:	Bo Choroszewski
PROJECT NAME AND NO.:	Fernie Alpine Resort- Fall 2016 EMS wk 4	QUOTE NO:	
PO NO.:		ALS CONTACT:	Lyudmyla Shvets
REPORT FORMAT:	☑ HARDCOPY ☑ EMAIL - ADDRESS: pmajer@skircr.com ☐ FAX ☐ EXCEL ☑ PDF ☐ OTHER:		

ANALYSIS REQUESTED:

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	2016-10-19	15:45	Water		X	X								11.5°C
	WWTP Influent BOD	2016-10-19	15:45	Water									X		11.5°C
2	WWTP Effluent Routine	2016-10-19	15:55	Water		X	X							X	11.9°C
	WWTP Effluent BOD	2016-10-19	15:55	Water									X		11.9°C
	WWTP Effluent Nutrients	2016-10-19	15:55	Water				X	X	X	X	X			11.9°C
	WWTP Effluent Bacteriological	2016-10-19	15:55	Water	X										11.9°C
	Elk River Upstream Routine	2016-10-19	16:10	Water		X	X								5.9°C
3	Elk River Upstream Nutrients	2016-10-19	16:10	Water				X	X	X	X	X			5.9°C
	Elk River Upstream Bacteriological	2016-10-19	16:10	Water	X										5.9°C
	Elk River @ Outfall Routine	2016-10-19	16:30	Water		X	X								6.0°C
4	Elk River @ Outfall Nutrients	2016-10-19	16:30	Water				X	X	X	X	X			6.0°C
	Elk River @ Outfall Bacteriological	2016-10-19	16:30	Water	X										6.0°C
	Elk River Downstream Routine	2016-10-19	16:20	Water		X	X								5.6°C
5	Elk River Downstream Nutrients	2016-10-19	16:20	Water				X	X	X	X	X			5.6°C
	Elk River Downstream Bacteriological	2016-10-19	16:20	Water	X										5.6°C

FOR LAB USE ONLY

TURN AROUND REQUIRED:	◉ ROUTINE ○ RUSH SPECIFY DATE: ______ (surcharge may apply)	RELINQUISHED BY:	DATE:		RECEIVED BY:	DATE:	10/21
			TIME:			TIME:	11:35
SEND INVOICE TO:	☐ SAME AS REPORT ☐ DIFFERENT FROM REPORT (provide details below)	RELINQUISHED BY:	DATE:	2016-10-19	RECEIVED BY:	DATE:	
INVOICE FORMAT:	☐ HARDCOPY ☐ PDF ☐ FAX	Bo Choroszewski	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? __Yes __No __N/A
Sample Temperature: 7 °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-OCT-16
Report Date: 04-NOV-16 17:09 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1849710

Project P.O. #: NOT SUBMITTED
Job Reference: FERNIE ALPINE RESORT - FALL 2016 EMS WK 5
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1849710-1 WWTP INFLUENT							
Sampled By: BO CHOROSZEWSKI on 26-OCT-16 @ 15:50							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	36	DLHC	20	mg/L		27-OCT-16	R3584998
Total Suspended Solids	39.7		3.0	mg/L		30-OCT-16	R3584642
pH	7.61		0.10	pH		04-NOV-16	R3588292
L1849710-2 WWTP EFFLUENT							
Sampled By: BO CHOROSZEWSKI on 26-OCT-16 @ 16:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		31-OCT-16	R3584677
Biochemical Oxygen Demand	<2.0		2.0	mg/L		27-OCT-16	R3584998
Chemical Oxygen Demand	<10		10	mg/L		02-NOV-16	R3587299
Orthophosphate-Dissolved (as P)	0.0482		0.0050	mg/L		27-OCT-16	R3581038
Coliform Bacteria - Fecal	<1		1	CFU/100mL		27-OCT-16	R3582302
Phosphorus (P)-Total	0.0436		0.0050	mg/L		29-OCT-16	R3582864
Total Suspended Solids	<3.0		3.0	mg/L		30-OCT-16	R3584642
pH	7.92		0.10	pH		04-NOV-16	R3588292
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	12.3		0.020	mg/L		29-OCT-16	R3586925
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	12.3		0.050	mg/L		03-NOV-16	
Nitrite in Water by IC							
Nitrite (as N)	0.017		0.010	mg/L		29-OCT-16	R3586925
L1849710-3 ELK RIVER UPSTREAM							
Sampled By: BO CHOROSZEWSKI on 26-OCT-16 @ 15:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		31-OCT-16	R3584677
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		27-OCT-16	R3581038
Coliform Bacteria - Fecal	1	OCR	1	CFU/100mL		27-OCT-16	R3582302
Phosphorus (P)-Total	<0.0050		0.0050	mg/L		29-OCT-16	R3582864
Total Suspended Solids	<3.0		3.0	mg/L		30-OCT-16	R3584642
pH	8.39		0.10	pH		04-NOV-16	R3588292
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.32		0.020	mg/L		29-OCT-16	R3586925
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.32		0.050	mg/L		03-NOV-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		29-OCT-16	R3586925
L1849710-4 ELK RIVER @ OUTFALL							
Sampled By: BO CHOROSZEWSKI on 26-OCT-16 @ 15:25							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		31-OCT-16	R3584677
Orthophosphate-Dissolved (as P)	0.0101		0.0050	mg/L		27-OCT-16	R3581038
Coliform Bacteria - Fecal	11	OCR	1	CFU/100mL		27-OCT-16	R3582302
Phosphorus (P)-Total	0.0141		0.0050	mg/L		29-OCT-16	R3582864
Total Suspended Solids	<3.0		3.0	mg/L		30-OCT-16	R3584642

* 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
L1849710-4 ELK RIVER @ OUTFALL							
Sampled By: BO CHOROSZEWSKI on 26-OCT-16 @ 15:25							
Matrix: WATER							
pH	8.22		0.10	pH		04-NOV-16	R3588292
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	0.463		0.020	mg/L		29-OCT-16	R3586925
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.463		0.050	mg/L		03-NOV-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		29-OCT-16	R3586925
L1849710-5 ELK RIVER DOWNSTREAM							
Sampled By: BO CHOROSZEWSKI on 26-OCT-16 @ 15:35							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		31-OCT-16	R3584677
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		27-OCT-16	R3581038
Coliform Bacteria - Fecal	<1		1	CFU/100mL		27-OCT-16	R3582302
Phosphorus (P)-Total	0.0053		0.0050	mg/L		29-OCT-16	R3582864
Total Suspended Solids	<3.0		3.0	mg/L		30-OCT-16	R3584642
pH	8.43		0.10	pH		04-NOV-16	R3588292
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.41		0.020	mg/L		29-OCT-16	R3586925
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.41		0.050	mg/L		03-NOV-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		29-OCT-16	R3586925

* 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-COL-CL	Water	Ammonia, Total (as N)	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 phenate colourimetric method.

NO2-BC-IC-CL	Water	Nitrite in Water by IC	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

NO3-BC-IC-CL	Water	Nitrate (as N)	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

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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Fort St. John BC, Box 256, 9831 - 98A Avenue, V1J 6W7, Tel: 250-261-55
Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5196 Toll Fre
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-791-1524
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 T
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Fre

L1849710-COFC

CHAIN OF CUSTODY FORM

SEND REPORT TO: PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	403 - 256 - 8473	FAX:	403 - 244 - 3774	SAMPLER:	Bo Choroszewski
PROJECT NAME AND NO.:	Fernie Alpine Resort- Fall 2016 EMS wk 5			QUOTE NO:	
PO NO.:		ALS CONTACT:	Lyudmyla Shvets		
REPORT FORMAT:	☑ HARDCOPY ☑ EMAIL - ADDRESS: pmajer@skircr.com				
	☐ FAX ☐ EXCEL ☑ PDF ☐ OTHER:				

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.)
		WWTP Influent Routine 1	2016-10-26	15:50	Water		X	X											12.6 °C
		WWTP Influent BOD 2	2016-10-26	15:50	Water									X					12.6 °C
		WWTP Effluent Routine 3	2016-10-26	16:00	Water		X	X							X				12.9 °C
		WWTP Effluent BOD 4	2016-10-26	16:00	Water									X					12.9 °C
		WWTP Effluent Nutrients 5	2016-10-26	16:00	Water				X	X	X	X	X						12.9 °C
		WWTP Effluent Bacteriological 6	2016-10-26	16:00	Water	X													12.9 °C
		Elk River Upstream Routine 7	2016-10-26	15:15	Water		X	X											4.6 °C
		Elk River Upstream Nutrients 8	2016-10-26	15:15	Water				X	X	X	X	X						4.6 °C
		Elk River Upstream Bacteriological 9	2016-10-26	15:15	Water	X													4.6 °C
		Elk River @ Outfall Routine 10	2016-10-26	15:25	Water		X	X											4.5 °C
		Elk River @ Outfall Nutrients 11	2016-10-26	15:25	Water				X	X	X	X	X						4.5 °C
		Elk River @ Outfall Bacteriological 12	2016-10-26	15:25	Water	X													4.5 °C
		Elk River Downstream Routine 13	2016-10-26	15:35	Water		X	X											4.6 °C
		Elk River Downstream Nutrients 14	2016-10-26	15:35	Water				X	X	X	X	X						4.6 °C
		Elk River Downstream Bacteriological 15	2016-10-26	15:35	Water	X													4.6 °C

TURN AROUND REQUIRED:	◉ ROUTINE ○ RUSH SPECIFY DATE: _____ (surcharge may apply)	RELINQUISHED BY:	DATE:		RECEIVED BY:	DATE:	10/27
			TIME:			TIME:	17:50
SEND INVOICE TO:	☐ SAME AS REPORT ☐ DIFFERENT FROM REPORT (provide details below)	RELINQUISHED BY:	DATE:	2016-10-26	RECEIVED BY:	DATE:	
INVOICE FORMAT:	☐ HARDCOPY ☐ PDF ☐ FAX	Bo Choroszewski	TIME:	16:15		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: 5 °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: 03-NOV-16
Report Date: 11-NOV-16 10:07 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1853111

Project P.O. #: NOT SUBMITTED
Job Reference: FERNIE ALPINE RESORT - FALL 2016 EMS WK 6
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1853111-1 WWTP INFLUENT							
Sampled By: BC on 02-NOV-16 @ 14:25							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	22.8	DLHC	6.0	mg/L		03-NOV-16	R3590427
Total Suspended Solids	36.0		3.0	mg/L		08-NOV-16	R3591635
pH	8.16		0.10	pH		10-NOV-16	R3592692
L1853111-2 WWTP EFFLUENT							
Sampled By: BC on 02-NOV-16 @ 15:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		06-NOV-16	R3588906
Biochemical Oxygen Demand	<2.0		2.0	mg/L		03-NOV-16	R3590427
Chemical Oxygen Demand	<10		10	mg/L		08-NOV-16	R3592189
Orthophosphate-Dissolved (as P)	0.126	DLA	0.010	mg/L		04-NOV-16	R3587872
Coliform Bacteria - Fecal	<1		1	CFU/100mL		03-NOV-16	R3588248
Phosphorus (P)-Total	0.204	DLA	0.010	mg/L		05-NOV-16	R3588541
Total Suspended Solids	<3.0		3.0	mg/L		08-NOV-16	R3591635
pH	8.27		0.10	pH		10-NOV-16	R3592692
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	5.66		0.020	mg/L		03-NOV-16	R3588099
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	5.66		0.050	mg/L		04-NOV-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		03-NOV-16	R3588099
L1853111-3 ELK RIVER UPSTREAM							
Sampled By: BC on 02-NOV-16 @ 14:40							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		06-NOV-16	R3588906
Orthophosphate-Dissolved (as P)	0.0064		0.0050	mg/L		04-NOV-16	R3587872
Coliform Bacteria - Fecal	9	OCR	1	CFU/100mL		03-NOV-16	R3588248
Phosphorus (P)-Total	0.0150		0.0050	mg/L		05-NOV-16	R3588541
Total Suspended Solids	6.7		3.0	mg/L		08-NOV-16	R3591635
pH	8.26		0.10	pH		10-NOV-16	R3592692
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	0.989		0.020	mg/L		03-NOV-16	R3588099
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.989		0.050	mg/L		04-NOV-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		03-NOV-16	R3588099
L1853111-4 ELK RIVER @ OUTFALL							
Sampled By: BC on 02-NOV-16 @ 14:50							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		06-NOV-16	R3588906
Orthophosphate-Dissolved (as P)	0.0147		0.0050	mg/L		04-NOV-16	R3587872
Coliform Bacteria - Fecal	6	OCR	1	CFU/100mL		03-NOV-16	R3588248
Phosphorus (P)-Total	0.0249		0.0050	mg/L		05-NOV-16	R3588541
Total Suspended Solids	6.7		3.0	mg/L		08-NOV-16	R3591635

* 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
L1853111-4 ELK RIVER @ OUTFALL							
Sampled By: BC on 02-NOV-16 @ 14:50							
Matrix: WATER							
pH	8.22		0.10	pH		10-NOV-16	R3592692
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	0.084		0.020	mg/L		03-NOV-16	R3588099
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.084		0.050	mg/L		04-NOV-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		03-NOV-16	R3588099
L1853111-5 ELK RIVER DOWNSTREAM							
Sampled By: BC on 02-NOV-16 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		06-NOV-16	R3588906
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		04-NOV-16	R3587872
Coliform Bacteria - Fecal	7	OCR	1	CFU/100mL		03-NOV-16	R3588248
Phosphorus (P)-Total	0.0116		0.0050	mg/L		05-NOV-16	R3588541
Total Suspended Solids	4.7		3.0	mg/L		08-NOV-16	R3591635
pH	8.26		0.10	pH		10-NOV-16	R3592692
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.13		0.020	mg/L		03-NOV-16	R3588099
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.13		0.050	mg/L		04-NOV-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		03-NOV-16	R3588099

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
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-COL-CL	Water	Ammonia, Total (as N)	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 phenate colourimetric method.

NO2-BC-IC-CL	Water	Nitrite in Water by IC	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

NO3-BC-IC-CL	Water	Nitrate (as N)	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

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-
Fort St. John BC, Box 256, 9831 - 98A Avenue, V1J 6W7, Tel: 250-261-5517 Fax:
Grand Prairie AB, 9595 - 111 Street, T8V 5W1, Tel: 780-539-5196 Toll Free: 1-80
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel: 780-791-1524 Fax: 7
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5227 Toll Free: 1-800-
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 403-291-9897 Toll Free
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-668-8370 Toll Free: 1-8

L1853111-COFC

SEND REPORT TO:

CHAIN OF CUSTODY FORM

PAGE of

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	403 - 256 - 8473	FAX:	403 - 244 - 3774	SAMPLER:	Bo Choroszewski
PROJECT NAME AND NO.:	Fernie Alpine Resort- Fall 2016 EMS wk 6			QUOTE NO:	
PO NO.:		ALS CONTACT:	Lyudmyla Shvets		
REPORT FORMAT:	☑ HARDCOPY ☑ EMAIL - ADDRESS: pmajer@skircr.com				
	☐ FAX ☐ EXCEL ☑ PDF ☐ OTHER:				

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	2016-11-02	14:25	Water		X	X											10.6 °C
	WWTP Influent BOD 2	2016-11-02	14:25	Water									X					10.6 °C
	WWTP Effluent Routine 3	2016-11-02	15:15	Water		X	X							X				11.8 °C
2	WWTP Effluent BOD 4	2016-11-02	15:15	Water									X					11.8 °C
	WWTP Effluent Nutrients 5	2016-11-02	15:15	Water				X	X	X	X	X						11.8 °C
	WWTP Effluent Bacteriological 6	2016-11-02	15:15	Water	X													11.8 °C
	Elk River Upstream Routine 7	2016-11-02	14:40	Water		X	X											5.0 °C
3	Elk River Upstream Nutrients 8	2016-11-02	14:40	Water				X	X	X	X	X						5.0 °C
	Elk River Upstream Bacteriological 9	2016-11-02	14:40	Water	X													5.0 °C
	Elk River @ Outfall Routine 10	2016-11-02	14:50	Water		X	X											5.7 °C
4	Elk River @ Outfall Nutrients 11	2016-11-02	14:50	Water				X	X	X	X	X						5.7 °C
	Elk River @ Outfall Bacteriological 12	2016-11-02	14:50	Water	X													5.7 °C
	Elk River Downstream Routine 13	2016-11-02	15:00	Water		X	X											4.9 °C
5	Elk River Downstream Nutrients 14	2016-11-02	15:00	Water				X	X	X	X	X						4.9 °C
	Elk River Downstream Bacteriological 15	2016-11-02	15:00	Water	X													4.9 °C

FOR LAB USE ONLY

TURN AROUND REQUIRED:	◉ ROUTINE ○ RUSH SPECIFY DATE: _____ (surcharge may apply)	RELINQUISHED BY:	DATE:		RECEIVED BY:	DATE:	3-NOV-16
			TIME:			TIME:	12:20
SEND INVOICE TO:	☐ SAME AS REPORT ☐ DIFFERENT FROM REPORT (provide details below)	RELINQUISHED BY:	DATE:	2016-11-02	RECEIVED BY:	DATE:	
INVOICE FORMAT:	☐ HARDCOPY ☐ PDF ☐ FAX	Bo Choroszewski	TIME:	15:30		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:	Cooling Method?
✓ Yes ___ No ___ N/A	6 °C Frozen? ___ Yes ✓ No	___ Icepacks ___ Ice ___ None

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

Date Received: 22-DEC-16
Report Date: 03-JAN-17 15:18 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1873428

Project P.O. #: NOT SUBMITTED
Job Reference: FARUC - WINTER 2016/2017 EMS WEEK 1
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1873428-1 WWTP INFLUENT							
Sampled By: BO CHOROSZEWSKI on 21-DEC-16 @ 13:45							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	275	DLHC	75	mg/L		23-DEC-16	R3624458
Total Suspended Solids	278	DLHC	15	mg/L		28-DEC-16	R3625526
pH	7.53		0.10	pH		03-JAN-17	R3626961
L1873428-2 WWTP EFFLUENT							
Sampled By: BO CHOROSZEWSKI on 21-DEC-16 @ 13:50							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		28-DEC-16	R3624562
Biochemical Oxygen Demand	<2.0		2.0	mg/L		23-DEC-16	R3624458
Chemical Oxygen Demand	17		10	mg/L		28-DEC-16	R3624797
Orthophosphate-Dissolved (as P)	0.415	DLA	0.025	mg/L		23-DEC-16	R3623067
Coliform Bacteria - Fecal	43	OCR	1	CFU/100mL		22-DEC-16	R3623294
Phosphorus (P)-Total	0.446	DLA	0.025	mg/L		29-DEC-16	R3625185
Total Suspended Solids	<3.0		3.0	mg/L		28-DEC-16	R3625526
pH	7.64		0.10	pH		03-JAN-17	R3626961
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	35.9		0.020	mg/L		22-DEC-16	R3623273
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	35.9		0.050	mg/L		23-DEC-16	
Nitrite in Water by IC							
Nitrite (as N)	0.013		0.010	mg/L		22-DEC-16	R3623273
L1873428-3 ELK RIVER UPSTREAM							
Sampled By: BO CHOROSZEWSKI on 21-DEC-16 @ 13:55							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		28-DEC-16	R3624562
Orthophosphate-Dissolved (as P)	0.0066		0.0050	mg/L		23-DEC-16	R3623067
Coliform Bacteria - Fecal	<1		1	CFU/100mL		22-DEC-16	R3623294
Phosphorus (P)-Total	0.0110		0.0050	mg/L		29-DEC-16	R3625185
Total Suspended Solids	<3.0		3.0	mg/L		28-DEC-16	R3625526
pH	8.03		0.10	pH		03-JAN-17	R3626961
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.22		0.020	mg/L		22-DEC-16	R3623273
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.22		0.050	mg/L		23-DEC-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		22-DEC-16	R3623273
L1873428-4 ELK RIVER @ OUTFALL							
Sampled By: BO CHOROSZEWSKI on 21-DEC-16 @ 14:05							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		28-DEC-16	R3624562
Orthophosphate-Dissolved (as P)	0.0178		0.0050	mg/L		23-DEC-16	R3623067
Coliform Bacteria - Fecal	2	OCR	1	CFU/100mL		22-DEC-16	R3623294
Phosphorus (P)-Total	0.0232		0.0050	mg/L		29-DEC-16	R3625185
Total Suspended Solids	<3.0		3.0	mg/L		28-DEC-16	R3625526

* 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
L1873428-4 ELK RIVER @ OUTFALL							
Sampled By: BO CHOROSZEWSKI on 21-DEC-16 @ 14:05							
Matrix: WATER							
pH	8.05		0.10	pH		03-JAN-17	R3626961
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	0.686		0.020	mg/L		22-DEC-16	R3623273
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.686		0.050	mg/L		23-DEC-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		22-DEC-16	R3623273
L1873428-5 ELK RIVER @ DOWNSTREAM							
Sampled By: BO CHOROSZEWSKI on 21-DEC-16 @ 14:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		28-DEC-16	R3624562
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		23-DEC-16	R3623067
Coliform Bacteria - Fecal	<1		1	CFU/100mL		22-DEC-16	R3623294
Phosphorus (P)-Total	0.0174		0.0050	mg/L		29-DEC-16	R3625185
Total Suspended Solids	12.3		3.0	mg/L		28-DEC-16	R3625526
pH	8.17		0.10	pH		03-JAN-17	R3626961
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.78		0.020	mg/L		22-DEC-16	R3623273
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.78		0.050	mg/L		23-DEC-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		22-DEC-16	R3623273

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

Reference Information

Sample Parameter Qualifier Key:

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

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

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-COL-CL	Water	Ammonia, Total (as N)	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 phenate colourimetric method.

NO2-BC-IC-CL	Water	Nitrite in Water by IC	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

NO3-BC-IC-CL	Water	Nitrate (as N)	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

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 Stre
Fort St. John BC, Box 256, 9831 -
Grand Prairie AB, 9595 - 111 Stre
Fort McMurray AB, Bay 1, 245 Mc
Edmonton AB, 9936 - 67th Avenu
Calgary AB, Bay 7, 1313 - 44th Av
Saskatoon SK, 819 - 58th Street E

L1873428-COFC

L1873428

EOT

SEND REPORT TO:

CHAIN OF CUSTODY FORM

PAGE OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	403 - 256 - 8473	FAX:	403 - 244 - 3774	SAMPLER:	Bo Choroszewski
PROJECT NAME AND NO.:	FARUC- winter 2016/2017 EMS week 1			QUOTE NO:	
PO NO.:		ALS CONTACT:	Lyudmyla Shvets		
REPORT FORMAT:	☒ HARDCOPY ☒ EMAIL ☐ 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.)
	WWTP Influent Routine 1	2016-12-21	13:45	Water		X	X												11.8 °C
	WWTP Influent BOD 2	2016-12-21	13:45	Water									X						11.8 °C
	WWTP Effluent Routine 3	2016-12-21	13:50	Water		X	X							X					11.8 °C
	WWTP Effluent BOD 4	2016-12-21	13:50	Water									X						11.8 °C
	WWTP Effluent Nutrients 5	2016-12-21	13:50	Water				X	X	X	X	X							11.8 °C
	WWTP Effluent Bacteriological 6	2016-12-21	13:50	Water	X														11.8 °C
	Elk River Upstream Routine 7	2016-12-21	13:55	Water		X	X												-0.2 °C
	Elk River Upstream Nutrients 8	2016-12-21	13:55	Water				X	X	X	X	X							-0.2 °C
	Elk River Upstream Bacteriological 9	2016-12-21	13:55	Water	X														-0.2 °C
	Elk River @ Outfall Routine 10	2016-12-21	14:05	Water		X	X												0.7 °C
	Elk River @ Outfall Nutrients 11	2016-12-21	14:05	Water				X	X	X	X	X							0.7 °C
	Elk River @ Outfall Bacteriological 12	2016-12-21	14:05	Water	X														0.7 °C
	Elk River Downstream Routine 13	2016-12-21	14:15	Water		X	X												-0.5 °C
	Elk River Downstream Nutrients 14	2016-12-21	14:15	Water				X	X	X	X	X							-0.5 °C
	Elk River Downstream Bacteriological 15	2016-12-21	14:15	Water	X														-0.5 °C

FOR LAB USE ONLY

TURN AROUND REQUIRED:	☐ RUSH	SPECIFY DATE:	(surcharge may apply)	RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
					TIME:		TIME:
SEND INVOICE TO:	☐ SAME AS REPORT ☐ DIFFERENT			RELINQUISHED BY:	DATE: 2016-12-21	RECEIVED BY:	DATE:
INVOICE FORMAT:	☐ HARDCOPY ☐ PDF			Bo Choroszewski	TIME: 15:15		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: 8 °C Frozen? ___Yes ___No	Cooling Method? ___Icepacks ___Ice ___None

G:/QUALITY/00_DOCUMENTS/10_AUTHORIZED/FORMS/CoC for ALS EMS.xls

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

Date Received: 29-DEC-16
Report Date: 04-JAN-17 15:45 (MT)
Version: FINAL

Client Phone: 403-254-7669

Certificate of Analysis

Lab Work Order #: L1874477

Project P.O. #: NOT SUBMITTED
Job Reference: FARUC - WINTER 2016/2017 EMS WEEK 2
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1874477-1 WWTP INFLUENT							
Sampled By: BC on 28-DEC-16 @ 10:30							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	157	DLHC	75	mg/L		29-DEC-16	R3626888
Total Suspended Solids	219	DLHC	11	mg/L		31-DEC-16	R3626816
pH	7.69		0.10	pH		03-JAN-17	R3626961
L1874477-2 WWTP EFFLUENT							
Sampled By: BC on 28-DEC-16 @ 10:40							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	0.674	RRV	0.050	mg/L		03-JAN-17	R3627000
Biochemical Oxygen Demand	<2.0		2.0	mg/L		29-DEC-16	R3626888
Chemical Oxygen Demand	18		10	mg/L		31-DEC-16	R3626133
Orthophosphate-Dissolved (as P)	1.22	DLA	0.10	mg/L		29-DEC-16	R3625122
Coliform Bacteria - Fecal	39	OCR	1	CFU/100mL		29-DEC-16	R3625655
Phosphorus (P)-Total	1.30	DLA	0.10	mg/L		29-DEC-16	R3625185
Total Suspended Solids	<3.0		3.0	mg/L		31-DEC-16	R3626816
pH	7.69		0.10	pH		30-DEC-16	R3626961
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	47.1	HTD	0.10	mg/L		03-JAN-17	R3625791
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	47.2		0.10	mg/L		04-JAN-17	
Nitrite in Water by IC							
Nitrite (as N)	0.104		0.010	mg/L		29-DEC-16	R3625791
L1874477-3 ELK RIVER UPSTREAM							
Sampled By: BC on 28-DEC-16 @ 10:15							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		03-JAN-17	R3627000
Orthophosphate-Dissolved (as P)	0.0062		0.0050	mg/L		29-DEC-16	R3625122
Coliform Bacteria - Fecal	<1		1	CFU/100mL		29-DEC-16	R3625655
Phosphorus (P)-Total	0.0099		0.0050	mg/L		29-DEC-16	R3625185
Total Suspended Solids	<3.0		3.0	mg/L		31-DEC-16	R3626816
pH	8.19		0.10	pH		30-DEC-16	R3626961
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	1.48		0.020	mg/L		29-DEC-16	R3625791
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	1.48		0.050	mg/L		30-DEC-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		29-DEC-16	R3625791
L1874477-4 ELK RIVER @ OUTFALL							
Sampled By: BC on 28-DEC-16 @ 10:10							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	0.076	RRV	0.050	mg/L		03-JAN-17	R3627000
Orthophosphate-Dissolved (as P)	0.144	DLA	0.010	mg/L		29-DEC-16	R3625122
Coliform Bacteria - Fecal	12	OCR	1	CFU/100mL		29-DEC-16	R3625655
Phosphorus (P)-Total	0.161	DLA	0.010	mg/L		29-DEC-16	R3625185
Total Suspended Solids	3.7		3.0	mg/L		31-DEC-16	R3626816

* 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
L1874477-4 ELK RIVER @ OUTFALL							
Sampled By: BC on 28-DEC-16 @ 10:10							
Matrix: WATER							
pH	8.30		0.10	pH		30-DEC-16	R3626961
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	4.94		0.020	mg/L		29-DEC-16	R3625791
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	4.96		0.050	mg/L		30-DEC-16	
Nitrite in Water by IC							
Nitrite (as N)	0.013		0.010	mg/L		29-DEC-16	R3625791
L1874477-5 ELK RIVER DOWN STREAM							
Sampled By: BC on 28-DEC-16 @ 10:05							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.050		0.050	mg/L		03-JAN-17	R3627000
Orthophosphate-Dissolved (as P)	<0.0050		0.0050	mg/L		29-DEC-16	R3625122
Coliform Bacteria - Fecal	1	OCR	1	CFU/100mL		29-DEC-16	R3625655
Phosphorus (P)-Total	0.0059		0.0050	mg/L		29-DEC-16	R3625185
Total Suspended Solids	<3.0		3.0	mg/L		31-DEC-16	R3626816
pH	8.27		0.10	pH		30-DEC-16	R3626961
NO2, NO3 (BC codes) and Sum of NO2/NO3							
Nitrate (as N)							
Nitrate (as N)	2.11		0.020	mg/L		29-DEC-16	R3625791
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	2.11		0.050	mg/L		30-DEC-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		29-DEC-16	R3625791

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
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.
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-COL-CL	Water	Ammonia, Total (as N)	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 phenate colourimetric method.

NO2-BC-IC-CL	Water	Nitrite in Water by IC	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

NO3-BC-IC-CL	Water	Nitrate (as N)	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

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

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-
Fort McMurray AB, Bay 1, 245 Macdonald Cr, T9H 4B5, Tel:
Edmonton AB, 9936 - 67th Avenue, T6E 0P5, Tel: 780-413-5
Calgary AB, Bay 7, 1313 - 44th Avenue NE, T2E 6L5, Tel: 40
Saskatoon SK, 819 - 58th Street East, S7K 6X5, Tel: 306-66

L1874477-COFC

CHAIN OF CUSTODY

SEND REPORT TO: OF

COMPANY:	FERNIE ALPINE RESORT UTILITIES CORPORATION			ATTN:	PATRICK MAJER
ADDRESS:	1505 - 17TH AVENUE SOUTH WEST				
CITY:	CALGARY	PROV:	ALBERTA	POSTAL CODE:	T2T 0E2
TEL:	403 - 256 - 8473	FAX:	403 - 244 - 3774	SAMPLER:	Bo Choroszewski
PROJECT NAME AND NO.:	FARUC- winter 2016/2017 EMS week 2			QUOTE NO:	
PO NO.:		ALS CONTACT:	Lyudmyla Shvets		
REPORT FORMAT:	☒ HARDMAIL ☒ EMAIL pmajor@skircr.com ☐ FAX ☐ EXCEL ☒ PDF ☐ ( )				

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	2016-12-28	10:30	Water		X	X												11.6
	WWTP Influent BOD	2016-12-28	10:30	Water									X						11.6
	WWTP Effluent Routine	2016-12-28	10:40	Water		X	X							X					13.4
	WWTP Effluent BOD	2016-12-28	10:40	Water									X						13.4
	WWTP Effluent Nutrients	2016-12-28	10:40	Water				X	X	X	X	X							13.4
	WWTP Effluent Bacteriological	2016-12-28	10:40	Water	X														13.4
	Elk River Upstream Routine	2016-12-28	10:15	Water		X	X												-0.8
	Elk River Upstream Nutrients	2016-12-28	10:15	Water				X	X	X	X	X							-0.8
	Elk River Upstream Bacteriological	2016-12-28	10:15	Water	X														-0.8
	Elk River @ Outfall Routine	2016-12-28	10:10	Water		X	X												0.3
	Elk River @ Outfall Nutrients	2016-12-28	10:10	Water				X	X	X	X	X							0.3
	Elk River @ Outfall Bacteriological	2016-12-28	10:10	Water	X														0.3
	Elk River Downstream Routine	2016-12-28	10:05	Water		X	X												-0.7
	Elk River Downstream Nutrients	2016-12-28	10:05	Water				X	X	X	X	X							-0.7
	Elk River Downstream Bacteriological	2016-12-28	10:05	Water	X														-0.7

FOR LAB USE ONLY

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

SEND INVOICE TO: ☐ SAME AS REPORT

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: 12/29
	TIME:	Tom	TIME: 9:30
RELINQUISHED BY:	DATE: 2016-12-28	RECEIVED BY:	DATE:
Bo Choroszewski	TIME:		TIME:

FOR LAB USE ONLY

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

4°

G:\QUALITY\00_DOCUMENTS\10_AUTHORIZED\FORMS\CoC for ALS EMS.xls

Nautilus Environmental

ATTN: Patrick Majer
Fernie Alpine Resort
1505-17th Ave S.W
Calgary, Alberta
Canada T2T 0E2

Received:	2016/01/22
Report Date:	2016/02/09
Version:	FINAL

Test Report

Client:	FER116
Reference:	16-0093
Billing:	not given

Senior Verifier

Nautilus Environmental

Trout (96-h LC50) Test Report

Result Summary

Client: FER116
Reference: 16-0093-01-TRD

Client: Fernie Alpine Resort; operation not given

Sample: WASTEWATER

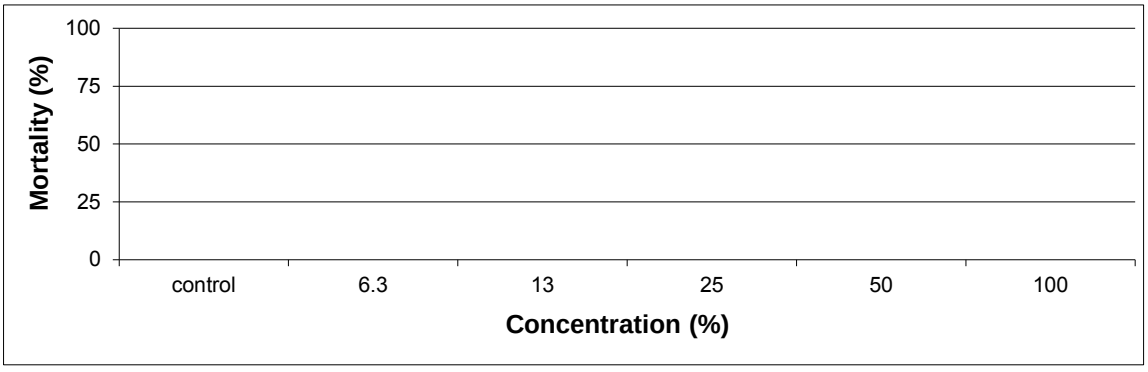
Collection: collected on 2016/01/21 at 1530 by BC
Receipt: received on 2016/01/22 at 0845 by MC
Containers: received 2 x 20 L pails at 12 °C, in good condition with no seals and no initials
Description: type: water, collection method: grab

Test: started on 2016/01/25 ; ended on 2016/01/29

Result:

	Endpoint (96-hour)	Value (%)	Confidence Limits (95%) lower	upper	Method Calculated
Acute:	LC50	>100			could not be calculated
(mortality)	LC25	>100			could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.

Senior Verifier

Nautilus Environmental

Trout (96-h LC50) Test Report

Test Conditions

Client: FER116
Reference: 16-0093-01-TRD

Method: Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout, 2000. Environment Canada, EPS 1/RM/13. Second Edition (amended May 2007).

Test type: Trout 96-h Static Acute Test (WTR-ME-041)
Species: *Oncorhynchus mykiss*
Organism source: Aqua Farms (Batch 122915)
Acclimation: 27 days (must be ≥2 weeks)
Stock mortality: 0.2% (seven days preceding testing)

Sample initial chemistry: pH: 7.5; EC: 897 (µS/cm @ 25°C); DO: 9.2 (mg/L); temperature: 16 °C
hardness (mg CaC03/L): 2200; colour: Yellow; odour: Odourless
Sample holding time: 4 days (must be ≤ 5 days)
Sample storage: 4 ± 2°C in darkness

Test vessel: The test was conducted in 22 L plastic pails with polyethylene liners
Test volume: 10 Litres (depth of solution in each test vessel ≥15cm)
Sample pre-treatment: All test solutions and controls were pre-aerated for 30 minutes at 6.5 ±1 mL/min/L
Dissolved oxygen in 100 % sample was 10 mg/L after pre-aeration
The sample was not filtered or pH adjusted prior to or during testing
Loading density: 0.34 g/Litre (must be ≤ 0.5 g/Litre)"
Control/dilution water: Dechlorinated City of Calgary water acclimated to test conditions
Test concentrations: 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)
Test replicates: One replicate per treatment; 10 fish per replicate
Feeding: Fish are not fed 24 hours before test initiation and no feeding during test
Measurements: pH, conductivity, dissolved oxygen and temperature measured at test initiation and test termination
Aeration: All treatments aerated at 6.5 ±1 mL/min/L by oil-free compressed air passed through airline tubes connected to disposable air stones
Lighting: Overhead full spectrum fluorescent lights
Photoperiod: 16h light:8h dark
Test temperature: 15 ± 1°C

Endpoint: Mortality, 96-h LC50 (with 95% confidence limits)
Test validity: The control had 100% survival (must ≥ 90%)
The control had 0 percent (%) stressed behaviour (must ≤ 10%)
Reference toxicant: 96-h test with Zinc (Zn) initiated January 20, 2016; current results
(96-h LC50 and 95% confidence limits) = 80.5 (59.4-109.5) log (µg/L Zn)
historical results:
(96-h LC50 and 95% confidence limits) = 71.0 (33.9-148.4) log (µg/L Zn)

Note: Outlined sections are protocol deviations explained on the comment page; v/v, volume per volume

Nautilus Environmental

Trout (96-h LC50) Test Report

Test Data

Client: FER116
Reference: 16-0093-01-TRD

Test Log:

Date	Day	Time	Technician
2016/01/25	0	1405	KL
2016/01/26	1	-	EL
2016/01/27	2	-	KL
2016/01/28	3	-	EL
2016/01/29	4	-	EL

Chemistry:

Conc. (%)	control	6.3	13	25	50	100

pH (units)

Day						
0	6.9	7.1	7.2	7.3	7.4	7.6
4	7.0	7.1	7.2	7.2	7.6	7.9

Conductivity (µS/cm @ 25°C)

0	28	94	155	277	516	975
4	35	97	157	282	525	978

Dissolved Oxygen (mg/L)

0	9.8	9.9	9.9	9.9	10.0	10.0
4	9.9	10.0	10.0	10.0	10.0	10.0

Temperature (^{o}C)

0	15	15	15	14	14	14
4	15	15	15	15	15	15

Number Alive (In brackets number stressed):

Conc. (%)	control	6.3	13	25	50	100

Day						
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10
3	10	10	10	10	10	10
4	10	10	10	10	10	10

Mortality (%)

4	0	0	0	0	0	0

Stressed (%)

4	0	0	0	0	0	0

Nautilus Environmental

Trout (96-h LC50) Test Report

Client: FER116
Reference: 16-0093-01-TRD

Test Data

Biology Summary Tables:

Control Fish	Length (cm)	Wet Weight(g)
1	30	0.3
2	32	0.5
3	28	0.3
4	28	0.3
5	31	0.5
6	26	0.2
7	26	0.2
8	27	0.3
9	28	0.3
10	30	0.5

average	28.6	0.3
sd	2.1	0.1
cv(%)	7.2	36.0

Notes: nd, not done; na, not applicable; sd, standard deviation; cv(%), coefficient of variation

Conc. (%)	Group Wet Weight (g)
control	3.4
6.3	-
13	-
25	-
50	-
100	-

Comments/Statistics

Test Result Comments:
None

Data Analysis:
Endpoints for mortality could not be calculated. No effect occurred.

Protocol Deviations:
None

GENERAL TERMS AND CONDITIONS:

These terms and conditions are incorporated into and form part of the Chain of Custody between HydroQual Laboratories Ltd. ("HydroQual") and the party named in the Chain of Custody (the "Client").

1. **Definitions:** Capitalized terms shall have the definition ascribed as such in these General Terms and Conditions and the Chain of Custody.
2. **The Services:** HydroQual will provide the Services to the Client as listed and described in the Chain of Custody.
3. **Prices:** HydroQual may review and change all prices, fees, surcharges or other charges as set out in proposals and/or price quotations if there are changes to HydroQual's cost beyond HydroQual's control, including changes in legislative requirements, Client variations of sample numbers and Client requests for changes to standard reporting requirements. Notwithstanding condition 3, all quotations are reviewed and updated on a yearly basis.
4. **Payment Terms:** The Client shall pay HydroQual within 30 days of the invoice date as provided by HydroQual. HydroQual may, for reasonable business reasons, require the Client to arrange for payment in advance.
5. **Quotation Numbers:** The Client shall provide the proposal and/or price quotation number to HydroQual (where applicable) to ensure correct pricing.
6. **Taxes:** Applicable taxes are not included in prices, surcharges and additional fees and will be added at the time of invoicing.
7. **No Guarantee of Results:** The Client is responsible for informing itself on the limitation of the results and acknowledges that the results are not guaranteed.
8. **Standard of Care:** HydroQual will use reasonable care and diligence as required by the laws of the province or territory where the sample is tested, subject to that level of care and skill ordinarily exercised by other laboratories currently practicing under similar conditions in the same locality, subject to the time limits and financial, physical or other constraints applicable to the Services. No warranty, express or implied, is made.
9. **Storage:** Where possible, HydroQual will store samples until a final report is issued to the Client, after which time HydroQual may discard the sample.
10. **Holds:** If the Client requests a sample be placed on hold, HydroQual will store the sample for the mutually agreed upon written time and price, after which HydroQual will invoice the Client and discard the sample.
11. **Archives:** If the Client requests a sample be archived, HydroQual will store the sample for a mutually agreed upon written time frame and price, after which HydroQual will invoice the Client and discard the sample.
12. **Handling Protocol:** Legal sample handling protocol must be arranged, and provided in writing, before samples are collected. HydroQual will provide a price quotation for legal sample protocol. Samples processed under legal protocol are stored indefinitely, subject to a storage charge as advised by HydroQual.
13. **Samples:** The quality, condition, content and source of samples stored and tested are not known to HydroQual except as declared and described on the Chain of Custody completed and submitted by the Client and accompanying the sample.
14. **Risk of Loss:** HydroQual will use reasonable care to protect samples during storage, however, all samples are stored at the Client's risk and the Client is responsible for obtaining appropriate insurance, if desired. The Client acknowledges that during the performance of the Services samples may be altered, lost, damaged or destroyed and the client forever releases HydroQual from any and all claims the Client may have for any loss or damage to the sample.
15. **Environmental:** the Client must comply with all applicable environmental legislation, including labeling all hazardous samples to comply with Canada's *Workplace Hazardous Materials Information System* and the Alberta *Transfer of Dangerous Goods* regulations, and must provide appropriate material safety data sheets that include the nature of the hazard and a contact name and phone number to call for information. The Client shall defend, indemnify and hold harmless HydroQual for all loss or damages, including any fine or cost of complying with an order of any government authority, resulting from the Client's breach of this paragraph.
16. **Hazardous Materials Disposal:** HydroQual may return, at the Client's cost, hazardous material to the Client for disposal.
17. **Hazardous Materials Surcharge:** HydroQual may apply an additional surcharge for handling of hazardous samples or samples with Naturally Occurring Radioactive Materials ("NORM"), such as and including without limitation, H_2S and CN.
18. **Sample Containers:** HydroQual may ship sample containers to the Client's location by the most cost effective means using HydroQual's preferred courier suppliers, within the specified project timeline. Shipping will be charged back to the Client.
19. **Additional Charges:** HydroQual may charge the Client:
    (a) for pick-up and delivery services when provided subject in each instance to a minimum charge of $50.00; and,
    (b) for rush service (processing samples and/or reporting).
20. **Large Bottle Orders:** The Client shall provide HydroQual with not less than 24 hours' notice for large bottle orders.
21. **Re-Tests:** HydroQual reserves the right to re-test any samples that remain in HydroQual's possession. Re-tests requested by the Client may be charged to Client and Client agrees to pay for such charges.
22. **Waiver:** The Client is responsible for making any assessment regarding the suitability of the Services and the intended results for the Client's purposes and waives any and all claims against HydroQual that the Client may have against HydroQual as a result of the interpretation of the results provided to the Client. The Client shall defend, indemnify and save harmless HydroQual for any and all claims made by any third party against HydroQual in respect of all losses however arising from the performance of the Services or the use of any report provided in the performance of the Services.
23. **LIMITATION OF LIABILITY:** IN NO EVENT SHALL HYDROQUAL BE RESPONSIBLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY OR PUNITIVE DAMAGES, WHETHER FORESEEABLE OR UNFORESEEABLE (INCLUDING CLAIMS FOR LOSS OF PROFITS OR REVENUE OR LOSSES CAUSED BY STOPPAGE OF OTHER WORK OR IMPAIRMENT OF OTHER ASSETS) INCURRED BY THE CLIENT ARISING OUT OF BREACH OR FAILURE OF EXPRESS OF IMPLIED WARRANTY, BREACH OF CONTRACT, BREACH OF WARRANTY, MISREPRESENTATION, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE. IN ANY EVENT, THE LIABILITY OF HYDROQUAL TO THE CLIENT SHALL BE LIMITED TO THE COST OF TESTING THE SAMPLE AS REQUESTED IN THE CHAIN OF CUSTODY UNDER WHICH THE SAMPLE WAS ORIGINALLY DEPOSITED. FOR THE PURPOSES OF THIS PARAGRAPH AND PARAGRAPHS 7, 14, 15, 22, AND 24, AS APPLICABLE, "HYDROQUAL" INCLUDES WITHOUT LIMITATIONS ITS DIRECTORS, OFFICERS, EMPLOYEES AND AFFILIATES AND THE "CLIENT" INCLUDES WITHOUT LIMITATION ANY THIRD PARTY THAT MAY HAVE A CLAIM AGAINST HYDROQUAL THROUGH THE CLIENT.
24. **Notice of Liability:** Notwithstanding paragraph 23, HydroQual shall not be liable to the Client unless the Client provides notice in writing to HydroQual of such loss or damage, together with full particulars thereof, within 30 days of the Client's receipt of the report of the analysis of the sample giving rise to such liability. The provisions of this paragraph allocate the risk between the Client and HydroQual, and the fees to be paid by the Client to HydroQual reflect this allocation of any such risks and the limitations of liability in these General Terms and Conditions.
25. **Entire Agreement:** These General Terms and Conditions, the Chain of Custody and price quotations constitute the entire agreement between the parties and supersede and take precedence over any terms and conditions contained in any documentation provided by the Client. HydroQual's execution of any subsequent documentation from the Client only acknowledges receipt and not acceptance of any terms or conditions therein unless expressly stipulated otherwise by HydroQual. If there is a conflict between these General Terms and Conditions and any other document, these General Terms and Conditions prevail.

Nautilus Environmental

ATTN: Patrick Majer
Fernie Alpine Resort
1505-17th Ave S.W
Calgary, Alberta
Canada T2T 0E2

Received:	2016/05/27
Report Date:	2016/06/08
Version:	FINAL

Test Report

Client:	FER116
Reference:	16-0620
Billing:	not given

Senior Verifier

Nautilus Environmental

Trout (96-h LC50) Test Report

Result Summary

Client: FER116
Reference: 16-0620-01-TRD

Client: Fernie Alpine Resort; operation not given

Sample: WASTEWATER

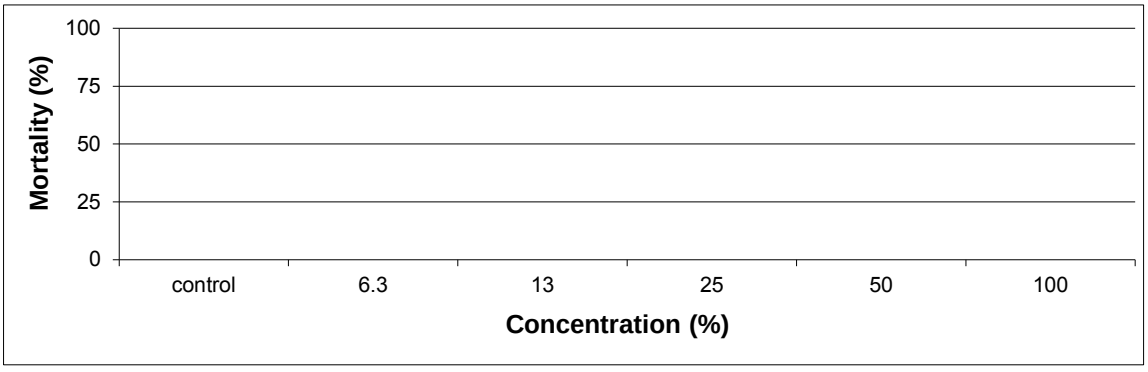
Collection: collected on 2016/05/26 at 1430 by Bo
Receipt: received on 2016/05/27 at 1000 by MC
Containers: received 2 x 20 L pails at 13 °C, in good condition with seals and no initials
Description: type: effluent, collection method: grab

Test: started on 2016/05/29 ; ended on 2016/06/02

Result:

	Endpoint (96-hour)	Value (%)	Confidence Limits (95%) lower	upper	Method Calculated
Acute:	LC50	>100			could not be calculated
(mortality)	LC25	>100			could not be calculated

Notes: LC25 & LC50, concentrations lethal to 25% and 50% of the test population



The test data and results are authorized and verified correct.

Jacklyn Poole

Senior Verifier

Nautilus Environmental

Trout (96-h LC50) Test Report

Test Conditions

Client: FER116
Reference: 16-0620-01-TRD

Method: Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout, 2000. Environment Canada, EPS 1/RM/13. Second Edition (2000; amended May 2007 and February 2016).

Test type: Trout 96-h Static Acute Test (WTR-ME-041)
Species: *Oncorhynchus mykiss*
Organism source: Miracle Springs (Batch 20160511TR)
Acclimation: 18 days (must be ≥2 weeks)
Stock mortality: 0% (seven days preceding testing)

Sample initial chemistry: pH: 7.2; EC: 632 (µS/cm @ 25°C); DO: 6.9 (mg/L); temperature: 19 °C
hardness (mg CaC03/L): 199; colour: yellow; odour: -
Sample holding time: 3 days (must be ≤ 5 days)
Sample storage: 4 ± 2°C in darkness

Test vessel: The test was conducted in 22 L plastic pails with polyethylene liners
Test volume: 20 Litres (depth of solution in each test vessel ≥15cm)
Sample pre-treatment: All test solutions and controls were pre-aerated for 30 minutes at 6.5 ±1 mL/min/L
Dissolved oxygen in 100 % sample was 8.8 mg/L after pre-aeration
The sample was not filtered or pH adjusted prior to or during testing
Loading density: 0.16 g/Litre (must be ≤ 0.5 g/Litre)
Control/dilution water: Dechlorinated City of Calgary water acclimated to test conditions
Test concentrations: 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)
Test replicates: One replicate per treatment; 10 fish per replicate
Feeding: Fish are not fed 24 hours before test initiation and no feeding during test
Measurements: pH, conductivity, dissolved oxygen and temperature measured at test initiation and test termination
Aeration: All treatments aerated at 6.5 ±1 mL/min/L by oil-free compressed air passed through airline tubes connected to disposable air stones
Lighting: Overhead full spectrum fluorescent lights
Photoperiod: 16h light:8h dark
Test temperature: 15 ± 1°C

Endpoint: Mortality, 96-h LC50 (with 95% confidence limits)
Test validity: The control had 100% survival (must ≥ 90%)
The control had 0 percent (%) stressed behaviour (must ≤ 10%)
Reference toxicant: 96-h test with Potassium Chloride (KCl) initiated May 25, 2016; current results (96-h LC50 and 95% confidence limits) = 0.48 (0.41-0.54) log (g/L KCl)
historical results:
(96-h LC50 and 95% confidence limits) = 0.55 (0.42-0.68) log (g/L KCl)

Note: Outlined sections are protocol deviations explained on the comment page; v/v, volume per volume

Nautilus Environmental

Trout (96-h LC50) Test Report

Test Data

Client: FER116
Reference: 16-0620-01-TRD

Test Log:

Date	Day	Time	Technician
2016/05/29	0	0910	ML
2016/05/30	1	0800	JW
2016/05/31	2	1000	BH
2016/06/01	3	0930	KLO
2016/06/02	4	0830	KLO

Chemistry:

Conc. (%)	control	6.3	13	25	50	100
Day	pH (units)					
0	7.5	7.4	7.4	7.5	7.6	7.7
4	8.0	8.1	8.1	8.1	8.1	8.1
	Conductivity (µS/cm @ 25°C)					
0	398	420	434	481	556	710
4	416	430	442	489	566	722
	Dissolved Oxygen (mg/L)					
0	8.8	8.8	8.8	8.8	8.8	8.8
4	8.7	8.8	8.8	8.8	8.8	8.8
	Temperature (^{o}C)					
0	15	15	15	15	15	15
4	15	15	15	15	15	15

Number Alive (In brackets number stressed):

Conc. (%)	control	6.3	13	25	50	100
Day						
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10
3	10	10	10	10	10	10
4	10	10	10	10	10(1)	10
	Mortality (%)					
4	0	0	0	0	0	0
	Stressed (%)					
4	0	0	0	0	10	0

Nautilus Environmental

Trout (96-h LC50) Test Report

Client: FER116
Reference: 16-0620-01-TRD

Test Data

Biology Summary Tables:

Control Fish	Length (cm)	Wet Weight(g)
1	3.0	0.2
2	3.3	0.4
3	3.2	0.3
4	3.0	0.3
5	3.3	0.4
6	3.1	0.3
7	3.2	0.4
8	3.0	0.3
9	3.2	0.4
10	2.9	0.2

average	3.1	0.3
sd	0.1	0.1
cv(%)	4.5	24.7

Notes: nd, not done; na, not applicable; sd, standard deviation; cv(%), coefficient of variation

Conc. (%)	Group Wet Weight (g)
control	3.2
6.3	3.5
13	2.9
25	3.2
50	3.2
100	3.6

Comments/Statistics

Test Result Comments:
None

Data Analysis:
Endpoints for mortality could not be calculated. No effect occurred.

Protocol Deviations:
None

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23. **LIMITATION OF LIABILITY:** IN NO EVENT SHALL HYDROQUAL BE RESPONSIBLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY OR PUNITIVE DAMAGES, WHETHER FORESEEABLE OR UNFORESEEABLE (INCLUDING CLAIMS FOR LOSS OF PROFITS OR REVENUE OR LOSSES CAUSED BY STOPPAGE OF OTHER WORK OR IMPAIRMENT OF OTHER ASSETS) INCURRED BY THE CLIENT ARISING OUT OF BREACH OR FAILURE OF EXPRESS OF IMPLIED WARRANTY, BREACH OF CONTRACT, BREACH OF WARRANTY, MISREPRESENTATION, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE. IN ANY EVENT, THE LIABILITY OF HYDROQUAL TO THE CLIENT SHALL BE LIMITED TO THE COST OF TESTING THE SAMPLE AS REQUESTED IN THE CHAIN OF CUSTODY UNDER WHICH THE SAMPLE WAS ORIGINALLY DEPOSITED. FOR THE PURPOSES OF THIS PARAGRAPH AND PARAGRAPHS 7, 14, 15, 22, AND 24, AS APPLICABLE, "HYDROQUAL" INCLUDES WITHOUT LIMITATIONS ITS DIRECTORS, OFFICERS, EMPLOYEES AND AFFILIATES AND THE "CLIENT" INCLUDES WITHOUT LIMITATION ANY THIRD PARTY THAT MAY HAVE A CLAIM AGAINST HYDROQUAL THROUGH THE CLIENT.
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NAUTILUS ENVIRONMENTAL

ATTN: Patrick Majer
Fernie Alpine Resort
1505 - 17th Ave SW
Calgary, Alberta
Canada T2T 0E2

Received:	2016/10/27
Report Date:	2016/11/14
Version:	FINAL

Test Report

Client:	FER116
Reference:	1617-0322
Billing:	not given

Senior Verifier

Trout (96-h LC50) Test Report

Result Summary

Client: FER116
Reference: 1617-0322-TRD

Client: Fernie Alpine Resort; operation not given

Sample: WASTEWATER

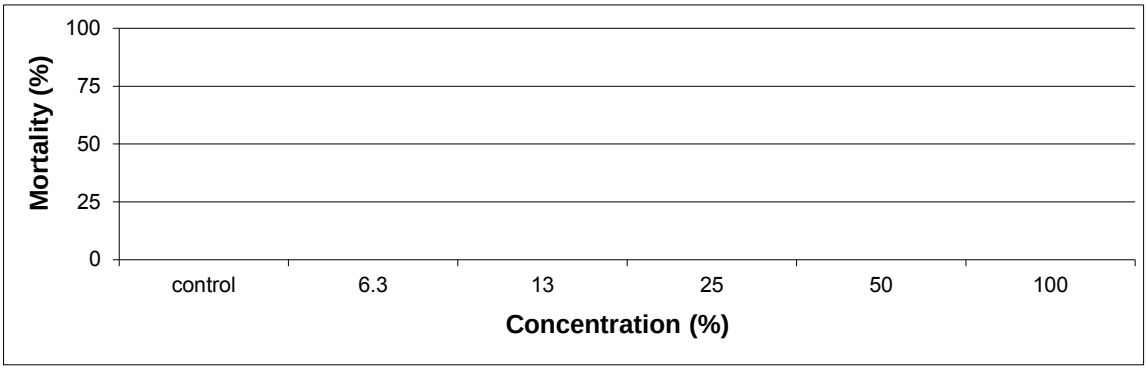
Collection: collected on 2016/10/26 at 1430 by BO
Receipt: received on 2016/10/27 at 1030 by MC
Containers: received 2 x 20 L pails at 16 °C, in good condition with no seals and no initials
Description: type: water, collection method: grab

Test: started on 2016/10/31 ; ended on 2016/11/04

Result:

	Endpoint (96-hour)	Value (%)	Confidence Limits (95%) lower	upper	Method Calculated
Acute: (mortality)	LC50	>100			could not be calculated

Notes: LC50 concentrations lethal to 50% of the test population



The test data and results are authorized and verified correct.

Senior Verifier

Test Conditions

Client: FER116
Reference: 1617-0322-TRD

Method: Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout, 2000. Environment Canada, EPS 1/RM/13. Second Edition (2000; amended May 2007 and February 2016).

Test type: Trout 96-h Static Acute Test (WTR-ME-041)
Species: *Oncorhynchus mykiss*
Organism source: Miracle Springs (Batch 20161012TR)
Acclimation: 19 days (must be ≥2 weeks)
Stock mortality: 0% (seven days preceding testing)

Sample initial chemistry: pH: 7.4; EC: 706 (µS/cm @ 25°C); DO: 8.7 (mg/L); temperature: 17 °C
hardness (mg CaC03/L): 333; colour: colourless; salinity (ppt): 0
Sample holding time: 5 days (must be ≤ 5 days)
Sample storage: 4 ± 2°C in darkness

Test vessel: The test was conducted in 22 L plastic pails with polyethylene liners
Test volume: 20 Litres (depth of solution in each test vessel ≥15cm)
Sample pre-treatment: All test solutions and controls were pre-aerated for 30 minutes at 6.5 ±1 mL/min/L
Dissolved oxygen in 100 % sample was 8.7 mg/L after pre-aeration
The sample was not filtered or pH adjusted prior to or during testing
Loading density: 0.15 g/Litre (must be ≤ 0.5 g/Litre)
Control/dilution water: Dechlorinated City of Calgary water acclimated to test conditions
Test concentrations: 5 effluent concentrations (6.3, 12.5, 25, 50, 100% (v/v) plus a negative control)
Test replicates: One replicate per treatment; 10 fish per replicate
Feeding: Fish are not fed 24 hours before test initiation and no feeding during test
Measurements: pH, conductivity, dissolved oxygen and temperature measured at test initiation and test termination
Aeration: All treatments aerated at 6.5 ±1 mL/min/L by oil-free compressed air passed through airline tubes connected to disposable air stones
Lighting: Overhead full spectrum fluorescent lights
Photoperiod: 16h light:8h dark
Test temperature: 15 ± 1°C

Endpoint: Mortality, 96-h LC50 (with 95% confidence limits)
Test validity: The control had 100% survival (must ≥ 90%)
The control had 0 percent (%) stressed behaviour (must ≤ 10%)
Reference toxicant: 96-h test with Potassium Chloride (KCl) initiated October 26, 2016; current results (96-h LC50 and 95% confidence limits) = 0.50 (0.42-0.56) log (g/L KCl)
historical results:
(96-h LC50 and 95% confidence limits) = 0.51 (0.36-0.66) log (g/L KCl)

Note: Outlined sections are protocol deviations explained on the comment page; v/v, volume per volume

Test Data

Client: FER116
Reference: 1617-0322-TRD

Test Log:

Date	Day	Time	Technician
2016/10/31	0	1400	EP
2016/11/01	1	0730	JW
2016/11/02	2	0940	JW
2016/11/03	3	0915	EP
2016/11/04	4	1005	ML/LC

Chemistry:

Conc. (%)	control	6.3	13	25	50	100
Day	pH (units)					
0	7.5	7.4	7.5	7.5	7.6	7.8
4	8.0	8.1	8.1	8.1	8.1	8.1
	Conductivity (µS/cm @ 25°C)					
0	437	459	465	485	531	604
4	430	445	462	481	518	599
	Dissolved Oxygen (mg/L)					
0	8.5	8.5	8.6	8.6	8.6	8.7
4	8.4	8.6	8.7	8.7	8.8	8.7
	Temperature (°C)					
0	15	14	14	14	14	14
4	15	15	14	14	15	15

Number Alive (In brackets number stressed):

Conc. (%)	control	6.3	13	25	50	100
Day						
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10
3	10	10	10	10	10	10
4	10	10	10	10	10	10
	Mortality (%)					
4	0	0	0	0	0	0
	Stressed (%)					
4	0	0	0	0	0	0

Client: FER116
Reference: 1617-0322-TRD

Test Data

Biology Summary Tables:

Control Fish	Length (cm)	Wet Weight(g)
1	2.9	0.3
2	2.7	0.2
3	3.0	0.3
4	2.9	0.3
5	2.8	0.3
6	2.8	0.3
7	2.9	0.3
8	3.1	0.4
9	2.9	0.3
10	2.8	0.3
average	2.9	0.3
sd	0.1	0.0
cv(%)	3.9	15.7

Notes: nd, not done; na, not applicable; sd, standard deviation; cv(%), coefficient of variation

Conc. (%)	Group Wet Weight (g)
control	3.0

Comments/Statistics

Test Result Comments:
None

Data Analysis:
Endpoints for mortality could not be calculated. No effect occurred.

Protocol Deviations:
None

CERTIFICATE OF INSURANCE

BROKER
Toole Peet & Co. Limited
P.O. Box 4650 Station C
1135 - 17th Avenue SW
Calgary, AB T2T 5R5
BROKER'S CLIENT ID:

This certificate is issued as a matter of information only and confers no rights upon the certificate holder. This certificate does not amend, extend or alter the coverage afforded by the policies below.

INSURED'S FULL NAME AND MAILING ADDRESS

Environmental Diagnostics Inc.
#140, 5050 - 106 Ave. SE
Calgary, AB T2C 5E9

COMPANIES AFFORDING COVERAGE

COMPANY **A**	**Aviva Insurance**
COMPANY **B**	**Certain Underwriters at Lloyds as under contract MKL2016001 (Markel Syndicate 3000)**
COMPANY **C**	**Certain Underwriters as arranged through Encon Group Inc.**
COMPANY **D**	

COVERAGES

This is to certify that the policies of insurance listed below have been issued to the insured named above for the policy period indicated, notwithstanding any requirement, term or condition of any contract or other document with respect to which this certificate may be issued or may pertain. The insurance afforded by the policies described herein is subject to all the terms, exclusions and conditions of such policies.

LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS

TYPE OF INSURANCE	CO LTR	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS OF LIABILITY	
COMMERCIAL GENERAL LIABILITY	**A**	81229768	3/30/2017	3/30/2018	EACH OCCURRENCE	$ **2,000,000**
☐ CLAIMS MADE OR ☑ OCCURRENCE					GENERAL AGGREGATE	$ **5,000,000**
☑ PRODUCTS AND / OR COMPLETED OPERATIONS					PRODUCTS - Comp/Ops Agg.	$ **2,000,000**
☐ EMPLOYERS' LIABILITY					PERSONAL INJURY	$ **2,000,000**
☑ CROSS LIABILITY					TENANT'S LEGAL LIABILITY	$ **250,000**
☑ TENANT'S LIABILITY					MED EXP (any one person)	$ **10,000**
☑ NON-OWNED AUTOMOBILES					NON-OWNED AUTO	$ **2,000,000**
☐ ☑ HIRED					OPTIONAL POLLUTION LIABILITY EXTENSION	$
☐ POLLUTION LIABILITY EXTENSION					(Per Occurrence/Aggregate)	$
☑ CONTRACTUAL LIABILITY						
AUTOMOBILE LIABILITY						
☑ DESCRIBED AUTOMOBILES	**A**	6141184202	9/18/2017	9/18/2018	BODILY INJURY PROPERTY DAMAGE COMBINED	$ **2,000,000**
☐ ALL OWNED AUTOMOBILES					BODILY INJURY (Per Person)	$
☐ LEASED AUTOMOBILES					BODILY INJURY (Per Accident)	$
					PROPERTY DAMAGE	$
**ALL AUTOMOBILES LEASED IN EXCESS OF 30 DAYS WHERE THE INSURED IS REQUIRED TO PROVIDE INSURANCE						
EXCESS LIABILITY						$
☐ UMBRELLA FORM						$
☐ OTHER THAN UMBRELLA FORM						
(Specify)						
OTHER LIABILITY (SPECIFY)						$
☑						$
ENVIRONMENTAL CONSULTING PROFESSIONAL (ERRORS AND OMISSIONS) LIABILITY (Claims Made)	**C**	SRD450628	4/20/2017	4/20/2018	Per Loss/Aggregate	$ **2,000,000**
☑ ENVIRONMENTAL IMPAIRMENT LIABILITY (Claims Made)	**B**	EILT2093	4/1/2017	4/1/2018	Each Claim	$ **1,000,000**
					Aggregate for Each Policy Period	$ **1,000,000**

ADDITIONAL INSURED	DESCRIPTION OF OPERATIONS, LOCATIONS/ AUTOMOBILES/ SPECIAL ITEMS
	Environmental Consultants

CERTIFICATE HOLDER	1	CANCELLATION
To Whom It May Concern		Should any of the above described policies be cancelled before the expiration date thereof, the issuing company will endeavor to mail 0 days written notice to the certificate holder named to the left, but failure to mail such notice shall impose no obligation or liability of any kind upon the company, its agents or representatives

SIGNATURE OF AUTHORIZED REPRESENTATIVE	FAX NUMBER	EMAIL ADDRESS
	(403) 228-0231	esiver@toolepeet.com
PRINT NAME INCLUDING POSITION HELD	COMPANY	DATE
Erica Siver, Account Manager	**Toole Peet & Co. Limited**	**March 9, 2017**

COMPANY PROFILE

ENVIRONMENTAL DIAGNOSTICS INC. (EDI) was established in 1993. EDI is a Canadian-based company offering ***environmental and engineering services*** to commercial, industrial, oil & gas and government clients in Western Canada. The company has the main office located in Calgary and operations offices in Edmonton and Kamloops.

Environmental Diagnostics Inc. brings more than 20 years of experience and knowledge in many areas of the environmental and engineering sectors. EDI employees are dedicated to providing effective solutions to the clients' problems, implementing efficient and cost effective methods as well as an innovative approach.

All of EDI ***personnel*** are graduates of engineering and/or environmental science programs at recognized universities, colleges and reclamation/environmental programs. Our staff consists of experienced technicians, technologists, scientists and engineers, which are members of ***APEGGA, APEGBC, AIA, APEGS, ACPA, ACPBC, CRLA, AWWA, WEFTEC, WCWWA*** and others.

The ***company*** is an active member of the Association of Professional Engineers, Geologists and Geophysicists of Alberta - ***APEGGA***, Association of Professional Engineers and Geoscientists of Saskatchewan - ***APEGS***, the Environmental Services Association of Alberta - ***ESAA***, the Canadian Land Reclamation Association - ***CLRA*** and the Alberta Petroleum Storage Systems Contractor's Association - ***APSSCA***.

The company possesses the ***Partnerships in Health & Safety*** Small Employer Certificate of Recognition - ***SECOR*** (currently working on ***COR***) and is a member of ***ISN***etworld.

EXPERIENCE OVERVIEW

ENVIRONMENTAL & CONTAMINATED LAND SITE ASSESSMENTS

- Pre-purchase Assessments
- Phase I, II and III Environmental Site Assessments for Commercial, Industrial, Residential and Oil & Gas Properties
- Site Specific Guideline Re-calculation
- Statistical Trend Analysis
- Conceptual Site Model Development
- Contact with Regulatory Agencies
- Soils, Surface Water, Groundwater, Snow and Sludge Sampling & Testing

RISK MANAGEMENT AND MITIGATION

- Risk Management Plans
- Risk Management Implementation
- Environmental Mitigation Strategies
- Exposure Control
- Natural Attenuation

REMEDIATION

- Soil & Groundwater Remediation Evaluation & Method Selection
  - ✓ In-situ Remediation (Vapour Extraction, Bioremediation, Oxygen Introduction, Groundwater Pump and Treat)
  - ✓ On-site (Landfarming, Bio-piling, Alluing/Aeration)
  - ✓ Source Removal and Off-site Disposal
  - ✓ Site Specific and Innovative Techniques
- Tender Documents Preparation
- Comprehensive Remediation Management and/or Supervision
- Experience with Numerous Contaminants: Salt, Hydrocarbons, Chlorinated Solvents, PAHs, Fertilizers, Herbicides/Pesticides, Heavy Metals, Disulfides and others
- Underground Storage Tanks Removals
- Post Remediation Monitoring & Evaluation

SOIL VAPOUR SURVEYS & EVALUATION

- Soil Vapour Assessments
- Soil Vapour Probe Sampling
- Soil Vapour Criteria Derivation
- Risk Management and Remediation
- Conceptual Site Model
- Experience with Various Parameters: Methane, Hydrocarbons, Solvents, etc.

INDOOR AIR QUALITY ASSESSMENT

- Indoor Air Sampling and Testing
- Sub-slab Air Sampling and Testing
- Pollutant Source Assessment and Problem Identification
- Air Quality Improvements
- Experience with Hydrocarbons, Chlorinated Compounds, Dust, Metals, Mould

HAZARDOUS BUILDING MATERIAL ASSESSMENT

- Indoor Air Sampling and Testing for Hazardous Materials: Asbestos, Lead, Arsenic, Mercury, UFFI, PCBs, Silica, Radioactive Materials, ODS
- Mould Testing
- Radon Testing and Mitigation

EXPERIENCE OVERVIEW - continued

REGULATORY COMPLIANCE FOR FACILITIES (under AER and AEP)

- Site Assessments (Phase I & II ESA, Contamination Delineation)
- Risk Management Plans
- Standard Operating Procedures Development & Process Optimization
- Liability Assessments including Site Specific
- Decommissioning Plans
- Site Remediation & Monitoring
- Contact with Regulatory Agencies
- Assistance with Regulatory Approvals

ENGINEERING – WATER, WASTEWATER & CONTAMINATED WATER

- Water & Wastewater Systems Evaluation
- Annual Compliance Reports
- Wastewater Irrigation Reports
- Environmental Emergency Plans for WTP
- Water Source Evaluation
- Well Pumping/Flow Tests and Evaluation
- Feasibility Studies
- Chemical and Microbial Sampling and Testing
- Soil Evaluation for Septic Fields
- Full Contaminated Water Remediation System Design and Treatment
- Pilot Water Testing (DAF, Media Filters, Membrane Filtration, Biological Activated Filter, and others)
- Design/Built Potable Water, Process Water and Contaminated Water Packages

COMPLIANCE TESTING & MONITORING

- Long Term Compliance Testing and Monitoring such as:
  - ✓ Water Distribution Systems
  - ✓ Water & Wastewater Treatment Plants Compliance Reports
  - ✓ Wastewater Irrigation Reports
  - ✓ Landfill Monitoring
  - ✓ Fuel Tank Sites Monitoring
  - ✓ Lead in Water Sampling
  - ✓ Surface Water Sampling
  - ✓ Snow & Snow Storage Sampling
- Various clients
  - ✓ Municipalities
  - ✓ Various Developments
  - ✓ Golf Courses
  - ✓ Resorts
  - ✓ Facilities

CORE PERSONNEL

Jana Zverina, P.Eng. (M.Sc. in Water Resources Engineering & Management and Diploma in Civil Engineering)
Manager of Environmental Engineering & Operations (Principal)

Jana has been working as a water resources and environmental engineer for more than 30 years. The following is the pertinent experience:

- ✓ Five years of process design, equipment selection, evaluation, pricing of industrial and municipal water & wastewater treatment, industrial water remediation including floatation sediment storage & transportation and mine rehabilitation work, environmental remediation including natural attenuation and containment for deep coal mines as a junior engineer
- ✓ Twenty five years as an environmental engineer including:
    - o Engineering and project management
    - o Thousands of environmental site assessments for oil & gas facilities, commercial and industrial sites & multi-residential site
    - o Hundreds of Remediation and Risk Management Plans for various projects such as oil & gas leases, batteries, gas plants, underground and aboveground storage tanks sites, chemical storage sites, sites on and adjacent to landfills, CPR yards, chemical storage sites, dry-cleaning and other facilities
    - o Specifications, budget proposals, cost estimates for hundreds of site abandonments projects including equipment dismantling, disposal, re-use, recycling
    - o Remediation and risk management options for a number of soil and groundwater treatment methods including off-site disposal and treatment, in-situ treatments ie land treatment, bio-piling, enhanced bio-remediation, chemical in-situ treatment, chemical oxidation and reduction, vapour extraction, pump and treat, etc. as well as other site specific treatment methods
    - o Numerous soil and groundwater remediation projects employing various remediation methods for salt, hydrocarbons, solvents, fertilizers, herbicides/pesticides, heavy metals and others
    - o Completed numerous remediation projects within the proposed budget cost

Irina Sabau, P.Ag. (B.Sc. In Environmental Sciences)
Environmental Project Manager (Principal)

Irina has been working as an environmental scientist for over 8 years. The following is the pertinent experience:

- ✓ One year of analytical environmental laboratory experience
- ✓ Seven years as an environmental scientist including:
    - o Hundreds of environmental site assessments, indoor air evaluations, soil vapour evaluations, snow assessment, mitigation plans, exposure control plans, hazardous materials assessments, methane gas studies, remediation and risk management plans for various projects
    - o Specifications, budget proposals, cost estimates for assessment
    - o Remediation and risk management options for a number of soil and groundwater treatment methods including off-site disposal and treatment, in-situ treatments ie land treatment, bio-piling, enhanced bio-remediation, chemical in-situ treatment, chemical oxidation and reduction, vapour extraction, pump and treat, etc. as well as other site specific treatment methods
    - o Numerous soil and groundwater remediation projects employing various remediation methods for salt, hydrocarbons, chlorinated solvents, fertilizers, heavy metals, disulfides, and others
    - o Completed numerous remediation projects within the proposed budget cost

Lisa Columbus
Office Manager

- Over 20 years of experience with office management, work and personnel organization, book-keeping and payroll

Kim Harvey, P.Chem (B.Sc. in Chemical Science)
Environmental Consultant

Kim has been working as an environmental consultant for over 10 years. The following is the pertinent experience:

- ✓ Four years of analytical environmental laboratory experience
- ✓ Ten years as an environmental consultant including:
  - o Hundreds of environmental site assessments, mitigation plans, risk management plans, soil and groundwater monitoring programs, reclamation and remediation assessments
  - o Specifications, budget proposals, cost estimates for assessment

Naomi Anton, A.T.T. (B.Sc. in Environmental Management, Diploma in Environmental Technology)
Environmental Consultant

Naomi has been working as an environmental consultant for over 6 years. The following is the pertinent experience:

- ✓ Six years as an environmental consultant including:
  - o Numerous environmental site assessments, soil and groundwater monitoring programs, remediation supervision, hazardous materials assessment, indoor air and soil vapour sampling
  - o Potable, surface and groundwater sampling

Samantha Thompson, (Diploma in Environmental Technology)
Samantha has been working as an environmental consultant for over 4 years. The following is the pertinent experience:

- o Phase I & II Environmental Site Assessments, Water sampling and testing, soil & indoor air & probe air sampling,

Desarae Ahlstrom, (Diploma in Environmental Technology)
Environmental Technologist/Water Sampler

- Water sampling and testing, analytical laboratory experience

Contract Work

Milan Zverina, P.Eng. (M.Sc. in Water/Wastewater Treatment & Water Resources)
Project Manager

- over 35 years of experience in feasibility studies, municipal and industrial water & wastewater systems evaluations, water & wastewater treatment, process equipment & package design, manufacture and start up, design and management of the construction of equipment and pipelines for oil & gas industry, the projects he participated in include numerous plants & equipment in Eastern Europe, Asia, Africa, Canada and US

Lukas Fikr, P.Geol. (M.Sc. in Geology)
Senior Geologist/Hydrogeologist

- Over 15 years of environmental, geological and hydrogeological experience including exploration, drilling supervision, interpretation of geological, hydrogeological and environmental data, processing of geological parts of risk and hazard assessments and environmental audits

S. Tolga Olcay, M.Sc., P.Eng. (B.Sc. in Environmental Engineering, M.Sc. in Environmental Sciences)

- Planned, implemented and reported ambient air quality and meteorological monitoring studies in Alberta, BC and NWT (Set-up monitoring units at site, maintenance and calibration, data collection, data processing, compliance reporting) for mining industry. extensive experience as air dispersion modeler (by using calpuff and aermod) for EIA projects for oil & gas industry, numerous oil sands projects and mining industries, conducted training sessions for new staff about environmental issues, ambient air quality and indoor air quality monitoring and reporting., accomplished indoor air quality studies for residential buildings, office buildings and industrial buildings. (Generic pollutants, mold, toxic gases…), performed periodical maintenance of monitoring analyzers and calibration devices, developed technical calibration procedures for electrochemical sensors for ambient air.

RECENT PROJECTS

The list of projects, clients and references can be provided on request.

Environmental Diagnostics Inc. has undertook thousands of Phase I, II and III Environmental Site Assessments, contamination delineations and contamination remediation projects in Southern and Central Alberta, British Columbia and Saskatchewan as well as numerous hazardous materials surveys, indoor/sub-slab and soil-vapour sampling and evaluations.

EDI also undertook numerous pump/flow tests and chemical tests as well as water well and water supply/treatment system evaluations and compliance report preparations.

Example of some of the EDI long-term clients:

City of Calgary
- Potable water sampling for the City of Calgary
- Storm water pond sampling
- Lead in water distribution system sampling
- Snow and meltwater sampling

City of Airdrie
- Landfill monitoring
- Fleet yard tank nest monitoring

Oil & Gas Midstream and Upstream Clients

Land Developers
- Ronmor Developers Inc.
- Harmin Holdings Ltd.
- MDC Properties Ltd.
- Certus Development Ltd.
- United Communities
- Qualico Development

Resorts and Golf Courses
- The Lake Louise Ski Resort
- Resort of the Canadian Rockies Inc.
- Priddis Greens Services Co-op Limited
- Azuridge Boutique Hotel
- Johnson Canyon Resort

Various
- Alsa Paving
- Freeze Maxwell Roofing Ltd.
- Calgary Metals
- NAI Advent
- Gas Plus
- Numerous commercial and industrial clients – transactional assessments & remediation work

EDI is on the list of all major banks and financial institutions such as Business Development Bank, Royal Bank of Canada, CIBC, Bank of Montreal and others.