CITY OF YORKTON

Wastewater System Renewal Downstream Use and Impact Study (DUIS)

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IN COLLABORATION WITH JACOBS

PREPARED BY:

Jon Nachtigall, B.Sc., P.Biol., PAg
Biologist-Environmental Scientist

Tracey Ozipko, B.A.Sc., B.Sc.
Environmental Engineer-In-Training

REVIEWED BY:

Barry Williamson, P.Eng., Jacobs Canada
Senior Project Manager

APPROVED BY:

Sean Bayer, M.Eng., P.Eng., PMP
Municipal Department Head

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Limitations

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1.0 INTRODUCTION

Wastewater Management in Saskatchewan is in part, advised by Environment and Climate Change Canada via the Canada Wide Strategy for the Management of Municipal Wastewater Effluent (2009) and the Wastewater System Regulations (WSER, 2014). The WSER, under the Fisheries Act, regulates the release of deleterious substances. The Water Security Agency (WSA) has developed a process known as a Downstream Use and Impact Study (DUIS) to support long term compliance in response to effluent discharge. The DUIS must be completed before discharge limits can be set and a permit issued. Although provincial regulations include standards and guidelines for wastewater effluent quality, there is no set of discharge limits that can be applied to all wastewater treatment systems. Instead, wastewater discharge limits are set on a case-by-case basis, with limits dependent on the specific receiving environment. A DUIS looks at the specific site to determine what concerns exist, so that issues may be mitigated.

The purpose of the DUIS is to guide the regulatory permitting process and any future upgrades to the treatment process with the goal of protecting the downstream environment and human health. The DUIS is intended to be the first step in the wastewater upgrading phase to help in the establishment of long-term regulatory limits.

KGS Group and Jacobs (known in the report as the Consultant Team), have been engaged by the City of Yorkton to prepare the report. The report will detail the downstream uses and users of Yorkton Creek, Cussed Creek, Whitesand River, and the Assiniboine River as well as provide analytical results from water samples collected from the effluent discharge, upstream of the discharge location and four downstream locations in the spring and fall of 2020. These analyses will help develop Effluent Discharge Objectives.

An aquatic habitat assessment, is included in this report, and can be found in Appendix B.

1.1 Project Background

The City of Yorkton (the City) is in east-central Saskatchewan and has a 2019 population of approximately 19,600 (yorkton.ca). It is a growing City and a retail and service center for more than 150,000 people within a 150 km radius serving eastern Saskatchewan and western Manitoba.

The City of Yorkton has had multiple wastewater treatment facilities throughout the City's history.

In 1979 a mechanical secondary plant was constructed where the current plant is located, east of Highway No. 9 approximately 1 km north of the City of Yorkton. This plant was expanded from 1989 - 1991 and was named the H.M. Bailey Water Pollution Control Plant (WPCP).

Treatment processes used at the facility include screening, sewage pumping, grit removal, primary clarification, aeration, final clarification, and sludge digestion. There are seven buildings, many of which are connected to one another with underground tunnels, that comprise the WPCP.

Effluent from the WPCP is released into Yorkton Creek which is a tributary of the Assiniboine River. Yorkton Creek was recently classified as fish bearing water which has prompted the need for a Downstream Use and Impact Assessment and potential future plant upgrade requirements. Future work will recognize the long-term effluent requirements established within this document in an effort to ensure long term compliance moving forward.

2.0 PROJECT OUTLINE

The following will be described within this report:

- Definition of the discharge path;
- Analysis of downstream use and users including human and biological users;
- Analysis of receiving water that will define the quality of the effluent as well as water chemistry and quality of the upstream and downstream water;
- Mixing zone analysis; and
- Recommendations for discharge limits.

3.0 ANALYSIS OF THE RECEIVING WATER BODY

3.1 Methodology

Analysis of the receiving water body included defining the discharge path, reviewing background information and completing a field work component.

3.1.1 BACKGROUND INFORMATION REVIEW

Once the discharge path was defined the background review could be completed by gathering information from public databases (e.g., Saskatchewan Water well database, Water Security Agency website, HabiSask), satellite imagery, and from the Assiniboine River Watershed Source Water Protection Plan (Saskatchewan Watershed Authority, 2006) and the Yorkton Area Aquifers Source Water Protection Plan (Saskatchewan Watershed Authority, 2006). This information was used to help determine the downstream use and users within the receiving water body and included municipal, industrial, and recreational users. The Wastewater Standards in the Assiniboine River Basin Area (Assiniboine River Basin Initiative (ARBI), 2020) was also consulted which reviewed effluent standards within the area of the Assiniboine River Basin which covers Manitoba, Saskatchewan and North Dakota.

3.1.2 FIELD COMPONENT

The field component included an aquatic habitat assessment (AHA) completed by Jacobs and assisted by the consultant team and surface water sampling completed by the Project Team (Jacobs & The consultant team) along the discharge path in May 2020 and by the consultant team in September and October 2020.

AQUATIC HABITAT ASSESSMENT

The purpose of the AHA as defined in Jacobs' report "is to present the baseline aquatic habitat conditions, provide a discussion on the potential natural environment and establish steps/risks associated with work in the area". This assessment was focused on Yorkton Creek directly north of the WWTP, the discharge effluent channel, and a drainage tributary connected to the creek downstream of the effluent discharge location. This report can be found in Appendix B.

SURFACE WATER SAMPLING

As part of the sampling procedures, surface water sampling was completed at five locations downstream of the WWTP and one location upstream of the WWTP (Fall sampling also included one additional upstream sample location). A sample of the discharge effluent was also collected. Water samples were submitted to ALS Environmental Group and analyzed for:

- Carbonaceous Biochemical Oxygen Demand (CBOD)
- Total Suspended Solids (TSS)
- Nitrogen
- Ammonia
- TKN
- Phosphorus

- Total Coliforms
- Metals

pH, electrical conductivity (EC) and temperature were recorded in the field during the collection of samples. Un-ionized ammonia and Volatile Suspended Solids (VSS) were added to the analysis for the Fall sampling, as well, water was collected from a single location along Crescent Creek approximately 13 km of the City of Melville Water Treatment Plant effluent discharge point.

3.2 Discharge Path and Analysis of Downstream Use and Users

The WWTP is south of Yorkton Creek within SW 13-26-04 W2M. Four receiving environments make up the discharge path and include Yorkton Creek, Cussed Creek, Whitesand River and Assiniboine River. All four streams are within the Assiniboine River Watershed (See Appendix A). The Assiniboine River Watershed covers 162,000 square kilometers across Manitoba, North Dakota and Saskatchewan (ARBI, 2020).

Upstream of the City of Yorkton the City of Melville releases its domestic lagoon as well moving forward will be releasing process wastewater from their new water treatment plant. Proactive discussions between the City of Yorkton and City of Melville took place during the authoring of the report which included sharing of the City of Melville's DUIS for review. In addition, the City through their consultant team reached out to SaskWater to review the DUIS for the new water treatment plants process wastewater discharge, a report that has yet to be finalized at the time of request.

3.2.1 YORKTON CREEK

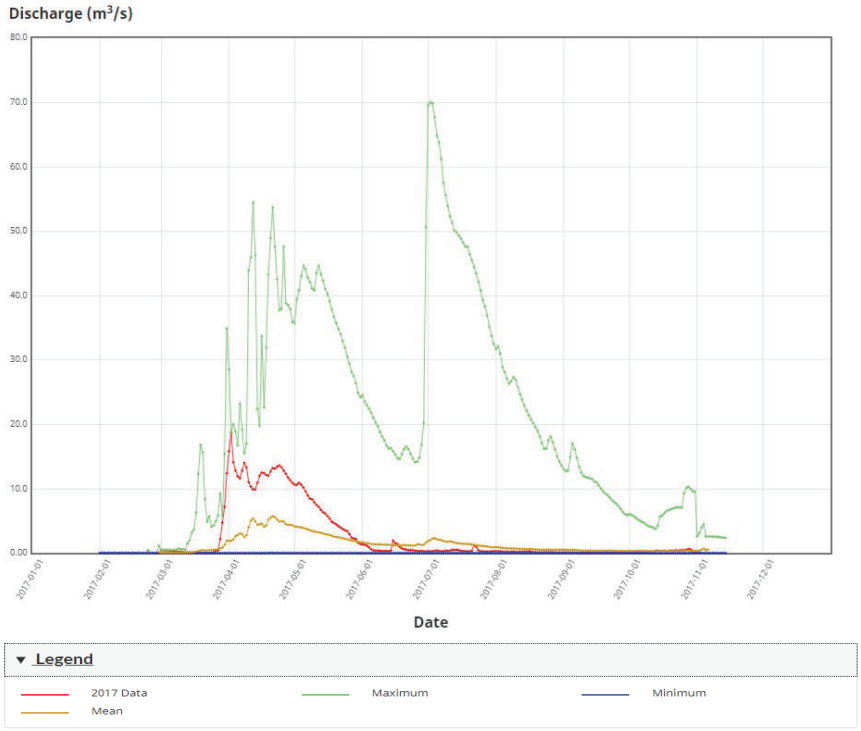
Effluent from the WWTP is currently discharging into Yorkton Creek north of the Plant. Yorkton Creek is a tributary to Cussed Creek which itself is a tributary to Whitesand River. The section of Yorkton Creek that runs from the WWTP to its connection with Cussed Creek is approximately 31 km in length and flows predominantly to the north before continuing northeast toward the confluence at Cussed Creek in NW 32-27-04 W2M. An active/seasonal hydrometric station is present near Ebenezer (see Appendix A) which operates from March to October. The 2017 monthly mean daily discharge at this station ranged from 0.096 m^3/s to 12.5 m^3/s shown in Figure 1 (Government of Canada, 2020). The Creek's peak is impacted by surface runoff and drainage with the majority of its annual discharge occurring during spring snow melt and heavy rainfall events. A maximum instantaneous discharge of 70.0 m^3/s was recorded on the river on July 2, 2014 which corresponded to significant flooding in the area.

The consultant team completed an aquatic habitat assessment (AHA) on May 21, 2020 and May 22, 2020. The following is a summary of the findings of the AHA (The full draft report completed by Jacobs can be found in Appendix B):

- The study area including the effluent discharge channel have experienced anthropogenic disturbance.
- Debris likely from the adjacent landfill was noted during the assessment.
- Eroded banks along the shoreline were noted in some areas.
- Green coloured water was observed within the creek indicative of nutrient overload resulting in algal growth.

- The project areas were considered to contain poor aquatic habitat due to the lack of overhanging riparian cover and limited fish passage especially for large-bodied fish. A beaver dam was observed in the creek.
- In general, the habitat in the project area was more suitable for small-bodied fish of which were observed during the assessment.

FIGURE 1 DAILY DISCHARGE GRAPH FOR YORKTON CREEK NEAR EBENEZER (05MB001)



Data points representing Maximum, Minimum and Mean trend lines from the above Figure correspond to statistics recorded from 1941 – 2017. To date, annual data from 2017 – 2019 have not been represented in the historical data and therefore is not depicted.

Land use adjacent to the Creek is almost entirely cropland. None of these areas appear to be irrigated. A small percentage of the Creek is adjacent to non-agricultural uses such as the City Landfill, a dirt bike park, commercial businesses, and homes, all located within close proximity to the WWTP. Industrial uses adjacent to or near the Creek were not identified. Recreational uses for the Creek may be limited due its size and location in the watershed and lack or proximity to any regional, provincial or federal parks.

A groundwater well search was completed within 500 m of Yorkton Creek which identified 13 wells utilized for domestic/municipal withdrawal purposes, zero wells were identified for industrial use. Wells utilized as water test holes where not included within the scope of review. These wells were identified as follows:

TABLE 1 LIST OF GROUNDWATER WELLS DOWNSTREAM OF EFFLUENT DISCHARGE LOCATION WITHIN 500 M OF YORKTON CREEK

Owner's Name	Total Depth (m) (ft)	Well ID	Water Use	Legal Land Location
Janzen	7.6 (25)	095283	Domestic - Withdrawal	NW-01-027-04-W2
Parkland Elk Farm	11.6 (38)	109589	Domestic - Withdrawal	NW-23-027-04-W2
Kapiniak	12.5 (41)	075766	Domestic - Withdrawal	NW-22-027-04-W2
Will	8.2 (27)	104312	Domestic - Withdrawal	NE-33-027-04-W2
Will	10.0 (33)	053377	Domestic - Withdrawal	NE-33-027-04-W2
Ebenezer	12.2 (40)	067299	Municipal - Withdrawal	SE-32-027-04-W2
Smolinski	7.6 (25)	224079	Domestic - Withdrawal	NW-13-026-04-W2
Yorkton Feed Management Services	7.6 (25)	105267	Domestic - Withdrawal	NW-13-026-04-W2
Chernipeski	19.8 (65)	045078	Domestic - Withdrawal	NE-14-026-04-W2
Anthony	27.4 (90)	200017	Domestic - Withdrawal	NE-14-026-04-W2
Krieger	12.2 (40)	066225	Domestic - Withdrawal	NE-36-026-04-W2
Hannah	7.6 (25)	097353	Domestic - Withdrawal	NE-26-026-04-W2
Friesen	7.6 (25)	048028	Domestic - Withdrawal	NE-26-026-04-W2

Municipal use of the Yorkton Creek consists of the City of Yorkton treated wastewater discharge and Lagoon discharges from the Village of Springside (depicted in Appendix A). The Village of Ebenezer has historically utilized the Creek for surface water however has since transitioned to groundwater.

3.2.2 CUSSED CREEK

The discharge path passes through an approximately 4.6 km segment of Cussed Creek between its confluence at Yorkton Creek and its end point at Whitesand River in NE 06-28-05 W2M. Most of the land adjacent to the Creek is native grassland with small stands of poplar trees. Small areas of hayland are also present. Industrial and recreational uses were not identified along this discharge path. There are also no records for domestic, municipal, or industrial wells within 500 m of this section of Creek. There is also no identified municipal or industrial use.

There is no hydrometric station on Cussed Creek.

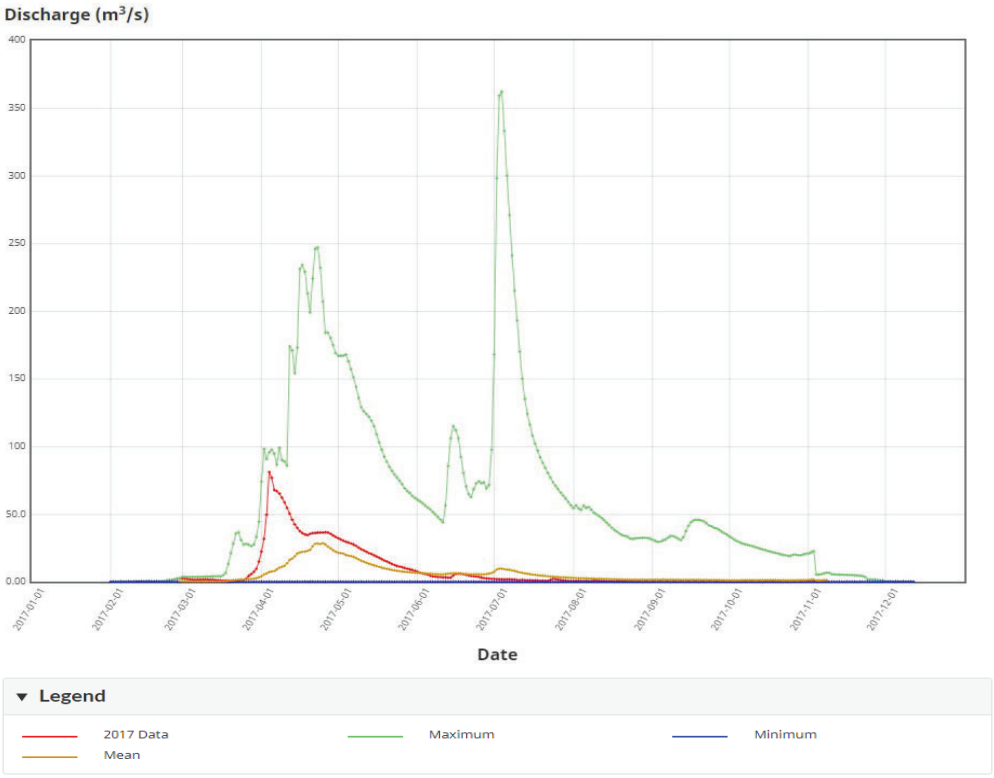
3.2.3 WHITESAND RIVER

The discharge path passes through approximately 127 km of Whitesand River between its confluence with Cussed Creek and where it connects with the Assiniboine River near Kamsack in SW 03-30-32 W1M. This is the longest section along the discharge path. The flow direction is to the northeast toward Canora then continues to the east before bending to the southeast toward Kamsack. Much of the River is contained within a river valley surrounded by natural riparian vegetation. The adjacent land use is almost entirely agriculture comprised mostly of cropland with areas of pasture for cattle and small farmyards. Industrial or recreational uses adjacent to or near the River were not identified. Whitesand River does not pass through any regional, provincial, or federal parks.

There are 30 well records for domestic and municipal wells within 500 m of the Whitesand River. These wells have not been tabulated as there should be no impact to any of these wells because of Yorkton's treated wastewater effluent discharge.

An active/seasonal hydrometric station is present near Canora (see Appendix A) which operates from March to October. The 2017 monthly mean daily discharge at this station ranged from 0.064 m^3/s to 45.0 m^3/s (Government of Canada, 2020) peak discharge period occurring between April – May as shown in Figure 2.

FIGURE 2 DAILY DISCHARGE GRAPH FOR WHITESAND RIVER NEAR CANORA (05MB003)



The Town of Canora discharges their Lagoon effluent to Whitesand River. There are no other known municipal or industrial users.

3.2.4 ASSINIBOINE RIVER

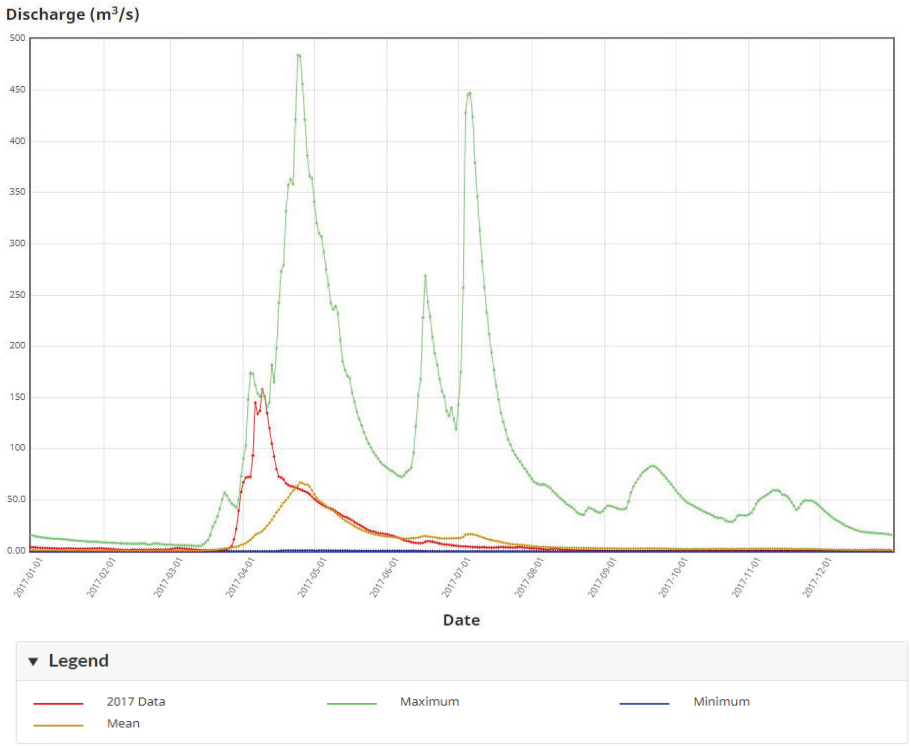
The discharge path follows a 50 km segment of the Assiniboine River from its confluence with the Whitesand River near Kamsack, SK and its end point at Highway 357 within SE 11-28-31 W1M. The confluence of the Whitesand and Assiniboine Rivers is adjacent to the west edge of Kamsack. Almost the entire length of the Assiniboine River discharge path is adjacent to non-irrigated cropland, and small areas of pasture and hayland. Some farmyards can also be seen adjacent to the river. Most of the agricultural land borders the edge of the River shoreline and there is very little riparian vegetation or wooded areas next to the River. Industrial and recreational uses were not identified near the river and no regional, provincial, or federal parks overlap with this segment of the River.

Key, Keeseekoose and Coté First Nation all have land that border the Assiniboine River.

One active hydrometric station is located on the river southwest of Kamsack. The 2017 monthly mean daily discharge ranged from 0.384 m^3 /s to approximately 85.8 m^3 /s (Government of Canada, 2020). The river sees high peak flow during spring snowmelt then rapidly decreases to a small base flow recorded to be charged by groundwater (WSA, 2006).

The Town of Kamsack discharges their Lagoon effluent downstream of the confluence of Whitesand River and Assiniboine River.

FIGURE 3 DAILY DISCHARGE GRAPH FOR ASSINIBOINE RIVER AT KAMSACK (05MB004)



3.3 Use and Users Identified Areas of Risk

3.3.1 AGRICULTURAL & LIVESTOCK USES

Land use in the area is primarily mixed grain farms, with pasture and hay lands common. Small livestock operations, feedlots and intensive livestock operations may also be found throughout the Assiniboine River Watershed.

Agricultural & Livestock are identified within both the Assiniboine River Watershed and Yorkton Area Aquifer protection plans as principal risk areas for the watershed as fertilizers and livestock will increase the nutrient levels in runoff. Livestock operations are a potential environmental source of antimicrobial compounds and hormones.

Risk areas identified for agriculture and livestock within the Assiniboine River Watershed Source Water Protection Plan include nutrients (N and P), pathogens, erosion/sediments, pesticides, and pharmaceuticals.

Industrial activity is largely limited to the larger urban centers, potash, and petroleum sectors. These are located outside the area of study.

3.3.2 GROUNDWATER

In the area surrounding the City of Yorkton, groundwater is essentially the only reliable supply of source water for drinking, as well as for agriculture, industry, and municipal supplies.

The Yorkton Area Aquifer consists of four main aquifers: the Collacott, Leech, Empress, Orcadia, Logan and Sturdee aquifers. It was identified within the Yorkton Area Aquifers Source Water Protection Plan that approximately 5,000 dam3 per year are withdrawn from wells in 20 townships throughout the planning area.

3.3.3 MUNICIPAL USERS

Treated wastewater release is the primary use for Municipal users of the watercourse. Discharges can be biannual, annually, every second year, as needed or rarely if ever depending on the need of the municipality.

Risk areas identified for municipal wastewater within the Assiniboine River Watershed Source Water Protection Plan include nutrients (N and P), pathogens, pharmaceuticals, as well as chronic and acute total ammonia concentration.

Known lagoon release points (upstream/downstream) include Melville, Theodore Springside, Canora and Kamsack. The existing Yorkton Wastewater Treatment Plant is also a major point source of nutrients in the Assiniboine River Watershed with treated effluent continually discharged to Yorkton Creek throughout the year.

Cote First Nation is understood to utilize surface water as their raw water source.

3.4 Analysis of the Receiving Water Body

3.4.1 HISTORICAL BACKGROUND SAMPLING

3.4.1.1 Upstream Analysis

The City of Yorkton sampled the Yorkton Creek, approximately 1 km upstream of the plant (referred to in the City's permit to operation as Station #SK05MB0099) three times, these were all in 2018 (SaskH2O). The results are as follows:

TABLE 2 YORKTON CREEK BACKGROUND WATER QUALITY RESULTS – 1 KILOMETER UPSTREAM OF DISCHARGE #SK05MB0099

	May 2018	July 2018	November 2018
Alkalinity (mg/L)	258	270	251
Calcium (mg/L)	115	86.1	75.1
BOD5 (mg/L)	< 2	3	5
Chloride (mg/L)	48.1	56.7	45.1
Coliforms (org/100mL)	2,490	17,300	41
E Coli (org/100mL)	10	3,450	0
Hardness (mg/L)	728	624	433
Magnesium (mg/L)	107	99.4	59.6
Nitrate (mg/L)	< 0.5	< 0.5	< 0.5
Total Kjeldahl Nitrogen (mg/L)	1.8	1.56	1.23
pH	8.19	8.39	8.07
Phosphorus Total (mg/L)	< 0.3	< 0.3	< 0.3
Potassium Dissolved (mg/L)	21.8	13.7	7.5
Sodium Dissolved (mg/L)	103	103	57.5
Total Dissolved Solids (mg/L)	1,120	1,010	691

3.4.1.2 Downstream Analysis

Additional sample locations, as part of the City's Permit to Operate (PTO) include 1 kilometer downstream of the discharge point (at the Airport Bridge) (#SK05MB0100) and west of the Village of Ebenezer (13+ kilometer downstream) (#SK05MB0101). The results of the historical sampling at the Airport Bridge are represented in Table 3, these results are represented seasonally and as a combined average. The sample results for the Ebenezer location were represented only as an average.

Aside from Un-Ionized Ammonia, Coliforms and E Coli the Yorkton Creek water quality does not vary significantly from one season to the next.

TABLE 3 YORKTON CREEK BACKGROUND WATER QUALITY AVERAGE SEASONAL RESULTS – 1 KILOMETER DOWNSTREAM #SK05MB0100& 13+ KILOMETER DOWNSTREAM #SK05MB0101

	Airport Bridge Results (DS-01/#SK05MB0100)					Average W. Of Ebenezer (DS-02/ #SK05MB0101)
	Spring	Summer	Fall	Winter	Average	
Alkalinity (mg/L)	364	412	489	471	434	412
Ammonia Un-Ionized (mg/L) *	0.564	---	---	0.075	0.3196	0.0998
Bicarbonate (mg/L)	442	533	619	575	542	490
Calcium (mg/L)	116	152	160	144	143	137
BOD5 (mg/L)	7.3	5	5	5	5.4	8.7
Carbonate (mg/L)	< 5	< 5	< 5	< 5	< 5	17.8
Chloride (mg/L)	418	521	602	657	550	532
Coliforms (org/100mL)	42,067	258,020	64,575	198,925	140,897	64,784
E Coli (org/100mL)	12,227	17,014	17,628	58,343	26,303	14,571
Hardness (mg/L)	586	756	763	662	692	735
Magnesium (mg/L)	72	92	88	73	81	95
Nitrate (mg/L)	0.5	2	2	1	1.4	1.2
Total Kjeldahl Nitrogen (mg/L)	17	17	24	29	22	15
pH	8.2	8.1	8.1	8	8.1	8.4
Phosphorus Total (mg/L)	2.2	3.9	2.8	3.6	3.1	2.5
Potassium Dissolved (mg/L)	21	17	22	25	21	23
Total Suspended Solids (TSS) (mg/L) *	26	9	---	151	62	45
Sodium Dissolved (mg/L)	313	323	446	514	399	399
Specific Conductance	2,676	2,810	3,970	3,442	3,225	3,204
Sulphate Dissolved (mg/L) *	288	482	487	450	427	456
Total Dissolved Solids (mg/L)	1,539	1,782	2,075	2,115	1,877	1,920

*Limited (>10) sample points.

The historical sampling shows that the concentrations of Alkalinity, Chloride, Total Coliforms, E. coli, Total Kjeldahl Nitrogen, Total Phosphorus, Sodium (Dissolved) and Total Dissolved Solids where in higher concentration levels 1 km downstream of the effluent discharge location than compared to the upstream samples.

Un-Ionized Ammonia reduces significantly 13+ km downstream, as does Total Phosphorus, Total Suspended Solids, Total Kjeldahl Nitrogen, E Coli and Total Coliforms. BOD5, Carbonate, Hardness and Magnesium appear to increase between the two downstream sample points.

3.4.2 FIELD ANALYSIS

Sampling of surface water occurred in the spring and fall of 2020. Collected samples were submitted to ALS Laboratory in Saskatoon for analysis. Analytical results were compared to:

- Saskatchewan Ministry of Environment (SMOE), Saskatchewan Environmental Quality Guidelines, Tier 1 Generic Criteria for agricultural land (SKEQG).
- Health Canada, Recreational Water Quality.
- National Performance Standards.
- The Waterworks and Sewage Works Regulations Section 11(3).
- Canadian Council of Ministers of the Environment (CCME), Canadian Environmental Quality Guidelines including:
  - Freshwater Aquatic Life
  - Agriculture – Irrigation
  - Agriculture – Livestock

The consultant team also completed field analysis of the collected water for pH, electrical conductivity (EC) and temperature. Dissolved oxygen was also assessed during the fall sampling.

Seven water samples were collected by the consultant team on May 21, 2020. One sample was collected from the effluent at the WWTP, one upstream sample was collected, and five downstream samples were collected. See Appendix A for the sample locations. The upstream and downstream samples 1 and 2 corresponded to the locations currently sampled within the City's permit to operate.

Water was collected from the same sampling locations during the fall sampling on September 24, 2020. In addition to the seven samples the consultant team attempted to sample water from two other upstream locations:

- One on Yorkton Creek approximately 17 km upstream of the upstream sample and approximately 1 km downstream of Leech Lake.
- One on Crescent Creek and approximately 31 km upstream, immediately downstream of the Melville water treatment plant effluent discharge point.

Water was not collected at either location as there was no flowing water at the time. Dry conditions and the fact that the Melville Wastewater Treatment facility (lagoon system) was not discharging effluent at the time was the likely reason for the lack of flow. These locations were chosen to determine the water quality downstream of the Melville wastewater treatment facility and (ultimately) water treatment plant process discharge and how it may impact the water quality of Yorkton Creek upstream of the Yorkton Wastewater Treatment plant. Yorkton and Crescent Creeks are hydraulically connected in the following manner:

- Crescent Creek empties in Crescent Lake,
- Crescent and Leech Lakes are connected via a drainage channel and flood control structure which flows north from Crescent Lake into Leach Lake,
- Yorkton Creek flows out of Leach Lake to the northeast.

The consultant team was notified by a representative of the Yorkton WWTP that Melville WWTP was discharging effluent and returned to the site on October 22, 2020 to attempt to sample the two upstream samples. Both locations were still dry. The consultant team scouted Crescent Creek to find an area where there was flow and collected a sample that was approximately 13 km downstream of the Melville WWTP effluent discharge point.

Please refer to Appendix A for the upstream and downstream sample locations.

TABLE 4 METALS – SPRING FIELD ANALYSIS

SAMPLE NAME SAMPLE LABORATORY ID SAMPLE DATE LABORATORY LABORATORY WORK ORDER	UNITS	SKEQG[1] Surface Water Tier 1 Generic Criteria	HC-CDWQ[2] Drinking Water	CCME[3] Freshwater Aquatic Life	CCME[3] Agriculture - Irrigation	CCME[3] Agriculture - Livestock	Upstream 20-May-20 ALS L2450551	Effluent 20-May-20 ALS L2450551	1 DS-05 20-May-20 ALS L2450551	1 Duplicate DS-06 (Duplicate) 20-May-20 ALS L2414265	RPD	2 DS-04 20-May-20 ALS L2450551	3 DS-01 20-May-20 ALS L2450551	4 DS-02 20-May-20 ALS L2450551	5 DS-03 20-May-20 ALS L2450551
Aluminum (Al)-Total	mg/L	0.1[5]	0.1-0.2[4] (OG)	0.1[5]	5	5	0.01	0.073	0.0436	0.0421	3.5%	0.0815	0.0319	**0.157**	**0.751**
Antimony (Sb)-Total	mg/L	0.006	0.006(MAC)	NV	NV	NV	0.0003	0.00034	0.00039	0.00036	8.0%	0.00049	0.00017	0.00025	0.00025
Arsenic (As)-Total	mg/L	0.005	0.010(MAC)	0.005	0.1	0.025	0.00345	0.00145	0.00211	0.00209	1.0%	0.00619	0.00279	0.00377	0.00372
Barium (Ba)-Total	mg/L	1	1.0(MAC)	NV	NV	NV	0.0476	0.0332	0.0436	0.0418	4.2%	0.044	0.0445	0.0548	0.0673
Beryllium (Be)-Total	mg/L	0.0053	NV	NV	0.1	0.1	<0.00010	<0.00020	<0.00020	<0.00020	--	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Total	mg/L	NV	NV	NV	NV	NV	<0.000050	0.00014	<0.00010	<0.00010	--	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total	mg/L	0.5	5.0(MAC)	29[9]; 1.5[10]	0.5-6[11]	5	0.096	0.236	0.269	0.252	6.5%	0.181	0.118	0.112	0.08
Cadmium (Cd)-Total	mg/L	0.000017	0.005(MAC)	NVC[12]	0.0051	0.08	0.0000066	0.000016	0.000018	0.000026	36.4%	0.00002	0.0000092	0.0000232	0.0000527
Calcium (Ca)-Total	mg/L	NV	NV	NV	NV	1000	74.4	120	137	131	4.5%	114	79.7	81.7	79.1
Cesium (Cs)-Total	mg/L	NV	NV	NV	NV	NV	<0.000010	0.000071	0.000064	0.000056	13.3%	0.000014	<0.000010	0.000037	0.000144
Chromium (Cr)-Total	mg/L	NV	0.05(MAC)	0.0089(III), 0.001(VI)	0.0049(III), 0.008(VI)	0.05 (III, VI)	<0.00010	0.0006	0.00052	0.00042	21.3%	0.00027	0.00013	0.0031	0.00129
Cobalt (Co)-Total	mg/L	0.05	NV	NV	0.05	1	0.00026	0.00038	0.00056	0.00057	1.8%	0.00104	0.00041	0.0076	0.00099
Copper (Cu)-Total	mg/L	0.002[6]	1.0(AO)	NVC[12]	0.2 - 1[11]	0.5 - 5[17]	0.00114	0.0127	0.0065	0.0064	1.6%	0.00197	0.00112	0.0018	0.00323
Iron (Fe)-Total	mg/L	0.3	0.3(AO)	0.3	5	NV	0.121	0.119	0.23	0.221	4.0%	0.23	0.204	**0.579**	**1.61**
Lead (Pb)-Total	mg/L	0.001[7]	0.010(MAC)	NVC[12]	0.2	0.1	0.000106	0.0004	0.00045	0.00044	2.2%	0.000273	0.000105	0.000384	0.000927
Lithium (Li)-Total	mg/L	2.5	NV	NV	2.5	NV	0.0631	0.0818	0.0948	0.0901	5.1%	0.0792	0.0736	0.0713	0.0464
Magnesium (Mg)-Total	mg/L	NV	NV	NV	NV	NV	62.5	87.1	94.7	91.9	3.0%	84.3	83.6	80.2	49.7
Manganese (Mn)-Total	mg/L	0.05	0.05(AO)	NV	0.2	NV	**0.12**	**0.125**	**0.198**	**0.196**	1.0%	**0.151**	**0.271**	**0.272**	**0.216**
Molybdenum (Mo)-Total	mg/L	0.073	NV	0.073	0.01-0.05[14]	0.5	0.00273	0.0112	0.0132	0.0128	3.1%	0.00763	0.00247	0.00278	0.00279
Nickel (Ni)-Total	mg/L	0.025[8]	NV	NVC[12]	0.2	1	0.00225	0.0024	0.0031	0.003	3.3%	0.00503	0.00193	0.00386	0.00482
Phosphorus (P)-Total	mg/L	NV	NV	[13]	NV	NV	0.055	3.11	3.98	3.87	2.8%	1.72	0.279	0.157	0.133
Potassium (K)-Total	mg/L	NV	NV	NV	NV	NV	19.4	21.9	21.2	20.9	1.4%	22.9	22.6	22.1	17.2
Rubidium (Rb)-Total	mg/L	NV	NV	NV	NV	NV	0.00202	0.0105	0.00973	0.0096	1.3%	0.00574	0.00302	0.00353	0.00517
Selenium (Se)-Total	mg/L	0.001	0.05(MAC)	0.001	0.02-0.05[15]	0.05	0.000488	0.00163	0.00123	0.00129	4.8%	0.000706	0.000343	0.000438	0.000433
Silicon (Si)-Total	mg/L	NV	NV	NV	NV	NV	1.86	12.9	11.5	11.5	0.0%	7.27	4.44	5.42	7.29
Silver (Ag)-Total	mg/L	0.0001	NV	0.00025	NV	NV	<0.000010	<0.000020	<0.000020	<0.000020	--	0.000011	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total	mg/L	200	200(AO)	NV	NV	NV	78.9	**446**	**414**	**406**	2.0%	**269**	80.3	70.7	36.1
Strontium (Sr)-Total	mg/L	NV	NV	NV	NV	NV	0.431	0.597	0.703	0.683	2.9%	0.564	0.36	0.356	0.283
Sulfur (S)-Total	mg/L	NV	NV	NV	NV	NV	108	133	144	143	0.7%	131	141	133	78.2
Tellurium (Te)-Total	mg/L	NV	NV	NV	NV	NV	<0.00020	<0.00040	<0.00040	<0.00040	--	<0.00020	<0.00020	<0.0020	<0.00020
Thallium (Tl)-Total	mg/L	0.0008	NV	0.008	NV	NV	<0.000010	<0.000020	<0.000020	<0.000020	--	<0.000010	<0.000010	0.000017	0.000035
Thorium (Th)-Total	mg/L	NV	NV	NV	NV	NV	<0.00010	<0.00020	<0.00020	<0.00020	--	<0.00010	<0.00010	<0.00010	0.00012
Tin (Sn)-Total	mg/L	NV	NV	NV	NV	NV	<0.00010	0.00046	0.00029	0.0003	3.4%	0.0012	<0.00010	0.0016	<0.00010
Titanium (Ti)-Total	mg/L	0.1	NV	NV	NV	NV	0.0004	<0.00060	0.00164	0.00131	22.4%	0.00338	0.00147	0.00546	0.0194
Tungsten (W)-Total	mg/L	NV	NV	NV	NV	NV	<0.00010	<0.00020	<0.00020	<0.00020	--	<0.00010	<0.00010	<0.00010	<0.00010
Uranium (U)-Total	mg/L	0.01	0.02(MAC)	0.033[9] 0.015[10]	0.01	0.2	0.00557	0.0123	0.012	0.0123	2.5%	0.00986	0.00526	0.00574	0.00473
Vanadium (V)-Total	mg/L	0.1	NV	NV	0.1	0.1	0.0013	<0.0010	0.0012	0.0011	8.7%	0.00491	0.00163	0.00262	0.00462
Zinc (Zn)-Total	mg/L	0.03	5(AO)	0.03	1-5[16]	50	<0.0030	0.0454	0.0243	0.0228	6.4%	0.0043	<0.0030	<0.0030	0.007
Zirconium (Zr)-total	mg/L	NV	NV	NV	NV	NV	<0.00020	<0.00040	<0.00040	<0.00040	--	0.00036	0.0002	0.00037	0.00079

NOTES:

RPD = relative percent difference

-- = RPD not calculated as one or more values were below laboratory detection limits

NV = no criteria value

NVC = no value calculated

1. Saskatchewan Ministry of Environment, Saskatchewan Environmental Quality Guidelines - Freshwater Aquatic Life. Found at: https://envrbrportal.crm.saskatchewan.ca/seqg-search/
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated October 2014.
   MAC = Maximum Acceptable Concentration
   AO = Aesthetic Objectives
   OG = Operational Guideline
3. CCME - Canadian Council of Ministers of the Environment. Canadian Environmental Quality Guidelines, 1999. Updated February 6, 2014.
4. This is an operational guidance value, designed to apply only to drinking water treatment plants using aluminum-based coagulants. The operational guidance value of 0.1 mg/L applies to conventional treatment plants, and 0.2 mg/L applies to other types of treatment systems.
5. 0.005 mg/L if pH < 6.5, 0.1 mg/L if pH >/= 6.5
6. 0.002 mg/L if water hardness is 0 to < 82 mg/L or if it is unknown, 0.004 mg/L if water hardness is > 180 mg/L. At hardness >/=82 to </=180 mg/L the guideline is calculated using the CCME calculator located at: http://st-ts.ccme.ca/en/index.html?lang=en&factsheet=71#aql_fresh_concentration.
7. 0.001 mg/L if water hardness is 0 to </= 60 mg/L or if it is unknown, 0.007 mg/L if water hardness is >180 mg/L. At hardness >60 to </=180 mg/L the guideline is calculated using the CCME calculator located at: http://st-ts.ccme.ca/en/index.html?lang=en&factsheet=124#aql_fresh_concentration
8. 0.025 mg/L if water hardness is </=60 mg/L or if it is unknown, 0.15 mg/L if water hardness is >180 mg/L. At hardness >60 to </=180 mg/L the guideline is calculated using the CCME calculator located at: http://st-ts.ccme.ca/en/index.html?lang=en&factsheet=139#aql_fresh_concentration
9. Short-term exposure (24 to 96 hours) concentrations which indicate potential for severe effects during transient events (spill events to aquatic receiving environments and infrequent releases of short-lived/non-persistent substances).
10. Long-term exposure guideline that protects all forms of aquatic life for indefinite exposure periods (>7 day exposures for fish and invertebrates, 24 hour exposures for aquatic plants and algae).
11. Guidelines depend on crop.
12. Water hardness was not analyzed so no value could be calculated
13. If trigger ranges for total phosphorous are exceeded, the potential exists for an environmental impact. If trigger range is not exceeded, but TP is more than 50% above baseline values, the potential exists for an environmental impact.
14. The concentration should not exceed 0.01 mg/L for continuous use on all soils, or 0.05 mg/L for short-term use on acidic soils.
15. For continuous use on all soils, guideline is 0.02 mg/L; for intermittent use on all soils, guideline is 0.05 mg/L.
16. For soil pH<6.5, guideline is 1 mg/L; for soil pH>6.5, guideline is 5 mg/L.
17. Guideline depends on livestock: 0.5 mg/L for sheep; 1 mg/L for cattle; and 5 mg/L for swine and poultry.

- Exceedance of SKEQG Tier I Guidelines for Surface Water - Freshwater Aquatic Life

BOLD - Exceedance of HC-CDWQ Criteria

Underline - Exceedance of CCME Criteria

TABLE 5 ROUTINE SURFACE WATER CHEMISTRY – SPRING FIELD ANALYSIS

SAMPLE NAME		SKEQG[1]	HC-CDWQ[2]		National Performance Standards	CCME[4]			Upstream	Effluent	1	1 (Duplicate)		2	3	4	5
SAMPLE LABORATORY ID SAMPLE DATE LABORATORY LABORATORY WORK ORDER	UNITS	Agricultural Land Tier 1 Generic Criteria Surface Water	Drinking Water	Recreational Water Quality[3]		Freshwater Aquatic Life	Agriculture - Irrigation	Agriculture - Livestock	20-May-20 ALS L2450551	20-May-20 ALS L2450551	DS-05 20-May-20 ALS L2450551	DS-06 20-May-20 ALS L2450551	RPD	DS-04 20-May-20 ALS L2450551	DS-01 20-May-20 ALS L2450551	DS-02 20-May-20 ALS L2450551	DS-03 20-May-20 ALS L2450551
pH (units)*	pH	6.5 - 8.5	7.0 - 10.5 (AO)	5.0-9.0	NV	6.5 - 9.0	NV	NV	8.21	7.64	7.8	7.8	0%	9.25	8.19	8.08	8.17
Electrical Conductivity*	µS/cm	NV	NV	NV	NV	NV	NV	NV	1169	3479	3481	3481	0%	2325	1331	1281.0%	887.4
Ammonia	mg/L	Variable[7]	NV	NV	NV	Variable[7]	NV	NV	0.053	8.9	21.4	21.8	2%	0.066	<0.050	<0.050	<0.050
Un-ionized Ammonia	mg/L	NV	NV	NV	1.24	0.019	NV	NV	0.0015	0.0715	0.2477	0.2523	2%	0.0164	0.0000	0.0000	0.0000
Nitrate (as N)	mg/L	3	10[5] (MAC)	NV	NV	3[8] / 124[9]	NV	NV	<0.040	<0.40	2.47	5.28	73%	<0.20	<0.040	<0.040	<0.020
Nitrite(as N)	mg/L	0.06	10[5] (MAC)	NV	NV	0.06	NV	10	<0.020	0.6	0.67	1.21	57%	<0.10	<0.020	<0.020	<0.010
Total Nitrogren	mg/L	NV	NV	NV	NV	NV	NV	NV	1.39	24	30	32	6%	4.78	1.96	1.86	1.76
CBOD	mg/L	NV	NV	NV	25	NV	NV	NV	<2	9	7	7	0%	13	3	2	<2
Total Phosphorus	mg/L	NV	NV	NV	NV	[10]	NV	NV	0.062	3.04	4	3.89	3%	1.79	0.281	0.144	0.188
Total Suspended Solids	mg/L	NV	[6]	NV	25	[6]	NV	NV	4	12.7	10.7	12.7	17%	30	7.3	18.0	64.7
Total Kjeldahl Nitrogen	mg/L	NV	NV	NV	NV	NV	NV	NV	1.39	23	27	25	8%	4.78	1.96	1.86	1.76
E. Coli	MPN/100 ml	NV	None Detectable per 100 mL (MAC)	≤200/100ml ≤400/100 ml	NV	NV	100 per 100 mL	NV	165	>200.5	>200.5	>200.5	--	9	18	15	9
Total Coliform	MPN/100 ml	NV	None Detectable per 100 mL (MAC)	NV	NV	NV	1,000 per 100 mL	NV	>200.5	>200.5	>200.5	>200.5	--	>200.5	>200.5	>200.5	>200.5

Notes:

-- = RPD not calculated as one or more values were below laboratory detection limits

NV = no criteria value

- = paramater not tested

* - Analyzed in the field.

1. Saskatchewan Ministry of Environment, Saskatchewan Environmental Quality Guidelines. Found at: https://envrbrportal.crm.saskatchewan.ca/seqg-search/

3. Health Canada - Guidelines for Canadian Recreational Water Quality. April 2012.

4. CCME - Canadian Council of Ministers of the Environment. Canadian Environmental Quality Guidelines, 1999. Updated February 6, 2014.
   Canadian Water Quality Guidelines for the Protection of Aquatic Life
   Canadian Water Quality Guidelines for the Protection of Agriculture

5. Equivalent to 10 mg/L as nitrate-nitrogen. Where nitrate and nitrite are determined separately, levels of nitrite should not exceed 3.2 mg/L, which is equivalent to 1 mg/L nitrite-nitrogen.

6. Suspended Sediments Guideline (see Total Particulate Matter fact sheet for complete details):
   Clear Flow:
   Maximum increase of 25 mg/L from background levels for any short-term exposure (eg. 24 hr period).
   Maximum average increase of 5 mg/L from background levels for longer term exposures (eg. inputs lasting between 24 hrs and 30 days).
   High Flow:
   Maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.
   Should not increase more than 10% of background levels when background is >250 mg/L.

7. Guideline for total ammonia is pH and Temperature dependent. Samples were 10 degrees celsius when received by the laboratory.

8. Long-term exposure guideline that protects all forms of aquatic life for indefinite exposure periods (>7d exposures for fish and invertebrates, 24h exposures for aquatic plants and algae).

9. Short-term exposure (24 to 96 hours) concentrations which indicate potential for severe effects during transient events
   (spill events to aquatic receiving environments and infrequent releases of short-lived/non-persistent substances).
   These are NOT protective guidelines.

10. If trigger ranges for total phosphorous are exceeded, the potential exists for an environmental impact. If trigger range is not exceeded, but TP is more than 50% above baseline values, the potential exists for an environmental impact.

Trigger ranges (mg/L):	ultra-oligotrophic	<0.004	meso-eutrophic	0.02-0.035
	oligotrophic	0.004-0.01	eutrophic	0.035-0.1
	mesotrophic	0.01-0.02	hyper-eutrophic	>0.1

11. Total unionized ammonia limit - 1.24 @ 15 degrees celcius.

	- Exceedance of SKEQG Tier I Guidelines for Surface Water
BOLD	- Exceedance of HC-CDWQ Criteria
Underline	- Exceedance of CCME Criteria

TABLE 6 METALS – FALL FIELD ANALYSIS

SAMPLE NAME		SKEQG[1]	HC-CDWQ[2]	CCME[3]			Crescent Creek	Upstream	Effluent	DS-01	DS-02	DS-03	DS-04	DS-05	DS-06 (DS-05 Duplicate)	
SAMPLE LABORATORY ID SAMPLE DATE LABORATORY LABORATORY WORK ORDER	UNITS	Surface Water Tier 1 Generic Criteria	Drinking Water	Freshwater Aquatic Life	Agriculture - Irrigation	Agriculture - Livestock	L2520369-1 22-Oct-20 ALS L2520369	L2508433-2 24-Sep-20 ALS L2508433	L2508433-1 24-Sep-20 ALS L2508433	L2508433-3 24-Sep-20 ALS L2508433	L2508433-4 24-Sep-20 ALS L2508433	L2508433-5 24-Sep-20 ALS L2508433	L2508433-6 24-Sep-20 ALS L2508433	L2508433-7 24-Sep-20 ALS L2508433	L2508433-8 24-Sep-20 ALS L2508433	RPD
Aluminum (Al)-Total	mg/L	0.1[5]	0.1-0.2[4] (OG)	0.1[5]	5	5	0.036	0.0762	0.029	0.024	0.0218	**0.132**	**0.227**	**0.616**	**1.25**	68.0%
Antimony (Sb)-Total	mg/L	0.006	0.006(MAC)	NV	NV	NV	<0.00050	0.00021	<0.00050	<0.00050	0.00021	0.00022	0.00035	0.00025	0.00026	3.9%
Arsenic (As)-Total	mg/L	0.005	0.010(MAC)	0.005	0.1	0.025	0.00326	0.00319	0.00117	0.00157	0.00268	0.00337	0.00313	0.00694	0.00726	4.5%
Barium (Ba)-Total	mg/L	1	1.0(MAC)	NV	NV	NV	0.0488	0.0476	0.0664	0.0638	0.0407	0.0463	0.0412	0.0644	0.0742	14.1%
Beryllium (Be)-Total	mg/L	NV	NV	NV	0.1	0.1	<0.00050	<0.00010	<0.00050	<0.00050	<0.00020	<0.00020	<0.00020	<0.00010	<0.00010	--
Bismuth (Bi)-Total	mg/L	NV	NV	NV	NV	NV	<0.00025	<0.000050	<0.00025	<0.00025	<0.00010	<0.00010	<0.00010	<0.000050	<0.000050	--
Boron (B)-Total	mg/L	1.5	5.0(MAC)	29[9]; 1.5[10]	0.5-6[11]	5	0.34	0.07	0.27	0.232	0.104	0.151	0.144	0.089	0.09	1.1%
Cadmium (Cd)-Total	mg/L	0.00009	0.005(MAC)	VAR[12ab]	0.0051	0.08	<0.000025	<0.0000050	<0.000025	<0.000025	<0.000010	0.00001	0.00002	0.0000637	0.0000781	20.3%
Calcium (Ca)-Total	mg/L	NV	NV	NV	NV	1000	190	44.4	160	160	115	78.5	68.3	81.7	82.1	0.5%
Cesium (Cs)-Total	mg/L	NV	NV	NV	NV	NV	<0.000050	0.00001	<0.000050	<0.000050	<0.000020	<0.000020	0.000037	0.000121	0.000279	79.0%
Chromium (Cr)-Total	mg/L	NV	0.05(MAC)	0.0089(III), 0.001(VI)	0.0049(III), 0.008(VI)	0.05 (III, VI)	<0.00050	0.00019	0.00057	<0.00050	<0.00020	0.00028	0.00031	0.00096	0.00206	72.8%
Cobalt (Co)-Total	mg/L	0.05	NV	NV	0.05	1	<0.00050	0.00033	<0.00050	0.00056	0.00054	0.00047	0.00079	0.00098	0.00131	28.8%
Copper (Cu)-Total	mg/L	0.004[6]	1.0(AO)	VAR[12]	0.2 - 1[11]	0.5 - 5 [17]	<0.0025	0.00075	0.0121	0.0059	<0.0010	<0.0010	0.002	0.00366	0.00456	21.9%
Iron (Fe)-Total	mg/L	0.3	0.3(AO)	0.3	5	NV	0.193	0.293	0.123	0.181	0.06	**0.376**	**0.498**	**1.28**	**2.33**	58.2%
Lead (Pb)-Total	mg/L	0.007[7]	0.010(MAC)	VAR[12]	0.2	0.1	<0.00025	0.000167	0.00037	0.00032	<0.00010	0.00029	0.00028	0.00103	0.00137	28.3%
Lithium (Li)-Total	mg/L	2.5	NV	NV	2.5	NV	0.217	0.0479	0.0896	0.0894	0.077	0.116	0.122	0.0415	0.0431	3.8%
Magnesium (Mg)-Total	mg/L	NV	NV	NV	NV	NV	207	44.3	80.3	85.4	77	123	98.3	40.2	38.6	4.1%
Manganese (Mn)-Total	mg/L	NV	0.05(AO)	NV	0.2	NV	**0.123**	**0.26**	**0.112**	**0.139**	0.0281	**0.28**	**0.291**	**0.152**	**0.169**	10.6%
Molybdenum (Mo)-Total	mg/L	0.073	NV	0.073	0.01-0.05[14]	0.5	0.0111	0.00236	0.00988	0.00815	0.00445	0.00352	0.00634	0.00252	0.00256	1.6%
Nickel (Ni)-Total	mg/L	VAR[8]	NV	VAR[12]	0.2	1	<0.0025	0.00166	<0.0025	0.0026	0.0037	0.0029	0.0067	0.00546	0.00637	15.4%
Potassium (K)-Total	mg/L	NV	NV	NV	NV	NV	36.9	8.81	20.7	20.1	19.5	29.2	27.3	7.52	7.84	4.2%
Phosphorus (P)-Total	mg/L	NV	NV	[13]	NV	NV	0.8	0.17	3.02	3.03	2.45	0.23	0.12	0.152	0.172	12.3%
Rubidium (Rb)-Total	mg/L	NV	NV	NV	NV	NV	0.0051	0.0014	0.0106	0.0099	0.00593	0.00316	0.0043	0.00326	0.00468	35.8%
Selenium (Se)-Total	mg/L	0.001	0.05(MAC)	0.001	0.02-0.05[15]	0.05	0.00034	0.00027	0.00082	0.00072	0.00034	0.00039	0.0005	0.000395	0.000398	0.8%
Silicon (Si)-Total	mg/L	NV	NV	NV	NV	NV	7.46	0.58	14.1	12.3	2.29	1.36	2.13	9.43	11.1	16.3%
Silver (Ag)-Total	mg/L	0.00025	NV	0.00025	NV	NV	<0.000050	<0.000010	<0.000050	<0.000050	<0.000020	<0.000020	<0.000020	<0.000010	0.000014	--
Sodium (Na)-Total	mg/L	NV	200(AO)	NV	NV	NV	**549**	53	**454**	**444**	**368**	162	150	20.6	21	1.9%
Strontium (Sr)-Total	mg/L	NV	NV	NV	NV	NV	1.37	0.313	0.755	0.808	0.637	0.444	0.43	0.281	0.283	0.7%
Sulfur (S)-Total	mg/L	NV	NV	NV	NV	NV	599	72.6	145	152	135	200	189	39	38.9	0.3%
Tellurium (Te)-Total	mg/L	NV	NV	NV	NV	NV	<0.0010	<0.00020	<0.0010	<0.0010	<0.00040	<0.00040	<0.00040	<0.00020	<0.00020	--
Thallium (Tl)-Total	mg/L	0.0008	NV	0.008	NV	NV	<0.000050	<0.000010	<0.000050	<0.000050	<0.000020	<0.000020	<0.000020	0.000031	0.000051	48.8%
Thorium (Th)-Total	mg/L	NV	NV	NV	NV	NV	<0.00050	<0.00010	<0.00050	<0.00050	<0.00020	<0.00020	<0.00020	0.0001	0.00015	40.0%
Tin (Sn)-Total	mg/L	NV	NV	NV	NV	NV	<0.00050	<0.00010	<0.00050	<0.00050	<0.00020	<0.00020	<0.00020	<0.00010	<0.00010	--
Titanium (Ti)-Total	mg/L	NV	NV	NV	NV	NV	0.0015	0.00239	<0.0015	<0.0015	0.00097	0.00414	0.0055	0.0144	0.0297	69.4%
Tungsten (W)-Total	mg/L	NV	NV	NV	NV	NV	<0.00050	<0.00010	<0.00050	<0.00050	<0.00020	<0.00020	<0.00020	<0.00010	<0.00010	--
Uranium (U)-Total	mg/L	0.01	0.02(MAC)	0.033[9] 0.015[10]	0.01	0.2	0.0109	0.00354	0.0138	0.0124	0.00581	0.0052	0.00495	0.00212	0.00229	7.7%
Vanadium (V)-Total	mg/L	0.1	NV	NV	0.1	0.1	<0.0025	0.0014	<0.0025	<0.0025	0.0017	0.0025	0.0019	0.00497	0.00709	35.2%
Zinc (Zn)-Total	mg/L	0.03	5(AO)	0.03	1-5[16]	50	<0.015	<0.0030	0.048	0.026	<0.0060	<0.0060	<0.0060	0.0068	0.0113	49.7%
Zirconium (Zr)-total	mg/L	NV	NV	NV	NV	NV	<0.0010	<0.00020	<0.0010	<0.0010	<0.00040	<0.00040	<0.00040	0.00062	0.00077	21.6%

NOTES:

RPD = relative percent difference

-- = RPD not calculated as one or more values were below laboratory detection limits

NV = no criteria value

VAR = value is variable

1. Saskatchewan Ministry of Environment, Saskatchewan Environmental Quality Guidelines-Freshwater Aquatic Life. Found at: https://envrbrportal.crm.saskatchewan.ca/seqg-search/
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated October 2014.
   MAC = Maximum Acceptable Concentration
   AO = Aesthetic Objectives
   OG = Operational Guideline
3. CCME - Canadian Council of Ministers of the Environment. Canadian Environmental Quality Guidelines, 1999. Updated February 6, 2014.

4. This is an operational guidance value, designed to apply only to drinking water treatment plants using aluminum-based coagulants. The operational guidance value of 0.1 mg/L applies to conventional treatment plants, and 0.2 mg/L applies to other types of treatment systems.
5. 0.005 mg/L if pH < 6.5, 0.1 mg/L if pH >/= 6.5
6. 0.002 mg/L if water hardness is 0 to < 82 mg/L or if it is unknown, 0.004 mg/L if water hardness is > 180 mg/L. At hardness >/=82 to </=180 mg/L the guideline is calculated using the CCME calculator located at: http://st-ts.ccme.ca/en/index.html?lang=en&factsheet=71#aql_fresh_concentration.
7. 0.001 mg/L if water hardness is 0 to </= 60 mg/L or if it is unknown, 0.007 mg/L if water hardness is >180 mg/L. At hardness >60 to </=180 mg/L the guideline is calculated using the CCME calculator located at: http://st-ts.ccme.ca/en/index.html?lang=en&factsheet=124#aql_fresh_concentration
8. 0.025 mg/L if water hardness is </=60 mg/L or if it is unknown, 0.15 mg/L if water hardness is >180 mg/L. At hardness >60 to </=180 mg/L the guideline is calculated using the CCME calculator located at: http://st-ts.ccme.ca/en/index.html?lang=en&factsheet=139#aql_fresh_concentration
9. Short-term exposure (24 to 96 hours) concentrations which indicate potential for severe effects during transient events (spill events to aquatic receiving environments and infrequent releases of short-lived/non-persistent substances).
10. Long-term exposure guideline that protects all forms of aquatic life for indefinite exposure periods (>7 day exposures for fish and invertebrates, 24 hour exposures for aquatic plants and algae).
11. Guidelines depend on crop.
12. For the following equations, hardness is expressed as $CaCO_3$ in mg/L and the guideline is in µg/L. exposure);
    a. **Cadmium** Guideline: The long-term CWQG of 0.09 ug/L is for waters of 50 mg $CaCO_3$/L hardness. When water hardness is >0 to <17 mg/L, CWQG is 0.04 µg/L. At other hardness values, the CWQG can be calculated with the equation CWQG = 10^{0.83[log(hardness)] - 3.2} µg/L valid for hardness between 17 and 280 mg CaCO3/L.
    b. **Cadmium** Guideline: The short-term benchmark concentration of 1.0 ug/L is for waters of 50 mg $CaCO_3$/L hardness. When water hardness is >0 to <5.3 mg/L, CWQG is 0.11 µg/L. At other hardness values, the benmark can be calculated with the equation Benchmark - 10^{1.016[log(hardness)]-1.71}, valid for hardness between 5.3 and 360 mg CaCO3/L.
    c. **Copper** Guideline = e^(0.8545[ln(hardness)]-1.465) * 0.2 µg/L;
    d. **Lead** Guideline = e^{1.273[ln(hardness)]-4.705) µg/L;
    e. **Nickel** Guideline = e^(0.76[ln(hardness)]+1.06) µg/L

Well No.	Hardness	12a. Cadmium (long-term) mg/L	12b. Cadmium (short-term) (mg/L)	12c. Copper (mg/L)	12d. Lead (mg/L)	12e. Nickel (mg/L)
Upstream	317	7.51414E-05	0.006777604	0.006337876	0.013819518	0.229697987
Effluent	700	0.000145021	0.015157222	0.012471677	0.037883864	0.419398296
DS-01	725	0.000149307	0.015707368	0.01285131	0.039614552	0.430733883
DS-02	600	0.000127604	0.012959901	0.010932483	0.031133719	0.37303287
DS-03	701	0.000145193	0.015179222	0.0124869	0.037952772	0.419853564
DS-04	596	0.000126898	0.012872124	0.010870174	0.030869739	0.37114132
DS-05	375	8.63865E-05	0.008039254	0.007316414	0.017115369	0.260985221
DS-06	372	8.58125E-05	0.007973915	0.00726637	0.016941257	0.259396902
Crescent Creek	1380	0.000254741	0.030207665	0.022274874	0.089889826	0.70252253

13. If trigger ranges for total phosphorous are exceeded, the potential exists for an environmental impact. If trigger range is not exceeded, but TP is more than 50% above baseline values, the potential exists for an environmental impact.
14. The concentration should not exceed 0.01 mg/L for continuous use on all soils, or 0.05 mg/L for short-term use on acidic soils.
15. For continuous use on all soils, guideline is 0.02 mg/L; for intermittent use on all soils, guideline is 0.05 mg/L.
16. For soil pH<6.5, guideline is 1 mg/L; for soil pH>6.5, guideline is 5 mg/L.
17. Guideline depends on livestock: 0.5 mg/L for sheep; 1 mg/L for cattle; and 5 mg/L for swine and poultry.

- Exceedance of SKEQG Tier I Guidelines for Surface Water - Freshwater Aquatic Life

BOLD - Exceedance of HC-CDWQ Criteria

Underline - Exceedance of CCME Criteria

TABLE 7 ROUTINE SURFACE WATER CHEMISTRY – FALL FIELD ANALYSIS

SAMPLE NAME		SKEQG[1]	HC-CDWQ[2]		National Performance Standards	CCME[4]			Crescent Creek	Upstream	Effluent	DS-01	DS-02	DS-03	DS-04	DS-05	DS-06 (DS-05 Duplicate) L2508433-8	RPD
SAMPLE LABORATORY ID SAMPLE DATE LABORATORY LABORATORY WORK ORDER	UNITS	Agricultural Land Tier 1 Generic Criteria Surface Water	Drinking Water	Recreational Water Quality[3]		Freshwater Aquatic Life	Agriculture - Irrigation	Agriculture - Livestock	L2520369-1 22-Oct-20 ALS L2520369	L2508433-2 24-Sep-20 ALS L2508433	L2508433-1 24-Sep-20 ALS L2508433	L2508433-3 24-Sep-20 ALS L2508433	L2508433-4 24-Sep-20 ALS L2508433	L2508433-5 24-Sep-20 ALS L2508433	L2508433-6 24-Sep-20 ALS L2508433	L2508433-7 24-Sep-20 ALS L2508433	24-Sep-20 ALS L2508433	
pH (units)	pH	6.5 - 8.5	7.0 - 10.5 (AO)	5.0-9.0	NV	6.5 - 9.0	NV	NV	7.9	8.45	8.16	8.23	8.69	8.58	8.4	8.51	8.52	0%
Electrical Conductivity*	µS/cm	NV	NV	NV	NV	NV	NV	NV	3,345	835	3580	3464	2742	1845	1660	697.40	697.40	0%
Ammonia	mg/L	Variable[7]	NV	NV	NV	Variable[7]	NV	NV	0.2	<0.050	15.4	6.3	0.057	<0.050	0.066	<0.050	<0.050	--
Un-ionized Ammonia	mg/L	NV	NV	NV	1.24[11]	0.019	NV	NV	0.0074	0.0031	0.2540	0.1120	0.0057	0.0036	0.0029	0.0029	0.0029	0%
Nitrate (as N)	mg/L	3	10[5] (MAC)	NV	NV	3[8]/ 124[9]	NV	NV	-	<0.020	6.4	5.09	<0.20	<0.10	<0.10	<0.020	<0.020	--
Nitrite(as N)	mg/L	0.06	10[5] (MAC)	NV	NV	0.06	NV	10	-	<0.010	0.48	0.48	<0.10	<0.050	<0.050	<0.010	<0.010	--
Total Nitrogen	mg/L	NV	NV	NV	NV	NV	NV	NV	-	1.92	26.10	14.50	1.13	1.64	1.70	1.00	1.18	17%
CBOD	mg/L	NV	NV	NV	25	NV	NV	NV	3.3	6.1	4.3	5.9	<2.0	3.8	<2.0	<2.0	<2.0	--
TotalPhosphorus	mg/L	NV	NV	NV	NV	[10]	NV	NV	0.879	0.170	3.020	3.030	2.450	0.230	0.120	0.152	0.172	12%
Total Suspended Solids	mg/L	NV	[6]	NV	25	[6]	NV	NV	4.1	21.7	6.9	10.3	<3.0	15.3	16.7	**134.0**	**119.0**	12%
Total Dissolved Solids	mg/L	50,000	NV	NV	NV	NV	NV	NV	-	506	2130	2080	1630	1230	1160	472	461	2%
Volatile Suspended Solids	mg/L	NV	NV	NV	NV	NV	NV	NV	<10	10.8	6.6	4.2	<3.0	5.4	<3.0	15.4	13.0	17%
Total Kjeldahl Nitrogen	mg/L	NV	NV	NV	NV	NV	NV	NV	1.47	1.92	19.20	8.90	1.13	1.64	1.70	1.00	1.18	17%
Water Hardness	mg/L	NV	NV	NV	NV	NV	NV	NV	1380	317	700	725	601	701	596	375	372	1%
E. Coli	MPN/100 ml	NV	None Detectable per 100 mL (MAC)	≤200/100ml ≤400/100 ml	NV	NV	100 per 100 mL	NV	**>200.5**	**687**	**>2420**	**>2420**	**7**	**12**	**228**	**70**	**110**	44%
Total Coliform	MPN/100 ml	NV	None Detectable per 100 mL (MAC)	NV	NV	NV	1,000 per 100 mL	NV	**>200.5**	**1550**	**>2420**	**>2420**	**1990**	**>2420**	**>2420**	**>2420**	**>2420**	--

Notes:
-- = RPD not calculated as one or more values were below laboratory detection limits
NV = no criteria value
- = paramater not tested
* - Analyzed in the field.

1. Saskatchewan Ministry of Environment, Saskatchewan Environmental Quality Guidelines. Found at: https://envrbrportal.crm.saskatchewan.ca/seqg-search/
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated October 2014.
   MAC = Maximum Acceptable Concentration
   AO = Aesthetic Objectives
3. Health Canada - Guidelines for Canadian Recreational Water Quality. April 2012.
4. CCME - Canadian Council of Ministers of the Environment. Canadian Environmental Quality Guidelines, 1999. Updated February 6, 2014.
   Canadian Water Quality Guidelines for the Protection of Aquatic Life
   Canadian Water Quality Guidelines for the Protection of Agriculture
5. Equivalent to 10 mg/L as nitrate-nitrogen. Where nitrate and nitrite are determined separately, levels of nitrite should not exceed 3.2 mg/L, which is equivalent to 1 mg/L nitrite-nitrogen.
6. Suspended Sediments Guideline (see Total Particulate Matter fact sheet for complete details):
   Clear Flow:
   Maximum increase of 25 mg/L from background levels for any short-term exposure (eg. 24 hr period).
   Maximum average increase of 5 mg/L from background levels for longer term exposures (eg. inputs lasting between 24 hrs and 30 days).
   High Flow:
   Maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.
   Should not increase more than 10% of background levels when background is >250 mg/L.
7. Guideline for total ammonia is pH and Temperature dependent.
8. Long-term exposure guideline that protects all forms of aquatic life for indefinite exposure periods (>7d exposures for fish and invertebrates, 24h exposures for aquatic plants and algae).
9. Short-term exposure (24 to 96 hours) concentrations which indicate potential for severe effects during transient events
   (spill events to aquatic receiving environments and infrequent releases of short-lived/non-persistent substances).
   These are NOT protective guidelines.
10. If trigger ranges for total phosphorous are exceeded, the potential exists for an environmental impact. If trigger range is not exceeded, but TP is more than 50% above baseline values, the potential exists for an environmental impact.

Trigger ranges (mg/L):	ultra-oligotrophic	<0.004	meso-eutrophic	0.02-0.035
	oligotrophic	0.004-0.01	eutrophic	0.035-0.1
	mesotrophic	0.01-0.02	hyper-eutrophic	>0.1

11. Total unionized ammonia limit - 1.24 @ 15 degrees celcius.

- Exceedance of SKEQG Tier I Guidelines for Surface Water
BOLD - Exceedance of HC-CDWQ Criteria
Underline - Exceedance of CCME Criteria

3.4.2.1 Upstream Analysis

Yorkton Creek

The nearest upstream sample to the WWTP was collected from Yorkton Creek at UTM location 13 U 679235 E, 5679599 N in NE 12-26-04 W2M.

Spring Sampling

The following parameters exceeded the applicable criteria:

- E. Coli exceeded the HC and CCME – Agriculture-Irrigation guidelines.
- Total Coliforms exceeded HC guideline.

Tables 4 and 5 show the complete analytical results.

The field parameters results were the following:

- EC - 1,169 μS/cm (micro Siemens per centimeter),
- pH – 8.21
- Temperature – 16.7 degrees Celsius

Fall Sampling

The following parameters exceeded the applicable criteria.

- Manganese (0.26 mg/L) exceeded CCME guidelines for agriculture- irrigation.
- Total phosphorus (0.17 mg/L) exceeded CCME guidelines for the protection of aquatic life.
- E. Coli (687 MPN/100 ml) exceeded both HC and CCME criteria for agriculture-irrigation.
- Total Coliform (1550 MPN/100 ml) exceeded both HC and CCME criteria for agriculture-irrigation.

The field parameters results are the following:

- EC - 835 μS/cm (micro Siemens per centimeter),
- pH – 8.66
- Temperature – 12.2 degrees Celsius
- Dissolved Oxygen – 9.47 mg/L

Crescent Creek Fall Sampling

The Crescent Creek sample was collected 13km downstream of the Melville WWTP outfall at UTM location 13 U 666241 E, 5651289 N (Appendix A)

The following parameters exceeded the applicable criteria:

- Molybdenum (0.0111 mg/L) exceeded CCME: Agriculture Irrigation guidelines.
- Uranium (0.0109 mg/L) exceeded both SKEQG Tier 1 guidelines and CCME: Agriculture Irrigation guidelines.

The field parameters results are the following:

- EC – 3,345 μS/cm (micro Siemens per centimeter),
- pH – 8.06
- Temperature – 5.3 degrees Celsius
- Dissolved Oxygen – 9.15 mg/L

3.4.2.2 Analysis of the Effluent

An effluent sample was collected directly from the WWTP sample shed, which is immediately prior to discharge.

Spring Sampling

The following parameters exceeded the applicable criteria:

- Selenium (0.00163 mg/L) and Zinc (0.0454 mg/L) exceeded both SKEGQ Tier 1 Guidelines and CCME – Freshwater Aquatic Life criteria.
- Molybdenum (0.0112 mg/L) exceeded CCME – Agriculture-Irrigation guidelines
- Phosphorus (3.11 mg/L) exceeded CCME–Freshwater Aquatic Life guidelines.
- Uranium (0.0123 mg/L) exceed SKEQG Tier I and CCME: Agriculture Irrigation guidelines.
- Nitrite exceeded both SKEGQ Tier I and CCME – Freshwater Aquatic Life.
- E. coli exceeded CCME – Agriculture-Irrigation guidelines.

Refer to Tables 4 and 5 for the analytical results.

The field parameter results for the effluent were the following:

- EC – 3,479 μS/cm
- pH – 7.64
- Temperature – 13.4 degrees Celsius

Fall Sampling

The following parameters exceeded the applicable criteria:

- Copper (0.0121 mg/L) and Zinc (0.048 mg/L) exceeded SKEQG guidelines.
- Uranium (0.0138 mg/L) exceeded both SKEQG and CCME: Agriculture-Irrigation guidelines.
- Phosphorus (3.02 mg/L) exceeded CCME: Freshwater Aquatic Life guidelines.

The field parameters results are the following:

- EC – 3,580 μS/cm (micro Siemens per centimeter),
- pH – 7.55
- Temperature – 12.2 degrees Celsius
- Dissolved Oxygen – 7.77 mg/L

3.4.2.3 Downstream Analysis

Yorkton Creek

Downstream samples 1 and 2 were collected from Yorkton Creek at the existing City of Yorkton WWTP sampling locations. Sample 1 was collected at 13 U 678782 E, 5681213 N in NE 13-26-04 W2M and Sample 2 was collected at 13 U 673758 E, 5694201 N in SE 33-27-04 W2M.

Spring Sampling

The following parameters exceeded the applicable criteria:

- **Sample 2** was the only downstream sample collected that contained Arsenic (0.00619 mg/L) at a concentration that exceeded SKEQG Tier I and CCME-Freshwater Aquatic criteria.
- Cadmium was found in concentrations exceeding SKEQG Tier I guidelines in both **Sample 1** (0.000018 mg/L) and **Sample 2** (0.00002 mg/L).
- Selenium (0.00123 mg/L) in **Sample 1** was above SKEQG Tier I and CCME – Freshwater Aquatic Life.
- Molybdenum (0.0132 mg/L) in **Sample 1** exceeded CCME – Agriculture-Irrigation criteria.
- Phosphorus concentrations in both **Sample 1** (3.98 mg/L) and **Sample 2** (1.72 mg/L) exceed CCME – Freshwater Aquatic Life criteria.
- Uranium concentrations in **Sample 1** (0.012 mg/L) exceeded SKEQG Tier I and CCME-Agriculture Irrigation guidelines.
- Nitrate concentrations in **Sample 1** (5.28 mg/L) exceeded SKEQG Tier I guidelines.
- The concentration for Nitrite in **Sample 1** (0.67 mg/L) exceeded both SKEQG Tier I and CCME – Freshwater Aquatic Life guidelines.
- In **Sample 1**, E. coli exceeded the HC guidelines for both drinking water and recreational use as well as the CCME – Agriculture-Irrigation guideline. E. coli in **Sample 2** exceeded the HC guideline.
- Both samples exceeded the HC guidelines for Total Coliforms.

The field parameter results for the effluent are the following:

- Sample 1:
  - EC – 3,481 μS/cm
  - pH – 7.8
  - Temperature – 17.7 degrees Celsius
- Sample 2:
  - EC – 2,325 μS/cm
  - pH – 9.25
  - Temperature – 17.8 degrees Celsius

The pH for sample 2 exceeded guidelines for SKEQG, and CCME – Freshwater Aquatic Life guidelines.

Fall Sampling

The following parameters exceeded the applicable criteria:

- Copper in **Sample 1** (0.0059 mg/L) exceeded SKEQG Tier I guidelines.
- Uranium in **Sample 1** (0.0124 mg/L) exceeded SKEQG Tier I and CCME: Freshwater Aquatic Life and Agriculture-Irrigation guidelines.
- Ammonia (6.3 mg/L), Nitrate (5.09 mg/L), and Nitrite (0.48 mg/L) in **Sample 1** exceeded SKEQG Tier I and CCME: Freshwater Aquatic Life criteria.
- Total Phosphorus in **Sample 1** (3.03 mg/L) and **Sample 2** (2.45 mg/L) exceeded CCME: Freshwater Aquatic Life criteria.
- E. Coli in **Sample 1** (>2420 MPN/100 mL) exceeded HC and Recreational Water quality guidelines as well as CCME: Freshwater Aquatic Life guidelines.
- E. Coli in **Sample 2** (7 MPN/100 mL) exceeded HC guidelines.
- Total Coliforms in **Samples 1 and 2** (>2420 MPN/100ml and 1990 MPN/100ml) exceeded HC and CCME: Agriculture-Irrigation guidelines.

The field parameter results for the effluent are the following:

Sample 1:

- EC – 3,464 µS/cm
- pH – 7.61
- Temperature – 12.9 degrees Celsius
- Dissolved Oxygen – 5.41 mg/L

Sample 2:

- EC – 2,742 µS/cm
- pH – 8.54
- Temperature – 17.8 degrees Celsius
- Dissolved Oxygen – 9.76 mg/L

Cussed Creek

No samples were collected from this creek.

Whitesand River

Samples 3 and 4 were collected from Whitesand River at 13 U 682239 E, 5717452 N in NW 04-30-03 W2M and 13 U 707132 E, 5725812 N in NE 36-30-01 W2M.

Spring Sampling

- Aluminum concentrations (0.157 mg/L) in **Sample 4** exceeded SKEQG Tier I and CCME – Freshwater Aquatic Life criteria as well as HC guidelines.
- Cadmium concentrations (0.0000232 mg/L) in **Sample 4** exceeded SKEQG Tier I criteria.
- Iron concentrations (0.579 mg/L) in **Sample 4** exceeded SKEQG Tier I, HC, and CCME-Freshwater Aquatic criteria.
- Manganese concentration in **Sample 3** (0.271 mg/L) and **Sample 4** (0.272 mg/L) exceeded CCME-Agriculture Irrigation.
- Phosphorus concentrations in both samples (0.279 mg/L and 0.157 mg/L) exceeded CCME – Freshwater Aquatic Life guidelines.
- E. Coli and Total Coliforms in both samples exceeded the HC guideline.

The field parameter results for the Whitesand River samples are the following:

Sample 3:

- EC – 1,331 μS/cm
- pH – 8.19
- Temperature – 17.3 degrees Celsius

Sample 4:

- EC – 1,281 µS/cm
- pH – 8.08
- Temperature – 17.0 degrees Celsius

Fall Sampling

- Aluminum concentrations in **Sample 3** (0.132 mg/L) and in **Sample 4** (0.227 mg/L) exceeded SKEQG Tier I and CCME – Freshwater Aquatic Life criteria as well as HC guidelines.
- Iron concentrations in **Sample 3** (0.376 mg/L) and **Sample 4** (0.498 mg/L) exceeded SKEQG Tier I and CCME – Freshwater Aquatic Life criteria as well as HC guidelines.
- Manganese concentrations in **Sample 3** (0.28 mg/L) and in **Sample 4** (0.291 mg/L) exceeded CCME – Agriculture-Irrigation criteria.
- Phosphorus in **Sample 3** (0.23 mg/L) and **Sample 4** (0.12 mg/L) exceeded the CCME-Freshwater Aquatic Life criteria.
- pH in **Sample 3** (8.58) was not within SKEQG Tier I guidelines.
- E. coli in **Sample 3** exceeded HC guidelines while **Sample 4** exceeded HC guidelines for both drinking water and recreational use as well as CCME-Agriculture-Irrigation guidelines.
- Total coliforms in both **samples 3 and 4** exceeded HC and CCME-Agriculture-Irrigation guidelines.

The field parameter results for the Whitesand River are the following:

Sample 3:

- EC – 1,845 μS/cm
- pH – 8.46
- Temperature – 13.1 degrees Celsius
- Dissolved Oxygen – 10.06 mg/L

Sample 4:

- EC – 1,660 µS/cm
- pH – 8.16
- Temperature – 14.7 degrees Celsius
- Dissolved Oxygen – 9.2 mg/L

Assiniboine River

Sample 5 was collected at 14 U 308922 E, 5698573 N in SE 11-28-31 W1M.

Spring Sampling

- Increased aluminum (0.751 mg/L) and Iron (1.61 mg/L) exceeded SKEQG Tier I, HC, and CCME – Freshwater Aquatic Life.
- Manganese (0.216 mg/L) exceeded SKEQG Tier I, HC, and CCME – Agriculture-Irrigation criteria.
- Cadmium (0.0000527 mg/L) exceeded SKEQG Tier I guidelines.
- Phosphorus (0.133 mg/L) exceeded the CCME – Freshwater Aquatic Life guideline.
- E. coli and Total Coliform in the sample exceeded the HC guideline.

The field parameter results for the effluent are the following:

- EC – 887.4 μS/cm
- pH – 8.17
- Temperature – 18.2 degrees Celsius

Fall Sampling

- Increased aluminum (0.616 mg/L) and Iron (1.28 mg/L) exceeded SKEQG Tier I, HC, and CCME – Freshwater Aquatic Life guidelines.
- Arsenic (0.00694 mg/L) exceeded SKEQG Tier I, and CCME-Freshwater Aquatic Life guidelines.
- Copper (0.00456 mg/L) exceeded SKEQG Tier I guidelines.
- Manganese (0.169 mg/L) exceeded SKEQG Tier I and HC guidelines.
- Phosphorus (0.172 mg/L) exceeded CCME Freshwater Aquatic Life guidelines.
- pH (8.51) was not within the SKEQG Tier I guidelines.
- Total Suspended Solids (134 mg/L) exceeded HC and CCME-Freshwater Aquatic Life guidelines.
- E. Coli and Total Coliforms exceeded HC and CCME-Agriculture-Irrigation guidelines.

The field parameter results for the sample 5 are the following:

- EC – 697.4 μS/cm
- pH – 8.24
- Temperature – 16.2 degrees Celsius
- Dissolved Oxygen – 9.19 mg/L

4.0 DEVELOPMENT OF EFFLUENT DISCHARGE OBJECTIVES

4.1 Flow Characteristics in Yorkton Creek

Flow Characteristics at Ebenezer WSC station, downstream of the discharge location are as follows:

- The hydrometric station at Ebenezer WSC station operates seasonally from March to October.
- 7Q10 represents the lowest 7-day average flow that occurs (on average) once every 10 years. Frequency analysis on the rolling averages of the seven-day flows for the past 28 years (1990-2018) for Yorkton Creek was evaluated to estimate the 7Q10. To provide conservative 7Q10 flow estimates, extreme high flow values were excluded. 7Q10 for this station was calculated as 0.04 m^3/d.
- Average flow, from 1990 – 2018 was 2.45 m^3/s from March to October.
- Flow is not monitored from November to February; Yorkton Creek at this station experiences freezing conditions during this period.

Effluent Discharge Characteristics are predicted as follows.

- For the year 2019, total plant flow was reported as 2,595,700 m^3, which is an average daily flow of 7,100 m^3/day (0.082 m^3/s).
- Estimated Future Flows - Average Daily Flow utilized an estimated design population of 39,695 in 2045 (Official Community Plan) and assumed a 350 L/c/d generation rate for a future average daily flow of 14,000 m^3/d (0.162 m^3/s).

4.2 Environmental Quality Objectives

The environmental quality objectives (EQOs) for the substances of concern are to be met at the end of a mixing zone once the discharge has assimilated into the river. EQOs must not result in the degradation of the receiving body water quality and needs to protect the various uses of the receiving body and downstream users. Identified potential surface water uses for Yorkton Creek include, livestock, and aquatic life. Non-contact recreational uses such as canoeing may occur, swimming would be unlikely due to the proximity to the landfill.

Primarily the EQOs will be determined based on the most sensitive water uses and the corresponding objectives. The most sensitive water use is typically the protection of aquatic life. Consideration was also given to background concentrations for each parameter in Yorkton Creek.

CCME Technical Supplement 3 states that “if the natural concentration in the upstream location is higher than the generic EQO equivalent, that concentration will apply as a site-specific EQO for the MWWE, and the generic EQO must be set aside. Otherwise, site-specific EQOs are not needed”. This concept was utilized when developing the EQOs.

Table 6 summarizes the candidate and proposed EQO values and the background water quality data for each of the substances of concern. These objectives represent the targeted EQOs of the site.

TABLE 8 PARAMETERS OF CONCERN & PROPOSED EQOS

Parameter	Upstream Yorkton Creek Concentration During Sampling		Historical Average	National Performance Standards	Saskatchewan Sewage Works Regulations	Manitoba Effluent Standards [4]	HC-CDWQ	SKEQG	CCME			Proposed EQO
	Min	Max					Recreation	Aquatic Life/Agricultural	Agricultural (irrigation)	Agricultural (livestock)	Freshwater Aquatic Life EQG	
BOD (mg/L)					30	25						30
CBOD (mg/L)	<2	6.1	6 [3]	25		25						25
TSS (mg/L)	4	21.7	17 [3]	25		25					Average Background + 5 mg/L	22
TN (mg/L) [1]	1.39	1.92										1.4
TP (mg/L) [2]	0.062	0.17				1						0.093
Total Coliforms (/100 mL)	>200.5	1,500							1,000			1000
E.Coli (/100 mL)	165	687				200	200 - 400		100			100
Unionized Ammonia-N (mg/L)	0.0015	0.0031		< 1.25 @ 15°C ± 1°C	< 1.24 @ 15°C ± 1°C	1.25					0.019	0.019
Nitrate (mg/L)	<0.040	6.4									3	3
Nitrite (mg/L)	< 0.020	0.6									0.06	0.06
Manganese (mg/L)	0.12	0.26						0.2	0.2			0.2
Copper (ug/L)	0.75	1.14						4	200-1,000	500-5,000	4	4
Lead (ug/L)	0.106	0.167						7	200	100	7	7
Selenium (ug/L)	0.27	0.488						1	20-50	50	1	1
Uranium (ug/L)	0.00354	0.0138						10	10	200	15	10
Zinc (ug/L)	< 3	< 3						30	1,000-5,000	50,000	30	30
Total Chlorine (mg/L)	--	--		0.02		0.02						0.02
Additional Parameters	--	--			Not Acutely Toxic							

(1) No guidelines so EQO = Background
(2) Concentration should not be 50% more than background (CCME)
(3) Historical Average (monthly testing), where available is based on 2019 Year End Final Report
(4) ARBI 2020, For Reference Only

4.3 Mixing Zone Allocation

A mixing zone represents a small portion of the river at the discharge point which may not meet the environmental quality objectives. Concentrations of Contaminants of Potential Concern (COPC) within the mixing zone may exceed the site-specific EQOs providing that substance concentration exceeding the site-specific EQO within the mixing zone will not negatively impact the overall quality of the surface water body or cause acute toxicity or other harmful impacts to aquatic life.

There are some notable characteristics of the Yorkton Creek which impact the ability of utilizing the assimilative capacity of an allocated mixing zone to develop site specific Effluent Discharge Objectives (EDOs) for this specific discharge. They are:

- The City of Yorkton discharges continuously throughout the year into Yorkton Creek.
- Yorkton Creek has ice cover during winter, and due to the depth of the Creek likely is completely, or predominately frozen solid.
- Only limited flow data at the effluent discharge location is available.
- 7Q10 for the Yorkton Creek station downstream of the discharge point was approximated as 0.04 m^3/d, this is lower than the average plant flow in 2019. This indicated that there will be periods of time where the flow of Yorkton Creek at the discharge location is likely predominately composed of the discharge effluent. It is also likely that the creek experiences conveyance losses.
- Tributary streams that would increase the flow along Yorkton Creek are limited. Therefore, a mixing zone, would likely encompass the entire length of Yorkton Creek/Cussed Creek (+25 km) during low flow scenarios.

The EPB 356 guidelines specifies with regards to effluent mixing zones that:

- “The mixing zone should be as small as practicable and should not be of such size or shape as to cause or contribute to the impairment of existing or likely water uses; and
- The limited use zone in streams and rivers should be apportioned no more than 25 percent of the cross-sectional area or volume of flow, nor more than one-third of the river width at any transect in the receiving water during all flow regimes which equal or exceed the 7Q10 flow for the area.”

Based on the EPB guidelines utilizing a mixing zone at the outfall of the WPCP would not be appropriate as many of the parameters in elevated concentrations in the effluent are also elevated 1.6 km downstream (with the exception of zinc). Concentrations are improved but not completely assimilated further downstream at Sample Location 2 (20.6 km downstream), therefore effluent discharge objectives (EDOs) will need to be set to the effluent quality objectives, which is the scenario presented in the following section.

4.4 Proposed Effluent Discharge Objectives

The objective of setting effluent criteria is to demonstrate that the downstream uses and users would be protected from significant impacts resulting from discharge of the WPCP effluent to Yorkton Creek. The proposed EDOs (not be confused with the proposed EQOs discussed in sections 4.2 and 4.3 and Table 8) are as follows:

TABLE 9 EFFLUENT DISCHARGE OBJECTIVES

Parameter	Proposed EDO
BOD (mg/L)	30
CBOD (mg/L)	25
TSS (mg/L)	25
TN (mg/L) (1) (2)	10
TP (mg/L) (1) (2)	1
Total Coliforms (/100 mL)	1000
E.Coli (/100 mL)(3)	100
Unionized Ammonia-N (mg/L)(1)	1.24
Nitrate (mg/L)	3
Nitrite (mg/L)	0.06
Total Chlorine	0.02
Additional Parameters	Not Acutely Toxic

(1) See accompanying description below.
(2) Maximum Acceptable Concentration based on monthly arithmetic mean.
(3) E.coli EDO – Maximum Acceptable Concentration based on monthly geometric mean.

BOD and CBOD limits were set as 30 and 25 respectively based on the National Performance Standards and Saskatchewan's Sewage Works Regulations. The **TSS limit** was based on the historical average TSS concentration (which per Yorkton's Permit to Operate is tested monthly) confirms this long-term requirement.

Nutrients – TN and TP: A TN EDO of 1.4 mg/L would be extremely difficult to obtain. As per CCME MMWE – Technical Supplement 2, "When the wastewater facility cannot improve its system for technical, financial, societal or other reasons, then a risk management decision may indicate nothing further can be done at this time. In such cases, EDOs become long-term goals that the wastewater facility must continue to strive to attain. EDOs will be reviewed when new information becomes available or when deemed necessary." Therefore, the consultant team is proposing a TN limit of 10 mg/L, which is in alignment with the most stringent requirements in the province and is technically feasible. The long-term objective of 1.4 mg/L can be in place and re-evaluated as new information and treatment technologies become available. A seasonal limit may also be appropriate as the City of Regina, for example, has a TN limit of 10 mg/L from June to November and a 14 mg/L limit from December – May.

A TP limit of 1 mg/L and objective of 0.093 mg/L may also be considered as the background requirements are quite restrictive. WSA has a policy of restricting TP to 1.0 mg/L for nutrient sensitive watersheds, which would be in keeping with this location.

Pathogens: For E. coli, as irrigation could be supported in the area, a limit of 100 org/100 mL is necessary. For Total Coliforms, a limit of 1,000 org/100 mL is also necessary for irrigation.

Ammonia: The consultant team is proposing a unionized ammonia limit of 1.24 mg/L to ensure discharged effluent is not acutely toxic, recommended in the Waterworks and Sewage Works Regulations for discharge to fish bearing waters (Section 11(3)) over the CCME Freshwater Aquatic Life EQG of < 0.019 mg/L. As a limit was assigned to both unionized ammonia and total nitrogen, a limit for total ammonia was not set.

Nitrate/Nitrite: These parameters are not generally included in the current PTO testing program and therefore, background concentrations are based on two sample sets collected in 2020. Objectives are assigned based of the CCME Freshwater Aquatic Life EQGs.

It should also be noted that metals such as Lead, Selenium and Uranium are naturally occurring in groundwater in Saskatchewan at levels that may exceed provincial and federal guidelines for the protection of aquatic life. Groundwater is the source of drinking water for Yorkton and as a result may contain elevated concentrations of these metals which would then find their way into wastewater. Lead, Selenium, and Uranium concentrations did not exceed HC-CDWQ guidelines in the effluent samples. Further review of historical metal testing can certainly be provided.

4.4.1 CURRENT EFFLUENT VS. PROPOSED OBJECTIVES

Based on the effluent samples taken during the consultant team's spring and fall 2020 sampling events (Tables 4 – 7) the plant would not meet the proposed objectives for:

- Total Nitrogen (24 mg/L (spring), 26.10 mg/L (fall))
- Total Phosphorus (3.04 mg/L, 3.020 mg/L)
- E.coli (>200.5 org/100 mL, >2420 org/100 mL)
- Total Coliforms (>200.5 org/100 mL, >2420 org/100 mL)
- Nitrate (<0.40 mg/L (did not exceed), 6.4 mg/L)
- Nitrite (0.60 mg/L, 0.48 mg/L)

5.0 CONCLUSION

This DUIS examined the existing WPCP discharge operations and the general environmental setting of the receiving water body, Yorkton Creek. The uses of Yorkton Creek were generally identified as recreation, aquatic life, and general agriculture livestock and certainly the opportunity for irrigation as potential uses.

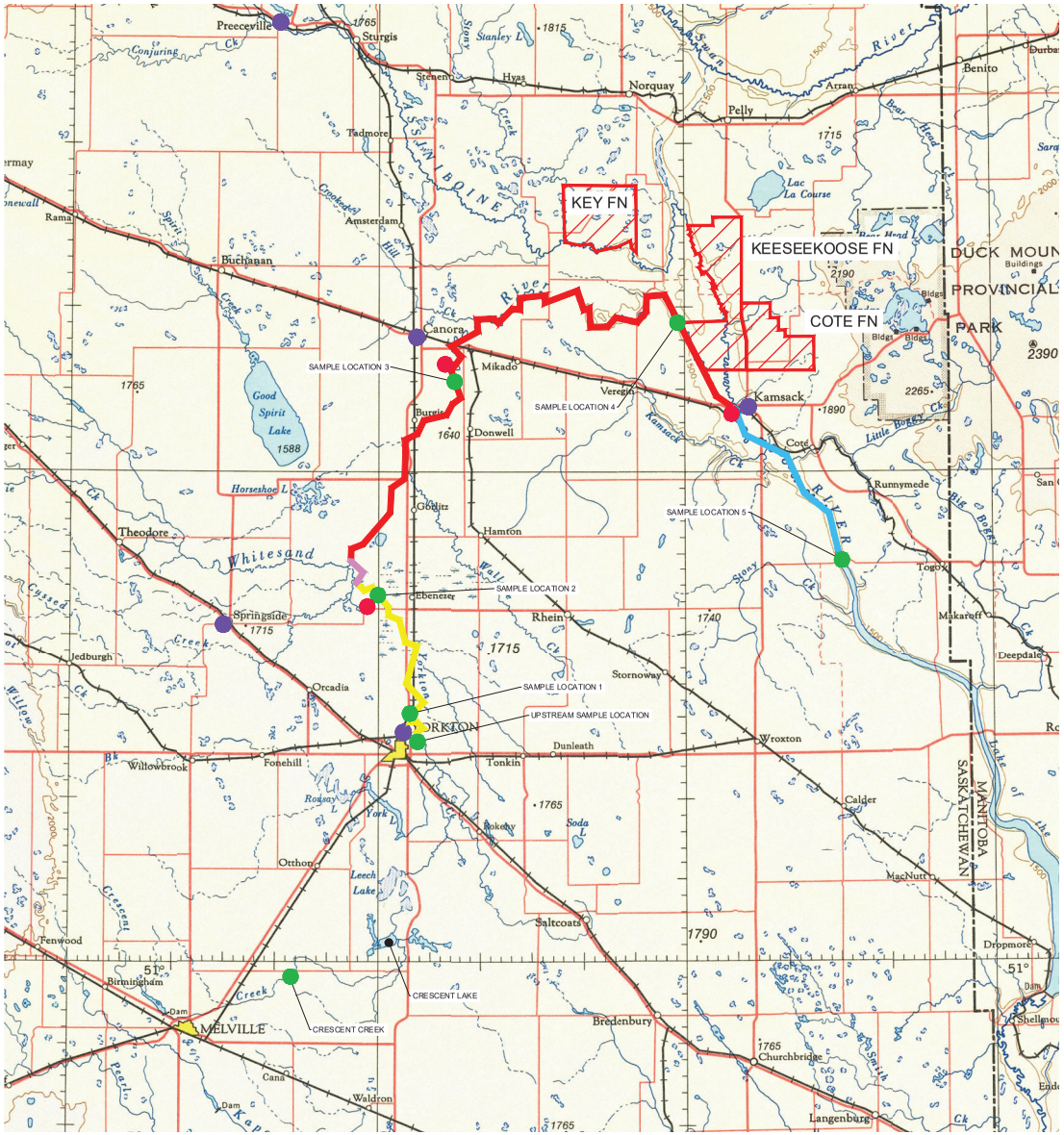
Fish and fish habitat in Yorkton Creek were reviewed within the corresponding Aquatic Habitat Assessment (Jacobs 2020).

Sampling of upstream, effluent, and downstream parameters occurred during the spring and fall.

Effluent quality objectives were identified using various policy sources including the WSA, CCME, and other relevant sources to determine potential EQOs that would be protective of the identified water uses. Analysis of the receiving body (Yorkton Creek) indicates that a mixing zone analysis would not be appropriate for this scenario as it is likely that, at times of low flow, the Creek would be predominately made up of the WPCP discharge. As a result, EDOs were set as the EQOs, with some alignment with current requirements in the province and treatment limitations.

APPENDIX A

Discharge Path



NOTES:

1. DRAWING DEVELOPED FROM:
   - 1.1. 1:500000 NTS MAP - 062NW
2. DISTANCES DOWNSTREAM FROM YORKTON:
   - 2.1. EBENEZER - 25km
   - 2.2. CANORA - 80km
   - 2.3. KAMSACK - 160km

LEGEND

- ASSINIBOIA RIVER
- CUSSED CREEK
- WHITE SAND CREEK
- YORKTON CREEK
- SAMPLE LOCATIONS
- KNOWN TREATED WW RELEASE POINTS
- ACTIVE HYDROMETRIC STATION
- FIRST NATIONS

NO.	YY/MM/DD	DESCRIPTION	DESIGN BY	DESIGN CHECK
A	20/06/01	ISSUED FOR REVIEW	TMO	

REVISIONS / ISSUE

CLIENT: CITY OF YORKTON

PROJECT: DOWNSTREAM USE & IMPACT STUDY

DWG. DESCRIPTION: DISCHARGE PATH

KGS GROUP

DESIGN BY: TMO	DATE (YY/MM/DD): 20/03/01	
DESIGN CHECK:	DATE:	
DRAWN BY: KNS	DATE: 20/06/01	
DWG CHECK:	DATE:	

DWG. NO. 20-1147-001 F01 REV. A

APPENDIX B

Aquatic Habitat Assessment - Final

Jacobs

City of Yorkton Wastewater System Renewal

Aquatic Habitat Assessment (AHA) in Support of a Downstream Use and Impact Study (DUIS)

Final

February 16, 2021

KGS Group

City of Yorkton Wastewater System Renewal

Project No:	CE775600
Document Title:	Aquatic Habitat Assessment (AHA) in Support of a Downstream Use and Impact Study (DUIS)
Document No.:	PPS0630201200WPG
Revision:	Final
Date:	February 16, 2021
Client Name:	KGS Group
Project Manager:	Barry Williamson
Author:	Christopher Flesher (Senior Biologist), Joyce Evans (Aquatic Biologist/Review)

CH2M HILL Canada Limited

245 Consumers Road, Suite 400
Toronto, ON M2J 1R3
T +1.416.499.9000
www.jacobs.com

Contents

Acronyms and Abbreviations

°C	degree(s) Celsius
ANSI	Area of Natural or Scientific Interest
BF	Beaufort Scale
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DFO	Fisheries and Oceans Canada
GIS	geographic information systems
km^2	square kilometre(s)
m	metre(s)
SAR	Species at Risk
SARA	Species at Risk Act, 2002
WWTP	Wastewater Treatment Plant

1. Introduction

1.1 Project Summary

Wastewater Management in Saskatchewan is in part, advised by Environment and Climate Change Canada via the Canada Wide Strategy for the Management of Municipal Wastewater Effluent and the Wastewater System Effluent Regulations (WSER). The WSER, under the *Fisheries Act*, regulates the release of deleterious substances. The Water Security Agency (WSA) has developed a process known as a Downstream Use and Impact Study (DUIS) that is a requirement to support consideration of an application to construct or upgrade any wastewater system that discharges to a fish bearing water, or any new or upgraded wastewater system that continuously discharges. The DUIS must be completed before discharge limits can be set and a permit issued. Although provincial regulations include standards and guidelines for wastewater effluent quality, there is no set guidelines of discharge limits that can be applied to all wastewater treatment systems. Instead, wastewater discharge limits are set on a case by case basis, with limits dependent on the specific receiving environment. A DUIS looks at the specific site to determine what concerns exist, so that issues may be mitigated. In support of the DUIS, this Technical Memorandum (TM) provides information on the baseline aquatic habitat conditions near the existing Wastewater Treatment Plant (WWTP).

The project location occurs slightly north of the existing WWTP, within the City of Yorkton. Specifically, the project location is within SW 13-26-04 W2M; Legal Subdivisions 03 and 04 of 13-26-04 W2M. The Aquatic Habitat Assessment (AHA) was carried out within Yorkton Creek, the discharge effluent channel and a drainage tributary between Saskota Flyway and Regional Road 40 (Figure 1). The AHA included inventories within the creek and 30 m riparian areas, proximal to the existing WWTP. Currently the WWTP discharges north of the plant, within Yorkton Creek which is hydrologically connected to the Whitesand River and is within the Assiniboine Watershed.

The purpose of this AHA is to present the baseline aquatic habitat conditions, provide an assessment on potential impacts to the natural environment due to wastewater effluent, and provide a discussion on potential natural environment permitting.

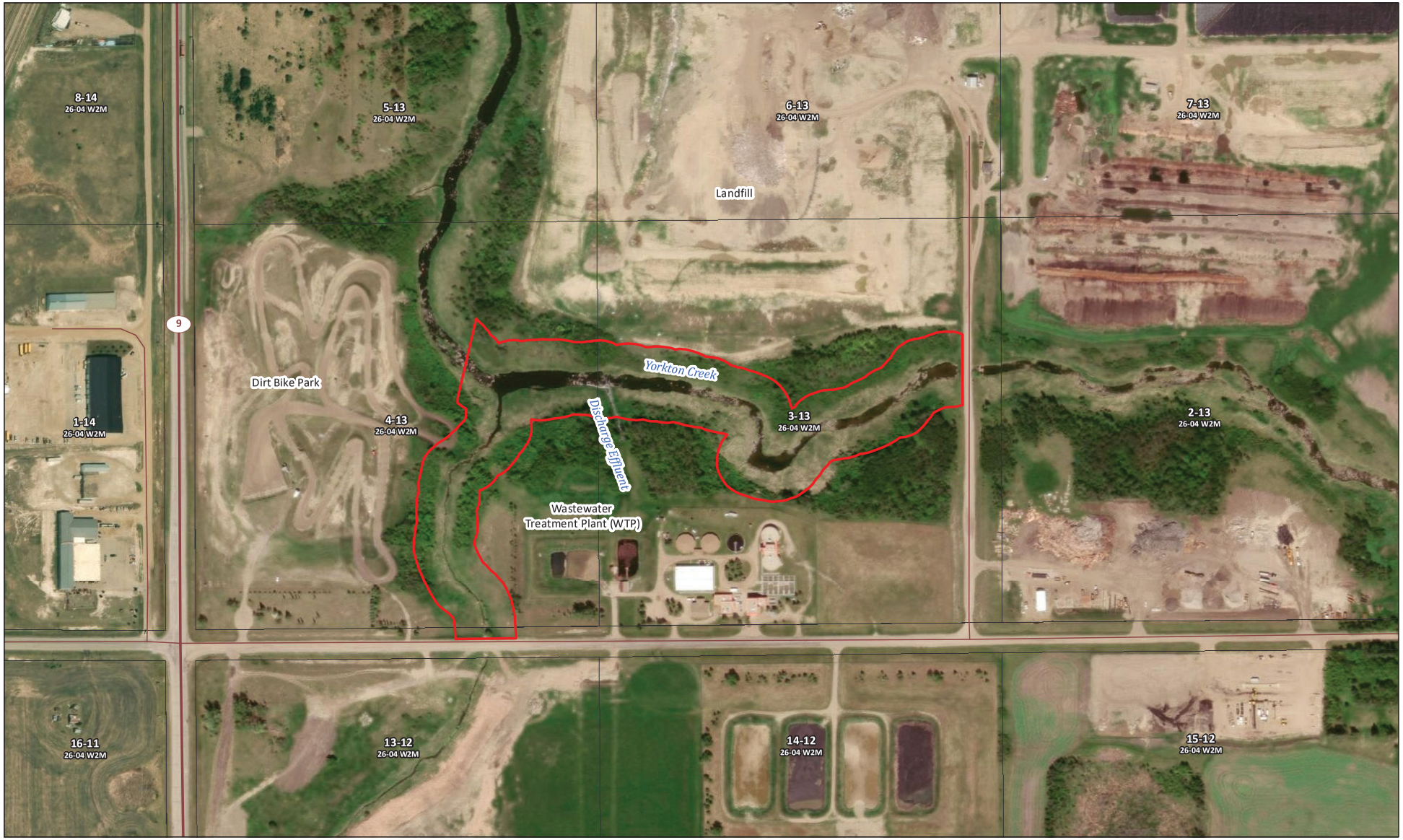


Figure 1
Project Location
Aquatic Habitat Assessment in Support of a DUIS
City of Yorkton/KGS
Yorkton, SK

Jacobs

\\DC1VS01\GISPROJ\Y\YORKTONCITYOF\CE775600CITYOFYORKTONWWTP\MAPFILES\REPORT\20200622_AHA\FIGURE1_PROJECTLOCATION.MXD SCYR 6/22/2020 1:05:26 PM

2. Background Information Records Review

Available online background data were accessed on May 6, 2020 and agency consultation (Appendix A) was implemented to retrieve fish data, including the following:

- Consultation via email with the Government of Saskatchewan's Fish, Wildlife and Lands Branch, Ministry of Environment.
- HABISask online mapping (Government of Saskatchewan, 2020)
- Fisheries and Oceans Canada (DFO) Aquatic Species-at-Risk Map (Government of Canada, 2020)
- Assiniboine River Watershed Source Water Protection Plan (SWA, 2006)

2.1 Physiography

The project location and general area occurs within the Saskatchewan Plains associated with the Assiniboine River and Quill Lake Plain. Generally, the topography is gently to moderately undulating with the higher relief evident in the northeast. Surficial sediments are primarily glacial till that is deeply incised by spillways and meltwater channels. Most of the area is underlain by Cretaceous shales of the Riding Mountain Formation up to 300 metres (m) thick (Environment Canada, 2000). The project location occurs at 490 meters above sea-level (masl) and sits relatively flat and low. There is a gradual increase to the north and south of the project location, up to 500 masl associated with the WWTP and adjacent landfill.

2.2 Biodiversity

2.2.1 Species-at-Risk (SAR)

SAR within Saskatchewan are protected under the *Species at Risk Act*, 2002, (*SARA*) administered by DFO for fish and mussels and Environment and Climate Change Canada for other flora and fauna. Up-to-date SAR lists are provided by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Species are ranked in order of significance, as follows:

1) Endangered
2) Threatened
3) Special Concern
4) Extirpated

According to both HABISask (Government of Saskatchewan, 2020) and DFO mapping (Government of Canada, 2020) no aquatic SAR occur within or proximal to the project location. However, the following rare and/or sensitive species may occur within or proximal to the project location (Government of Saskatchewan, 2020):

Table 2-1. List of Significant Species as per HABISask

Common Name	Scientific Name	COSEWIC	S-Rank
+Eastern Yellow Stargrass	*Hypoxis hirsuta*	NAR	S2
Pallas' Bugseed	*Corispermum pallasii*	NAR	S2
+Mucronate Blue-eyed-grass	*Sisyrinchium mucronatum*	NAR	S3

COSEWIC = The Committee on the Status of Endangered Wildlife in Canada
NAR = Not at risk
S-Rank = Subnational Rank
S1 = Critically Imperiled/Extremely Rare
S2 = Imperiled/Very Rare
S3 = Vulnerable/Rare to uncommon
S4 = Apparently Secure
S5 = Secure/Common
? = Some uncertainty regarding rank
+ = Considered to be an historic occurrence

2.2.1.1 Natural Features

Based on review of HABISask available online mapping no significant natural features (other than Yorkton Creek) occur within the project location (i.e. wetlands, specialized wildlife habitat, Ecological Protection Specialists Districts and managed areas).

2.3 Aquatic Habitat

Yorkton Creek occurs within the project location, north of the current WWTP and is a receptor of the WWTP's discharge effluent. Yorkton Creek is hydrologically connected to Whitesand River and is within the Assiniboine Watershed.

The Assiniboine River and its tributaries are located in eastern Saskatchewan and western Manitoba. The Assiniboine River Watershed covers an area of 17,300 square kilometres within Saskatchewan. This area includes 24 rural municipalities, eight towns, 15 villages and the cities of Melville and Yorkton. The headwaters of the Assiniboine River are about 50 kilometres (km) northwest of Preeceville in the Porcupine Hills. The Whitesand River originates in the Beaver Hills northwest of Yorkton, then joins the Assiniboine River near Kamsack. Other major tributaries located within Saskatchewan are Lilian River, Smith Creek, Crescent Creek, Willow Brook, Wallace Creek, Kamsack Creek, Stony Creek and Yorkton Creek. Several natural lakes are found within the watershed, the most notable of which are Good Spirit Lake, Fishing Lake, and the series of small, interconnected lakes south of Yorkton which include York, Roussay, Leech, and Crescent Lakes. From Kamsack, the Assiniboine River continues southeast for another 45 km before entering Lake of the Prairies near the Manitoba border. Lake of the Prairies is a reservoir 56 km in length straddling the Saskatchewan-Manitoba border. Shellmouth Dam, which creates Lake of the Prairies, is located 35 km downstream of the provincial boundary (SWA, 2006).

According to the Ministry of Environment (Appendix A), the following aquatic species occur within Yorkton Creek during periods of adequate flows:

- Walleye (*Stizostedion vitreum*)
- Northern Pike (*Esox Lucius*)
- *Catostomus sp.*

3. Existing Conditions

3.1 Field Methodology

CH2M HILL Canada Limited (now Jacobs Engineering Group Inc. [Jacobs]) staff used the results of the Background Review listed in Section 2, coupled with air photo interpretation and HABISask spatial data, to scope and plan site-specific field surveys during the growing season which addressed data gaps on terrestrial and aquatic resources and features, where possible. A focus of the field surveys included Yorkton Creek, the discharge effluent channel, a drainage tributary and riparian and terrestrial habitat within 30 m of the water features. KGS group also provided field staff for the surveys.

Table 3-1 provides the dates, staff, and type of surveys conducted by Jacobs.

Table 3-1. Survey Date, Types, and Surveyor

Survey Date(s)	Weather Conditions	Survey Type(s)	Surveyor
May 21, 2020	Sunny, 18-24°C, gentle breeze, BF 3	Aquatic Habitat Assessment (AHA), terrestrial, wildlife and SAR.	Ryan St. Louis (Jacobs) and Jon Nachtigall (KGS Group)
May 22, 2020	Sunny, 18-26°C, gentle breeze, BF 3	Aquatic Habitat Assessment (AHA), terrestrial, wildlife and SAR.	Ryan St. Louis (Jacobs) and Jon Nachtigall (KGS Group)

Note:
BF = Beaufort Scale

3.1.1 Vegetation and Vegetative Communities

The vegetative communities within the project location were originally assessed using air photo interpretation coupled with a review of agency background data from HABISask. Data were assessed to define the extent of ecological boundaries and overall ecosystem function. The data were also used to plan and carry out ecosystem classification surveys targeting potential SAR and/or rare and sensitive flora. The surveys were carried out within the riparian and vegetative areas of the project location and extending 30 m from Yorkton Creek utilizing the *Field Guide to the Ecosites of Saskatchewan's Provincial Forests* (Ministry of Environment, 2010).

3.1.2 Wildlife and Wildlife Habitat

Numerous targeted and incidental wildlife surveys were conducted for specific species. Jacobs assessed the presence of suitable and significant wildlife habitats. Background information from HABISask was used to initially scope the field investigations relating to the potential presence of SAR. The project location experiences noise typical for an industrialized environment, including vehicle traffic from the adjacent roads and noise from the nearby landfill and WWTP, which may have reduced wildlife overheard during the surveys.

3.1.3 Aquatic Habitat and Fisheries

The AHA was carried out within Yorkton Creek from Regional Road 40 to the western limits of the creek within the project location, adjacent to the existing WWTP. The entire creek within the project location was assessed, as well as six (6) stations were inventoried to collect habitat information.

Physical assessment of the creek included documenting the following observations:

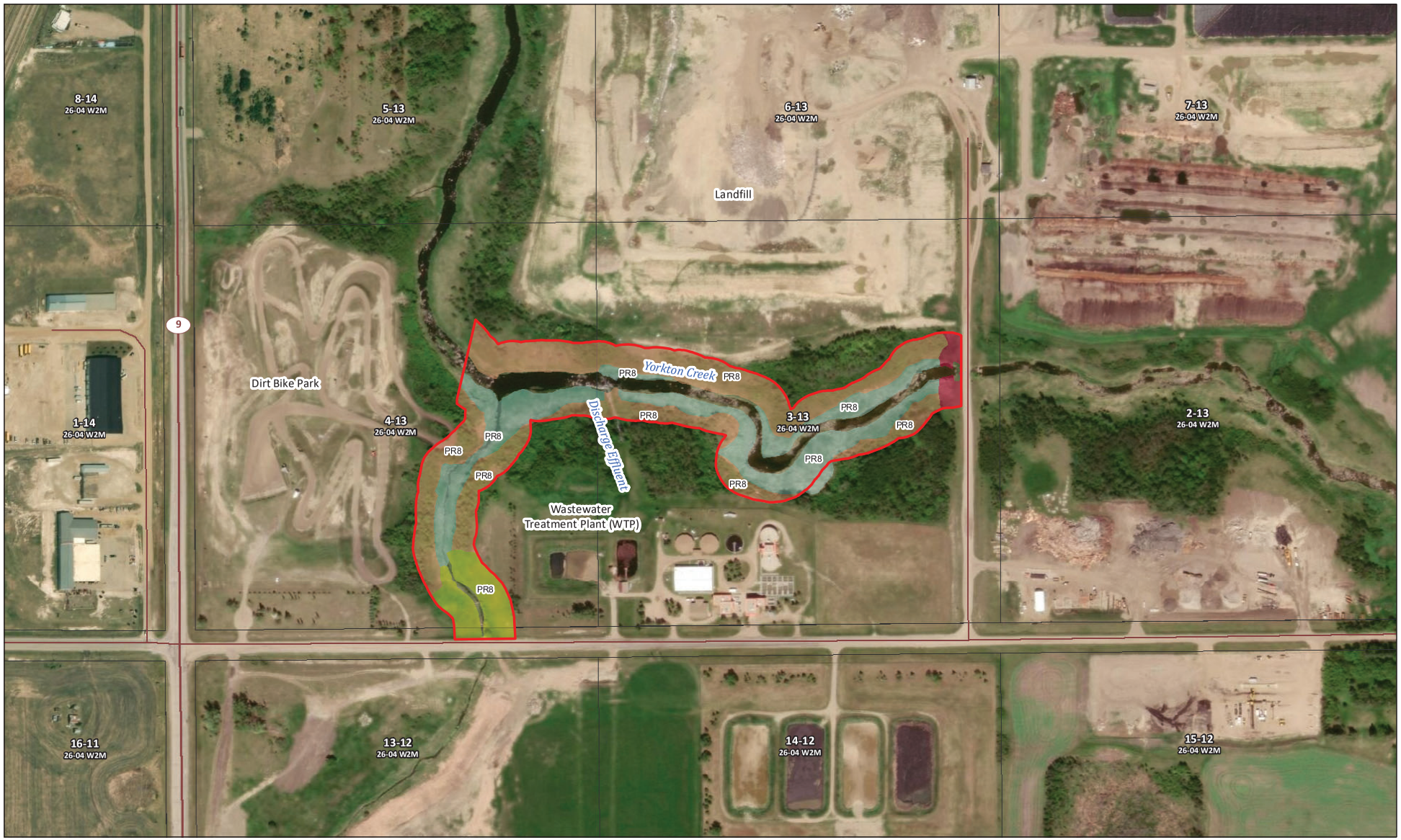
- Fish and fish habitat conditions
- Fish passage potential and barriers
- General habitat conditions, including channel substrate
- Bank condition and erosion
- Bank stabilization (placement of armour stone, rip-rap)
- Flow characteristics
- In-stream aquatic vegetation and cover

3.2 Results

3.2.1 Vegetation and Vegetative Communities

The project location sits slightly low and is bound to the south by the existing WWTP, to the north by a landfill, to the west by a recreational motocross park and to the east by Regional Road 40. The project location occurs within the Prairie ecozone, slightly south of the Boreal Plain (Ministry of Environment, 2010) and the vegetative ecosite is classed as PR8 – Balsam Poplar. The PR8 ecosite includes three (3) ecological sub-communities as shown in Figure 2 and Appendix B.

1) Riparian habitat
2) Shrub habitat
3) Grassland



N

0 25 50 75
Metres

Aquatic Habitat Assessment Area
Highway
Road
Grassland
Shrub Habitat
Riparian Habitat
Bridge Construction Area
PR8 – Prairie Ecosite (MOE, 2010)

Notes:
1. PR8 – Prairie Ecosite referenced from Field Guide to the Ecosites of Saskatchewan's Provincial Forests (MOE, 2010).

Figure 2
Ecosystem Classification
Aquatic Habitat Assessment in Support of a DUIS
City of Yorkton/KGS
Yorkton, SK

Jacobs

\\DC1VS01\GISPROJ\Y\YORKTONCITYOF\CE775600CITYOFYORKTONWWTP\MAPFILES\REPORT\20200622_AHA\FIGURE2_ECOSYSTEMCLASSIFICATION.MXD SCYR 1/29/2021 12:46:23 PM

3.2.1.1 PR8 – Riparian Habitat

This community occurred within the bank areas of Yorkton Creek and was dominated by Reed Canary Grass (*Phalaris arundinacea*). Secondary species include Wild licorice (*Glycyrrhiza lepidota*), Snowberry (*Symphoricarpos albus*) and Choke Cherry (*Prunus virginiana*).

3.2.1.2 PR8 – Shrub Habitat/Treed Habitat

Transitioning from the riparian areas along the banks of Yorkton Creek, shrub and treed habitat occurred. Within the canopy, Choke cherry was observed to be the dominant form on the south side of the creek while Wolf Willow (*Elaeagnus commutate*) co-dominated the north banks alongside Choke Cherry. Manitoba Maple (*Acer negundo*) was co-dominant with Choke Cherry along the discharge effluent channel. Snowberry was observed to be the secondary shrub type in all areas. Other shrub species observed included Saskatoon Berry (*Amelanchier alnifolia*), Balsam Poplar (*Populus tremuloides*), Red-osier Dogwood (*Cornus sericea*), and Willow (*salix sp.*). A Trembling Aspen (*Populous tremuloides)* stand mixed with young Balsam Poplar was also observed within this sub-community.

The understory contained Smooth Brome (*Bromus inermis*), Raspberry (*Rubus sp*.), Stinging Nettle (*Urtica dioica*), Goldenrod (*solidago sp*.), Cow Parsnip (*Heracleum lanatum*), and Common Burdock (*Arctium minus*).

3.2.1.3 PR8 – Grassland Habitat

The grassland ecological community occurred within the southwestern extremities of the project location, immediately adjacent to the exiting WWTP. This community is dominated by Smooth Brome with minor occurrences of Thistle (*Cirsium sp*.) and Absinthe Wormwood (*Artemisia absinthium*).

No SAR, rare or sensitive flora was inventoried. Photos of the ecosite and sub-communities can be found within Appendix B.

3.2.2 Wildlife

No SAR, rare or sensitive fauna was overheard or observed. Incidental wildlife observations included Spotted Sandpiper (*Actitis macularius*) were observed and Clay-coloured Sparrow (*Spizella pallida*), Yellow Warbler (*Setophaga petechia*) and Common Yellowthroat (*Geothlypis trichas*) were heard. Beaver (*Castor canadensis*) sign was also evident, by the beaver dam and lodge.

3.2.3 Aquatic Habitat and Fisheries

The following section describes the AHA completed within Yorkton Creek. Aquatic habitat field surveys were conducted to inventory existing conditions within Yorkton Creek. The creek was transected on both banks within the project location. Figure 3 provides details of physical creek observations collected.

Photographs from the surveys can be found in Appendix B.

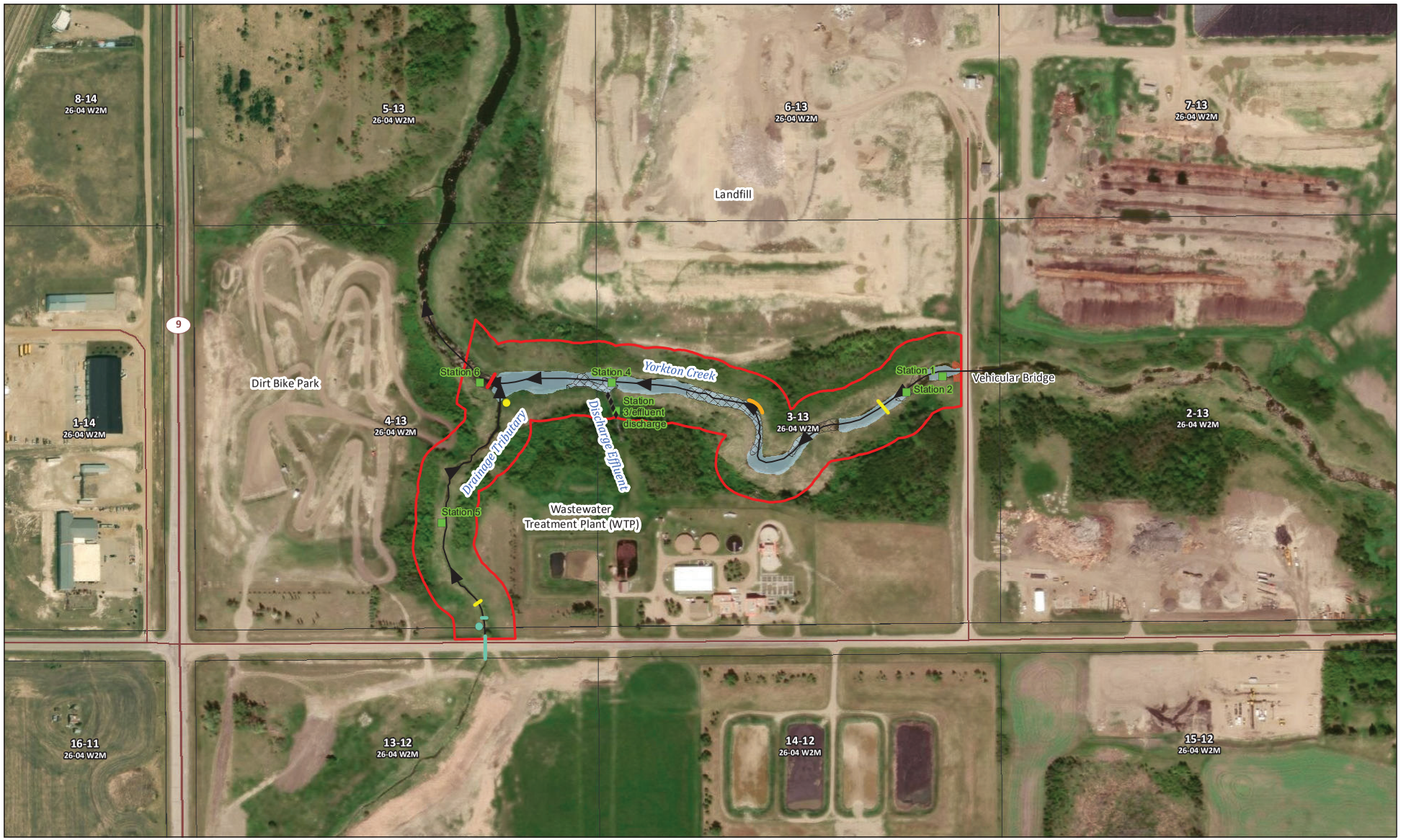


Figure 3
Aquatic Habitat Assessment
Aquatic Habitat Assessment in Support of a DUIS
City of Yorkton/KGS
Yorkton, SK

Jacobs

\\DC1VS01\GISPROJ\Y\YORKTONCITYOF\CE775600CITYOFYORKTONWWTP\MAPFILES\REPORT\20200622_AHA\FIGURE3_AQUATICHABITATASSESSMENT..MXD SCYR 6/26/2020 1:33:01 PM

The watercourse features within the project location include three distinctive habitat features including the main reach of Yorkton Creek, the discharge effluent channel and the creek confluence, which occurs towards the western limits. The creek confluence includes the downstream reach and a tributary (a drainage channel) to the south.

3.2.3.1 Yorkton Creek Main Branch

The entire reach of the main branch of Yorkton Creek within the project location generally consisted of a substrate of cobble and boulders. The only exception was at Station 1 (Figure 3) where the creek has been disturbed by bridge construction (Regional Road 40 overpass) (Appendix B) and the substrate consisted of silt with a mix of organics laid over boulders. As well, boulders were observed to be dominant within the bed at the creek within Station 4 and upstream of this location. Rip-rap has been placed at both bridge abutments. Natural eroded banks were observed throughout the reach of the creek and Erosion and Sedimentation Control (ESC) measures were observed at the eastern limits (likely associated with the bridge construction). The entire creek had a defined run with flows occurring from east to west and draining to the north at the western confluence. Pool habitat dominated the creek with three (3) minor runs noted associated with boulders on the bed. A beaver dam and an active beaver lodge were also present (Figure 3). Areas of low-flow were observed throughout the project location which may have adverse effects on fish passage.

The creek had no canopy cover, limiting fish refuge habitat and cooling areas. Emergent vegetation was also limited, occurring along the creek banks and sporadically scattered within boulder fields. Hardstem Bulrush (*Schoenoplectus acutus*) was observed to be the dominant emergent vegetation type, occurring along the edges of the creek. Cattail (*Typha sp*.), Narrow-leaved Water Plantain (*Alisma gramineum*), Water Parsnip (*Sium suave*), and Creeping Spikerush (*Eleocharis palustris*) were also observed as a secondary species along the edges of the creek.

3.2.3.2 Discharge Effluent Channel

The discharge effluent channel consisted of riffle habitat, and the substrate included large boulders (Appendix B). The velocity within the channel was at a peak for the entire project location with a change in grade sloping approximately between 4-8% from the WWTP discharge point. The channel banks have been cut approximately 1 m below exiting grade (Appendix B). A small waterfall, at the outlet of the discharge, was observed upstream from the confluence with the creek and included an approximately 1 m drop. No floating or submerged aquatic vegetation was observed within the channel, however, Water Parsnip was inventoried on the edge of the channel.

3.2.3.3 Drainage Tributary

The drainage tributary occurred downstream from the main branch of the creek, directly adjacent to the existing WWTP and within the southwestern extremities of the project location. The tributary was comprised of run habitat with silt, cobble and boulder substrate. An outfall and culvert were present at the southern extremities of the project location associated with the road. Like the discharge effluent channel, the drainage tributary banks have also been cut down approximately 1m below the existing grade (Appendix B). Aquatic vegetation was not observed within this water feature. Hardstem Bulrush was observed within the southern limits of the project location.

3.2.3.4 Summary

A smaller portion of the creek, the effluent discharge channel, drainage tributary and associated riparian areas have experienced anthropogenic disturbance and debris from either the landfill to the north, or construction activities occurring to the east during the site assessment period.

The creek also contained poor aquatic habitat as evident from the lack of overhanging riparian cover along the banks and the fish passage limitations due to baseflow conditions in the main run of the creek. Thus, fish migration, especially large-bodied fish, from downstream areas of the site is unlikely unless flow conditions allow. A beaver dam was noted which may result in an impediment to fish passage for non-jumping species. Based on the site conditions, spawning potential by Northern Pike, Walleye and other sportfish is low. Faster velocity and rockier sections of the main branch of the creek may have potential for Catostomid (sucker) spawning when there are adequate flows. Generally, habitat was more suitable for small-bodied fish species such as brook stickleback (*Culaea inconstans*) and Cyprinids. Small-bodied fish were observed at the site and were likely Cyprinid sp.

Table 3.2 below provides the results.

Table 3-2. Aquatic Habitat Assessment (AHA) Station Results

Station #	Wetted Width (m)	Centre of Creek Depth (m)	Depth at Left Bank (m)	Depth at Right Bank (m)	Flow Velocity (m/s)	Substrate	Habitat
1	28.7	N/A	0.20	0.20	0	Silt over boulders	Pool
2	23.8	0.14	0	0	0.06	Cobble and boulders	Run
3	3.4	0.16	0.08	0.01	0.43	Boulders	Riffle
4	21	0.52	0.30	0.1	0.06	Cobble and boulders	Pool
5	2.5	0.11	0.08	0.08	0.15	Silt and some cobble and boulders	Run
6	19.3	0.12	0.06	0.12	0.16	Cobble and boulders with trace of sandy silt	Run

4. Potential Natural Environment Permitting

4.1 Fisheries and Oceans Canada (DFO)

DFO prohibits the harmful alteration, disruption or destruction of fish habitat (HADD) and death of fish as per the recently amended *Fisheries Act*. Based on the habitat of the creek, and the need for longterm regulatory compliance, HADD and death of fish is not predicted as the creek is wadable, the area can be isolated to allow for fish salvages, fish passage and flows. However, the discharge effluent has the potential to increase organic loading into the creek and in return cause adverse effects to fish. Nutrient loading (i.e. Nitrogen and Phosphorous) from the WWTP has been analyzed as part of the DUIS. Based on the known fish species to occur within the creek (Appendix A), location and spawning requirements of the species, any in-water works should be avoided from April 16 – June 30 (Government of Canada, 2013). The timing window of any in-water works should be confirmed by the Ministry of Environment. As well, a DFO Request for Review (RFR) should be submitted and it is anticipated that a Letter of Advice (LOA) can be generated based on following any in-water works timing window, appropriate fish protection measures are implemented, and avoidance of the release of increased nutrient levels from the WWTP.

The following activities associated with long term regulatory compliance may cause impacts to fish and fish habitat without the introduction of mitigation measures:

- Vegetation clearing
- Addition or removal of aquatic vegetation
- Change in timing, duration and frequency of flow
- Wastewater management
- Placement of material or structures in water
- Structure removal
- Use of industrial equipment and
- Sediment release to the creek

The activities above have the potential to cause numerous negative effects to fish and fish habitat. Many of the impacts are temporary in nature and mitigation applied can result in avoidance of impacts.

Impacts to aquatic SAR are not predicted due to the unlikelihood of SAR present within Yorkton Creek based on background search and agency consultation.

4.2 Ministry of Environment (MOE) and Water Security Agency (WSA)

Any industrial development in the project location will have provincial regulatory requirements relating to protection of fish habitat due to the operation of machinery and heavy equipment, in-water work/site isolation, dewatering and ESC. An Aquatic Habitat Protection Permit (AHPP) will be required from the WSA and/or MOE if there is in-water works.

5. Conclusion

The proposed WWTP compliance project will require permitting under DFO, WSA and/or MOE. An aquatic habitat impact assessment with mitigation and recommendations will be required during the planning and detailed design stages. Proposed works may cause temporary effects to fish habitat, however, implementation of abiding by the in-water works timing window, fish protection measures within the creek should allow for project approvals. The overall DUIS report provides long term compliance discharge objectives for the community.

6. References

City of Yorkton, 2020. Accessed June 2020. https://www.yorkton.ca/dept/pweng/waterworks/water/

Cornell Lab of Ornithology. 2019. *All About Birds*. Accessed June 2020. https://www.allaboutbirds.org/news/

Environment Canada, 2000. *Upper Assiniboine River Basin Study*.

Government of Canada, 2020. Fisheries and Oceans Canada (DFO). Aquatic species at risk map. Accessed May 2020. http://www.dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html.

Government of Canada, 2013. Fisheries and Oceans Canada (DFO). Saskatchewan Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat. Accessed June 2020. https://www.dfo-mpo.gc.ca/pnw-ppe/timing-periodes/sk-eng.html

Government of Saskatchewan, 2020. HABISask. Accessed May 2020. https://gisappl.saskatchewan.ca/html5ext/?viewer=habisask

Government of Canada. 2020. Species at risk public registry. Accessed May 2020. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html.

Ministry of Environment, 2010. *Field Guide to the Ecosites of Saskatchewan's Provincial Forests*.

Bird Studies Canada. 2009. *Ontario Breeding Bird Atlas*. Accessed May 2020. https://www.birdsontario.org/atlas/index.jsp

Saskatchewan Watershed Authority (SWA), 2006. *Assiniboine River Watershed Source Water Protection Plan.*

Appendix A
Agency Consultation Record

From: Merkowsky, Jennifer ENV
To: Flesher, Chris/TOR; Kuntz, Curtis ENV
Cc: Williamson, Barry/WPG; Sedgewick, Gord ENV
Date: Wednesday, May 6, 2020 1:55:29 PM

Hi, actually I do have some information on Yorkton Creek. We testnetted Crescent Lake back in 2010 and caught walleye, pike and sucker. Outflow of Crescent Ck is via Yorkton Creek – Cussed Ck and into the Whitesand River. So fish can move up through the system when water flows are adequate. Other fisheries staff have also documented the presence of pike in Yorkton Creek.

Jennifer Merkowsky
Government of Saskatchewan
Senior Fisheries Ecologist
Fish, Wildlife and Lands Branch, Ministry of Environment
102-112 Research Drive
Saskatoon, Canada S7N 3R3
Bus: 306-933-7943
Fax: 306-933-7930
email: jennifer.merkowsky@gov.sk.ca

From: Flesher, Chris/TOR <Chris.Flesher@jacobs.com>
Sent: Wednesday, May 6, 2020 9:34 AM
To: Merkowsky, Jennifer ENV <Jennifer.Merkowsky@gov.sk.ca>; Kuntz, Curtis ENV <Curtis.Kuntz@gov.sk.ca>
Cc: Williamson, Barry/WPG <Barry.Williamson@jacobs.com>
Subject: City of Yorkton WTP Downstream Use Impact Study

Hi Jennifer and Chris

I received your contact information form a colleague and wanted to screen the following project with you for fish data and SAR:

On behalf of the City of Yorkton Jacobs is completing a Downstream Use Impact Study (DUIS) to expand or replace their WWTP as part of a renewal. Site figure attached (which is about 1 KM north of the City of Yorkton).

Do you happen to have any fish data for Yorkton Creek or adjacent tributaries? As well, we reviewed the Habisask online portal but wondering if you have additional SAR information? Any other natural environment data would be welcomed.

Thanks so much,

Christopher Flesher, B.Sc.(Hons), ET.Dip.
Jacobs
Senior Biologist
416.499.0090 ext. 73703 (office)
416.333.2936 (mobile)
Chris.Flesher@jacobs.com

245 Consumers Road, Suite 400
Toronto, Ontario M2J 1R3
Canada
www.jacobs.com

Appendix B
Photo Log

Photo 1. Standing on right bank, looking upstream at the Vehicular Bridge constructed.

Photo 2. Looking downstream from the bridge and Station 1.

Photo 3. Eroded bank downstream of Station 1.

Photo 4. Pool habitat, looking downstream of Station 3.

Photo 5. Ecosite PR8 treed habitat.

Photo 6. Ecosite PR8 shrub habitat transitioning to treed habitat

Photo 7. Discharge effluent channel, looking downstream at main reach of Yorkton Creek.

Photo 8. Boulder habitat looking upstream of Station 2.

Photo 9. Looking downstream within the drainage tributary, at Station 5.

Photo 10. Looking upstream at the culvert at the southwestern limits of the Project Location.

Photo 11. Beaver dam, upstream of Station 6.

Photo 12. Confluence of discharge effluent and Yorkton Creek.

APPENDIX C

Laboratory Analysis Reports

KGS Group Consultants (Regina)
ATTN: Jon Nachtigall
Suite 200
4561 Parliament Avenue
Regina SK S4W 0G3

Date Received: 22-MAY-20
Report Date: 01-JUN-20 13:42 (MT)
Version: FINAL

Client Phone: 306-757-9681

Certificate of Analysis

Lab Work Order #: L2450551

Project P.O. #: NOT SUBMITTED
Job Reference: 20-1147-001
C of C Numbers:
Legal Site Desc:

Brian Morgan, B.Sc. Hons.
Client Services Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L2450551-1 EFFLUENT									
Sampled By: JHN on 21-MAY-20 @ 08:15									
Matrix: WATER									
Miscellaneous Parameters									
Ammonia, Total (as N)	8.9	+/-0.9	DLHC	5.0	mg/L	0		29-MAY-20	R5101981
BOD Carbonaceous	9	+/-2		2	mg/L	0	22-MAY-20	22-MAY-20	R5099262
Phosphorus (P)-Total	3.04	+/-0.32	DLHC	0.25	mg/L	0		27-MAY-20	R5099218
Total Suspended Solids	12.7	+/-2.0		3.0	mg/L	0		28-MAY-20	R5102011
Total Coliform, E. Coli - Quanti-Tray									
Total Coliforms	>200.5	-		0	MPN/100mL	-	22-MAY-20	22-MAY-20	R5095485
Escherichia Coli	>200.5	-		0	MPN/100mL	-	22-MAY-20	22-MAY-20	R5095485
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0730	+/-0.010	DLDS	0.0060	mg/L	0		26-MAY-20	R5098679
Antimony (Sb)-Total	0.00034	+/-0.00007	DLDS	0.00020	mg/L	0		26-MAY-20	R5098679
Arsenic (As)-Total	0.00145	+/-0.00015	DLDS	0.00020	mg/L	0		26-MAY-20	R5098679
Barium (Ba)-Total	0.0332	+/-0.0035	DLDS	0.00020	mg/L	0		26-MAY-20	R5098679
Beryllium (Be)-Total	<0.00020	-	DLDS	0.00020	mg/L	-		26-MAY-20	R5098679
Bismuth (Bi)-Total	0.00014	+/-0.00002	DLDS	0.00010	mg/L	0		26-MAY-20	R5098679
Boron (B)-Total	0.236	+/-0.033	DLDS	0.020	mg/L	0		26-MAY-20	R5098679
Cadmium (Cd)-Total	0.000016	+/-0.000004	DLDS	0.000010	mg/L	0		26-MAY-20	R5098679
Calcium (Ca)-Total	120	+/-16	DLDS	0.10	mg/L	0		26-MAY-20	R5098679
Cesium (Cs)-Total	0.000071	-	DLDS	0.000020	mg/L	-		26-MAY-20	R5098679
Chromium (Cr)-Total	0.00060	+/-0.00010	DLDS	0.00020	mg/L	0		26-MAY-20	R5098679
Cobalt (Co)-Total	0.00038	+/-0.00004	DLDS	0.00020	mg/L	0		26-MAY-20	R5098679
Copper (Cu)-Total	0.0127	+/-0.0011	DLDS	0.0010	mg/L	0		26-MAY-20	R5098679
Iron (Fe)-Total	0.119	+/-0.013	DLDS	0.020	mg/L	0		26-MAY-20	R5098679
Lead (Pb)-Total	0.00040	+/-0.00007	DLDS	0.00010	mg/L	0		26-MAY-20	R5098679
Lithium (Li)-Total	0.0818	+/-0.012	DLDS	0.0020	mg/L	0		26-MAY-20	R5098679
Magnesium (Mg)-Total	87.1	+/-9.3	DLDS	0.010	mg/L	0		26-MAY-20	R5098679
Manganese (Mn)-Total	0.125	+/-0.012	DLDS	0.00020	mg/L	0		26-MAY-20	R5098679
Molybdenum (Mo)-Total	0.0112	+/-0.0014	DLDS	0.00010	mg/L	0		26-MAY-20	R5098679
Nickel (Ni)-Total	0.0024	+/-0.0003	DLDS	0.0010	mg/L	0		26-MAY-20	R5098679
Potassium (K)-Total	21.9	+/-2.4	DLDS	0.10	mg/L	0		26-MAY-20	R5098679
Phosphorus (P)-Total	3.11	+/-0.44	DLDS	0.10	mg/L	0		26-MAY-20	R5098679
Rubidium (Rb)-Total	0.0105	-	DLDS	0.00040	mg/L	-		26-MAY-20	R5098679
Selenium (Se)-Total	0.00163	+/-0.00018	DLDS	0.00010	mg/L	0		26-MAY-20	R5098679
Silicon (Si)-Total	12.9	+/-1.7	DLDS	0.20	mg/L	+7%		26-MAY-20	R5098679
Silver (Ag)-Total	<0.000020	-	DLDS	0.000020	mg/L	-		26-MAY-20	R5098679
Sodium (Na)-Total	446	+/-49	DLDS	0.10	mg/L	0		26-MAY-20	R5098679
Strontium (Sr)-Total	0.597	+/-0.078	DLDS	0.00040	mg/L	0		26-MAY-20	R5098679
Sulfur (S)-Total	133	-	DLDS	1.0	mg/L	-		26-MAY-20	R5098679
Tellurium (Te)-Total	<0.00040	-	DLDS	0.00040	mg/L	-		26-MAY-20	R5098679
Thallium (Tl)-Total	<0.000020	-	DLDS	0.000020	mg/L	-		26-MAY-20	R5098679
Thorium (Th)-Total	<0.00020	-	DLDS	0.00020	mg/L	-		26-MAY-20	R5098679
Tin (Sn)-Total	0.00046	+/-0.00005	DLDS	0.00020	mg/L	0		26-MAY-20	R5098679
Titanium (Ti)-Total	<0.00060	-	DLDS	0.00060	mg/L	-		26-MAY-20	R5098679
Tungsten (W)-Total	<0.00020	-	DLDS	0.00020	mg/L	-		26-MAY-20	R5098679
Uranium (U)-Total	0.0123	+/-0.0017	DLDS	0.000020	mg/L	0		26-MAY-20	R5098679
Vanadium (V)-Total	<0.0010	-	DLDS	0.0010	mg/L	-		26-MAY-20	R5098679
Zinc (Zn)-Total	0.0454	+/-0.0047	DLDS	0.0060	mg/L	0		26-MAY-20	R5098679
Zirconium (Zr)-Total	<0.00040	-	DLDS	0.00040	mg/L	-		26-MAY-20	R5098679
Total Nitrogen									
Nitrate in Water by IC									
Nitrate (as N)	<0.40	-	DLDS	0.40	mg/L	-		22-MAY-20	R5095456
Nitrite in Water by IC									

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L2450551-1 EFFLUENT									
Sampled By: JHN on 21-MAY-20 @ 08:15									
Matrix: WATER									
Nitrite in Water by IC									
Nitrite (as N)	0.60	-	DLDS	0.20	mg/L	-		22-MAY-20	R5095456
Total Kjeldahl Nitrogen by Fluorescence									
Total Kjeldahl Nitrogen	23	+/-4	DLHC	10	mg/L	0		29-MAY-20	R5102139
Total Nitrogen (Calculation)									
Total Nitrogen	24	-		10	mg/L	-		29-MAY-20	
L2450551-2 UPSTREAM									
Sampled By: JHN on 21-MAY-20 @ 08:15									
Matrix: WATER									
Miscellaneous Parameters									
Ammonia, Total (as N)	0.053	+/-0.009		0.050	mg/L	0		29-MAY-20	R5101981
BOD Carbonaceous	<2	-		2	mg/L	-	22-MAY-20	22-MAY-20	R5099262
Phosphorus (P)-Total	0.0620	+/-0.0075		0.0050	mg/L	0		27-MAY-20	R5099218
Total Suspended Solids	4.0	+/-1.0		3.0	mg/L	0		28-MAY-20	R5102011
Total Coliform, E. Coli - Quanti-Tray									
Total Coliforms	>200.5	-		0	MPN/100mL	-	22-MAY-20	22-MAY-20	R5095485
Escherichia Coli	165	-		0	MPN/100mL	-	22-MAY-20	22-MAY-20	R5095485
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0103	+/-0.0033		0.0030	mg/L	0		26-MAY-20	R5098679
Antimony (Sb)-Total	0.00030	+/-0.00006		0.00010	mg/L	0		26-MAY-20	R5098679
Arsenic (As)-Total	0.00345	+/-0.00034		0.00010	mg/L	0		26-MAY-20	R5098679
Barium (Ba)-Total	0.0476	+/-0.0050		0.00010	mg/L	0		26-MAY-20	R5098679
Beryllium (Be)-Total	<0.00010	-		0.00010	mg/L	-		26-MAY-20	R5098679
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		26-MAY-20	R5098679
Boron (B)-Total	0.096	+/-0.014		0.010	mg/L	0		26-MAY-20	R5098679
Cadmium (Cd)-Total	0.0000066	+/-0.0000034		0.0000050	mg/L	0		26-MAY-20	R5098679
Calcium (Ca)-Total	74.4	+/-9.7		0.050	mg/L	0		26-MAY-20	R5098679
Cesium (Cs)-Total	<0.000010	-		0.000010	mg/L	-		26-MAY-20	R5098679
Chromium (Cr)-Total	<0.00010	-		0.00010	mg/L	-		26-MAY-20	R5098679
Cobalt (Co)-Total	0.00026	+/-0.00003		0.00010	mg/L	0		26-MAY-20	R5098679
Copper (Cu)-Total	0.00114	+/-0.00023		0.00050	mg/L	0		26-MAY-20	R5098679
Iron (Fe)-Total	0.121	+/-0.013		0.010	mg/L	0		26-MAY-20	R5098679
Lead (Pb)-Total	0.000106	+/-0.000032		0.000050	mg/L	0		26-MAY-20	R5098679
Lithium (Li)-Total	0.0631	+/-0.0091		0.0010	mg/L	0		26-MAY-20	R5098679
Magnesium (Mg)-Total	62.5	+/-6.7		0.0050	mg/L	0		26-MAY-20	R5098679
Manganese (Mn)-Total	0.120	+/-0.012		0.00010	mg/L	0		26-MAY-20	R5098679
Molybdenum (Mo)-Total	0.00273	+/-0.00035		0.000050	mg/L	0		26-MAY-20	R5098679
Nickel (Ni)-Total	0.00225	+/-0.00026		0.00050	mg/L	0		26-MAY-20	R5098679
Potassium (K)-Total	19.4	+/-2.1		0.050	mg/L	0		26-MAY-20	R5098679
Phosphorus (P)-Total	0.055	+/-0.021		0.050	mg/L	0		26-MAY-20	R5098679
Rubidium (Rb)-Total	0.00202	-		0.00020	mg/L	-		26-MAY-20	R5098679
Selenium (Se)-Total	0.000488	+/-0.000056		0.000050	mg/L	0		26-MAY-20	R5098679
Silicon (Si)-Total	1.86	+/-0.25		0.10	mg/L	+7%		26-MAY-20	R5098679
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		26-MAY-20	R5098679
Sodium (Na)-Total	78.9	+/-8.7		0.050	mg/L	0		26-MAY-20	R5098679
Strontium (Sr)-Total	0.431	+/-0.056		0.00020	mg/L	0		26-MAY-20	R5098679
Sulfur (S)-Total	108	-		0.50	mg/L	-		26-MAY-20	R5098679
Tellurium (Te)-Total	<0.00020	-		0.00020	mg/L	-		26-MAY-20	R5098679
Thallium (Tl)-Total	<0.000010	-		0.000010	mg/L	-		26-MAY-20	R5098679
Thorium (Th)-Total	<0.00010	-		0.00010	mg/L	-		26-MAY-20	R5098679
Tin (Sn)-Total	<0.00010	-		0.00010	mg/L	-		26-MAY-20	R5098679

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L2450551-2 UPSTREAM									
Sampled By: JHN on 21-MAY-20 @ 08:15									
Matrix: WATER									
Total Metals in Water by CRC ICPMS									
Titanium (Ti)-Total	0.00040	+/-0.00017		0.00030	mg/L	0		26-MAY-20	R5098679
Tungsten (W)-Total	<0.00010	-		0.00010	mg/L	-		26-MAY-20	R5098679
Uranium (U)-Total	0.00557	+/-0.00076		0.000010	mg/L	0		26-MAY-20	R5098679
Vanadium (V)-Total	0.00130	+/-0.00014		0.00050	mg/L	0		26-MAY-20	R5098679
Zinc (Zn)-Total	<0.0030	-		0.0030	mg/L	-		26-MAY-20	R5098679
Zirconium (Zr)-Total	<0.00020	-		0.00020	mg/L	-		26-MAY-20	R5098679
Total Nitrogen									
Nitrate in Water by IC									
Nitrate (as N)	<0.040	-	DLDS	0.040	mg/L	-		22-MAY-20	R5095456
Nitrite in Water by IC									
Nitrite (as N)	<0.020	-	DLDS	0.020	mg/L	-		22-MAY-20	R5095456
Total Kjeldahl Nitrogen by Fluorescence									
Total Kjeldahl Nitrogen	1.39	+/-0.25		0.20	mg/L	0		29-MAY-20	R5102139
Total Nitrogen (Calculation)									
Total Nitrogen	1.39	-		0.20	mg/L	-		29-MAY-20	
L2450551-3 DS-01									
Sampled By: JHN on 21-MAY-20 @ 08:15									
Matrix: WATER									
Miscellaneous Parameters									
Ammonia, Total (as N)	<0.050	-		0.050	mg/L	-		29-MAY-20	R5101981
BOD Carbonaceous	3	+/-1		2	mg/L	0	22-MAY-20	22-MAY-20	R5099262
Phosphorus (P)-Total	0.281	+/-0.031	DLHC	0.050	mg/L	0		27-MAY-20	R5099218
Total Suspended Solids	7.3	+/-1.3		3.0	mg/L	0		28-MAY-20	R5102011
Total Coliform, E. Coli - Quanti-Tray									
Total Coliforms	>200.5	-		0	MPN/100mL	-	22-MAY-20	22-MAY-20	R5095485
Escherichia Coli	18	-		0	MPN/100mL	-	22-MAY-20	22-MAY-20	R5095485
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0319	+/-0.0054		0.0030	mg/L	0		26-MAY-20	R5098679
Antimony (Sb)-Total	0.00017	+/-0.00005		0.00010	mg/L	0		26-MAY-20	R5098679
Arsenic (As)-Total	0.00279	+/-0.00028		0.00010	mg/L	0		26-MAY-20	R5098679
Barium (Ba)-Total	0.0445	+/-0.0047		0.00010	mg/L	0		26-MAY-20	R5098679
Beryllium (Be)-Total	<0.00010	-		0.00010	mg/L	-		26-MAY-20	R5098679
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		26-MAY-20	R5098679
Boron (B)-Total	0.118	+/-0.017		0.010	mg/L	0		26-MAY-20	R5098679
Cadmium (Cd)-Total	0.0000092	+/-0.0000035		0.0000050	mg/L	0		26-MAY-20	R5098679
Calcium (Ca)-Total	79.7	+/-10		0.050	mg/L	0		26-MAY-20	R5098679
Cesium (Cs)-Total	<0.000010	-		0.000010	mg/L	-		26-MAY-20	R5098679
Chromium (Cr)-Total	0.00013	+/-0.00006		0.00010	mg/L	0		26-MAY-20	R5098679
Cobalt (Co)-Total	0.00041	+/-0.00004		0.00010	mg/L	0		26-MAY-20	R5098679
Copper (Cu)-Total	0.00112	+/-0.00023		0.00050	mg/L	0		26-MAY-20	R5098679
Iron (Fe)-Total	0.204	+/-0.021		0.010	mg/L	0		26-MAY-20	R5098679
Lead (Pb)-Total	0.000105	+/-0.000032		0.000050	mg/L	0		26-MAY-20	R5098679
Lithium (Li)-Total	0.0736	+/-0.011		0.0010	mg/L	0		26-MAY-20	R5098679
Magnesium (Mg)-Total	83.6	+/-9.0		0.0050	mg/L	0		26-MAY-20	R5098679
Manganese (Mn)-Total	0.271	+/-0.026		0.00010	mg/L	0		26-MAY-20	R5098679
Molybdenum (Mo)-Total	0.00247	+/-0.00032		0.000050	mg/L	0		26-MAY-20	R5098679
Nickel (Ni)-Total	0.00193	+/-0.00023		0.00050	mg/L	0		26-MAY-20	R5098679
Potassium (K)-Total	22.6	+/-2.5		0.050	mg/L	0		26-MAY-20	R5098679
Phosphorus (P)-Total	0.279	+/-0.046		0.050	mg/L	0		26-MAY-20	R5098679
Rubidium (Rb)-Total	0.00302	-		0.00020	mg/L	-		26-MAY-20	R5098679

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L2450551-3 DS-01									
Sampled By: JHN on 21-MAY-20 @ 08:15									
Matrix: WATER									
Total Metals in Water by CRC ICPMS									
Selenium (Se)-Total	0.000343	+/-0.000040		0.000050	mg/L	0		26-MAY-20	R5098679
Silicon (Si)-Total	4.44	+/-0.59		0.10	mg/L	+7%		26-MAY-20	R5098679
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		26-MAY-20	R5098679
Sodium (Na)-Total	80.3	+/-8.8		0.050	mg/L	0		26-MAY-20	R5098679
Strontium (Sr)-Total	0.360	+/-0.047		0.00020	mg/L	0		26-MAY-20	R5098679
Sulfur (S)-Total	141	-		0.50	mg/L	-		26-MAY-20	R5098679
Tellurium (Te)-Total	<0.00020	-		0.00020	mg/L	-		26-MAY-20	R5098679
Thallium (Tl)-Total	<0.000010	-		0.000010	mg/L	-		26-MAY-20	R5098679
Thorium (Th)-Total	<0.00010	-		0.00010	mg/L	-		26-MAY-20	R5098679
Tin (Sn)-Total	<0.00010	-		0.00010	mg/L	-		26-MAY-20	R5098679
Titanium (Ti)-Total	0.00147	+/-0.00035		0.00030	mg/L	0		26-MAY-20	R5098679
Tungsten (W)-Total	<0.00010	-		0.00010	mg/L	-		26-MAY-20	R5098679
Uranium (U)-Total	0.00526	+/-0.00072		0.000010	mg/L	0		26-MAY-20	R5098679
Vanadium (V)-Total	0.00163	+/-0.00017		0.00050	mg/L	0		26-MAY-20	R5098679
Zinc (Zn)-Total	<0.0030	-		0.0030	mg/L	-		26-MAY-20	R5098679
Zirconium (Zr)-Total	0.00020	-		0.00020	mg/L	-		26-MAY-20	R5098679
Total Nitrogen									
Nitrate in Water by IC									
Nitrate (as N)	<0.040	-	DLDS	0.040	mg/L	-		22-MAY-20	R5095456
Nitrite in Water by IC									
Nitrite (as N)	<0.020	-	DLDS	0.020	mg/L	-		22-MAY-20	R5095456
Total Kjeldahl Nitrogen by Fluorescence									
Total Kjeldahl Nitrogen	1.96	+/-0.35		0.20	mg/L	0		29-MAY-20	R5102139
Total Nitrogen (Calculation)									
Total Nitrogen	1.96	-		0.20	mg/L	-		29-MAY-20	
L2450551-4 DS-02									
Sampled By: JHN on 21-MAY-20 @ 08:15									
Matrix: WATER									
Miscellaneous Parameters									
Ammonia, Total (as N)	<0.050	-		0.050	mg/L	-		29-MAY-20	R5101981
BOD Carbonaceous	2	+/-1		2	mg/L	0	22-MAY-20	22-MAY-20	R5099262
Phosphorus (P)-Total	0.144	+/-0.016	DLHC	0.010	mg/L	0		27-MAY-20	R5099218
Total Suspended Solids	18.0	+/-2.7		3.0	mg/L	0		28-MAY-20	R5102011
Total Coliform, E. Coli - Quanti-Tray									
Total Coliforms	>200.5	-		0	MPN/100mL	-	22-MAY-20	22-MAY-20	R5095485
Escherichia Coli	15	-		0	MPN/100mL	-	22-MAY-20	22-MAY-20	R5095485
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.157	+/-0.021		0.0030	mg/L	0		26-MAY-20	R5098679
Antimony (Sb)-Total	0.00025	+/-0.00006		0.00010	mg/L	0		26-MAY-20	R5098679
Arsenic (As)-Total	0.00377	+/-0.00038		0.00010	mg/L	0		26-MAY-20	R5098679
Barium (Ba)-Total	0.0548	+/-0.0058		0.00010	mg/L	0		26-MAY-20	R5098679
Beryllium (Be)-Total	<0.00010	-		0.00010	mg/L	-		26-MAY-20	R5098679
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		26-MAY-20	R5098679
Boron (B)-Total	0.112	+/-0.016		0.010	mg/L	0		26-MAY-20	R5098679
Cadmium (Cd)-Total	0.0000232	+/-0.0000042		0.0000050	mg/L	0		26-MAY-20	R5098679
Calcium (Ca)-Total	81.7	+/-11		0.050	mg/L	0		26-MAY-20	R5098679
Cesium (Cs)-Total	0.000037	-		0.000010	mg/L	-		26-MAY-20	R5098679
Chromium (Cr)-Total	0.00031	+/-0.00007		0.00010	mg/L	0		26-MAY-20	R5098679
Cobalt (Co)-Total	0.00076	+/-0.00008		0.00010	mg/L	0		26-MAY-20	R5098679
Copper (Cu)-Total	0.00180	+/-0.00027		0.00050	mg/L	0		26-MAY-20	R5098679

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L2450551-4 DS-02									
Sampled By: JHN on 21-MAY-20 @ 08:15									
Matrix: WATER									
Total Metals in Water by CRC ICPMS									
Iron (Fe)-Total	0.579	+/-0.059		0.010	mg/L	0		26-MAY-20	R5098679
Lead (Pb)-Total	0.000384	+/-0.000064		0.000050	mg/L	0		26-MAY-20	R5098679
Lithium (Li)-Total	0.0713	+/-0.010		0.0010	mg/L	0		26-MAY-20	R5098679
Magnesium (Mg)-Total	80.2	+/-8.6		0.0050	mg/L	0		26-MAY-20	R5098679
Manganese (Mn)-Total	0.272	+/-0.026		0.00010	mg/L	0		26-MAY-20	R5098679
Molybdenum (Mo)-Total	0.00278	+/-0.00036		0.000050	mg/L	0		26-MAY-20	R5098679
Nickel (Ni)-Total	0.00386	+/-0.00042		0.00050	mg/L	0		26-MAY-20	R5098679
Potassium (K)-Total	22.1	+/-2.4		0.050	mg/L	0		26-MAY-20	R5098679
Phosphorus (P)-Total	0.157	+/-0.031		0.050	mg/L	0		26-MAY-20	R5098679
Rubidium (Rb)-Total	0.00353	-		0.00020	mg/L	-		26-MAY-20	R5098679
Selenium (Se)-Total	0.000438	+/-0.000051		0.000050	mg/L	0		26-MAY-20	R5098679
Silicon (Si)-Total	5.42	+/-0.72		0.10	mg/L	+7%		26-MAY-20	R5098679
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		26-MAY-20	R5098679
Sodium (Na)-Total	70.7	+/-7.8		0.050	mg/L	0		26-MAY-20	R5098679
Strontium (Sr)-Total	0.356	+/-0.046		0.00020	mg/L	0		26-MAY-20	R5098679
Sulfur (S)-Total	133	-		0.50	mg/L	-		26-MAY-20	R5098679
Tellurium (Te)-Total	<0.00020	-		0.00020	mg/L	-		26-MAY-20	R5098679
Thallium (Tl)-Total	0.000017	+/-0.000006		0.000010	mg/L	0		26-MAY-20	R5098679
Thorium (Th)-Total	<0.00010	-		0.00010	mg/L	-		26-MAY-20	R5098679
Tin (Sn)-Total	0.00016	+/-0.00003		0.00010	mg/L	0		26-MAY-20	R5098679
Titanium (Ti)-Total	0.00546	+/-0.0011		0.00030	mg/L	0		26-MAY-20	R5098679
Tungsten (W)-Total	<0.00010	-		0.00010	mg/L	-		26-MAY-20	R5098679
Uranium (U)-Total	0.00574	+/-0.00079		0.000010	mg/L	0		26-MAY-20	R5098679
Vanadium (V)-Total	0.00262	+/-0.00028		0.00050	mg/L	0		26-MAY-20	R5098679
Zinc (Zn)-Total	<0.0030	-		0.0030	mg/L	-		26-MAY-20	R5098679
Zirconium (Zr)-Total	0.00037	-		0.00020	mg/L	-		26-MAY-20	R5098679
Total Nitrogen									
Nitrate in Water by IC									
Nitrate (as N)	<0.040	-	DLDS	0.040	mg/L	-		22-MAY-20	R5095456
Nitrite in Water by IC									
Nitrite (as N)	<0.020	-	DLDS	0.020	mg/L	-		22-MAY-20	R5095456
Total Kjeldahl Nitrogen by Fluorescence									
Total Kjeldahl Nitrogen	1.86	+/-0.33		0.20	mg/L	0		29-MAY-20	R5102139
Total Nitrogen (Calculation)									
Total Nitrogen	1.86	-		0.20	mg/L	-		29-MAY-20	
L2450551-5 DS-03									
Sampled By: JHN on 21-MAY-20 @ 08:15									
Matrix: WATER									
Miscellaneous Parameters									
Ammonia, Total (as N)	<0.050	-		0.050	mg/L	-		29-MAY-20	R5101981
BOD Carbonaceous	<2	-		2	mg/L	-	22-MAY-20	22-MAY-20	R5099262
Phosphorus (P)-Total	0.188	+/-0.021	DLHC	0.010	mg/L	0		27-MAY-20	R5099218
Total Suspended Solids	64.7	+/-9.2		3.0	mg/L	0		28-MAY-20	R5102011
Total Coliform, E. Coli - Quanti-Tray									
Total Coliforms	>200.5	-		0	MPN/100mL	-	22-MAY-20	22-MAY-20	R5095485
Escherichia Coli	9	-		0	MPN/100mL	-	22-MAY-20	22-MAY-20	R5095485
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.751	+/-0.096		0.0030	mg/L	0		26-MAY-20	R5098679
Antimony (Sb)-Total	0.00025	+/-0.00006		0.00010	mg/L	0		26-MAY-20	R5098679
Arsenic (As)-Total	0.00372	+/-0.00037		0.00010	mg/L	0		26-MAY-20	R5098679
Barium (Ba)-Total	0.0673	+/-0.0071		0.00010	mg/L	0		26-MAY-20	R5098679

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L2450551-5 DS-03									
Sampled By: JHN on 21-MAY-20 @ 08:15									
Matrix: WATER									
Total Metals in Water by CRC ICPMS									
Beryllium (Be)-Total	<0.00010	-		0.00010	mg/L	-		26-MAY-20	R5098679
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		26-MAY-20	R5098679
Boron (B)-Total	0.080	+/-0.011		0.010	mg/L	0		26-MAY-20	R5098679
Cadmium (Cd)-Total	0.0000527	+/-0.0000067		0.0000050	mg/L	0		26-MAY-20	R5098679
Calcium (Ca)-Total	79.1	+/-10		0.050	mg/L	0		26-MAY-20	R5098679
Cesium (Cs)-Total	0.000144	-		0.000010	mg/L	-		26-MAY-20	R5098679
Chromium (Cr)-Total	0.00129	+/-0.00017		0.00010	mg/L	0		26-MAY-20	R5098679
Cobalt (Co)-Total	0.00099	+/-0.00011		0.00010	mg/L	0		26-MAY-20	R5098679
Copper (Cu)-Total	0.00323	+/-0.00036		0.00050	mg/L	0		26-MAY-20	R5098679
Iron (Fe)-Total	1.61	+/-0.16		0.010	mg/L	0		26-MAY-20	R5098679
Lead (Pb)-Total	0.000927	+/-0.00014		0.000050	mg/L	0		26-MAY-20	R5098679
Lithium (Li)-Total	0.0464	+/-0.0067		0.0010	mg/L	0		26-MAY-20	R5098679
Magnesium (Mg)-Total	49.7	+/-5.3		0.0050	mg/L	0		26-MAY-20	R5098679
Manganese (Mn)-Total	0.216	+/-0.021		0.00010	mg/L	0		26-MAY-20	R5098679
Molybdenum (Mo)-Total	0.00279	+/-0.00036		0.000050	mg/L	0		26-MAY-20	R5098679
Nickel (Ni)-Total	0.00482	+/-0.00052		0.00050	mg/L	0		26-MAY-20	R5098679
Potassium (K)-Total	17.2	+/-1.9		0.050	mg/L	0		26-MAY-20	R5098679
Phosphorus (P)-Total	0.133	+/-0.028		0.050	mg/L	0		26-MAY-20	R5098679
Rubidium (Rb)-Total	0.00517	-		0.00020	mg/L	-		26-MAY-20	R5098679
Selenium (Se)-Total	0.000433	+/-0.000050		0.000050	mg/L	0		26-MAY-20	R5098679
Silicon (Si)-Total	7.29	+/-0.97		0.10	mg/L	+7%		26-MAY-20	R5098679
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		26-MAY-20	R5098679
Sodium (Na)-Total	36.1	+/-4.0		0.050	mg/L	0		26-MAY-20	R5098679
Strontium (Sr)-Total	0.283	+/-0.037		0.00020	mg/L	0		26-MAY-20	R5098679
Sulfur (S)-Total	78.2	-		0.50	mg/L	-		26-MAY-20	R5098679
Tellurium (Te)-Total	<0.00020	-		0.00020	mg/L	-		26-MAY-20	R5098679
Thallium (Tl)-Total	0.000035	+/-0.000008		0.000010	mg/L	0		26-MAY-20	R5098679
Thorium (Th)-Total	0.00012	-		0.00010	mg/L	-		26-MAY-20	R5098679
Tin (Sn)-Total	<0.00010	-		0.00010	mg/L	-		26-MAY-20	R5098679
Titanium (Ti)-Total	0.0194	+/-0.0039		0.00030	mg/L	0		26-MAY-20	R5098679
Tungsten (W)-Total	<0.00010	-		0.00010	mg/L	-		26-MAY-20	R5098679
Uranium (U)-Total	0.00473	+/-0.00065		0.000010	mg/L	0		26-MAY-20	R5098679
Vanadium (V)-Total	0.00462	+/-0.00049		0.00050	mg/L	0		26-MAY-20	R5098679
Zinc (Zn)-Total	0.0070	+/-0.0026		0.0030	mg/L	0		26-MAY-20	R5098679
Zirconium (Zr)-Total	0.00079	-		0.00020	mg/L	-		26-MAY-20	R5098679
Total Nitrogen									
Nitrate in Water by IC									
Nitrate (as N)	<0.020	-		0.020	mg/L	-		22-MAY-20	R5095456
Nitrite in Water by IC									
Nitrite (as N)	<0.010	-		0.010	mg/L	-		22-MAY-20	R5095456
Total Kjeldahl Nitrogen by Fluorescence									
Total Kjeldahl Nitrogen	1.76	+/-0.31		0.20	mg/L	0		29-MAY-20	R5102139
Total Nitrogen (Calculation)									
Total Nitrogen	1.76	-		0.20	mg/L	-		29-MAY-20	
L2450551-6 DS-04									
Sampled By: JHN on 21-MAY-20 @ 08:15									
Matrix: WATER									
Miscellaneous Parameters									
Ammonia, Total (as N)	0.066	+/-0.010		0.050	mg/L	0		29-MAY-20	R5101981
BOD Carbonaceous	13	+/-2		2	mg/L	0	22-MAY-20	22-MAY-20	R5099262

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L2450551-6 DS-04									
Sampled By: JHN on 21-MAY-20 @ 08:15									
Matrix: WATER									
Phosphorus (P)-Total	1.79	+/-0.19	DLHC	0.10	mg/L	0		27-MAY-20	R5099218
Total Suspended Solids	30.0	+/-4.4		3.0	mg/L	0		28-MAY-20	R5102011
Total Coliform, E. Coli - Quanti-Tray									
Total Coliforms	>200.5	-		0	MPN/100mL	-	22-MAY-20	22-MAY-20	R5095485
Escherichia Coli	9	-		0	MPN/100mL	-	22-MAY-20	22-MAY-20	R5095485
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0815	+/-0.011		0.0030	mg/L	0		26-MAY-20	R5098679
Antimony (Sb)-Total	0.00049	+/-0.00009		0.00010	mg/L	0		26-MAY-20	R5098679
Arsenic (As)-Total	0.00619	+/-0.00062		0.00010	mg/L	0		26-MAY-20	R5098679
Barium (Ba)-Total	0.0440	+/-0.0046		0.00010	mg/L	0		26-MAY-20	R5098679
Beryllium (Be)-Total	<0.00010	-		0.00010	mg/L	-		26-MAY-20	R5098679
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		26-MAY-20	R5098679
Boron (B)-Total	0.181	+/-0.025		0.010	mg/L	0		26-MAY-20	R5098679
Cadmium (Cd)-Total	0.0000200	+/-0.0000040		0.0000050	mg/L	0		26-MAY-20	R5098679
Calcium (Ca)-Total	114	+/-15		0.050	mg/L	0		26-MAY-20	R5098679
Cesium (Cs)-Total	0.000014	-		0.000010	mg/L	-		26-MAY-20	R5098679
Chromium (Cr)-Total	0.00027	+/-0.00007		0.00010	mg/L	0		26-MAY-20	R5098679
Cobalt (Co)-Total	0.00104	+/-0.00011		0.00010	mg/L	0		26-MAY-20	R5098679
Copper (Cu)-Total	0.00197	+/-0.00028		0.00050	mg/L	0		26-MAY-20	R5098679
Iron (Fe)-Total	0.230	+/-0.024		0.010	mg/L	0		26-MAY-20	R5098679
Lead (Pb)-Total	0.000273	+/-0.000050		0.000050	mg/L	0		26-MAY-20	R5098679
Lithium (Li)-Total	0.0792	+/-0.011		0.0010	mg/L	0		26-MAY-20	R5098679
Magnesium (Mg)-Total	84.3	+/-9.0		0.0050	mg/L	0		26-MAY-20	R5098679
Manganese (Mn)-Total	0.151	+/-0.015		0.00010	mg/L	0		26-MAY-20	R5098679
Molybdenum (Mo)-Total	0.00763	+/-0.00097		0.000050	mg/L	0		26-MAY-20	R5098679
Nickel (Ni)-Total	0.00503	+/-0.00054		0.00050	mg/L	0		26-MAY-20	R5098679
Potassium (K)-Total	22.9	+/-2.5		0.050	mg/L	0		26-MAY-20	R5098679
Phosphorus (P)-Total	1.72	+/-0.25		0.050	mg/L	0		26-MAY-20	R5098679
Rubidium (Rb)-Total	0.00574	-		0.00020	mg/L	-		26-MAY-20	R5098679
Selenium (Se)-Total	0.000706	+/-0.000080		0.000050	mg/L	0		26-MAY-20	R5098679
Silicon (Si)-Total	7.27	+/-0.97		0.10	mg/L	+7%		26-MAY-20	R5098679
Silver (Ag)-Total	0.000011	+/-0.000003		0.000010	mg/L	0		26-MAY-20	R5098679
Sodium (Na)-Total	269	+/-30		0.050	mg/L	0		26-MAY-20	R5098679
Strontium (Sr)-Total	0.564	+/-0.074		0.00020	mg/L	0		26-MAY-20	R5098679
Sulfur (S)-Total	131	-		0.50	mg/L	-		26-MAY-20	R5098679
Tellurium (Te)-Total	<0.00020	-		0.00020	mg/L	-		26-MAY-20	R5098679
Thallium (Tl)-Total	<0.000010	-		0.000010	mg/L	-		26-MAY-20	R5098679
Thorium (Th)-Total	<0.00010	-		0.00010	mg/L	-		26-MAY-20	R5098679
Tin (Sn)-Total	0.00012	+/-0.00003		0.00010	mg/L	0		26-MAY-20	R5098679
Titanium (Ti)-Total	0.00338	+/-0.00072		0.00030	mg/L	0		26-MAY-20	R5098679
Tungsten (W)-Total	<0.00010	-		0.00010	mg/L	-		26-MAY-20	R5098679
Uranium (U)-Total	0.00986	+/-0.0014		0.000010	mg/L	0		26-MAY-20	R5098679
Vanadium (V)-Total	0.00491	+/-0.00052		0.00050	mg/L	0		26-MAY-20	R5098679
Zinc (Zn)-Total	0.0043	+/-0.0025		0.0030	mg/L	0		26-MAY-20	R5098679
Zirconium (Zr)-Total	0.00036	-		0.00020	mg/L	-		26-MAY-20	R5098679
Total Nitrogen									
Nitrate in Water by IC									
Nitrate (as N)	<0.20	-	DLDS	0.20	mg/L	-		22-MAY-20	R5095456
Nitrite in Water by IC									
Nitrite (as N)	<0.10	-	DLDS	0.10	mg/L	-		22-MAY-20	R5095456
Total Kjeldahl Nitrogen by Fluorescence									
Total Kjeldahl Nitrogen	4.78	+/-0.84		0.20	mg/L	0		29-MAY-20	R5102139

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L2450551-6 DS-04									
Sampled By: JHN on 21-MAY-20 @ 08:15									
Matrix: WATER									
Total Nitrogen (Calculation)									
Total Nitrogen	4.78	-		0.30	mg/L	-		29-MAY-20	
L2450551-7 DS-05									
Sampled By: JHN on 21-MAY-20 @ 08:15									
Matrix: WATER									
Miscellaneous Parameters									
Ammonia, Total (as N)	21.4	+/-2.2	DLHC	5.0	mg/L	0		29-MAY-20	R5101981
BOD Carbonaceous	7	+/-2		2	mg/L	0	22-MAY-20	22-MAY-20	R5099262
Phosphorus (P)-Total	4.00	+/-0.43	DLHC	0.25	mg/L	0		27-MAY-20	R5099218
Total Suspended Solids	10.7	+/-1.7		3.0	mg/L	0		28-MAY-20	R5102011
Total Coliform, E. Coli - Quanti-Tray									
Total Coliforms	>200.5	-		0	MPN/100mL	-	22-MAY-20	22-MAY-20	R5095485
Escherichia Coli	>200.5	-		0	MPN/100mL	-	22-MAY-20	22-MAY-20	R5095485
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0436	+/-0.0068	DLDS	0.0060	mg/L	0		26-MAY-20	R5098679
Antimony (Sb)-Total	0.00039	+/-0.00008	DLDS	0.00020	mg/L	0		26-MAY-20	R5098679
Arsenic (As)-Total	0.00211	+/-0.00021	DLDS	0.00020	mg/L	0		26-MAY-20	R5098679
Barium (Ba)-Total	0.0436	+/-0.0046	DLDS	0.00020	mg/L	0		26-MAY-20	R5098679
Beryllium (Be)-Total	<0.00020	-	DLDS	0.00020	mg/L	-		26-MAY-20	R5098679
Bismuth (Bi)-Total	<0.00010	-	DLDS	0.00010	mg/L	-		26-MAY-20	R5098679
Boron (B)-Total	0.269	+/-0.038	DLDS	0.020	mg/L	0		26-MAY-20	R5098679
Cadmium (Cd)-Total	0.000018	+/-0.000004	DLDS	0.000010	mg/L	0		26-MAY-20	R5098679
Calcium (Ca)-Total	137	+/-18	DLDS	0.10	mg/L	0		26-MAY-20	R5098679
Cesium (Cs)-Total	0.000064	-	DLDS	0.000020	mg/L	-		26-MAY-20	R5098679
Chromium (Cr)-Total	0.00052	+/-0.00009	DLDS	0.00020	mg/L	0		26-MAY-20	R5098679
Cobalt (Co)-Total	0.00056	+/-0.00006	DLDS	0.00020	mg/L	0		26-MAY-20	R5098679
Copper (Cu)-Total	0.0065	+/-0.0006	DLDS	0.0010	mg/L	0		26-MAY-20	R5098679
Iron (Fe)-Total	0.230	+/-0.024	DLDS	0.020	mg/L	0		26-MAY-20	R5098679
Lead (Pb)-Total	0.00045	+/-0.00007	DLDS	0.00010	mg/L	0		26-MAY-20	R5098679
Lithium (Li)-Total	0.0948	+/-0.014	DLDS	0.0020	mg/L	0		26-MAY-20	R5098679
Magnesium (Mg)-Total	94.7	+/-10	DLDS	0.010	mg/L	0		26-MAY-20	R5098679
Manganese (Mn)-Total	0.198	+/-0.019	DLDS	0.00020	mg/L	0		26-MAY-20	R5098679
Molybdenum (Mo)-Total	0.0132	+/-0.0017	DLDS	0.00010	mg/L	0		26-MAY-20	R5098679
Nickel (Ni)-Total	0.0031	+/-0.0003	DLDS	0.0010	mg/L	0		26-MAY-20	R5098679
Potassium (K)-Total	21.2	+/-2.4	DLDS	0.10	mg/L	0		26-MAY-20	R5098679
Phosphorus (P)-Total	3.98	+/-0.56	DLDS	0.10	mg/L	0		26-MAY-20	R5098679
Rubidium (Rb)-Total	0.00973	-	DLDS	0.00040	mg/L	-		26-MAY-20	R5098679
Selenium (Se)-Total	0.00123	+/-0.00014	DLDS	0.00010	mg/L	0		26-MAY-20	R5098679
Silicon (Si)-Total	11.5	+/-1.5	DLDS	0.20	mg/L	+7%		26-MAY-20	R5098679
Silver (Ag)-Total	<0.000020	-	DLDS	0.000020	mg/L	-		26-MAY-20	R5098679
Sodium (Na)-Total	414	+/-46	DLDS	0.10	mg/L	0		26-MAY-20	R5098679
Strontium (Sr)-Total	0.703	+/-0.092	DLDS	0.00040	mg/L	0		26-MAY-20	R5098679
Sulfur (S)-Total	144	-	DLDS	1.0	mg/L	-		26-MAY-20	R5098679
Tellurium (Te)-Total	<0.00040	-	DLDS	0.00040	mg/L	-		26-MAY-20	R5098679
Thallium (Tl)-Total	<0.000020	-	DLDS	0.000020	mg/L	-		26-MAY-20	R5098679
Thorium (Th)-Total	<0.00020	-	DLDS	0.00020	mg/L	-		26-MAY-20	R5098679
Tin (Sn)-Total	0.00029	+/-0.00004	DLDS	0.00020	mg/L	0		26-MAY-20	R5098679
Titanium (Ti)-Total	0.00164	+/-0.00038	DLDS	0.00060	mg/L	0		26-MAY-20	R5098679
Tungsten (W)-Total	<0.00020	-	DLDS	0.00020	mg/L	-		26-MAY-20	R5098679
Uranium (U)-Total	0.0120	+/-0.0016	DLDS	0.000020	mg/L	0		26-MAY-20	R5098679
Vanadium (V)-Total	0.0012	+/-0.0001	DLDS	0.0010	mg/L	0		26-MAY-20	R5098679
Zinc (Zn)-Total	0.0243	+/-0.0033	DLDS	0.0060	mg/L	0		26-MAY-20	R5098679

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L2450551-7 DS-05									
Sampled By: JHN on 21-MAY-20 @ 08:15									
Matrix: WATER									
Total Metals in Water by CRC ICPMS									
Zirconium (Zr)-Total	<0.00040	-	DLDS	0.00040	mg/L	-		26-MAY-20	R5098679
Total Nitrogen									
Nitrate in Water by IC									
Nitrate (as N)	2.47	-	DLDS	0.40	mg/L	-		22-MAY-20	R5095456
Nitrite in Water by IC									
Nitrite (as N)	0.67	-	DLDS	0.20	mg/L	-		22-MAY-20	R5095456
Total Kjeldahl Nitrogen by Fluorescence									
Total Kjeldahl Nitrogen	27	+/-5	DLHC	10	mg/L	0		29-MAY-20	R5102139
Total Nitrogen (Calculation)									
Total Nitrogen	30	-		10	mg/L	-		29-MAY-20	
L2450551-8 DS-06									
Sampled By: JHN on 21-MAY-20 @ 08:15									
Matrix: WATER									
Miscellaneous Parameters									
Ammonia, Total (as N)	21.8	+/-2.2	DLHC	5.0	mg/L	0		29-MAY-20	R5101981
BOD Carbonaceous	7	+/-2		2	mg/L	0	22-MAY-20	22-MAY-20	R5099262
Phosphorus (P)-Total	3.89	+/-0.41	DLHC	0.25	mg/L	0		27-MAY-20	R5099218
Total Suspended Solids	12.7	+/-2.0		3.0	mg/L	0		28-MAY-20	R5102011
Total Coliform, E. Coli - Quanti-Tray									
Total Coliforms	>200.5	-		0	MPN/100mL	-	22-MAY-20	22-MAY-20	R5095485
Escherichia Coli	>200.5	-		0	MPN/100mL	-	22-MAY-20	22-MAY-20	R5095485
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0421	+/-0.0066	DLDS	0.0060	mg/L	0		26-MAY-20	R5098679
Antimony (Sb)-Total	0.00036	+/-0.00007	DLDS	0.00020	mg/L	0		26-MAY-20	R5098679
Arsenic (As)-Total	0.00209	+/-0.00021	DLDS	0.00020	mg/L	0		26-MAY-20	R5098679
Barium (Ba)-Total	0.0418	+/-0.0044	DLDS	0.00020	mg/L	0		26-MAY-20	R5098679
Beryllium (Be)-Total	<0.00020	-	DLDS	0.00020	mg/L	-		26-MAY-20	R5098679
Bismuth (Bi)-Total	<0.00010	-	DLDS	0.00010	mg/L	-		26-MAY-20	R5098679
Boron (B)-Total	0.252	+/-0.035	DLDS	0.020	mg/L	0		26-MAY-20	R5098679
Cadmium (Cd)-Total	0.000026	+/-0.000004	DLDS	0.000010	mg/L	0		26-MAY-20	R5098679
Calcium (Ca)-Total	131	+/-17	DLDS	0.10	mg/L	0		26-MAY-20	R5098679
Cesium (Cs)-Total	0.000056	-	DLDS	0.000020	mg/L	-		26-MAY-20	R5098679
Chromium (Cr)-Total	0.00042	+/-0.00008	DLDS	0.00020	mg/L	0		26-MAY-20	R5098679
Cobalt (Co)-Total	0.00057	+/-0.00006	DLDS	0.00020	mg/L	0		26-MAY-20	R5098679
Copper (Cu)-Total	0.0064	+/-0.0006	DLDS	0.0010	mg/L	0		26-MAY-20	R5098679
Iron (Fe)-Total	0.221	+/-0.023	DLDS	0.020	mg/L	0		26-MAY-20	R5098679
Lead (Pb)-Total	0.00044	+/-0.00007	DLDS	0.00010	mg/L	0		26-MAY-20	R5098679
Lithium (Li)-Total	0.0901	+/-0.013	DLDS	0.0020	mg/L	0		26-MAY-20	R5098679
Magnesium (Mg)-Total	91.9	+/-9.8	DLDS	0.010	mg/L	0		26-MAY-20	R5098679
Manganese (Mn)-Total	0.196	+/-0.019	DLDS	0.00020	mg/L	0		26-MAY-20	R5098679
Molybdenum (Mo)-Total	0.0128	+/-0.0016	DLDS	0.00010	mg/L	0		26-MAY-20	R5098679
Nickel (Ni)-Total	0.0030	+/-0.0003	DLDS	0.0010	mg/L	0		26-MAY-20	R5098679
Potassium (K)-Total	20.9	+/-2.3	DLDS	0.10	mg/L	0		26-MAY-20	R5098679
Phosphorus (P)-Total	3.87	+/-0.54	DLDS	0.10	mg/L	0		26-MAY-20	R5098679
Rubidium (Rb)-Total	0.00960	-	DLDS	0.00040	mg/L	-		26-MAY-20	R5098679
Selenium (Se)-Total	0.00129	+/-0.00015	DLDS	0.00010	mg/L	0		26-MAY-20	R5098679
Silicon (Si)-Total	11.5	+/-1.5	DLDS	0.20	mg/L	+7%		26-MAY-20	R5098679
Silver (Ag)-Total	<0.000020	-	DLDS	0.000020	mg/L	-		26-MAY-20	R5098679
Sodium (Na)-Total	406	+/-45	DLDS	0.10	mg/L	0		26-MAY-20	R5098679
Strontium (Sr)-Total	0.683	+/-0.089	DLDS	0.00040	mg/L	0		26-MAY-20	R5098679
Sulfur (S)-Total	143	-	DLDS	1.0	mg/L	-		26-MAY-20	R5098679

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L2450551-8 DS-06									
Sampled By: JHN on 21-MAY-20 @ 08:15									
Matrix: WATER									
Total Metals in Water by CRC ICPMS									
Tellurium (Te)-Total	<0.00040	-	DLDS	0.00040	mg/L	-		26-MAY-20	R5098679
Thallium (Tl)-Total	<0.000020	-	DLDS	0.000020	mg/L	-		26-MAY-20	R5098679
Thorium (Th)-Total	<0.00020	-	DLDS	0.00020	mg/L	-		26-MAY-20	R5098679
Tin (Sn)-Total	0.00030	+/-0.00004	DLDS	0.00020	mg/L	0		26-MAY-20	R5098679
Titanium (Ti)-Total	0.00131	+/-0.00032	DLDS	0.00060	mg/L	0		26-MAY-20	R5098679
Tungsten (W)-Total	<0.00020	-	DLDS	0.00020	mg/L	-		26-MAY-20	R5098679
Uranium (U)-Total	0.0123	+/-0.0017	DLDS	0.000020	mg/L	0		26-MAY-20	R5098679
Vanadium (V)-Total	0.0011	+/-0.0001	DLDS	0.0010	mg/L	0		26-MAY-20	R5098679
Zinc (Zn)-Total	0.0228	+/-0.0033	DLDS	0.0060	mg/L	0		26-MAY-20	R5098679
Zirconium (Zr)-Total	<0.00040	-	DLDS	0.00040	mg/L	-		26-MAY-20	R5098679
Total Nitrogen									
Nitrate in Water by IC									
Nitrate (as N)	5.28	-	DLDS	0.40	mg/L	-		22-MAY-20	R5095456
Nitrite in Water by IC									
Nitrite (as N)	1.21	-	DLDS	0.20	mg/L	-		22-MAY-20	R5095456
Total Kjeldahl Nitrogen by Fluorescence									
Total Kjeldahl Nitrogen	25	+/-4	DLHC	10	mg/L	0		29-MAY-20	R5102139
Total Nitrogen (Calculation)									
Total Nitrogen	32	-		10	mg/L	-		29-MAY-20	

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Aluminum (Al)-Total	MS-B	L2450551-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Barium (Ba)-Total	MS-B	L2450551-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Calcium (Ca)-Total	MS-B	L2450551-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Chromium (Cr)-Total	MS-B	L2450551-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Cobalt (Co)-Total	MS-B	L2450551-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Copper (Cu)-Total	MS-B	L2450551-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Iron (Fe)-Total	MS-B	L2450551-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Lead (Pb)-Total	MS-B	L2450551-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Lithium (Li)-Total	MS-B	L2450551-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2450551-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Manganese (Mn)-Total	MS-B	L2450551-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Nickel (Ni)-Total	MS-B	L2450551-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Potassium (K)-Total	MS-B	L2450551-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Rubidium (Rb)-Total	MS-B	L2450551-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Silicon (Si)-Total	MS-B	L2450551-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Sodium (Na)-Total	MS-B	L2450551-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Strontium (Sr)-Total	MS-B	L2450551-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Titanium (Ti)-Total	MS-B	L2450551-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Uranium (U)-Total	MS-B	L2450551-1, -2, -3, -4, -5, -6, -7, -8

Sample Parameter Qualifier Key:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
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	Preparation Method Reference	Method Reference**
BOD-CBOD-SK	Water	Biochemical Oxygen Demand (BOD)		APHA 5210 B
Samples are diluted, seeded, and have a nitrification inhibitor added. Samples are then incubated in airtight bottles at 20□C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.				
MET-T-CCMS-SK	Water	Total Metals in Water by CRC ICPMS		EPA 200.2/6020A (mod)
This procedure involves preliminary digestion with concentrated nitric acid followed by instrumental analysis using collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).				
N-T-CALC-SK	Water	Total Nitrogen (Calculation)		APHA 4500 N-Calculated
Total Nitrogen is a calculated parameter. Total Nitrogen = Total Kjeldahl Nitrogen + [Nitrate and Nitrite (as N)]				
NH3-F-CL	Water	Ammonia by Fluorescence		J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.				
NO2-IC-N-SK	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-SK	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.				
TC,EC-QT51-SK	Water	Total Coliform, E. Coli - Quanti-Tray		APHA 9223B 2B
The analysis of Total Coliform (TC) & Escherichia coli (EC) is processed by Quanti-tray (QT): Two substrates, ONPG for TC detection and MUG for EC detection are used. The substrates are added to the 100 ml sample dispensed into the 51 well tray. The tray is incubated at 35 Celcius for 24 hours. A colour reaction develops to indicate a positve reaction (presence of TC, EC). The number of positive wells are counted and converted to Most Probable				

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Preparation Method Reference	Method Reference**
Number Units (MPNU) per 100 ml.				
TKN-F-CL	Water	Total Kjeldahl Nitrogen by Fluorescence		APHA 4500-NORG (TKN)
This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.				
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.				

** The indicated Method Reference is the closest nationally or internationally recognized reference for the applicable ALS test method. ALS methods may incorporate modifications from the specified reference 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
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surr - 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.
MU: Measurement Uncertainty. The reported uncertainty is an expanded uncertainty calculated using a coverage factor of 2 which gives a level of confidence of approximately 95%.
Bias: The reported method bias is the average long term deviation from the target value for a long term reference or control sample, measured in percent. Zero values indicate no detectable method bias.

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: L2450551 Report Date: 01-JUN-20

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BOD-CBOD-SK	**Water**							
Batch R5099262								
WG3327387-1 DUP		**L2450551-3**						
BOD Carbonaceous		3	3		mg/L	1.4	30	22-MAY-20
WG3327387-3 LCS								
BOD Carbonaceous			199		mg/L		168-228	22-MAY-20
WG3327387-2 MB								
BOD Carbonaceous			<2		mg/L		2	22-MAY-20
MET-T-CCMS-SK	**Water**							
Batch R5098679								
WG3328285-3 CRM		**TMRM_20**						
Aluminum (Al)-Total			103.7		%		80-120	26-MAY-20
Antimony (Sb)-Total			104.8		%		80-120	26-MAY-20
Arsenic (As)-Total			99.4		%		80-120	26-MAY-20
Barium (Ba)-Total			100.4		%		80-120	26-MAY-20
Beryllium (Be)-Total			100.7		%		80-120	26-MAY-20
Bismuth (Bi)-Total			103.8		%		80-120	26-MAY-20
Boron (B)-Total			98.8		%		80-120	26-MAY-20
Cadmium (Cd)-Total			99.1		%		80-120	26-MAY-20
Calcium (Ca)-Total			96.1		%		80-120	26-MAY-20
Cesium (Cs)-Total			95.7		%		80-120	26-MAY-20
Chromium (Cr)-Total			101.4		%		80-120	26-MAY-20
Cobalt (Co)-Total			96.7		%		80-120	26-MAY-20
Copper (Cu)-Total			99.5		%		80-120	26-MAY-20
Iron (Fe)-Total			108.1		%		80-120	26-MAY-20
Lead (Pb)-Total			105.7		%		80-120	26-MAY-20
Lithium (Li)-Total			106.8		%		80-120	26-MAY-20
Magnesium (Mg)-Total			105.3		%		80-120	26-MAY-20
Manganese (Mn)-Total			101.3		%		80-120	26-MAY-20
Molybdenum (Mo)-Total			100.0		%		80-120	26-MAY-20
Nickel (Ni)-Total			98.4		%		80-120	26-MAY-20
Potassium (K)-Total			102.9		%		80-120	26-MAY-20
Phosphorus (P)-Total			107.1		%		70-130	26-MAY-20
Rubidium (Rb)-Total			102.5		%		80-120	26-MAY-20
Selenium (Se)-Total			98.4		%		80-120	26-MAY-20
Silicon (Si)-Total			104.3		%		60-140	26-MAY-20
Silver (Ag)-Total			101.0		%		80-120	26-MAY-20

Quality Control Report

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-SK	**Water**							
Batch R5098679								
WG3328285-3 CRM		**TMRM_20**						
Sodium (Na)-Total			99.9		%		80-120	26-MAY-20
Strontium (Sr)-Total			105.6		%		80-120	26-MAY-20
Sulfur (S)-Total			93.8		%		80-120	26-MAY-20
Tellurium (Te)-Total			94.3		%		80-120	26-MAY-20
Thallium (Tl)-Total			103.2		%		80-120	26-MAY-20
Thorium (Th)-Total			104.7		%		80-120	26-MAY-20
Tin (Sn)-Total			99.4		%		80-120	26-MAY-20
Titanium (Ti)-Total			95.8		%		80-120	26-MAY-20
Tungsten (W)-Total			100.7		%		80-120	26-MAY-20
Uranium (U)-Total			108.1		%		80-120	26-MAY-20
Vanadium (V)-Total			101.0		%		80-120	26-MAY-20
Zinc (Zn)-Total			97.7		%		80-120	26-MAY-20
Zirconium (Zr)-Total			98.8		%		80-120	26-MAY-20
WG3328285-2 DUP		**L2450551-3**						
Aluminum (Al)-Total		0.0319	0.0343		mg/L	7.1	20	26-MAY-20
Antimony (Sb)-Total		0.00017	0.00017		mg/L	0.6	20	26-MAY-20
Arsenic (As)-Total		0.00279	0.00278		mg/L	0.3	20	26-MAY-20
Barium (Ba)-Total		0.0445	0.0436		mg/L	2.0	20	26-MAY-20
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	26-MAY-20
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	26-MAY-20
Boron (B)-Total		0.118	0.122		mg/L	3.1	20	26-MAY-20
Cadmium (Cd)-Total		0.0000092	0.0000106		mg/L	13	20	26-MAY-20
Calcium (Ca)-Total		79.7	83.1		mg/L	4.2	20	26-MAY-20
Cesium (Cs)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	26-MAY-20
Chromium (Cr)-Total		0.00013	0.00014		mg/L	9.1	20	26-MAY-20
Cobalt (Co)-Total		0.00041	0.00041		mg/L	0.4	20	26-MAY-20
Copper (Cu)-Total		0.00112	0.00102		mg/L	9.1	20	26-MAY-20
Iron (Fe)-Total		0.204	0.204		mg/L	0.3	20	26-MAY-20
Lead (Pb)-Total		0.000105	0.000107		mg/L	2.2	20	26-MAY-20
Lithium (Li)-Total		0.0736	0.0768		mg/L	4.3	20	26-MAY-20
Magnesium (Mg)-Total		83.6	86.0		mg/L	2.8	20	26-MAY-20
Manganese (Mn)-Total		0.271	0.262		mg/L	3.4	20	26-MAY-20
Molybdenum (Mo)-Total		0.00247	0.00260		mg/L	5.3	20	26-MAY-20

Quality Control Report

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-SK	**Water**							
Batch R5098679								
WG3328285-2 DUP		**L2450551-3**						
Nickel (Ni)-Total		0.00193	0.00195		mg/L	1.0	20	26-MAY-20
Potassium (K)-Total		22.6	22.6		mg/L	0.3	20	26-MAY-20
Phosphorus (P)-Total		0.279	0.273		mg/L	2.3	20	26-MAY-20
Rubidium (Rb)-Total		0.00302	0.00307		mg/L	1.8	20	26-MAY-20
Selenium (Se)-Total		0.000343	0.000286		mg/L	18	20	26-MAY-20
Silicon (Si)-Total		4.44	4.37		mg/L	1.8	20	26-MAY-20
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	26-MAY-20
Sodium (Na)-Total		80.3	79.7		mg/L	0.8	20	26-MAY-20
Strontium (Sr)-Total		0.360	0.375		mg/L	4.0	20	26-MAY-20
Sulfur (S)-Total		141	140		mg/L	0.6	20	26-MAY-20
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	26-MAY-20
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	26-MAY-20
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	26-MAY-20
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	26-MAY-20
Titanium (Ti)-Total		0.00147	0.00124		mg/L	16	20	26-MAY-20
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	26-MAY-20
Uranium (U)-Total		0.00526	0.00522		mg/L	0.7	20	26-MAY-20
Vanadium (V)-Total		0.00163	0.00165		mg/L	1.7	20	26-MAY-20
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	26-MAY-20
Zirconium (Zr)-Total		0.00020	0.00021		mg/L	5.4	20	26-MAY-20
WG3328285-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	26-MAY-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	26-MAY-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	26-MAY-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	26-MAY-20
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	26-MAY-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	26-MAY-20
Boron (B)-Total			<0.010		mg/L		0.01	26-MAY-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	26-MAY-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	26-MAY-20
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	26-MAY-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	26-MAY-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	26-MAY-20

Quality Control Report

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-SK	**Water**							
Batch R5098679								
WG3328285-1 MB								
Copper (Cu)-Total			<0.00050		mg/L		0.0005	26-MAY-20
Iron (Fe)-Total			<0.010		mg/L		0.01	26-MAY-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	26-MAY-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	26-MAY-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	26-MAY-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	26-MAY-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	26-MAY-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	26-MAY-20
Potassium (K)-Total			<0.050		mg/L		0.05	26-MAY-20
Phosphorus (P)-Total			<0.050		mg/L		0.05	26-MAY-20
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	26-MAY-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	26-MAY-20
Silicon (Si)-Total			<0.10		mg/L		0.1	26-MAY-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	26-MAY-20
Sodium (Na)-Total			<0.050		mg/L		0.05	26-MAY-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	26-MAY-20
Sulfur (S)-Total			<0.50		mg/L		0.5	26-MAY-20
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	26-MAY-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	26-MAY-20
Thorium (Th)-Total			<0.00010		mg/L		0.0001	26-MAY-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	26-MAY-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	26-MAY-20
Tungsten (W)-Total			<0.00010		mg/L		0.0001	26-MAY-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	26-MAY-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	26-MAY-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	26-MAY-20
Zirconium (Zr)-Total			<0.00020		mg/L		0.0002	26-MAY-20
WG3328285-4 MS		**L2450801-7**						
Aluminum (Al)-Total			N/A	MS-B	%		-	26-MAY-20
Antimony (Sb)-Total			95.3		%		70-130	26-MAY-20
Arsenic (As)-Total			101.6		%		70-130	26-MAY-20
Barium (Ba)-Total			N/A	MS-B	%		-	26-MAY-20
Beryllium (Be)-Total			95.9		%		70-130	26-MAY-20
Bismuth (Bi)-Total			99.4		%		70-130	26-MAY-20

Quality Control Report

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-SK	**Water**							
Batch R5098679								
WG3328285-4 MS		**L2450801-7**						
Boron (B)-Total			90.4		%		70-130	26-MAY-20
Cadmium (Cd)-Total			98.9		%		70-130	26-MAY-20
Calcium (Ca)-Total			N/A	MS-B	%		-	26-MAY-20
Cesium (Cs)-Total			100.9		%		70-130	26-MAY-20
Chromium (Cr)-Total			N/A	MS-B	%		-	26-MAY-20
Cobalt (Co)-Total			N/A	MS-B	%		-	26-MAY-20
Copper (Cu)-Total			N/A	MS-B	%		-	26-MAY-20
Iron (Fe)-Total			N/A	MS-B	%		-	26-MAY-20
Lead (Pb)-Total			N/A	MS-B	%		-	26-MAY-20
Lithium (Li)-Total			N/A	MS-B	%		-	26-MAY-20
Magnesium (Mg)-Total			N/A	MS-B	%		-	26-MAY-20
Manganese (Mn)-Total			N/A	MS-B	%		-	26-MAY-20
Molybdenum (Mo)-Total			97.4		%		70-130	26-MAY-20
Nickel (Ni)-Total			N/A	MS-B	%		-	26-MAY-20
Potassium (K)-Total			N/A	MS-B	%		-	26-MAY-20
Phosphorus (P)-Total			100.8		%		70-130	26-MAY-20
Rubidium (Rb)-Total			N/A	MS-B	%		-	26-MAY-20
Selenium (Se)-Total			99.9		%		70-130	26-MAY-20
Silicon (Si)-Total			N/A	MS-B	%		-	26-MAY-20
Silver (Ag)-Total			105.7		%		70-130	26-MAY-20
Sodium (Na)-Total			N/A	MS-B	%		-	26-MAY-20
Strontium (Sr)-Total			N/A	MS-B	%		-	26-MAY-20
Sulfur (S)-Total			101.9		%		70-130	26-MAY-20
Tellurium (Te)-Total			102.7		%		70-130	26-MAY-20
Thallium (Tl)-Total			96.1		%		70-130	26-MAY-20
Thorium (Th)-Total			113.2		%		70-130	26-MAY-20
Tin (Sn)-Total			104.5		%		70-130	26-MAY-20
Titanium (Ti)-Total			N/A	MS-B	%		-	26-MAY-20
Tungsten (W)-Total			101.0		%		70-130	26-MAY-20
Uranium (U)-Total			N/A	MS-B	%		-	26-MAY-20
Vanadium (V)-Total			106.1		%		70-130	26-MAY-20
Zinc (Zn)-Total			94.4		%		70-130	26-MAY-20
Zirconium (Zr)-Total			121.0		%		70-130	26-MAY-20

Quality Control Report

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-F-CL	**Water**							
Batch R5101981								
WG3331809-30 LCS								
Ammonia, Total (as N)			103.5		%		85-115	29-MAY-20
WG3331809-29 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	29-MAY-20
NO2-IC-N-SK	**Water**							
Batch R5095456								
WG3327583-1 DUP		**L2450540-1**						
Nitrite (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	22-MAY-20
WG3327583-3 LCS								
Nitrite (as N)			100.9		%		90-110	22-MAY-20
WG3327583-2 MB								
Nitrite (as N)			<0.010		mg/L		0.01	22-MAY-20
WG3327583-4 MS		**L2450284-1**						
Nitrite (as N)			97.9		%		75-125	22-MAY-20
NO3-IC-N-SK	**Water**							
Batch R5095456								
WG3327583-1 DUP		**L2450540-1**						
Nitrate (as N)		57.1	57.5		mg/L	0.8	20	22-MAY-20
WG3327583-3 LCS								
Nitrate (as N)			101.2		%		90-110	22-MAY-20
WG3327583-2 MB								
Nitrate (as N)			<0.020		mg/L		0.02	22-MAY-20
WG3327583-4 MS		**L2450284-1**						
Nitrate (as N)			101.7		%		75-125	22-MAY-20
P-T-COL-CL	**Water**							
Batch R5099218								
WG3329831-2 LCS								
Phosphorus (P)-Total			99.3		%		80-120	27-MAY-20
WG3329831-1 MB								
Phosphorus (P)-Total			<0.0050		mg/L		0.005	27-MAY-20
TC,EC-QT51-SK	**Water**							
Batch R5095485								
WG3327428-1 DUP		**L2450551-3**						
Total Coliforms		>200.5	1000000		MPN/100mL	0.0	65	22-MAY-20
Escherichia Coli		18	12		MPN/100mL	36	65	22-MAY-20
WG3327428-2 MB								
Total Coliforms			0		MPN/100mL		1	22-MAY-20

Quality Control Report

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TC,EC-QT51-SK	**Water**							
Batch R5095485								
WG3327428-2 MB								
Escherichia Coli			0		MPN/100mL		1	22-MAY-20
TKN-F-CL	**Water**							
Batch R5102139								
WG3332016-3 DUP		**L2452826-1**						
Total Kjeldahl Nitrogen		1.88	1.92		mg/L	1.8	20	29-MAY-20
WG3332016-6 DUP		**L2450366-2**						
Total Kjeldahl Nitrogen		38.6	38.5		mg/L	0.2	20	29-MAY-20
WG3332016-9 DUP		**L2450551-7**						
Total Kjeldahl Nitrogen		27	26		mg/L	5.3	20	29-MAY-20
WG3332016-2 LCS								
Total Kjeldahl Nitrogen			83.5		%		75-125	29-MAY-20
WG3332016-5 LCS								
Total Kjeldahl Nitrogen			87.3		%		75-125	29-MAY-20
WG3332016-8 LCS								
Total Kjeldahl Nitrogen			83.8		%		75-125	29-MAY-20
WG3332016-1 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	29-MAY-20
WG3332016-4 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	29-MAY-20
WG3332016-7 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	29-MAY-20
TSS-CL	**Water**							
Batch R5102011								
WG3330625-3 DUP		**L2450569-1**						
Total Suspended Solids		1180	1120		mg/L	4.8	20	28-MAY-20
WG3330625-2 LCS								
Total Suspended Solids			95.1		%		85-115	28-MAY-20
WG3330625-1 MB								
Total Suspended Solids			<3.0		mg/L		3	28-MAY-20

Quality Control Report

Workorder: L2450551 Report Date: 01-JUN-20

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Legend:

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

Sample Parameter Qualifier Definitions:

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

Hold Time Exceedances:

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

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

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

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

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2450551-COFC

COC Number: 17 - 735782

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	KGS Group
Contact:	Jonathan Nachtigall
Phone:	306-551-4323
Company address below will appear on the final report	
Street:	200-4561 Parliament Avenue
City/Province:	Regina SK
Postal Code:	S4W 0G3
Invoice To	Same as Report To [x] YES [ ] NO
	Copy of Invoice with Report [x] YES [ ] NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: [x] PDF [x] EXCEL [ ] EDD (DIGITAL)

Quality Control (QC) Report with Report [x] YES [ ] NO

[ ] Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: [x] EMAIL [ ] MAIL [ ] FAX

Email 1 or Fax: jnachtigall@kgsgroup.com

Email 2: lpeters@kgsgroup.com

Email 3:

Invoice Distribution

Select Invoice Distribution: [x] EMAIL [ ] MAIL [ ] FAX

Email 1 or Fax: lpeters@kgsgroup.com

Email 2:

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] [x] Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4-20%] [ ] | 3 day [P3-25%] [ ] | 2 day [P2-50%] [ ]

EMERGENCY: 1 Business day [E - 100%] [ ] | Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] [ ]

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #:

Job #: 20-1147-001

PO / AFE:

LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: | PO#

Major/Minor Code: | Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (lab use only):

ALS Contact:

Sampler: JHN

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	CBOD	TSS	Nitrogen	Ammonia	TNN	Phosphorous	Total Coliforms	Metals	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
											P	P			
	Effluent	21-MAY-20	08:15	W	6	X	X	X	X	X	X	X	X		
	Upstream	21-MAY-20	08:40	W	6	X	X	X	X	X	X	X	X		
	DS-01	21-MAY-20	~~11:30~~ 10:12 *	W	6	X	X	X	X	X	X	X	X		
	DS-02	21-MAY-20	10:57	W	6	X	X	X	X	X	X	X	X		
	DS-03	21-MAY-20	11:50	W	6	X	X	X	X	X	X	X	X		
	DS-04	21-MAY-20	09:35	W	6	X	X	X	X	X	X	X	X		
	DS-05	21-MAY-20	09:00	W	6	X	X	X	X	X	X	X	X		
	DS-06	21-MAY-20	09:00	W	6	X	X	X	X	X	X	X	X		

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? [ ] YES [ ] NO

Are samples for human consumption/ use? [ ] YES [ ] NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen [ ] | SIF Observations Yes [ ] No [ ]

Ice Packs [ ] Ice Cubes [ ] | Custody seal intact Yes [ ] No [ ]

Cooling Initiated [ ]

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
10C							

SHIPMENT RELEASE (client use)

Released by: Jo. Nachtigall | Date: May 21, 2020 | Time: 15:30

INITIAL SHIPMENT RECEPTION (lab use only)

Received by: | Date: 22 May 2020 | Time: 9:00

FINAL SHIPMENT RECEPTION (lab use only)

Received by: | Date: | Time: 9:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JUNE 2018 FRONT

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

KGS Group Consultants (Regina)
ATTN: Jon Nachtigall
Suite 200
4561 Parliament Avenue
Regina SK S4W 0G3

Date Received: 25-SEP-20
Report Date: 08-OCT-20 10:59 (MT)
Version: FINAL

Client Phone: 306-757-9681

Certificate of Analysis

Lab Work Order #: L2508433

Project P.O. #: NOT SUBMITTED
Job Reference: 20-1147-001
C of C Numbers:
Legal Site Desc:

Brian Morgan, B.Sc. Hons.
Client Services Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L2508433-1 EFFLUENT									
Sampled By: JHN on 24-SEP-20 @ 08:30									
Matrix: WATER									
Miscellaneous Parameters									
Ammonia, Total (as N)	15.4	+/-1.6	DLHC	5.0	mg/L	0		29-SEP-20	R5242826
BOD Carbonaceous	4.3	+/-1.1	BODQ	2.0	mg/L	0		26-SEP-20	R5244047
Hardness (as CaCO3)	700	-		0.63		-		25-SEP-20	
Total Dissolved Solids	2130	-	DLDS	20	mg/L	-		28-SEP-20	R5242029
Total Kjeldahl Nitrogen	19.2	+/-3.5	DLHC	1.0	mg/L	0		30-SEP-20	R5241953
Total Suspended Solids	6.9	+/-1.6		3.0	mg/L	0		28-SEP-20	R5241839
Ammonia, Un-ionized (as N), 15C, WSER	0.254	-		0.083	mg/L	-		01-OCT-20	
pH	8.16	+/-0.07		0.10	pH	0		26-SEP-20	R5240057
pH at 15C, WSER	7.79	-		0.10	pH	-		30-SEP-20	R5242731
Total Coliform, E. Coli - Quanti-Tray									
Total Coliforms	>2420	-		0	MPN/100mL	-	25-SEP-20	25-SEP-20	R5238777
Escherichia Coli	>2420	-		0	MPN/100mL	-	25-SEP-20	25-SEP-20	R5238777
Volatile & Fixed Suspend Solids									
Volatile Suspended Solids	6.6	-		3.0	mg/L	-	06-OCT-20	06-OCT-20	R5251062
Fixed Suspended Solids	<3.0	-		3.0	mg/L	-	06-OCT-20	06-OCT-20	R5251062
Dissolved Metals in Water by CRC ICPMS									
Dissolved Metals Filtration Location	LAB	-	SFP			-		29-SEP-20	R5242409
Calcium (Ca)-Dissolved	150	+/-21	DLDS	0.25	mg/L	0		30-SEP-20	R5243087
Magnesium (Mg)-Dissolved	79.3	+/-7.3	DLDS	0.025	mg/L	0		30-SEP-20	R5243087
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.029	+/-0.005	DLDS	0.015	mg/L	0		30-SEP-20	R5242907
Antimony (Sb)-Total	<0.00050	-	DLDS	0.00050	mg/L	-		30-SEP-20	R5242907
Arsenic (As)-Total	0.00117	+/-0.00012	DLDS	0.00050	mg/L	0		30-SEP-20	R5242907
Barium (Ba)-Total	0.0664	+/-0.0070	DLDS	0.00050	mg/L	0		30-SEP-20	R5242907
Beryllium (Be)-Total	<0.00050	-	DLDS	0.00050	mg/L	-		30-SEP-20	R5242907
Bismuth (Bi)-Total	<0.00025	-	DLDS	0.00025	mg/L	-		30-SEP-20	R5242907
Boron (B)-Total	0.270	+/-0.038	DLDS	0.050	mg/L	0		30-SEP-20	R5242907
Cadmium (Cd)-Total	<0.000025	-	DLDS	0.000025	mg/L	-		30-SEP-20	R5242907
Calcium (Ca)-Total	160	+/-21	DLDS	0.25	mg/L	0		30-SEP-20	R5242907
Cesium (Cs)-Total	<0.000050	-	DLDS	0.000050	mg/L	-		30-SEP-20	R5242907
Chromium (Cr)-Total	0.00057	+/-0.00009	DLDS	0.00050	mg/L	0		30-SEP-20	R5242907
Cobalt (Co)-Total	<0.00050	-	DLDS	0.00050	mg/L	-		30-SEP-20	R5242907
Copper (Cu)-Total	0.0121	+/-0.0011	DLDS	0.0025	mg/L	0		30-SEP-20	R5242907
Iron (Fe)-Total	0.123	+/-0.013	DLDS	0.050	mg/L	0		30-SEP-20	R5242907
Lead (Pb)-Total	0.00037	+/-0.00006	DLDS	0.00025	mg/L	0		30-SEP-20	R5242907
Lithium (Li)-Total	0.0896	+/-0.013	DLDS	0.0050	mg/L	0		30-SEP-20	R5242907
Magnesium (Mg)-Total	80.3	+/-8.6	DLDS	0.025	mg/L	0		30-SEP-20	R5242907
Manganese (Mn)-Total	0.112	+/-0.011	DLDS	0.00050	mg/L	0		30-SEP-20	R5242907
Molybdenum (Mo)-Total	0.00988	+/-0.0013	DLDS	0.00025	mg/L	0		30-SEP-20	R5242907
Nickel (Ni)-Total	<0.0025	-	DLDS	0.0025	mg/L	-		30-SEP-20	R5242907
Potassium (K)-Total	20.7	+/-2.3	DLDS	0.25	mg/L	0		30-SEP-20	R5242907
Phosphorus (P)-Total	3.02	+/-0.43	DLDS	0.25	mg/L	0		30-SEP-20	R5242907
Rubidium (Rb)-Total	0.0106	-	DLDS	0.0010	mg/L	-		30-SEP-20	R5242907
Selenium (Se)-Total	0.00082	+/-0.00009	DLDS	0.00025	mg/L	0		30-SEP-20	R5242907
Silicon (Si)-Total	14.1	+/-1.9	DLDS	0.50	mg/L	+7%		30-SEP-20	R5242907
Silver (Ag)-Total	<0.000050	-	DLDS	0.000050	mg/L	-		30-SEP-20	R5242907
Sodium (Na)-Total	454	+/-50	DLDS	0.25	mg/L	0		30-SEP-20	R5242907
Strontium (Sr)-Total	0.755	+/-0.098	DLDS	0.0010	mg/L	0		30-SEP-20	R5242907
Sulfur (S)-Total	145	-	DLDS	2.5	mg/L	-		30-SEP-20	R5242907
Tellurium (Te)-Total	<0.0010	-	DLDS	0.0010	mg/L	-		30-SEP-20	R5242907
Thallium (Tl)-Total	<0.000050	-	DLDS	0.000050	mg/L	-		30-SEP-20	R5242907

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L2508433-1 EFFLUENT									
Sampled By: JHN on 24-SEP-20 @ 08:30									
Matrix: WATER									
Total Metals in Water by CRC ICPMS									
Thorium (Th)-Total	<0.00050	-	DLDS	0.00050	mg/L	-		30-SEP-20	R5242907
Tin (Sn)-Total	<0.00050	-	DLDS	0.00050	mg/L	-		30-SEP-20	R5242907
Titanium (Ti)-Total	<0.0015	-	DLDS	0.0015	mg/L	-		30-SEP-20	R5242907
Tungsten (W)-Total	<0.00050	-	DLDS	0.00050	mg/L	-		30-SEP-20	R5242907
Uranium (U)-Total	0.0138	+/-0.0019	DLDS	0.000050	mg/L	0		30-SEP-20	R5242907
Vanadium (V)-Total	<0.0025	-	DLDS	0.0025	mg/L	-		30-SEP-20	R5242907
Zinc (Zn)-Total	0.048	+/-0.005	DLDS	0.015	mg/L	0		30-SEP-20	R5242907
Zirconium (Zr)-Total	<0.0010	-	DLDS	0.0010	mg/L	-		30-SEP-20	R5242907
Total Nitrogen									
Nitrate in Water by IC									
Nitrate (as N)	6.40	-	DLDS	0.40	mg/L	-		26-SEP-20	R5241384
Nitrite in Water by IC									
Nitrite (as N)	0.48	-	DLDS	0.20	mg/L	-		26-SEP-20	R5241384
Total Nitrogen (Calculation)									
Total Nitrogen	26.1	-		1.1	mg/L	-		30-SEP-20	
L2508433-2 UPSTREAM									
Sampled By: JHN on 24-SEP-20 @ 08:57									
Matrix: WATER									
Miscellaneous Parameters									
Ammonia, Total (as N)	<0.050	-		0.050	mg/L	-		29-SEP-20	R5242826
BOD Carbonaceous	6.1	+/-1.4	BODQ	2.0	mg/L	0		26-SEP-20	R5244047
Hardness (as CaCO3)	317	-		0.60	mg/L	-		02-OCT-20	
Total Dissolved Solids	506	-	DLDS	20	mg/L	-		28-SEP-20	R5242029
Total Kjeldahl Nitrogen	1.92	+/-0.36		0.20	mg/L	0		28-SEP-20	R5241953
Total Suspended Solids	21.7	+/-3.2		3.0	mg/L	0		28-SEP-20	R5241839
Ammonia, Un-ionized (as N), 15C, WSER	<0.0031	-		0.0031	mg/L	-		01-OCT-20	
pH	8.45	+/-0.07		0.10	pH	0		26-SEP-20	R5240057
pH at 15C, WSER	8.38	-		0.10	pH	-		30-SEP-20	R5242731
Total Coliform, E. Coli - Quanti-Tray									
Total Coliforms	1550	-		0	MPN/100mL	-	25-SEP-20	25-SEP-20	R5238777
Escherichia Coli	687	-		0	MPN/100mL	-	25-SEP-20	25-SEP-20	R5238777
Volatile & Fixed Suspend Solids									
Volatile Suspended Solids	10.8	-		3.0	mg/L	-	06-OCT-20	06-OCT-20	R5251062
Fixed Suspended Solids	10.3	-		3.0	mg/L	-	06-OCT-20	06-OCT-20	R5251062
Dissolved Metals in Water by CRC ICPMS									
Dissolved Metals Filtration Location	LAB	-	SFP			-		29-SEP-20	R5242409
Calcium (Ca)-Dissolved	47.6	+/-6.8		0.050	mg/L	0		30-SEP-20	R5243087
Magnesium (Mg)-Dissolved	48.1	+/-4.4		0.0050	mg/L	0		30-SEP-20	R5243087
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0762	+/-0.011		0.0030	mg/L	0		30-SEP-20	R5242907
Antimony (Sb)-Total	0.00021	+/-0.00005		0.00010	mg/L	0		30-SEP-20	R5242907
Arsenic (As)-Total	0.00319	+/-0.00032		0.00010	mg/L	0		30-SEP-20	R5242907
Barium (Ba)-Total	0.0476	+/-0.0050		0.00010	mg/L	0		30-SEP-20	R5242907
Beryllium (Be)-Total	<0.00010	-		0.00010	mg/L	-		30-SEP-20	R5242907
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		30-SEP-20	R5242907
Boron (B)-Total	0.070	+/-0.010		0.010	mg/L	0		30-SEP-20	R5242907
Cadmium (Cd)-Total	<0.0000050	-		0.0000050	mg/L	-		30-SEP-20	R5242907
Calcium (Ca)-Total	44.4	+/-5.8		0.050	mg/L	0		30-SEP-20	R5242907
Cesium (Cs)-Total	0.000010	-		0.000010	mg/L	-		30-SEP-20	R5242907
Chromium (Cr)-Total	0.00019	+/-0.00006		0.00010	mg/L	0		30-SEP-20	R5242907

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L2508433-2 UPSTREAM									
Sampled By: JHN on 24-SEP-20 @ 08:57									
Matrix: WATER									
Total Metals in Water by CRC ICPMS									
Cobalt (Co)-Total	0.00033	+/-0.00004		0.00010	mg/L	0		30-SEP-20	R5242907
Copper (Cu)-Total	0.00075	+/-0.00022		0.00050	mg/L	0		30-SEP-20	R5242907
Iron (Fe)-Total	0.293	+/-0.030		0.010	mg/L	0		30-SEP-20	R5242907
Lead (Pb)-Total	0.000167	+/-0.000037		0.000050	mg/L	0		30-SEP-20	R5242907
Lithium (Li)-Total	0.0479	+/-0.0069		0.0010	mg/L	0		30-SEP-20	R5242907
Magnesium (Mg)-Total	44.3	+/-4.7		0.0050	mg/L	0		30-SEP-20	R5242907
Manganese (Mn)-Total	0.260	+/-0.025		0.00010	mg/L	0		30-SEP-20	R5242907
Molybdenum (Mo)-Total	0.00236	+/-0.00030		0.000050	mg/L	0		30-SEP-20	R5242907
Nickel (Ni)-Total	0.00166	+/-0.00021		0.00050	mg/L	0		30-SEP-20	R5242907
Potassium (K)-Total	8.81	+/-0.98		0.050	mg/L	0		30-SEP-20	R5242907
Phosphorus (P)-Total	0.170	+/-0.033		0.050	mg/L	0		30-SEP-20	R5242907
Rubidium (Rb)-Total	0.00140	-		0.00020	mg/L	-		30-SEP-20	R5242907
Selenium (Se)-Total	0.000270	+/-0.000032		0.000050	mg/L	0		30-SEP-20	R5242907
Silicon (Si)-Total	0.58	+/-0.08		0.10	mg/L	+7%		30-SEP-20	R5242907
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		30-SEP-20	R5242907
Sodium (Na)-Total	53.0	+/-5.8		0.050	mg/L	0		30-SEP-20	R5242907
Strontium (Sr)-Total	0.313	+/-0.041		0.00020	mg/L	0		30-SEP-20	R5242907
Sulfur (S)-Total	72.6	-		0.50	mg/L	-		30-SEP-20	R5242907
Tellurium (Te)-Total	<0.00020	-		0.00020	mg/L	-		30-SEP-20	R5242907
Thallium (Tl)-Total	<0.000010	-		0.000010	mg/L	-		30-SEP-20	R5242907
Thorium (Th)-Total	<0.00010	-		0.00010	mg/L	-		30-SEP-20	R5242907
Tin (Sn)-Total	<0.00010	-		0.00010	mg/L	-		30-SEP-20	R5242907
Titanium (Ti)-Total	0.00239	+/-0.00052		0.00030	mg/L	0		30-SEP-20	R5242907
Tungsten (W)-Total	<0.00010	-		0.00010	mg/L	-		30-SEP-20	R5242907
Uranium (U)-Total	0.00354	+/-0.00049		0.000010	mg/L	0		30-SEP-20	R5242907
Vanadium (V)-Total	0.00140	+/-0.00015		0.00050	mg/L	0		30-SEP-20	R5242907
Zinc (Zn)-Total	<0.0030	-		0.0030	mg/L	-		30-SEP-20	R5242907
Zirconium (Zr)-Total	<0.00020	-		0.00020	mg/L	-		30-SEP-20	R5242907
Total Nitrogen									
Nitrate in Water by IC									
Nitrate (as N)	<0.020	-		0.020	mg/L	-		26-SEP-20	R5241384
Nitrite in Water by IC									
Nitrite (as N)	<0.010	-		0.010	mg/L	-		26-SEP-20	R5241384
Total Nitrogen (Calculation)									
Total Nitrogen	1.92	-		0.20	mg/L	-		29-SEP-20	
L2508433-3 DS-01									
Sampled By: JHN on 24-SEP-20 @ 10:23									
Matrix: WATER									
Miscellaneous Parameters									
Ammonia, Total (as N)	6.3	+/-0.6	DLHC	2.5	mg/L	0		29-SEP-20	R5242826
BOD Carbonaceous	5.9	+/-1.4	BODQ	2.0	mg/L	0		26-SEP-20	R5244047
Hardness (as CaCO3)	725	-		0.63	mg/L	-		02-OCT-20	
Total Dissolved Solids	2080	-	DLDS	20	mg/L	-		28-SEP-20	R5242029
Total Kjeldahl Nitrogen	8.9	+/-1.6	DLHC	1.0	mg/L	0		30-SEP-20	R5241953
Total Suspended Solids	10.3	+/-1.9		3.0	mg/L	0		28-SEP-20	R5241839
Ammonia, Un-ionized (as N), 15C, WSER	0.112	-		0.044	mg/L	-		01-OCT-20	
pH	8.23	+/-0.07		0.10	pH	0		26-SEP-20	R5240057
pH at 15C, WSER	7.82	-		0.10	pH	-		30-SEP-20	R5242731
Total Coliform, E. Coli - Quanti-Tray									
Total Coliforms	>2420	-		0	MPN/100mL	-	25-SEP-20	25-SEP-20	R5238777

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L2508433-3 DS-01									
Sampled By: JHN on 24-SEP-20 @ 10:23									
Matrix: WATER									
Total Coliform, E. Coli - Quanti-Tray									
Escherichia Coli	>2420	-		0	MPN/100mL	-	25-SEP-20	25-SEP-20	R5238777
Volatile & Fixed Suspend Solids									
Volatile Suspended Solids	4.2	-		3.0	mg/L	-	06-OCT-20	06-OCT-20	R5251062
Fixed Suspended Solids	6.7	-		3.0	mg/L	-	06-OCT-20	06-OCT-20	R5251062
Dissolved Metals in Water by CRC ICPMS									
Dissolved Metals Filtration Location	LAB	-	SFP			-		29-SEP-20	R5242409
Calcium (Ca)-Dissolved	153	+/-22	DLDS	0.25	mg/L	0		30-SEP-20	R5243087
Magnesium (Mg)-Dissolved	83.1	+/-7.7	DLDS	0.025	mg/L	0		30-SEP-20	R5243087
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.024	+/-0.005	DLDS	0.015	mg/L	0		30-SEP-20	R5242907
Antimony (Sb)-Total	<0.00050	-	DLDS	0.00050	mg/L	-		30-SEP-20	R5242907
Arsenic (As)-Total	0.00157	+/-0.00016	DLDS	0.00050	mg/L	0		30-SEP-20	R5242907
Barium (Ba)-Total	0.0638	+/-0.0067	DLDS	0.00050	mg/L	0		30-SEP-20	R5242907
Beryllium (Be)-Total	<0.00050	-	DLDS	0.00050	mg/L	-		30-SEP-20	R5242907
Bismuth (Bi)-Total	<0.00025	-	DLDS	0.00025	mg/L	-		30-SEP-20	R5242907
Boron (B)-Total	0.232	+/-0.033	DLDS	0.050	mg/L	0		30-SEP-20	R5242907
Cadmium (Cd)-Total	<0.000025	-	DLDS	0.000025	mg/L	-		30-SEP-20	R5242907
Calcium (Ca)-Total	160	+/-21	DLDS	0.25	mg/L	0		30-SEP-20	R5242907
Cesium (Cs)-Total	<0.000050	-	DLDS	0.000050	mg/L	-		30-SEP-20	R5242907
Chromium (Cr)-Total	<0.00050	-	DLDS	0.00050	mg/L	-		30-SEP-20	R5242907
Cobalt (Co)-Total	0.00056	+/-0.00006	DLDS	0.00050	mg/L	0		30-SEP-20	R5242907
Copper (Cu)-Total	0.0059	+/-0.0006	DLDS	0.0025	mg/L	0		30-SEP-20	R5242907
Iron (Fe)-Total	0.181	+/-0.019	DLDS	0.050	mg/L	0		30-SEP-20	R5242907
Lead (Pb)-Total	0.00032	+/-0.00006	DLDS	0.00025	mg/L	0		30-SEP-20	R5242907
Lithium (Li)-Total	0.0894	+/-0.013	DLDS	0.0050	mg/L	0		30-SEP-20	R5242907
Magnesium (Mg)-Total	85.4	+/-9.1	DLDS	0.025	mg/L	0		30-SEP-20	R5242907
Manganese (Mn)-Total	0.139	+/-0.014	DLDS	0.00050	mg/L	0		30-SEP-20	R5242907
Molybdenum (Mo)-Total	0.00815	+/-0.0010	DLDS	0.00025	mg/L	0		30-SEP-20	R5242907
Nickel (Ni)-Total	0.0026	+/-0.0003	DLDS	0.0025	mg/L	0		30-SEP-20	R5242907
Potassium (K)-Total	20.1	+/-2.2	DLDS	0.25	mg/L	0		30-SEP-20	R5242907
Phosphorus (P)-Total	3.03	+/-0.43	DLDS	0.25	mg/L	0		30-SEP-20	R5242907
Rubidium (Rb)-Total	0.0099	-	DLDS	0.0010	mg/L	-		30-SEP-20	R5242907
Selenium (Se)-Total	0.00072	+/-0.00008	DLDS	0.00025	mg/L	0		30-SEP-20	R5242907
Silicon (Si)-Total	12.3	+/-1.6	DLDS	0.50	mg/L	+7%		30-SEP-20	R5242907
Silver (Ag)-Total	<0.000050	-	DLDS	0.000050	mg/L	-		30-SEP-20	R5242907
Sodium (Na)-Total	444	+/-49	DLDS	0.25	mg/L	0		30-SEP-20	R5242907
Strontium (Sr)-Total	0.808	+/-0.11	DLDS	0.0010	mg/L	0		30-SEP-20	R5242907
Sulfur (S)-Total	152	-	DLDS	2.5	mg/L	-		30-SEP-20	R5242907
Tellurium (Te)-Total	<0.0010	-	DLDS	0.0010	mg/L	-		30-SEP-20	R5242907
Thallium (Tl)-Total	<0.000050	-	DLDS	0.000050	mg/L	-		30-SEP-20	R5242907
Thorium (Th)-Total	<0.00050	-	DLDS	0.00050	mg/L	-		30-SEP-20	R5242907
Tin (Sn)-Total	<0.00050	-	DLDS	0.00050	mg/L	-		30-SEP-20	R5242907
Titanium (Ti)-Total	<0.0015	-	DLDS	0.0015	mg/L	-		30-SEP-20	R5242907
Tungsten (W)-Total	<0.00050	-	DLDS	0.00050	mg/L	-		30-SEP-20	R5242907
Uranium (U)-Total	0.0124	+/-0.0017	DLDS	0.000050	mg/L	0		30-SEP-20	R5242907
Vanadium (V)-Total	<0.0025	-	DLDS	0.0025	mg/L	-		30-SEP-20	R5242907
Zinc (Zn)-Total	0.026	+/-0.003	DLDS	0.015	mg/L	0		30-SEP-20	R5242907
Zirconium (Zr)-Total	<0.0010	-	DLDS	0.0010	mg/L	-		30-SEP-20	R5242907
Total Nitrogen									
Nitrate in Water by IC									
Nitrate (as N)	5.09	-	DLDS	0.40	mg/L	-		26-SEP-20	R5241384
Nitrite in Water by IC									

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L2508433-3 DS-01									
Sampled By: JHN on 24-SEP-20 @ 10:23									
Matrix: WATER									
Nitrite in Water by IC									
Nitrite (as N)	0.48	-	DLDS	0.20	mg/L	-		26-SEP-20	R5241384
Total Nitrogen (Calculation)									
Total Nitrogen	14.5	-		1.1	mg/L	-		30-SEP-20	
L2508433-4 DS-02									
Sampled By: JHN on 24-SEP-20 @ 10:55									
Matrix: WATER									
Miscellaneous Parameters									
Ammonia, Total (as N)	0.057	+/-0.009		0.050	mg/L	0		29-SEP-20	R5242826
BOD Carbonaceous	<2.0	-		2.0	mg/L	-		26-SEP-20	R5244047
Hardness (as CaCO3)	601	-		0.60	mg/L	-		02-OCT-20	
Total Dissolved Solids	1630	-	DLDS	20	mg/L	-		28-SEP-20	R5242029
Total Kjeldahl Nitrogen	1.13	+/-0.22		0.20	mg/L	0		28-SEP-20	R5241953
Total Suspended Solids	<3.0	-		3.0	mg/L	-		28-SEP-20	R5241839
Ammonia, Un-ionized (as N), 15C, WSER	0.0057	-		0.0050	mg/L	-		01-OCT-20	
pH	8.69	+/-0.07		0.10	pH	0		26-SEP-20	R5240057
pH at 15C, WSER	8.61	-		0.10	pH	-		30-SEP-20	R5242731
Total Coliform, E. Coli - Quanti-Tray									
Total Coliforms	1990	-		0	MPN/100mL	-	25-SEP-20	25-SEP-20	R5238777
Escherichia Coli	7	-		0	MPN/100mL	-	25-SEP-20	25-SEP-20	R5238777
Volatile & Fixed Suspend Solids									
Volatile Suspended Solids	<3.0	-		3.0	mg/L	-	06-OCT-20	06-OCT-20	R5251062
Fixed Suspended Solids	3.3	-		3.0	mg/L	-	06-OCT-20	06-OCT-20	R5251062
Dissolved Metals in Water by CRC ICPMS									
Dissolved Metals Filtration Location	LAB	-	SFP			-		29-SEP-20	R5242409
Calcium (Ca)-Dissolved	114	+/-16	DLDS	0.10	mg/L	0		30-SEP-20	R5243087
Magnesium (Mg)-Dissolved	76.7	+/-7.1	DLDS	0.010	mg/L	0		30-SEP-20	R5243087
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.0218	+/-0.0043	DLDS	0.0060	mg/L	0		30-SEP-20	R5242907
Antimony (Sb)-Total	0.00021	+/-0.00005	DLDS	0.00020	mg/L	0		30-SEP-20	R5242907
Arsenic (As)-Total	0.00268	+/-0.00027	DLDS	0.00020	mg/L	0		30-SEP-20	R5242907
Barium (Ba)-Total	0.0407	+/-0.0043	DLDS	0.00020	mg/L	0		30-SEP-20	R5242907
Beryllium (Be)-Total	<0.00020	-	DLDS	0.00020	mg/L	-		30-SEP-20	R5242907
Bismuth (Bi)-Total	<0.00010	-	DLDS	0.00010	mg/L	-		30-SEP-20	R5242907
Boron (B)-Total	0.104	+/-0.015	DLDS	0.020	mg/L	0		30-SEP-20	R5242907
Cadmium (Cd)-Total	<0.000010	-	DLDS	0.000010	mg/L	-		30-SEP-20	R5242907
Calcium (Ca)-Total	115	+/-15	DLDS	0.10	mg/L	0		30-SEP-20	R5242907
Cesium (Cs)-Total	<0.000020	-	DLDS	0.000020	mg/L	-		30-SEP-20	R5242907
Chromium (Cr)-Total	<0.00020	-	DLDS	0.00020	mg/L	-		30-SEP-20	R5242907
Cobalt (Co)-Total	0.00054	+/-0.00006	DLDS	0.00020	mg/L	0		30-SEP-20	R5242907
Copper (Cu)-Total	<0.0010	-	DLDS	0.0010	mg/L	-		30-SEP-20	R5242907
Iron (Fe)-Total	0.060	+/-0.007	DLDS	0.020	mg/L	0		30-SEP-20	R5242907
Lead (Pb)-Total	<0.00010	-	DLDS	0.00010	mg/L	-		30-SEP-20	R5242907
Lithium (Li)-Total	0.0770	+/-0.011	DLDS	0.0020	mg/L	0		30-SEP-20	R5242907
Magnesium (Mg)-Total	77.0	+/-8.2	DLDS	0.010	mg/L	0		30-SEP-20	R5242907
Manganese (Mn)-Total	0.0281	+/-0.0027	DLDS	0.00020	mg/L	0		30-SEP-20	R5242907
Molybdenum (Mo)-Total	0.00445	+/-0.00057	DLDS	0.00010	mg/L	0		30-SEP-20	R5242907
Nickel (Ni)-Total	0.0037	+/-0.0004	DLDS	0.0010	mg/L	0		30-SEP-20	R5242907
Potassium (K)-Total	19.5	+/-2.2	DLDS	0.10	mg/L	0		30-SEP-20	R5242907
Phosphorus (P)-Total	2.45	+/-0.35	DLDS	0.10	mg/L	0		30-SEP-20	R5242907
Rubidium (Rb)-Total	0.00593	-	DLDS	0.00040	mg/L	-		30-SEP-20	R5242907

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L2508433-4 DS-02									
Sampled By: JHN on 24-SEP-20 @ 10:55									
Matrix: WATER									
Total Metals in Water by CRC ICPMS									
Selenium (Se)-Total	0.00034	+/-0.00004	DLDS	0.00010	mg/L	0		30-SEP-20	R5242907
Silicon (Si)-Total	2.29	+/-0.31	DLDS	0.20	mg/L	+7%		30-SEP-20	R5242907
Silver (Ag)-Total	<0.000020	-	DLDS	0.000020	mg/L	-		30-SEP-20	R5242907
Sodium (Na)-Total	368	+/-40	DLDS	0.10	mg/L	0		30-SEP-20	R5242907
Strontium (Sr)-Total	0.637	+/-0.083	DLDS	0.00040	mg/L	0		30-SEP-20	R5242907
Sulfur (S)-Total	135	-	DLDS	1.0	mg/L	-		30-SEP-20	R5242907
Tellurium (Te)-Total	<0.00040	-	DLDS	0.00040	mg/L	-		30-SEP-20	R5242907
Thallium (Tl)-Total	<0.000020	-	DLDS	0.000020	mg/L	-		30-SEP-20	R5242907
Thorium (Th)-Total	<0.00020	-	DLDS	0.00020	mg/L	-		30-SEP-20	R5242907
Tin (Sn)-Total	<0.00020	-	DLDS	0.00020	mg/L	-		30-SEP-20	R5242907
Titanium (Ti)-Total	0.00097	+/-0.00026	DLDS	0.00060	mg/L	0		30-SEP-20	R5242907
Tungsten (W)-Total	<0.00020	-	DLDS	0.00020	mg/L	-		30-SEP-20	R5242907
Uranium (U)-Total	0.00581	+/-0.00080	DLDS	0.000020	mg/L	0		30-SEP-20	R5242907
Vanadium (V)-Total	0.0017	+/-0.0002	DLDS	0.0010	mg/L	0		30-SEP-20	R5242907
Zinc (Zn)-Total	<0.0060	-	DLDS	0.0060	mg/L	-		30-SEP-20	R5242907
Zirconium (Zr)-Total	<0.00040	-	DLDS	0.00040	mg/L	-		30-SEP-20	R5242907
Total Nitrogen									
Nitrate in Water by IC									
Nitrate (as N)	<0.20	-	DLDS	0.20	mg/L	-		26-SEP-20	R5241384
Nitrite in Water by IC									
Nitrite (as N)	<0.10	-	DLDS	0.10	mg/L	-		26-SEP-20	R5241384
Total Nitrogen (Calculation)									
Total Nitrogen	1.13	-		0.30	mg/L	-		29-SEP-20	
L2508433-5 DS-03									
Sampled By: JHN on 24-SEP-20 @ 11:35									
Matrix: WATER									
Miscellaneous Parameters									
Ammonia, Total (as N)	<0.050	-		0.050	mg/L	-		29-SEP-20	R5242826
BOD Carbonaceous	3.8	+/-1.0	BODQ	2.0	mg/L	0		26-SEP-20	R5244047
Hardness (as CaCO3)	701	-		0.60	mg/L	-		02-OCT-20	
Total Dissolved Solids	1230	-	DLDS	20	mg/L	-		28-SEP-20	R5242029
Total Kjeldahl Nitrogen	1.64	+/-0.31		0.20	mg/L	0		28-SEP-20	R5241953
Total Suspended Solids	15.3	+/-2.4		3.0	mg/L	0		28-SEP-20	R5241839
Ammonia, Un-ionized (as N), 15C, WSER	<0.0036	-		0.0036	mg/L	-		01-OCT-20	
pH	8.58	+/-0.07		0.10	pH	0		26-SEP-20	R5240057
pH at 15C, WSER	8.45	-		0.10	pH	-		30-SEP-20	R5242731
Total Coliform, E. Coli - Quanti-Tray									
Total Coliforms	>2420	-		0	MPN/100mL	-	25-SEP-20	25-SEP-20	R5238777
Escherichia Coli	12	-		0	MPN/100mL	-	25-SEP-20	25-SEP-20	R5238777
Volatile & Fixed Suspend Solids									
Volatile Suspended Solids	5.4	-		3.0	mg/L	-	06-OCT-20	06-OCT-20	R5251062
Fixed Suspended Solids	11.1	-		3.0	mg/L	-	06-OCT-20	06-OCT-20	R5251062
Dissolved Metals in Water by CRC ICPMS									
Dissolved Metals Filtration Location	LAB	-	SFP			-		29-SEP-20	R5242409
Calcium (Ca)-Dissolved	79.7	+/-11	DLDS	0.10	mg/L	0		30-SEP-20	R5243087
Magnesium (Mg)-Dissolved	122	+/-11	DLDS	0.010	mg/L	0		30-SEP-20	R5243087
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.132	+/-0.018	DLDS	0.0060	mg/L	0		30-SEP-20	R5242907
Antimony (Sb)-Total	0.00022	+/-0.00005	DLDS	0.00020	mg/L	0		30-SEP-20	R5242907
Arsenic (As)-Total	0.00337	+/-0.00034	DLDS	0.00020	mg/L	0		30-SEP-20	R5242907

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L2508433-5 DS-03									
Sampled By: JHN on 24-SEP-20 @ 11:35									
Matrix: WATER									
Total Metals in Water by CRC ICPMS									
Barium (Ba)-Total	0.0463	+/-0.0049	DLDS	0.00020	mg/L	0		30-SEP-20	R5242907
Beryllium (Be)-Total	<0.00020	-	DLDS	0.00020	mg/L	-		30-SEP-20	R5242907
Bismuth (Bi)-Total	<0.00010	-	DLDS	0.00010	mg/L	-		30-SEP-20	R5242907
Boron (B)-Total	0.151	+/-0.021	DLDS	0.020	mg/L	0		30-SEP-20	R5242907
Cadmium (Cd)-Total	0.000010	+/-0.000004	DLDS	0.000010	mg/L	0		30-SEP-20	R5242907
Calcium (Ca)-Total	78.5	+/-10	DLDS	0.10	mg/L	0		30-SEP-20	R5242907
Cesium (Cs)-Total	<0.000020	-	DLDS	0.000020	mg/L	-		30-SEP-20	R5242907
Chromium (Cr)-Total	0.00028	+/-0.00007	DLDS	0.00020	mg/L	0		30-SEP-20	R5242907
Cobalt (Co)-Total	0.00047	+/-0.00005	DLDS	0.00020	mg/L	0		30-SEP-20	R5242907
Copper (Cu)-Total	<0.0010	-	DLDS	0.0010	mg/L	-		30-SEP-20	R5242907
Iron (Fe)-Total	0.376	+/-0.039	DLDS	0.020	mg/L	0		30-SEP-20	R5242907
Lead (Pb)-Total	0.00029	+/-0.00005	DLDS	0.00010	mg/L	0		30-SEP-20	R5242907
Lithium (Li)-Total	0.116	+/-0.017	DLDS	0.0020	mg/L	0		30-SEP-20	R5242907
Magnesium (Mg)-Total	123	+/-13	DLDS	0.010	mg/L	0		30-SEP-20	R5242907
Manganese (Mn)-Total	0.280	+/-0.027	DLDS	0.00020	mg/L	0		30-SEP-20	R5242907
Molybdenum (Mo)-Total	0.00352	+/-0.00045	DLDS	0.00010	mg/L	0		30-SEP-20	R5242907
Nickel (Ni)-Total	0.0029	+/-0.0003	DLDS	0.0010	mg/L	0		30-SEP-20	R5242907
Potassium (K)-Total	29.2	+/-3.2	DLDS	0.10	mg/L	0		30-SEP-20	R5242907
Phosphorus (P)-Total	0.23	+/-0.04	DLDS	0.10	mg/L	0		30-SEP-20	R5242907
Rubidium (Rb)-Total	0.00316	-	DLDS	0.00040	mg/L	-		30-SEP-20	R5242907
Selenium (Se)-Total	0.00039	+/-0.00005	DLDS	0.00010	mg/L	0		30-SEP-20	R5242907
Silicon (Si)-Total	1.36	+/-0.18	DLDS	0.20	mg/L	+7%		30-SEP-20	R5242907
Silver (Ag)-Total	<0.000020	-	DLDS	0.000020	mg/L	-		30-SEP-20	R5242907
Sodium (Na)-Total	162	+/-18	DLDS	0.10	mg/L	0		30-SEP-20	R5242907
Strontium (Sr)-Total	0.444	+/-0.058	DLDS	0.00040	mg/L	0		30-SEP-20	R5242907
Sulfur (S)-Total	200	-	DLDS	1.0	mg/L	-		30-SEP-20	R5242907
Tellurium (Te)-Total	<0.00040	-	DLDS	0.00040	mg/L	-		30-SEP-20	R5242907
Thallium (Tl)-Total	<0.000020	-	DLDS	0.000020	mg/L	-		30-SEP-20	R5242907
Thorium (Th)-Total	<0.00020	-	DLDS	0.00020	mg/L	-		30-SEP-20	R5242907
Tin (Sn)-Total	<0.00020	-	DLDS	0.00020	mg/L	-		30-SEP-20	R5242907
Titanium (Ti)-Total	0.00414	+/-0.00086	DLDS	0.00060	mg/L	0		30-SEP-20	R5242907
Tungsten (W)-Total	<0.00020	-	DLDS	0.00020	mg/L	-		30-SEP-20	R5242907
Uranium (U)-Total	0.00520	+/-0.00071	DLDS	0.000020	mg/L	0		30-SEP-20	R5242907
Vanadium (V)-Total	0.0025	+/-0.0003	DLDS	0.0010	mg/L	0		30-SEP-20	R5242907
Zinc (Zn)-Total	<0.0060	-	DLDS	0.0060	mg/L	-		30-SEP-20	R5242907
Zirconium (Zr)-Total	<0.00040	-	DLDS	0.00040	mg/L	-		30-SEP-20	R5242907
Total Nitrogen									
Nitrate in Water by IC									
Nitrate (as N)	<0.10	-	DLDS	0.10	mg/L	-		26-SEP-20	R5241384
Nitrite in Water by IC									
Nitrite (as N)	<0.050	-	DLDS	0.050	mg/L	-		26-SEP-20	R5241384
Total Nitrogen (Calculation)									
Total Nitrogen	1.64	-		0.23	mg/L	-		29-SEP-20	
L2508433-6 DS-04									
Sampled By: JHN on 24-SEP-20 @ 12:19									
Matrix: WATER									
Miscellaneous Parameters									
Ammonia, Total (as N)	0.066	+/-0.010		0.050	mg/L	0		29-SEP-20	R5242826
BOD Carbonaceous	<2.0	-		2.0	mg/L	-		26-SEP-20	R5244047
Hardness (as CaCO3)	596	-		0.60	mg/L	-		02-OCT-20	
Total Dissolved Solids	1160	-	DLDS	20	mg/L	-		28-SEP-20	R5242029

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L2508433-6 DS-04									
Sampled By: JHN on 24-SEP-20 @ 12:19									
Matrix: WATER									
Total Kjeldahl Nitrogen	1.70	+/-0.32		0.20	mg/L	0		28-SEP-20	R5241953
Total Suspended Solids	16.7	+/-2.6		3.0	mg/L	0		28-SEP-20	R5241839
Ammonia, Un-ionized (as N), 15C, WSER	DF0029	-		0.0022	mg/L	-		01-OCT-20	
pH	8.40	+/-0.07		0.10	pH	0		26-SEP-20	R5240057
pH at 15C, WSER	8.23	-		0.10	pH	-		30-SEP-20	R5242731
Total Coliform, E. Coli - Quanti-Tray									
Total Coliforms	>2420	-		0	MPN/100mL	-	25-SEP-20	25-SEP-20	R5238777
Escherichia Coli	228	-		0	MPN/100mL	-	25-SEP-20	25-SEP-20	R5238777
Volatile & Fixed Suspend Solids									
Volatile Suspended Solids	<3.0	-		3.0	mg/L	-	06-OCT-20	06-OCT-20	R5251062
Fixed Suspended Solids	18.9	-		3.0	mg/L	-	06-OCT-20	06-OCT-20	R5251062
Dissolved Metals in Water by CRC ICPMS									
Dissolved Metals Filtration Location	LAB	-	SFP			-		29-SEP-20	R5242409
Calcium (Ca)-Dissolved	68.9	+/-9.8	DLDS	0.10	mg/L	0		30-SEP-20	R5243087
Magnesium (Mg)-Dissolved	103	+/-9.5	DLDS	0.010	mg/L	0		30-SEP-20	R5243087
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.227	+/-0.030	DLDS	0.0060	mg/L	0		30-SEP-20	R5242907
Antimony (Sb)-Total	0.00035	+/-0.00007	DLDS	0.00020	mg/L	0		30-SEP-20	R5242907
Arsenic (As)-Total	0.00313	+/-0.00031	DLDS	0.00020	mg/L	0		30-SEP-20	R5242907
Barium (Ba)-Total	0.0412	+/-0.0043	DLDS	0.00020	mg/L	0		30-SEP-20	R5242907
Beryllium (Be)-Total	<0.00020	-	DLDS	0.00020	mg/L	-		30-SEP-20	R5242907
Bismuth (Bi)-Total	<0.00010	-	DLDS	0.00010	mg/L	-		30-SEP-20	R5242907
Boron (B)-Total	0.144	+/-0.020	DLDS	0.020	mg/L	0		30-SEP-20	R5242907
Cadmium (Cd)-Total	0.000020	+/-0.000004	DLDS	0.000010	mg/L	0		30-SEP-20	R5242907
Calcium (Ca)-Total	68.3	+/-8.9	DLDS	0.10	mg/L	0		30-SEP-20	R5242907
Cesium (Cs)-Total	0.000037	-	DLDS	0.000020	mg/L	-		30-SEP-20	R5242907
Chromium (Cr)-Total	0.00031	+/-0.00007	DLDS	0.00020	mg/L	0		30-SEP-20	R5242907
Cobalt (Co)-Total	0.00079	+/-0.00009	DLDS	0.00020	mg/L	0		30-SEP-20	R5242907
Copper (Cu)-Total	0.0020	+/-0.0003	DLDS	0.0010	mg/L	0		30-SEP-20	R5242907
Iron (Fe)-Total	0.498	+/-0.051	DLDS	0.020	mg/L	0		30-SEP-20	R5242907
Lead (Pb)-Total	0.00028	+/-0.00005	DLDS	0.00010	mg/L	0		30-SEP-20	R5242907
Lithium (Li)-Total	0.122	+/-0.018	DLDS	0.0020	mg/L	0		30-SEP-20	R5242907
Magnesium (Mg)-Total	98.3	+/-11	DLDS	0.010	mg/L	0		30-SEP-20	R5242907
Manganese (Mn)-Total	0.291	+/-0.028	DLDS	0.00020	mg/L	0		30-SEP-20	R5242907
Molybdenum (Mo)-Total	0.00634	+/-0.00081	DLDS	0.00010	mg/L	0		30-SEP-20	R5242907
Nickel (Ni)-Total	0.0067	+/-0.0007	DLDS	0.0010	mg/L	0		30-SEP-20	R5242907
Potassium (K)-Total	27.3	+/-3.0	DLDS	0.10	mg/L	0		30-SEP-20	R5242907
Phosphorus (P)-Total	0.12	+/-0.03	DLDS	0.10	mg/L	0		30-SEP-20	R5242907
Rubidium (Rb)-Total	0.00430	-	DLDS	0.00040	mg/L	-		30-SEP-20	R5242907
Selenium (Se)-Total	0.00050	+/-0.00006	DLDS	0.00010	mg/L	0		30-SEP-20	R5242907
Silicon (Si)-Total	2.13	+/-0.29	DLDS	0.20	mg/L	+7%		30-SEP-20	R5242907
Silver (Ag)-Total	<0.000020	-	DLDS	0.000020	mg/L	-		30-SEP-20	R5242907
Sodium (Na)-Total	150	+/-16	DLDS	0.10	mg/L	0		30-SEP-20	R5242907
Strontium (Sr)-Total	0.430	+/-0.056	DLDS	0.00040	mg/L	0		30-SEP-20	R5242907
Sulfur (S)-Total	189	-	DLDS	1.0	mg/L	-		30-SEP-20	R5242907
Tellurium (Te)-Total	<0.00040	-	DLDS	0.00040	mg/L	-		30-SEP-20	R5242907
Thallium (Tl)-Total	<0.000020	-	DLDS	0.000020	mg/L	-		30-SEP-20	R5242907
Thorium (Th)-Total	<0.00020	-	DLDS	0.00020	mg/L	-		30-SEP-20	R5242907
Tin (Sn)-Total	<0.00020	-	DLDS	0.00020	mg/L	-		30-SEP-20	R5242907
Titanium (Ti)-Total	0.00550	+/-0.0011	DLDS	0.00060	mg/L	0		30-SEP-20	R5242907
Tungsten (W)-Total	<0.00020	-	DLDS	0.00020	mg/L	-		30-SEP-20	R5242907
Uranium (U)-Total	0.00495	+/-0.00068	DLDS	0.000020	mg/L	0		30-SEP-20	R5242907

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L2508433-6 DS-04									
Sampled By: JHN on 24-SEP-20 @ 12:19									
Matrix: WATER									
Total Metals in Water by CRC ICPMS									
Vanadium (V)-Total	0.0019	+/-0.0002	DLDS	0.0010	mg/L	0		30-SEP-20	R5242907
Zinc (Zn)-Total	<0.0060	-	DLDS	0.0060	mg/L	-		30-SEP-20	R5242907
Zirconium (Zr)-Total	<0.00040	-	DLDS	0.00040	mg/L	-		30-SEP-20	R5242907
Total Nitrogen									
Nitrate in Water by IC									
Nitrate (as N)	<0.10	-	DLDS	0.10	mg/L	-		26-SEP-20	R5241384
Nitrite in Water by IC									
Nitrite (as N)	<0.050	-	DLDS	0.050	mg/L	-		26-SEP-20	R5241384
Total Nitrogen (Calculation)									
Total Nitrogen	1.70	-		0.23	mg/L	-		29-SEP-20	
L2508433-7 DS-05									
Sampled By: JHN on 24-SEP-20 @ 13:06									
Matrix: WATER									
Miscellaneous Parameters									
Ammonia, Total (as N)	<0.050	-		0.050	mg/L	-		29-SEP-20	R5242826
BOD Carbonaceous	<2.0	-		2.0	mg/L	-		26-SEP-20	R5244047
Hardness (as CaCO3)	375	-		0.60	mg/L	-		02-OCT-20	
Total Dissolved Solids	472	-	DLDS	20	mg/L	-		28-SEP-20	R5242029
Total Kjeldahl Nitrogen	1.00	+/-0.19		0.20	mg/L	0		28-SEP-20	R5241953
Total Suspended Solids	134	+/-18		3.0	mg/L	0		28-SEP-20	R5241839
Ammonia, Un-ionized (as N), 15C, WSER	<0.0029	-		0.0029	mg/L	-		01-OCT-20	
pH	8.51	+/-0.07		0.10	pH	0		26-SEP-20	R5240057
pH at 15C, WSER	8.35	-		0.10	pH	-		30-SEP-20	R5242731
Total Coliform, E. Coli - Quanti-Tray									
Total Coliforms	>2420	-		0	MPN/100mL	-	25-SEP-20	25-SEP-20	R5238777
Escherichia Coli	70	-		0	MPN/100mL	-	25-SEP-20	25-SEP-20	R5238777
Volatile & Fixed Suspend Solids									
Volatile Suspended Solids	15.4	-		3.0	mg/L	-	06-OCT-20	06-OCT-20	R5251062
Fixed Suspended Solids	127	-		3.0	mg/L	-	06-OCT-20	06-OCT-20	R5251062
Dissolved Metals in Water by CRC ICPMS									
Dissolved Metals Filtration Location	LAB	-	SFP			-		29-SEP-20	R5242409
Calcium (Ca)-Dissolved	83.0	+/-12		0.050	mg/L	0		30-SEP-20	R5243087
Magnesium (Mg)-Dissolved	40.7	+/-3.8		0.0050	mg/L	0		30-SEP-20	R5243087
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.616	+/-0.079		0.0030	mg/L	0		01-OCT-20	R5243348
Antimony (Sb)-Total	0.00025	+/-0.00006		0.00010	mg/L	0		01-OCT-20	R5243348
Arsenic (As)-Total	0.00694	+/-0.00069		0.00010	mg/L	0		01-OCT-20	R5243348
Barium (Ba)-Total	0.0644	+/-0.0068		0.00010	mg/L	0		01-OCT-20	R5243348
Beryllium (Be)-Total	<0.00010	-		0.00010	mg/L	-		01-OCT-20	R5243348
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		01-OCT-20	R5243348
Boron (B)-Total	0.089	+/-0.013		0.010	mg/L	0		01-OCT-20	R5243348
Cadmium (Cd)-Total	0.0000637	+/-0.0000078		0.0000050	mg/L	0		01-OCT-20	R5243348
Calcium (Ca)-Total	81.7	+/-11		0.050	mg/L	0		01-OCT-20	R5243348
Cesium (Cs)-Total	0.000121	-		0.000010	mg/L	-		01-OCT-20	R5243348
Chromium (Cr)-Total	0.00096	+/-0.00013		0.00010	mg/L	0		01-OCT-20	R5243348
Cobalt (Co)-Total	0.00098	+/-0.00011		0.00010	mg/L	0		01-OCT-20	R5243348
Copper (Cu)-Total	0.00366	+/-0.00039		0.00050	mg/L	0		01-OCT-20	R5243348
Iron (Fe)-Total	1.28	+/-0.13		0.010	mg/L	0		01-OCT-20	R5243348
Lead (Pb)-Total	0.00103	+/-0.00015		0.000050	mg/L	0		01-OCT-20	R5243348
Lithium (Li)-Total	0.0415	+/-0.0060		0.0010	mg/L	0		01-OCT-20	R5243348

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L2508433-7 DS-05									
Sampled By: JHN on 24-SEP-20 @ 13:06									
Matrix: WATER									
Total Metals in Water by CRC ICPMS									
Magnesium (Mg)-Total	40.2	+/-4.3		0.0050	mg/L	0		01-OCT-20	R5243348
Manganese (Mn)-Total	0.152	+/-0.015		0.00010	mg/L	0		01-OCT-20	R5243348
Molybdenum (Mo)-Total	0.00252	+/-0.00032		0.000050	mg/L	0		01-OCT-20	R5243348
Nickel (Ni)-Total	0.00546	+/-0.00059		0.00050	mg/L	0		01-OCT-20	R5243348
Potassium (K)-Total	7.52	+/-0.84		0.050	mg/L	0		01-OCT-20	R5243348
Phosphorus (P)-Total	0.152	+/-0.030		0.050	mg/L	0		01-OCT-20	R5243348
Rubidium (Rb)-Total	0.00326	-		0.00020	mg/L	-		01-OCT-20	R5243348
Selenium (Se)-Total	0.000395	+/-0.000046		0.000050	mg/L	0		01-OCT-20	R5243348
Silicon (Si)-Total	9.43	+/-1.3		0.10	mg/L	+7%		01-OCT-20	R5243348
Silver (Ag)-Total	<0.000010	-		0.000010	mg/L	-		01-OCT-20	R5243348
Sodium (Na)-Total	20.6	+/-2.3		0.050	mg/L	0		01-OCT-20	R5243348
Strontium (Sr)-Total	0.281	+/-0.037		0.00020	mg/L	0		01-OCT-20	R5243348
Sulfur (S)-Total	39.0	-		0.50	mg/L	-		01-OCT-20	R5243348
Tellurium (Te)-Total	<0.00020	-		0.00020	mg/L	-		01-OCT-20	R5243348
Thallium (Tl)-Total	0.000031	+/-0.000007		0.000010	mg/L	0		01-OCT-20	R5243348
Thorium (Th)-Total	0.00010	-		0.00010	mg/L	-		01-OCT-20	R5243348
Tin (Sn)-Total	<0.00010	-		0.00010	mg/L	-		01-OCT-20	R5243348
Titanium (Ti)-Total	0.0144	+/-0.0029		0.00030	mg/L	0		01-OCT-20	R5243348
Tungsten (W)-Total	<0.00010	-		0.00010	mg/L	-		01-OCT-20	R5243348
Uranium (U)-Total	0.00212	+/-0.00029		0.000010	mg/L	0		01-OCT-20	R5243348
Vanadium (V)-Total	0.00497	+/-0.00053		0.00050	mg/L	0		01-OCT-20	R5243348
Zinc (Zn)-Total	0.0068	+/-0.0026		0.0030	mg/L	0		01-OCT-20	R5243348
Zirconium (Zr)-Total	0.00062	-		0.00020	mg/L	-		01-OCT-20	R5243348
Total Nitrogen									
Nitrate in Water by IC									
Nitrate (as N)	<0.020	-		0.020	mg/L	-		26-SEP-20	R5241384
Nitrite in Water by IC									
Nitrite (as N)	<0.010	-		0.010	mg/L	-		26-SEP-20	R5241384
Total Nitrogen (Calculation)									
Total Nitrogen	1.00	-		0.20	mg/L	-		29-SEP-20	
L2508433-8 DS-06									
Sampled By: JHN on 24-SEP-20 @ 13:06									
Matrix: WATER									
Miscellaneous Parameters									
Ammonia, Total (as N)	<0.050	-		0.050	mg/L	-		29-SEP-20	R5242826
BOD Carbonaceous	<2.0	-		2.0	mg/L	-		26-SEP-20	R5244047
Hardness (as CaCO3)	372	-		0.60	mg/L	-		02-OCT-20	
Total Dissolved Solids	461	-	DLDS	20	mg/L	-		28-SEP-20	R5242029
Total Kjeldahl Nitrogen	1.18	+/-0.23		0.20	mg/L	0		28-SEP-20	R5241953
Total Suspended Solids	119	+/-16		3.0	mg/L	0		28-SEP-20	R5241839
Ammonia, Un-ionized (as N), 15C, WSER	<0.0029	-		0.0029	mg/L	-		01-OCT-20	
pH	8.52	+/-0.07		0.10	pH	0		26-SEP-20	R5240057
pH at 15C, WSER	8.35	-		0.10	pH	-		30-SEP-20	R5242731
Total Coliform, E. Coli - Quanti-Tray									
Total Coliforms	>2420	-		0	MPN/100mL	-	25-SEP-20	25-SEP-20	R5238777
Escherichia Coli	110	-		0	MPN/100mL	-	25-SEP-20	25-SEP-20	R5238777
Volatile & Fixed Suspend Solids									
Volatile Suspended Solids	13.0	-		3.0	mg/L	-	06-OCT-20	06-OCT-20	R5251062
Fixed Suspended Solids	114	-		3.0	mg/L	-	06-OCT-20	06-OCT-20	R5251062
Dissolved Metals in Water by CRC ICPMS									

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L2508433-8 DS-06									
Sampled By: JHN on 24-SEP-20 @ 13:06									
Matrix: WATER									
Dissolved Metals in Water by CRC ICPMS									
Dissolved Metals Filtration Location	LAB	-	SFP			-		29-SEP-20	R5242409
Calcium (Ca)-Dissolved	80.4	+/-11		0.050	mg/L	0		30-SEP-20	R5243087
Magnesium (Mg)-Dissolved	41.5	+/-3.8		0.0050	mg/L	0		30-SEP-20	R5243087
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	1.25	+/-0.16		0.0030	mg/L	0		01-OCT-20	R5243348
Antimony (Sb)-Total	0.00026	+/-0.00006		0.00010	mg/L	0		01-OCT-20	R5243348
Arsenic (As)-Total	0.00726	+/-0.00072		0.00010	mg/L	0		01-OCT-20	R5243348
Barium (Ba)-Total	0.0742	+/-0.0078		0.00010	mg/L	0		01-OCT-20	R5243348
Beryllium (Be)-Total	<0.00010	-		0.00010	mg/L	-		01-OCT-20	R5243348
Bismuth (Bi)-Total	<0.000050	-		0.000050	mg/L	-		01-OCT-20	R5243348
Boron (B)-Total	0.090	+/-0.013		0.010	mg/L	0		01-OCT-20	R5243348
Cadmium (Cd)-Total	0.0000781	+/-0.0000093		0.0000050	mg/L	0		01-OCT-20	R5243348
Calcium (Ca)-Total	82.1	+/-11		0.050	mg/L	0		01-OCT-20	R5243348
Cesium (Cs)-Total	0.000279	-		0.000010	mg/L	-		01-OCT-20	R5243348
Chromium (Cr)-Total	0.00206	+/-0.00026		0.00010	mg/L	0		01-OCT-20	R5243348
Cobalt (Co)-Total	0.00131	+/-0.00014		0.00010	mg/L	0		01-OCT-20	R5243348
Copper (Cu)-Total	0.00456	+/-0.00046		0.00050	mg/L	0		01-OCT-20	R5243348
Iron (Fe)-Total	2.33	+/-0.24		0.010	mg/L	0		01-OCT-20	R5243348
Lead (Pb)-Total	0.00137	+/-0.00020		0.000050	mg/L	0		01-OCT-20	R5243348
Lithium (Li)-Total	0.0431	+/-0.0062		0.0010	mg/L	0		01-OCT-20	R5243348
Magnesium (Mg)-Total	38.6	+/-4.1		0.0050	mg/L	0		01-OCT-20	R5243348
Manganese (Mn)-Total	0.169	+/-0.016		0.00010	mg/L	0		01-OCT-20	R5243348
Molybdenum (Mo)-Total	0.00256	+/-0.00033		0.000050	mg/L	0		01-OCT-20	R5243348
Nickel (Ni)-Total	0.00637	+/-0.00068		0.00050	mg/L	0		01-OCT-20	R5243348
Potassium (K)-Total	7.84	+/-0.87		0.050	mg/L	0		01-OCT-20	R5243348
Phosphorus (P)-Total	0.172	+/-0.033		0.050	mg/L	0		01-OCT-20	R5243348
Rubidium (Rb)-Total	0.00468	-		0.00020	mg/L	-		01-OCT-20	R5243348
Selenium (Se)-Total	0.000398	+/-0.000046		0.000050	mg/L	0		01-OCT-20	R5243348
Silicon (Si)-Total	11.1	+/-1.5		0.10	mg/L	+7%		01-OCT-20	R5243348
Silver (Ag)-Total	0.000014	+/-0.000003		0.000010	mg/L	0		01-OCT-20	R5243348
Sodium (Na)-Total	21.0	+/-2.3		0.050	mg/L	0		01-OCT-20	R5243348
Strontium (Sr)-Total	0.283	+/-0.037		0.00020	mg/L	0		01-OCT-20	R5243348
Sulfur (S)-Total	38.9	-		0.50	mg/L	-		01-OCT-20	R5243348
Tellurium (Te)-Total	<0.00020	-		0.00020	mg/L	-		01-OCT-20	R5243348
Thallium (Tl)-Total	0.000051	+/-0.000009		0.000010	mg/L	0		01-OCT-20	R5243348
Thorium (Th)-Total	0.00015	-		0.00010	mg/L	-		01-OCT-20	R5243348
Tin (Sn)-Total	<0.00010	-		0.00010	mg/L	-		01-OCT-20	R5243348
Titanium (Ti)-Total	0.0297	+/-0.0059		0.00030	mg/L	0		01-OCT-20	R5243348
Tungsten (W)-Total	<0.00010	-		0.00010	mg/L	-		01-OCT-20	R5243348
Uranium (U)-Total	0.00229	+/-0.00031		0.000010	mg/L	0		01-OCT-20	R5243348
Vanadium (V)-Total	0.00709	+/-0.00076		0.00050	mg/L	0		01-OCT-20	R5243348
Zinc (Zn)-Total	0.0113	+/-0.0027		0.0030	mg/L	0		01-OCT-20	R5243348
Zirconium (Zr)-Total	0.00077	-		0.00020	mg/L	-		01-OCT-20	R5243348
Total Nitrogen									
Nitrate in Water by IC									
Nitrate (as N)	<0.020	-		0.020	mg/L	-		26-SEP-20	R5241384
Nitrite in Water by IC									
Nitrite (as N)	<0.010	-		0.010	mg/L	-		26-SEP-20	R5241384
Total Nitrogen (Calculation)									
Total Nitrogen	1.18	-		0.20	mg/L	-		29-SEP-20	

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
* Refer to Referenced Information for Qualifiers (if any) and Methodology.									

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Nitrate (as N)	B	L2508433-1, -2, -3, -4, -5, -6, -7, -8
Laboratory Control Sample	BOD Carbonaceous	LCS-ND	L2508433-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Nitrate (as N)	MS-B	L2508433-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Ammonia, Total (as N)	MS-B	L2508433-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Barium (Ba)-Total	MS-B	L2508433-1, -2, -3, -4, -5, -6
Matrix Spike	Boron (B)-Total	MS-B	L2508433-1, -2, -3, -4, -5, -6
Matrix Spike	Calcium (Ca)-Total	MS-B	L2508433-1, -2, -3, -4, -5, -6
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2508433-1, -2, -3, -4, -5, -6
Matrix Spike	Manganese (Mn)-Total	MS-B	L2508433-1, -2, -3, -4, -5, -6
Matrix Spike	Sodium (Na)-Total	MS-B	L2508433-1, -2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Total	MS-B	L2508433-1, -2, -3, -4, -5, -6
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2508433-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2508433-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Aluminum (Al)-Total	MS-B	L2508433-7, -8
Matrix Spike	Barium (Ba)-Total	MS-B	L2508433-7, -8
Matrix Spike	Boron (B)-Total	MS-B	L2508433-7, -8
Matrix Spike	Calcium (Ca)-Total	MS-B	L2508433-7, -8
Matrix Spike	Iron (Fe)-Total	MS-B	L2508433-7, -8
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2508433-7, -8
Matrix Spike	Manganese (Mn)-Total	MS-B	L2508433-7, -8
Matrix Spike	Potassium (K)-Total	MS-B	L2508433-7, -8
Matrix Spike	Sodium (Na)-Total	MS-B	L2508433-7, -8
Matrix Spike	Strontium (Sr)-Total	MS-B	L2508433-7, -8

Sample Parameter Qualifier Key:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
BODQ	BOD Qualification: Lab Control Sample outside standard 85-115% objective (see QC report). Sample(s) cannot be rerun due to hold time expiry.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
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.
SFP	Sample was Filtered and Preserved at the laboratory

Test Method References:

ALS Test Code	Matrix	Test Description	Preparation Method Reference	Method Reference**
BOD-CBOD-CL	Water	Carbonaceous 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.

HARDNESS-CALC-SK	Water	Hardness		APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

MET-D-CCMS-SK	Water	Dissolved Metals in Water by CRC ICPMS		APHA 3030B / EPA 6020A

This procedure involves preliminary filtration through a 0.45 um filter followed by instrumental analysis using collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

MET-T-CCMS-SK	Water	Total Metals in Water by CRC ICPMS		EPA 200.2/6020A (mod)

This procedure involves preliminary digestion with concentrated nitric acid followed by instrumental analysis using collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

N-T-CALC-SK	Water	Total Nitrogen (Calculation)		APHA 4500 N-Calculated

Total Nitrogen is a calculated parameter. Total Nitrogen = Total Kjeldahl Nitrogen + [Nitrate and Nitrite (as N)]

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Preparation Method Reference	Method Reference**
NH3-F-CL	Water	Ammonia by Fluorescence		J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.				
NH3-UNION-15-CALC-CL	Water	Un-ionized Ammonia at 15C, WSER		WSER 29June2012
NO2-IC-N-SK	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-SK	Water	Nitrate in Water by IC		EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.				
PH-15C-MAN-CL	Water	pH in Water (at 15C)		APHA 4500 H-Electrode
pH at 15C is determined by the electrometric method after equilibration of test samples and pH buffer solutions to 15 +/- 1 C, and is used to calculate Un-Ionized Ammonia for the federal Wastewater Systems Effluent Regulation. A 5 day recommended hold time is based on the trout acute lethality test, which pH at 15C is intended to represent.				
PH-PCT-SK	Water	pH by Meter (Automated)		APHA 4500-H pH Value
This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode It is recommended that this analysis be conducted in the field.				
SOLIDS-TSS-SK	Water	Total Suspended Solids		APHA 2540 D-Gravimetric
A well mixed sample is filtered through a weighed 0.45 um filter and the residue retained on the filter is dried to a constant weight at 103 C to 105 C. The increase in the weight of the filter represents the total suspended solids.				
SOLIDS-VOLSUS-SK	Water	Volatile & Fixed Suspend Solids		APHA 2540 E-GRAVIMETRIC
A well mixed sample is filtered through a weighed 0.45 um filter and the residue retained on the filter is dried to constant weight at 103 C to 105 C. The increase in the weight of the filter represents the total suspended solids. The filter is then ignited at 550”–50”C for 1 hour. The remaining solids represent the Total Fixed Solids, while the weight lost on ignition represents the Total Volatile Solids.				
T+ECOLI-QT97-SK	Water	Total Coliform, E. Coli - Quanti-Tray		APHA 9223B 2B
The analysis of Total Coliform (TC) & Escherichia coli (EC) is processed by Quanti-tray (QT): Two substrates, ONPG for TC detection and MUG for EC detection are used. The substrates are added to the 100 ml sample dispensed into the 97 well tray. The tray is incubated at 35 Celcius for 24 hours. A colour reaction develops to indicate a positve reaction (presence of TC, EC). The number of positive wells are counted and converted to Most Probable Number Units (MPNU) per 100 ml.				
TDS-SK	Water	Total Dissolved Solids		APHA 2540 C
An aliquot of sample is filtered using a glass fibre filter and the filtrate evaporated to dryness at 180 – 2□C in a pre-weighed dish. The dish plus residue is cooled and weighed to constant weight. Total dissolved solids (TDS) is determined by difference.				
TKN-F-CL	Water	Total Kjeldahl Nitrogen by Fluorescence		APHA 4500-NORG (TKN)
This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.				

** The indicated Method Reference is the closest nationally or internationally recognized reference for the applicable ALS test method. ALS methods may incorporate modifications from the specified reference 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
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surr - 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.
MU: Measurement Uncertainty. The reported uncertainty is an expanded uncertainty calculated using a coverage factor of 2 which gives a level of confidence of approximately 95%.
Bias: The reported method bias is the average long term deviation from the target value for a long term reference or control sample, measured in percent. Zero values indicate no detectable method bias.

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: L2508433 Report Date: 08-OCT-20

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BOD-CBOD-CL	**Water**							
Batch R5244047								
WG3417212-3 DUP		**L2508433-1**						
BOD Carbonaceous		4.3	3.5		mg/L	21	30	26-SEP-20
WG3417212-2 LCS								
BOD Carbonaceous			83.8	LCS-ND	%		85-115	26-SEP-20
WG3417212-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	26-SEP-20
MET-D-CCMS-SK	**Water**							
Batch R5243087								
WG3412917-3 CRM		**TMRM_20**						
Calcium (Ca)-Dissolved			97.1		%		80-120	30-SEP-20
Magnesium (Mg)-Dissolved			100.1		%		80-120	30-SEP-20
WG3412917-2 DUP		**L2508433-3**						
Calcium (Ca)-Dissolved		153	157		mg/L	2.5	20	30-SEP-20
Magnesium (Mg)-Dissolved		83.1	87.4		mg/L	5.0	20	30-SEP-20
WG3412917-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	30-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	30-SEP-20
WG3412917-4 MS		**L2508568-8**						
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	30-SEP-20
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	30-SEP-20
MET-T-CCMS-SK	**Water**							
Batch R5242907								
WG3412914-3 CRM		**TMRM_20**						
Aluminum (Al)-Total			96.3		%		80-120	30-SEP-20
Antimony (Sb)-Total			108.8		%		80-120	30-SEP-20
Arsenic (As)-Total			98.8		%		80-120	30-SEP-20
Barium (Ba)-Total			91.6		%		80-120	30-SEP-20
Beryllium (Be)-Total			101.6		%		80-120	30-SEP-20
Bismuth (Bi)-Total			102.0		%		80-120	30-SEP-20
Boron (B)-Total			97.3		%		80-120	30-SEP-20
Cadmium (Cd)-Total			105.8		%		80-120	30-SEP-20
Calcium (Ca)-Total			97.6		%		80-120	30-SEP-20
Cesium (Cs)-Total			98.7		%		80-120	30-SEP-20
Chromium (Cr)-Total			96.0		%		80-120	30-SEP-20
Cobalt (Co)-Total			95.1		%		80-120	30-SEP-20
Copper (Cu)-Total			96.4		%		80-120	30-SEP-20

Quality Control Report

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-SK	**Water**							
Batch R5242907								
WG3412914-3 CRM		**TMRM_20**						
Iron (Fe)-Total			103.9		%		80-120	30-SEP-20
Lead (Pb)-Total			103.0		%		80-120	30-SEP-20
Lithium (Li)-Total			103.8		%		80-120	30-SEP-20
Magnesium (Mg)-Total			94.7		%		80-120	30-SEP-20
Manganese (Mn)-Total			99.1		%		80-120	30-SEP-20
Molybdenum (Mo)-Total			97.5		%		80-120	30-SEP-20
Nickel (Ni)-Total			95.8		%		80-120	30-SEP-20
Potassium (K)-Total			93.3		%		80-120	30-SEP-20
Phosphorus (P)-Total			102.1		%		70-130	30-SEP-20
Rubidium (Rb)-Total			97.7		%		80-120	30-SEP-20
Selenium (Se)-Total			103.8		%		80-120	30-SEP-20
Silicon (Si)-Total			100.2		%		60-140	30-SEP-20
Silver (Ag)-Total			101.2		%		80-120	30-SEP-20
Sodium (Na)-Total			99.6		%		80-120	30-SEP-20
Strontium (Sr)-Total			101.8		%		80-120	30-SEP-20
Sulfur (S)-Total			100.6		%		80-120	30-SEP-20
Tellurium (Te)-Total			98.0		%		80-120	30-SEP-20
Thallium (Tl)-Total			101.7		%		80-120	30-SEP-20
Thorium (Th)-Total			93.3		%		80-120	30-SEP-20
Tin (Sn)-Total			99.1		%		80-120	30-SEP-20
Titanium (Ti)-Total			91.5		%		80-120	30-SEP-20
Tungsten (W)-Total			99.9		%		80-120	30-SEP-20
Uranium (U)-Total			98.1		%		80-120	30-SEP-20
Vanadium (V)-Total			97.6		%		80-120	30-SEP-20
Zinc (Zn)-Total			95.0		%		80-120	30-SEP-20
Zirconium (Zr)-Total			95.4		%		80-120	30-SEP-20
WG3412914-2 DUP		**L2508433-2**						
Aluminum (Al)-Total		0.0762	0.0901		mg/L	17	20	30-SEP-20
Antimony (Sb)-Total		0.00021	0.00020		mg/L	4.6	20	30-SEP-20
Arsenic (As)-Total		0.00319	0.00322		mg/L	0.9	20	30-SEP-20
Barium (Ba)-Total		0.0476	0.0498		mg/L	4.4	20	30-SEP-20
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	30-SEP-20
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	30-SEP-20

Quality Control Report

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-SK	**Water**							
Batch R5242907								
WG3412914-2 DUP		**L2508433-2**						
Boron (B)-Total		0.070	0.072		mg/L	2.0	20	30-SEP-20
Cadmium (Cd)-Total		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	30-SEP-20
Calcium (Ca)-Total		44.4	46.2		mg/L	4.0	20	30-SEP-20
Cesium (Cs)-Total		0.000010	0.000013		mg/L	18	20	30-SEP-20
Chromium (Cr)-Total		0.00019	0.00021		mg/L	14	20	30-SEP-20
Cobalt (Co)-Total		0.00033	0.00036		mg/L	10	20	30-SEP-20
Copper (Cu)-Total		0.00075	0.00066		mg/L	13	20	30-SEP-20
Iron (Fe)-Total		0.293	0.302		mg/L	3.0	20	30-SEP-20
Lead (Pb)-Total		0.000167	0.000163		mg/L	2.3	20	30-SEP-20
Lithium (Li)-Total		0.0479	0.0520		mg/L	8.2	20	30-SEP-20
Magnesium (Mg)-Total		44.3	45.3		mg/L	2.2	20	30-SEP-20
Manganese (Mn)-Total		0.260	0.264		mg/L	1.4	20	30-SEP-20
Molybdenum (Mo)-Total		0.00236	0.00238		mg/L	0.9	20	30-SEP-20
Nickel (Ni)-Total		0.00166	0.00172		mg/L	3.5	20	30-SEP-20
Potassium (K)-Total		8.81	8.62		mg/L	2.2	20	30-SEP-20
Phosphorus (P)-Total		0.170	0.168		mg/L	1.2	20	30-SEP-20
Rubidium (Rb)-Total		0.00140	0.00157		mg/L	11	20	30-SEP-20
Selenium (Se)-Total		0.000270	0.000329		mg/L	20	20	30-SEP-20
Silicon (Si)-Total		0.58	0.63		mg/L	8.4	20	30-SEP-20
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	30-SEP-20
Sodium (Na)-Total		53.0	54.4		mg/L	2.7	20	30-SEP-20
Strontium (Sr)-Total		0.313	0.319		mg/L	1.7	20	30-SEP-20
Sulfur (S)-Total		72.6	73.9		mg/L	1.8	20	30-SEP-20
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	30-SEP-20
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	30-SEP-20
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	30-SEP-20
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	30-SEP-20
Titanium (Ti)-Total		0.00239	0.00244		mg/L	2.3	20	30-SEP-20
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	30-SEP-20
Uranium (U)-Total		0.00354	0.00355		mg/L	0.5	20	30-SEP-20
Vanadium (V)-Total		0.00140	0.00151		mg/L	8.0	20	30-SEP-20
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	30-SEP-20
Zirconium (Zr)-Total		<0.00020	<0.00020		mg/L			30-SEP-20

Quality Control Report

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-SK	**Water**							
Batch R5242907								
WG3412914-2 DUP		**L2508433-2**						
Zirconium (Zr)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	30-SEP-20
WG3412914-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	30-SEP-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	30-SEP-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	30-SEP-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	30-SEP-20
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	30-SEP-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	30-SEP-20
Boron (B)-Total			<0.010		mg/L		0.01	30-SEP-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	30-SEP-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	30-SEP-20
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	30-SEP-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	30-SEP-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	30-SEP-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	30-SEP-20
Iron (Fe)-Total			<0.010		mg/L		0.01	30-SEP-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	30-SEP-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	30-SEP-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	30-SEP-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	30-SEP-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	30-SEP-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	30-SEP-20
Potassium (K)-Total			<0.050		mg/L		0.05	30-SEP-20
Phosphorus (P)-Total			<0.050		mg/L		0.05	30-SEP-20
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	30-SEP-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	30-SEP-20
Silicon (Si)-Total			<0.10		mg/L		0.1	30-SEP-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	30-SEP-20
Sodium (Na)-Total			<0.050		mg/L		0.05	30-SEP-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	30-SEP-20
Sulfur (S)-Total			<0.50		mg/L		0.5	30-SEP-20
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	30-SEP-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	30-SEP-20
Thorium (Th)-Total			<0.00010		mg/L		0.0001	30-SEP-20

Quality Control Report

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-SK	**Water**							
Batch R5242907								
WG3412914-1 MB								
Tin (Sn)-Total			<0.00010		mg/L		0.0001	30-SEP-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	30-SEP-20
Tungsten (W)-Total			<0.00010		mg/L		0.0001	30-SEP-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	30-SEP-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	30-SEP-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	30-SEP-20
Zirconium (Zr)-Total			<0.00020		mg/L		0.0002	30-SEP-20
WG3412914-4 MS		**L2508328-24**						
Aluminum (Al)-Total			97.2		%		70-130	30-SEP-20
Antimony (Sb)-Total			107.7		%		70-130	30-SEP-20
Arsenic (As)-Total			100.7		%		70-130	30-SEP-20
Barium (Ba)-Total			N/A	MS-B	%		-	30-SEP-20
Beryllium (Be)-Total			96.5		%		70-130	30-SEP-20
Bismuth (Bi)-Total			95.3		%		70-130	30-SEP-20
Boron (B)-Total			N/A	MS-B	%		-	30-SEP-20
Cadmium (Cd)-Total			101.5		%		70-130	30-SEP-20
Calcium (Ca)-Total			N/A	MS-B	%		-	30-SEP-20
Cesium (Cs)-Total			108.8		%		70-130	30-SEP-20
Chromium (Cr)-Total			98.2		%		70-130	30-SEP-20
Cobalt (Co)-Total			95.5		%		70-130	30-SEP-20
Copper (Cu)-Total			95.1		%		70-130	30-SEP-20
Iron (Fe)-Total			95.8		%		70-130	30-SEP-20
Lead (Pb)-Total			95.3		%		70-130	30-SEP-20
Lithium (Li)-Total			101.5		%		70-130	30-SEP-20
Magnesium (Mg)-Total			N/A	MS-B	%		-	30-SEP-20
Manganese (Mn)-Total			N/A	MS-B	%		-	30-SEP-20
Molybdenum (Mo)-Total			106.2		%		70-130	30-SEP-20
Nickel (Ni)-Total			94.4		%		70-130	30-SEP-20
Potassium (K)-Total			101.4		%		70-130	30-SEP-20
Phosphorus (P)-Total			100.0		%		70-130	30-SEP-20
Rubidium (Rb)-Total			102.8		%		70-130	30-SEP-20
Selenium (Se)-Total			103.6		%		70-130	30-SEP-20
Silicon (Si)-Total			95.1		%		70-130	30-SEP-20
Silver (Ag)-Total			103.9		%		70-130	30-SEP-20

Quality Control Report

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-SK	**Water**							
Batch R5242907								
WG3412914-4 MS		**L2508328-24**						
Sodium (Na)-Total			N/A	MS-B	%		-	30-SEP-20
Strontium (Sr)-Total			N/A	MS-B	%		-	30-SEP-20
Sulfur (S)-Total			103.2		%		70-130	30-SEP-20
Tellurium (Te)-Total			96.9		%		70-130	30-SEP-20
Thallium (Tl)-Total			96.3		%		70-130	30-SEP-20
Thorium (Th)-Total			100.8		%		70-130	30-SEP-20
Tin (Sn)-Total			101.8		%		70-130	30-SEP-20
Titanium (Ti)-Total			95.6		%		70-130	30-SEP-20
Tungsten (W)-Total			102.8		%		70-130	30-SEP-20
Uranium (U)-Total			100.3		%		70-130	30-SEP-20
Vanadium (V)-Total			101.8		%		70-130	30-SEP-20
Zinc (Zn)-Total			95.8		%		70-130	30-SEP-20
Zirconium (Zr)-Total			103.4		%		70-130	30-SEP-20
Batch R5243348								
WG3412915-3 CRM		**TMRM_20**						
Aluminum (Al)-Total			103.2		%		80-120	01-OCT-20
Antimony (Sb)-Total			103.0		%		80-120	01-OCT-20
Arsenic (As)-Total			100.8		%		80-120	01-OCT-20
Barium (Ba)-Total			101.2		%		80-120	01-OCT-20
Beryllium (Be)-Total			110.2		%		80-120	01-OCT-20
Bismuth (Bi)-Total			105.5		%		80-120	01-OCT-20
Boron (B)-Total			116.1		%		80-120	01-OCT-20
Cadmium (Cd)-Total			101.1		%		80-120	01-OCT-20
Calcium (Ca)-Total			102.1		%		80-120	01-OCT-20
Cesium (Cs)-Total			101.3		%		80-120	01-OCT-20
Chromium (Cr)-Total			98.8		%		80-120	01-OCT-20
Cobalt (Co)-Total			98.9		%		80-120	01-OCT-20
Copper (Cu)-Total			96.2		%		80-120	01-OCT-20
Iron (Fe)-Total			102.8		%		80-120	01-OCT-20
Lead (Pb)-Total			97.0		%		80-120	01-OCT-20
Lithium (Li)-Total			111.8		%		80-120	01-OCT-20
Magnesium (Mg)-Total			100.4		%		80-120	01-OCT-20
Manganese (Mn)-Total			102.4		%		80-120	01-OCT-20
Molybdenum (Mo)-Total			100.5		%		80-120	01-OCT-20

Quality Control Report

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-SK	**Water**							
Batch R5243348								
WG3412915-3 CRM		**TMRM_20**						
Nickel (Ni)-Total			98.4		%		80-120	01-OCT-20
Potassium (K)-Total			101.0		%		80-120	01-OCT-20
Phosphorus (P)-Total			100.2		%		70-130	01-OCT-20
Rubidium (Rb)-Total			101.1		%		80-120	01-OCT-20
Selenium (Se)-Total			100.6		%		80-120	01-OCT-20
Silicon (Si)-Total			100.1		%		60-140	01-OCT-20
Silver (Ag)-Total			100.2		%		80-120	01-OCT-20
Sodium (Na)-Total			102.6		%		80-120	01-OCT-20
Strontium (Sr)-Total			97.1		%		80-120	01-OCT-20
Sulfur (S)-Total			103.7		%		80-120	01-OCT-20
Tellurium (Te)-Total			96.7		%		80-120	01-OCT-20
Thallium (Tl)-Total			101.9		%		80-120	01-OCT-20
Thorium (Th)-Total			88.9		%		80-120	01-OCT-20
Tin (Sn)-Total			95.8		%		80-120	01-OCT-20
Titanium (Ti)-Total			98.1		%		80-120	01-OCT-20
Tungsten (W)-Total			97.7		%		80-120	01-OCT-20
Uranium (U)-Total			96.4		%		80-120	01-OCT-20
Vanadium (V)-Total			99.3		%		80-120	01-OCT-20
Zinc (Zn)-Total			103.1		%		80-120	01-OCT-20
Zirconium (Zr)-Total			96.0		%		80-120	01-OCT-20
WG3412915-2 DUP		**L2508568-20**						
Aluminum (Al)-Total		0.0406	0.0434		mg/L	6.5	20	01-OCT-20
Antimony (Sb)-Total		0.00220	0.00224		mg/L	1.8	20	01-OCT-20
Arsenic (As)-Total		0.00093	0.00088		mg/L	5.2	20	01-OCT-20
Barium (Ba)-Total		0.0816	0.0812		mg/L	0.5	20	01-OCT-20
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	01-OCT-20
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	01-OCT-20
Boron (B)-Total		0.169	0.167		mg/L	1.3	20	01-OCT-20
Cadmium (Cd)-Total		0.0000574	0.0000580		mg/L	1.0	20	01-OCT-20
Calcium (Ca)-Total		60.5	59.9		mg/L	0.9	20	01-OCT-20
Cesium (Cs)-Total		0.000011	0.000011		mg/L	3.0	20	01-OCT-20
Chromium (Cr)-Total		0.00050	0.00055		mg/L	9.3	20	01-OCT-20
Cobalt (Co)-Total		0.00082	0.00081		mg/L	1.2	20	01-OCT-20

Quality Control Report

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-SK	**Water**							
Batch R5243348								
WG3412915-2 DUP		**L2508568-20**						
Copper (Cu)-Total		0.0109	0.0108		mg/L	0.8	20	01-OCT-20
Iron (Fe)-Total		0.037	0.039		mg/L	4.0	20	01-OCT-20
Lead (Pb)-Total		0.000109	0.000106		mg/L	2.2	20	01-OCT-20
Lithium (Li)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	01-OCT-20
Magnesium (Mg)-Total		9.67	9.51		mg/L	1.6	20	01-OCT-20
Manganese (Mn)-Total		0.0258	0.0257		mg/L	0.5	20	01-OCT-20
Molybdenum (Mo)-Total		0.00181	0.00187		mg/L	3.2	20	01-OCT-20
Nickel (Ni)-Total		0.00189	0.00188		mg/L	0.7	20	01-OCT-20
Potassium (K)-Total		7.36	7.37		mg/L	0.1	20	01-OCT-20
Phosphorus (P)-Total		0.118	0.134		mg/L	12	20	01-OCT-20
Rubidium (Rb)-Total		0.00677	0.00667		mg/L	1.5	20	01-OCT-20
Selenium (Se)-Total		0.000366	0.000350		mg/L	4.7	20	01-OCT-20
Silicon (Si)-Total		6.78	6.75		mg/L	0.3	20	01-OCT-20
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	01-OCT-20
Sodium (Na)-Total		18.2	17.6		mg/L	3.2	20	01-OCT-20
Strontium (Sr)-Total		0.366	0.367		mg/L	0.2	20	01-OCT-20
Sulfur (S)-Total		17.4	17.9		mg/L	2.4	20	01-OCT-20
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	01-OCT-20
Thallium (Tl)-Total		0.000018	0.000020		mg/L	9.7	20	01-OCT-20
Thorium (Th)-Total		0.00012	0.00011		mg/L	12	20	01-OCT-20
Tin (Sn)-Total		0.00028	0.00028		mg/L	0.4	20	01-OCT-20
Titanium (Ti)-Total		0.00142	0.00150		mg/L	6.0	20	01-OCT-20
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	01-OCT-20
Uranium (U)-Total		0.00233	0.00232		mg/L	0.5	20	01-OCT-20
Vanadium (V)-Total		0.00225	0.00222		mg/L	1.5	20	01-OCT-20
Zinc (Zn)-Total		0.0048	0.0046		mg/L	5.1	20	01-OCT-20
Zirconium (Zr)-Total		0.00021	0.00021		mg/L	1.2	20	01-OCT-20
WG3412915-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	01-OCT-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	01-OCT-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	01-OCT-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	01-OCT-20
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	01-OCT-20

Quality Control Report

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-SK	**Water**							
Batch R5243348								
WG3412915-1 MB								
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	01-OCT-20
Boron (B)-Total			<0.010		mg/L		0.01	01-OCT-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	01-OCT-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	01-OCT-20
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	01-OCT-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	01-OCT-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	01-OCT-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	01-OCT-20
Iron (Fe)-Total			<0.010		mg/L		0.01	01-OCT-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	01-OCT-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	01-OCT-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	01-OCT-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	01-OCT-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	01-OCT-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	01-OCT-20
Potassium (K)-Total			<0.050		mg/L		0.05	01-OCT-20
Phosphorus (P)-Total			<0.050		mg/L		0.05	01-OCT-20
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	01-OCT-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	01-OCT-20
Silicon (Si)-Total			<0.10		mg/L		0.1	01-OCT-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	01-OCT-20
Sodium (Na)-Total			<0.050		mg/L		0.05	01-OCT-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	01-OCT-20
Sulfur (S)-Total			<0.50		mg/L		0.5	01-OCT-20
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	01-OCT-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	01-OCT-20
Thorium (Th)-Total			<0.00010		mg/L		0.0001	01-OCT-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	01-OCT-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	01-OCT-20
Tungsten (W)-Total			<0.00010		mg/L		0.0001	01-OCT-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	01-OCT-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	01-OCT-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	01-OCT-20

Quality Control Report

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-SK	**Water**							
Batch R5243348								
WG3412915-1 MB								
Zirconium (Zr)-Total			<0.00020		mg/L		0.0002	01-OCT-20
WG3412915-4 MS		**L2508568-8**						
Aluminum (Al)-Total			N/A	MS-B	%		-	01-OCT-20
Antimony (Sb)-Total			101.6		%		70-130	01-OCT-20
Arsenic (As)-Total			102.2		%		70-130	01-OCT-20
Barium (Ba)-Total			N/A	MS-B	%		-	01-OCT-20
Beryllium (Be)-Total			101.7		%		70-130	01-OCT-20
Bismuth (Bi)-Total			104.6		%		70-130	01-OCT-20
Boron (B)-Total			N/A	MS-B	%		-	01-OCT-20
Cadmium (Cd)-Total			106.7		%		70-130	01-OCT-20
Calcium (Ca)-Total			N/A	MS-B	%		-	01-OCT-20
Cesium (Cs)-Total			103.8		%		70-130	01-OCT-20
Chromium (Cr)-Total			100.2		%		70-130	01-OCT-20
Cobalt (Co)-Total			96.3		%		70-130	01-OCT-20
Copper (Cu)-Total			93.7		%		70-130	01-OCT-20
Iron (Fe)-Total			N/A	MS-B	%		-	01-OCT-20
Lead (Pb)-Total			98.8		%		70-130	01-OCT-20
Lithium (Li)-Total			101.7		%		70-130	01-OCT-20
Magnesium (Mg)-Total			N/A	MS-B	%		-	01-OCT-20
Manganese (Mn)-Total			N/A	MS-B	%		-	01-OCT-20
Molybdenum (Mo)-Total			101.3		%		70-130	01-OCT-20
Nickel (Ni)-Total			96.2		%		70-130	01-OCT-20
Potassium (K)-Total			N/A	MS-B	%		-	01-OCT-20
Phosphorus (P)-Total			97.0		%		70-130	01-OCT-20
Rubidium (Rb)-Total			99.6		%		70-130	01-OCT-20
Selenium (Se)-Total			100.6		%		70-130	01-OCT-20
Silicon (Si)-Total			96.9		%		70-130	01-OCT-20
Silver (Ag)-Total			99.9		%		70-130	01-OCT-20
Sodium (Na)-Total			N/A	MS-B	%		-	01-OCT-20
Strontium (Sr)-Total			N/A	MS-B	%		-	01-OCT-20
Sulfur (S)-Total			105.7		%		70-130	01-OCT-20
Tellurium (Te)-Total			91.7		%		70-130	01-OCT-20
Thallium (Tl)-Total			98.0		%		70-130	01-OCT-20
Thorium (Th)-Total			107.8		%		70-130	01-OCT-20

Quality Control Report

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-SK	**Water**							
Batch R5243348								
WG3412915-4 MS		**L2508568-8**						
Tin (Sn)-Total			97.3		%		70-130	01-OCT-20
Titanium (Ti)-Total			127.8		%		70-130	01-OCT-20
Tungsten (W)-Total			100.8		%		70-130	01-OCT-20
Uranium (U)-Total			101.3		%		70-130	01-OCT-20
Vanadium (V)-Total			99.6		%		70-130	01-OCT-20
Zinc (Zn)-Total			98.3		%		70-130	01-OCT-20
Zirconium (Zr)-Total			100.5		%		70-130	01-OCT-20
NH3-F-CL	**Water**							
Batch R5242826								
WG3414664-11 DUP		**L2508545-8**						
Ammonia, Total (as N)		0.339	0.340		mg/L	0.2	20	29-SEP-20
WG3414664-10 LCS								
Ammonia, Total (as N)			95.7		%		85-115	29-SEP-20
WG3414664-9 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	29-SEP-20
WG3414664-12 MS		**L2508545-8**						
Ammonia, Total (as N)			N/A	MS-B	%		-	29-SEP-20
NO2-IC-N-SK	**Water**							
Batch R5241384								
WG3412811-1 DUP		**L2508433-6**						
Nitrite (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	26-SEP-20
WG3412811-3 LCS								
Nitrite (as N)			97.3		%		90-110	26-SEP-20
WG3412811-2 MB								
Nitrite (as N)			<0.010		mg/L		0.01	26-SEP-20
WG3412811-4 MS		**L2508237-7**						
Nitrite (as N)			119.3		%		75-125	27-SEP-20
NO3-IC-N-SK	**Water**							
Batch R5241384								
WG3412811-1 DUP		**L2508433-6**						
Nitrate (as N)		<0.10	<0.10	RPD-NA	mg/L	N/A	20	26-SEP-20
WG3412811-3 LCS								
Nitrate (as N)			99.5		%		90-110	26-SEP-20
WG3412811-2 MB								
Nitrate (as N)			0.048	B	mg/L		0.02	26-SEP-20
WG3412811-4 MS		**L2508237-7**						

Quality Control Report

Client: KGS Group Consultants (Regina)
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-N-SK	**Water**							
Batch R5241384								
WG3412811-4 MS		**L2508237-7**						
Nitrate (as N)			N/A	MS-B	%		-	27-SEP-20
PH-15C-MAN-CL	**Water**							
Batch R5242731								
WG3415647-2 DUP		**L2507880-3**						
pH at 15C, WSER		1.42	1.42	J	pH	0.00	0.2	30-SEP-20
WG3415647-1 LCS								
pH at 15C, WSER			6.98		pH		6.9-7.1	30-SEP-20
PH-PCT-SK	**Water**							
Batch R5240057								
WG3413091-1 DUP		**L2508545-1**						
pH		7.94	7.90	J	pH	0.04	0.2	26-SEP-20
WG3413091-2 LCS								
pH			6.89		pH		6.76-6.96	26-SEP-20
SOLIDS-TSS-SK	**Water**							
Batch R5241839								
WG3413560-3 DUP		**L2508532-1**						
Total Suspended Solids		161	165		mg/L	2.3	20	28-SEP-20
WG3413560-2 LCS								
Total Suspended Solids			102.8		%		85-115	28-SEP-20
WG3413560-1 MB								
Total Suspended Solids			<3.0		mg/L		3	28-SEP-20
SOLIDS-VOLSUS-SK	**Water**							
Batch R5251062								
WG3419380-2 DUP		**L2508433-5**						
Volatile Suspended Solids		5.4	5.0		mg/L	7.7	20	06-OCT-20
Fixed Suspended Solids		11.1	11.9		mg/L	7.0	20	06-OCT-20
WG3419380-1 MB								
Volatile Suspended Solids			<3.0		mg/L		3	06-OCT-20
Fixed Suspended Solids			<3.0		mg/L		3	06-OCT-20
T+ECOLI-QT97-SK	**Water**							
Batch R5238777								
WG3412639-1 DUP		**L2508433-6**						
Total Coliforms		>2420	>2420		MPN/100mL	0.0	65	25-SEP-20
Escherichia Coli		228	206		MPN/100mL	10	65	25-SEP-20
WG3412639-2 MB								

Quality Control Report

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Regina SK S4W 0G3
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
T+ECOLI-QT97-SK	**Water**							
Batch R5238777								
WG3412639-2 MB								
Total Coliforms			0		MPN/100mL		1	25-SEP-20
Escherichia Coli			0		MPN/100mL		1	25-SEP-20
TDS-SK	**Water**							
Batch R5242029								
WG3413558-2 DUP		**L2508433-1**						
Total Dissolved Solids		2130	2210		mg/L	3.9	20	28-SEP-20
WG3413558-3 LCS								
Total Dissolved Solids			98.3		%		85-115	28-SEP-20
WG3413558-1 MB								
Total Dissolved Solids			<10		mg/L		10	28-SEP-20
TKN-F-CL	**Water**							
Batch R5241953								
WG3414682-10 DUP		**L2508238-3**						
Total Kjeldahl Nitrogen		35	33		mg/L	6.5	20	28-SEP-20
WG3414682-13 DUP		**L2508433-8**						
Total Kjeldahl Nitrogen		1.18	1.33		mg/L	12	20	28-SEP-20
WG3414682-7 DUP		**L2508238-1**						
Total Kjeldahl Nitrogen		1.4	<2.0	RPD-NA	mg/L	N/A	20	28-SEP-20
WG3414682-12 LCS								
Total Kjeldahl Nitrogen			85.7		%		75-125	28-SEP-20
WG3414682-16 LCS								
Total Kjeldahl Nitrogen			84.6		%		75-125	28-SEP-20
WG3414682-2 LCS								
Total Kjeldahl Nitrogen			89.2		%		75-125	28-SEP-20
WG3414682-4 LCS								
Total Kjeldahl Nitrogen			88.5		%		75-125	28-SEP-20
WG3414682-6 LCS								
Total Kjeldahl Nitrogen			84.9		%		75-125	28-SEP-20
WG3414682-9 LCS								
Total Kjeldahl Nitrogen			84.4		%		75-125	28-SEP-20
WG3414682-1 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	28-SEP-20
WG3414682-11 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	28-SEP-20
WG3414682-15 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	28-SEP-20
WG3414682-3 MB								

Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-F-CL	**Water**							
Batch R5241953								
WG3414682-3 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	28-SEP-20
WG3414682-5 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	28-SEP-20
WG3414682-8 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	28-SEP-20
WG3414682-14 MS		**L2508433-8**						
Total Kjeldahl Nitrogen			101.0		%		70-130	28-SEP-20

Quality Control Report

Workorder: L2508433 Report Date: 08-OCT-20

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

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
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
J	Duplicate results and limits are expressed in terms of absolute difference.
LCS-ND	Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.
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: L2508433 Report Date: 08-OCT-20

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Volatile & Fixed Suspend Solids							
	1	24-SEP-20 08:30	06-OCT-20 14:30	7	12	days	EHT
	2	24-SEP-20 08:57	06-OCT-20 14:30	7	12	days	EHT
	3	24-SEP-20 10:23	06-OCT-20 14:30	7	12	days	EHT
	4	24-SEP-20 10:55	06-OCT-20 14:30	7	12	days	EHT
	5	24-SEP-20 11:35	06-OCT-20 14:30	7	12	days	EHT
	6	24-SEP-20 12:19	06-OCT-20 14:30	7	12	days	EHT
	7	24-SEP-20 13:06	06-OCT-20 14:30	7	12	days	EHT
	8	24-SEP-20 13:06	06-OCT-20 14:30	7	12	days	EHT
pH by Meter (Automated)							
	1	24-SEP-20 08:30	26-SEP-20 17:00	0.25	56	hours	EHTR-FM
	2	24-SEP-20 08:57	26-SEP-20 17:00	0.25	56	hours	EHTR-FM
	3	24-SEP-20 10:23	26-SEP-20 17:00	0.25	55	hours	EHTR-FM
	4	24-SEP-20 10:55	26-SEP-20 17:00	0.25	54	hours	EHTR-FM
	5	24-SEP-20 11:35	26-SEP-20 17:00	0.25	54	hours	EHTR-FM
	6	24-SEP-20 12:19	26-SEP-20 17:00	0.25	53	hours	EHTR-FM
	7	24-SEP-20 13:06	26-SEP-20 17:00	0.25	52	hours	EHTR-FM
	8	24-SEP-20 13:06	26-SEP-20 17:00	0.25	52	hours	EHTR-FM
pH in Water (at 15C)							
	1	24-SEP-20 08:30	30-SEP-20 13:00	0.25	149	hours	EHTR-FM
	2	24-SEP-20 08:57	30-SEP-20 13:00	0.25	148	hours	EHTR-FM
	3	24-SEP-20 10:23	30-SEP-20 13:00	0.25	147	hours	EHTR-FM
	4	24-SEP-20 10:55	30-SEP-20 13:00	0.25	146	hours	EHTR-FM
	5	24-SEP-20 11:35	30-SEP-20 13:00	0.25	145	hours	EHTR-FM
	6	24-SEP-20 12:19	30-SEP-20 13:00	0.25	145	hours	EHTR-FM
	7	24-SEP-20 13:06	30-SEP-20 13:00	0.25	144	hours	EHTR-FM
	8	24-SEP-20 13:06	30-SEP-20 13:00	0.25	144	hours	EHTR-FM

Legend & Qualifier Definitions:

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

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2508433 were received on 25-SEP-20 11:45.

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

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

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

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2508433-COFC

COC Number: 17 - 736299

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	KGS Group
Contact:	Jonathan Nachtigall
Phone:	306-551-4323
Company address below will appear on the final report	
Street:	200-4561 Parliament Avenue
City/Province:	Regina, SK
Postal Code:	S4W 0G3
Invoice To	Same as Report To [✓] YES [ ] NO
	Copy of Invoice with Report [✓] YES [ ] NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: [✓] PDF [✓] EXCEL [ ] EDD (DIGITAL)

Quality Control (QC) Report with Report [ ] YES [ ] NO

[ ] Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: [✓] EMAIL [ ] MAIL [ ] FAX

Email 1 or Fax: jnachtigall@kgsgroup.com

Email 2: lpeters@kgsgroup.com

Email 3:

Invoice Distribution

Select Invoice Distribution: [✓] EMAIL [ ] MAIL [ ] FAX

Email 1 or Fax: lpeters@kgsgroup.com

Email 2: sbatter@kgsgroup.com

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

Project Information

ALS Account # / Quote #:

Job #: 20-1147-001

PO / AFE:

LSD:

ALS Lab Work Order # (lab use only):

ALS Contact: Sampler: JHN

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] [✓] Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4-20%] [ ] | 3 day [P3-25%] [ ] | 2 day [P2-50%] [ ]

EMERGENCY: 1 Business day [E - 100%] [ ] | Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] [ ]

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	cBOD	TSS	Nitrogen Ammonia	Un-ionized Ammonia	TKN	Phosphorous	Total Coliform	Metals	Water Hardness	pH	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
	Effluent	24-009-20	08:30	W	6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	Upstream	24-009-20	08:57	W	6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	~~Crescent Creek~~	~~24-009-20~~		W		✓	✓	✓									
	DS-01	24-009-20	10:23	W	6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	DS-02	24-009-20	10:55	W	6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	DS-03	24-009-20	11:35	W	6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	DS-04	24-009-20	12:19	W	6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	DS-05	24-009-20	13:06	W	6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	DS-06	24-009-20	13:06	W	6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? [ ] YES [ ] NO

Are samples for human consumption/ use? [ ] YES [ ] NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen [ ] SIF Observations Yes [ ] No [ ]

Ice Packs [ ] Ice Cubes [ ] Custody seal intact Yes [ ] No [ ]

Cooling Initiated [ ]

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
6							

SHIPMENT RELEASE (client use)

Released by: J. Nachtigall Date: Sept 24, 2020 Time: 14:20

INITIAL SHIPMENT RECEPTION (lab use only)

Received by: Date: Sept 24/2020 Time: 11:45

FINAL SHIPMENT RECEPTION (lab use only)

Received by: Date: Time: 11:45

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JUNE 2018 FRONT

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

KGS Group Consultants (Regina)
ATTN: Jon Nachtigall
Suite 200
4561 Parliament Avenue
Regina SK S4W 0G3

Date Received: 22-OCT-20
Report Date: 29-OCT-20 13:00 (MT)
Version: FINAL

Client Phone: 306-757-9681

Certificate of Analysis

Lab Work Order #: L2520369

Project P.O. #: NOT SUBMITTED
Job Reference: 20-1147-001
C of C Numbers:
Legal Site Desc:

Brian Morgan, B.Sc. Hons.
Client Services Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L2520369-1 CRESCENT CREEK									
Sampled By: CLIENT on 22-OCT-20 @ 11:20									
Matrix: WATER									
Two Metals in Water by ICPMS (Diss.)									
Dissolved Metals in Water by CRC ICPMS									
Dissolved Metals Filtration Location	LAB	-	SFP			-		23-OCT-20	R5266582
Calcium (Ca)-Dissolved	196	+/-28	DLDS	0.25	mg/L	0		23-OCT-20	R5267820
Magnesium (Mg)-Dissolved	218	+/-20	DLDS	0.025	mg/L	0		23-OCT-20	R5267820
Miscellaneous Parameters									
Ammonia, Total (as N)	0.200	+/-0.022		0.050	mg/L	0		28-OCT-20	R5270613
BOD Carbonaceous	3.3	+/-0.9	BODQ	2.0	mg/L	0		23-OCT-20	R5270488
Hardness (as CaCO3)	1380	-		0.63	mg/L	-		26-OCT-20	
Total Kjeldahl Nitrogen	1.47	+/-0.28		0.20	mg/L	0		24-OCT-20	R5268090
Phosphorus (P)-Total	0.879	+/-0.094	DLHC	0.050	mg/L	0		26-OCT-20	R5268849
Total Suspended Solids	4.1	+/-1.0		3.0	mg/L	0		24-OCT-20	R5268239
Ammonia, Un-ionized (as N), 15C, WSER	0.0074	-		0.0019	mg/L	-		29-OCT-20	
Volatile Suspended Solids	<10	-		10	mg/L	-		24-OCT-20	R5268239
pH	7.90	-		0.10	pH	-	23-OCT-20	23-OCT-20	R5267099
pH at 15C, WSER	8.15	-		0.10	pH	-		27-OCT-20	R5269319
Total Coliform, E. Coli - Quanti-Tray									
Total Coliforms	>200.5	-		0	MPN/100mL	-	23-OCT-20	23-OCT-20	R5268144
Escherichia Coli	>200.5	-		0	MPN/100mL	-	23-OCT-20	23-OCT-20	R5268144
Total Metals in Water by CRC ICPMS									
Aluminum (Al)-Total	0.036	+/-0.006	DLDS	0.015	mg/L	0		23-OCT-20	R5267863
Antimony (Sb)-Total	<0.00050	-	DLDS	0.00050	mg/L	-		23-OCT-20	R5267863
Arsenic (As)-Total	0.00326	+/-0.00032	DLDS	0.00050	mg/L	0		23-OCT-20	R5267863
Barium (Ba)-Total	0.0488	+/-0.0051	DLDS	0.00050	mg/L	0		23-OCT-20	R5267863
Beryllium (Be)-Total	<0.00050	-	DLDS	0.00050	mg/L	-		23-OCT-20	R5267863
Bismuth (Bi)-Total	<0.00025	-	DLDS	0.00025	mg/L	-		23-OCT-20	R5267863
Boron (B)-Total	0.340	+/-0.048	DLDS	0.050	mg/L	0		23-OCT-20	R5267863
Cadmium (Cd)-Total	<0.000025	-	DLDS	0.000025	mg/L	-		23-OCT-20	R5267863
Calcium (Ca)-Total	190	+/-25	DLDS	0.25	mg/L	0		23-OCT-20	R5267863
Cesium (Cs)-Total	<0.000050	-	DLDS	0.000050	mg/L	-		23-OCT-20	R5267863
Chromium (Cr)-Total	<0.00050	-	DLDS	0.00050	mg/L	-		23-OCT-20	R5267863
Cobalt (Co)-Total	<0.00050	-	DLDS	0.00050	mg/L	-		23-OCT-20	R5267863
Copper (Cu)-Total	<0.0025	-	DLDS	0.0025	mg/L	-		23-OCT-20	R5267863
Iron (Fe)-Total	0.193	+/-0.020	DLDS	0.050	mg/L	0		23-OCT-20	R5267863
Lead (Pb)-Total	<0.00025	-	DLDS	0.00025	mg/L	-		23-OCT-20	R5267863
Lithium (Li)-Total	0.217	+/-0.031	DLDS	0.0050	mg/L	0		23-OCT-20	R5267863
Magnesium (Mg)-Total	207	+/-22	DLDS	0.025	mg/L	0		23-OCT-20	R5267863
Manganese (Mn)-Total	0.123	+/-0.012	DLDS	0.00050	mg/L	0		23-OCT-20	R5267863
Molybdenum (Mo)-Total	0.0111	+/-0.0014	DLDS	0.00025	mg/L	0		23-OCT-20	R5267863
Nickel (Ni)-Total	<0.0025	-	DLDS	0.0025	mg/L	-		23-OCT-20	R5267863
Potassium (K)-Total	36.9	+/-4.1	DLDS	0.25	mg/L	0		23-OCT-20	R5267863
Phosphorus (P)-Total	0.80	+/-0.12	DLDS	0.25	mg/L	0		23-OCT-20	R5267863
Rubidium (Rb)-Total	0.0051	-	DLDS	0.0010	mg/L	-		23-OCT-20	R5267863
Selenium (Se)-Total	0.00034	+/-0.00004	DLDS	0.00025	mg/L	0		23-OCT-20	R5267863
Silicon (Si)-Total	7.46	+/-1.0	DLDS	0.50	mg/L	+7%		23-OCT-20	R5267863
Silver (Ag)-Total	<0.000050	-	DLDS	0.000050	mg/L	-		23-OCT-20	R5267863
Sodium (Na)-Total	549	+/-60	DLDS	0.25	mg/L	0		23-OCT-20	R5267863
Strontium (Sr)-Total	1.37	+/-0.18	DLDS	0.0010	mg/L	0		23-OCT-20	R5267863
Sulfur (S)-Total	599	-	DLDS	2.5	mg/L	-		23-OCT-20	R5267863
Tellurium (Te)-Total	<0.0010	-	DLDS	0.0010	mg/L	-		23-OCT-20	R5267863
Thallium (Tl)-Total	<0.000050	-	DLDS	0.000050	mg/L	-		23-OCT-20	R5267863
Thorium (Th)-Total	<0.00050	-	DLDS	0.00050	mg/L	-		23-OCT-20	R5267863

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	MU	Qualifier*	D.L.	Units	Bias	Extracted	Analyzed	Batch
L2520369-1 CRESCENT CREEK									
Sampled By: CLIENT on 22-OCT-20 @ 11:20									
Matrix: WATER									
Total Metals in Water by CRC ICPMS									
Tin (Sn)-Total	<0.00050	-	DLDS	0.00050	mg/L	-		23-OCT-20	R5267863
Titanium (Ti)-Total	0.0015	+/-0.0004	DLDS	0.0015	mg/L	0		23-OCT-20	R5267863
Tungsten (W)-Total	<0.00050	-	DLDS	0.00050	mg/L	-		23-OCT-20	R5267863
Uranium (U)-Total	0.0109	+/-0.0015	DLDS	0.000050	mg/L	0		23-OCT-20	R5267863
Vanadium (V)-Total	<0.0025	-	DLDS	0.0025	mg/L	-		23-OCT-20	R5267863
Zinc (Zn)-Total	<0.015	-	DLDS	0.015	mg/L	-		23-OCT-20	R5267863
Zirconium (Zr)-Total	<0.0010	-	DLDS	0.0010	mg/L	-		23-OCT-20	R5267863
Total Nitrogen									
Total Nitrogen (Calculation)									
Total Nitrogen	N/A	-		0.20	mg/L	-		24-OCT-20	

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Laboratory Control Sample	BOD Carbonaceous	LCS-ND	L2520369-1
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2520369-1
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2520369-1
Matrix Spike	Barium (Ba)-Total	MS-B	L2520369-1
Matrix Spike	Calcium (Ca)-Total	MS-B	L2520369-1
Matrix Spike	Copper (Cu)-Total	MS-B	L2520369-1
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2520369-1
Matrix Spike	Sodium (Na)-Total	MS-B	L2520369-1
Matrix Spike	Strontium (Sr)-Total	MS-B	L2520369-1
Matrix Spike	Sulfur (S)-Total	MS-B	L2520369-1
Matrix Spike	Phosphorus (P)-Total	MS-B	L2520369-1

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.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
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.
SFP	Sample was Filtered and Preserved at the laboratory

Test Method References:

ALS Test Code	Matrix	Test Description	Preparation Method Reference	Method Reference**
BOD-CBOD-CL	Water	Carbonaceous 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.				
HARDNESS-CALC-SK	Water	Hardness		APHA 2340B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.				
MET-D-CCMS-SK	Water	Dissolved Metals in Water by CRC ICPMS		APHA 3030B / EPA 6020A
This procedure involves preliminary filtration through a 0.45 um filter followed by instrumental analysis using collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).				
MET-T-CCMS-SK	Water	Total Metals in Water by CRC ICPMS		EPA 200.2/6020A (mod)
This procedure involves preliminary digestion with concentrated nitric acid followed by instrumental analysis using collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).				
N-T-CALC-SK	Water	Total Nitrogen (Calculation)		APHA 4500 N-Calculated
Total Nitrogen is a calculated parameter. Total Nitrogen = Total Kjeldahl Nitrogen + [Nitrate and Nitrite (as N)]				
NH3-F-CL	Water	Ammonia by Fluorescence		J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.				
NH3-UNION-15-CALC-CL	Water	Un-ionized Ammonia at 15C, WSER		WSER 29June2012
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-15C-MAN-CL	Water	pH in Water (at 15C)		APHA 4500 H-Electrode
pH at 15C is determined by the electrometric method after equilibration of test samples and pH buffer solutions to 15 +/- 1 C, and is used to calculate Un-Ionized Ammonia for the federal Wastewater Systems Effluent Regulation. A 5 day recommended hold time is based on the trout acute lethality test, which pH at 15C is intended to represent.				

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Preparation Method Reference	Method Reference**
PH-SK	Water	pH		APHA 4500 H-Electrode

pH in water is determined using a manual pH electrode attached to a pH meter.

pH is a field test. It is recommended that this analysis be conducted in the field.

SOLIDS-VOLSUS-CL	Water	Volatile Suspended Solids		APHA 2540 E-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Volatile Suspended Solids (VSS) are determined by filtering a sample through a glass fibre filter, VSS is determined by igniting the filter at 550°C.

TC,EC-QT51-SK	Water	Total Coliform, E. Coli - Quanti-Tray		APHA 9223B 2B

The analysis of Total Coliform (TC) & Escherichia coli (EC) is processed by Quanti-tray (QT): Two substrates, ONPG for TC detection and MUG for EC detection are used. The substrates are added to the 100 ml sample dispensed into the 51 well tray. The tray is incubated at 35 Celcius for 24 hours. A colour reaction develops to indicate a positve reaction (presence of TC, EC). The number of positive wells are counted and converted to Most Probable Number Units (MPNU) per 100 ml.

TKN-F-CL	Water	Total Kjeldahl Nitrogen by Fluorescence		APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

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.

** The indicated Method Reference is the closest nationally or internationally recognized reference for the applicable ALS test method. ALS methods may incorporate modifications from the specified reference 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
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surr - 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.
MU: Measurement Uncertainty. The reported uncertainty is an expanded uncertainty calculated using a coverage factor of 2 which gives a level of confidence of approximately 95%.
Bias: The reported method bias is the average long term deviation from the target value for a long term reference or control sample, measured in percent. Zero values indicate no detectable method bias.

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: L2520369 Report Date: 29-OCT-20

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BOD-CBOD-CL	**Water**							
Batch R5270488								
WG3434031-3 DUP		**L2520716-1**						
BOD Carbonaceous		<2.0	<2.0	RPD-NA	mg/L	N/A	30	23-OCT-20
WG3434031-2 LCS								
BOD Carbonaceous			79.6	LCS-ND	%		85-115	23-OCT-20
WG3434031-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	23-OCT-20
MET-D-CCMS-SK	**Water**							
Batch R5267820								
WG3430452-3 CRM		**TMRM_20**						
Calcium (Ca)-Dissolved			94.4		%		80-120	23-OCT-20
Magnesium (Mg)-Dissolved			99.2		%		80-120	23-OCT-20
WG3430452-2 DUP		**L2520496-6**						
Calcium (Ca)-Dissolved		445	438		mg/L	1.8	20	23-OCT-20
Magnesium (Mg)-Dissolved		335	339		mg/L	1.1	20	23-OCT-20
WG3430452-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	23-OCT-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	23-OCT-20
WG3430452-4 MS		**L2519464-3**						
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	23-OCT-20
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	23-OCT-20
MET-T-CCMS-SK	**Water**							
Batch R5267863								
WG3430437-3 CRM		**TMRM_20**						
Aluminum (Al)-Total			106.7		%		80-120	23-OCT-20
Antimony (Sb)-Total			111.8		%		80-120	23-OCT-20
Arsenic (As)-Total			104.1		%		80-120	23-OCT-20
Barium (Ba)-Total			106.8		%		80-120	23-OCT-20
Beryllium (Be)-Total			96.1		%		80-120	23-OCT-20
Bismuth (Bi)-Total			106.0		%		80-120	23-OCT-20
Boron (B)-Total			98.2		%		80-120	23-OCT-20
Cadmium (Cd)-Total			103.9		%		80-120	23-OCT-20
Calcium (Ca)-Total			95.2		%		80-120	23-OCT-20
Cesium (Cs)-Total			102.3		%		80-120	23-OCT-20
Chromium (Cr)-Total			103.7		%		80-120	23-OCT-20
Cobalt (Co)-Total			101.9		%		80-120	23-OCT-20
Copper (Cu)-Total			101.4		%		80-120	23-OCT-20

Quality Control Report

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-SK	**Water**							
Batch R5267863								
WG3430437-3 CRM		**TMRM_20**						
Iron (Fe)-Total			107.9		%		80-120	23-OCT-20
Lead (Pb)-Total			104.2		%		80-120	23-OCT-20
Lithium (Li)-Total			94.0		%		80-120	23-OCT-20
Magnesium (Mg)-Total			102.6		%		80-120	23-OCT-20
Manganese (Mn)-Total			99.8		%		80-120	23-OCT-20
Molybdenum (Mo)-Total			105.6		%		80-120	23-OCT-20
Nickel (Ni)-Total			102.3		%		80-120	23-OCT-20
Potassium (K)-Total			104.4		%		80-120	23-OCT-20
Phosphorus (P)-Total			101.0		%		70-130	23-OCT-20
Rubidium (Rb)-Total			106.1		%		80-120	23-OCT-20
Selenium (Se)-Total			103.2		%		80-120	23-OCT-20
Silicon (Si)-Total			103.8		%		60-140	23-OCT-20
Silver (Ag)-Total			105.1		%		80-120	23-OCT-20
Sodium (Na)-Total			106.3		%		80-120	23-OCT-20
Strontium (Sr)-Total			104.1		%		80-120	23-OCT-20
Sulfur (S)-Total			99.3		%		80-120	23-OCT-20
Tellurium (Te)-Total			96.9		%		80-120	23-OCT-20
Thallium (Tl)-Total			105.0		%		80-120	23-OCT-20
Thorium (Th)-Total			94.0		%		80-120	23-OCT-20
Tin (Sn)-Total			101.2		%		80-120	23-OCT-20
Titanium (Ti)-Total			102.6		%		80-120	23-OCT-20
Tungsten (W)-Total			104.4		%		80-120	23-OCT-20
Uranium (U)-Total			103.2		%		80-120	23-OCT-20
Vanadium (V)-Total			103.4		%		80-120	23-OCT-20
Zinc (Zn)-Total			101.6		%		80-120	23-OCT-20
Zirconium (Zr)-Total			100.8		%		80-120	23-OCT-20
WG3430437-2 DUP		**L2520496-7**						
Aluminum (Al)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	23-OCT-20
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	23-OCT-20
Arsenic (As)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	23-OCT-20
Barium (Ba)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	23-OCT-20
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	23-OCT-20
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	23-OCT-20

Quality Control Report

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-SK	**Water**							
Batch R5267863								
WG3430437-2 DUP		**L2520496-7**						
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	23-OCT-20
Cadmium (Cd)-Total		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	23-OCT-20
Calcium (Ca)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	23-OCT-20
Cesium (Cs)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	23-OCT-20
Chromium (Cr)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	23-OCT-20
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	23-OCT-20
Copper (Cu)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	23-OCT-20
Iron (Fe)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	23-OCT-20
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	23-OCT-20
Lithium (Li)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	23-OCT-20
Magnesium (Mg)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	23-OCT-20
Manganese (Mn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	23-OCT-20
Molybdenum (Mo)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	23-OCT-20
Nickel (Ni)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	23-OCT-20
Potassium (K)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	23-OCT-20
Phosphorus (P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	23-OCT-20
Rubidium (Rb)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	23-OCT-20
Selenium (Se)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	23-OCT-20
Silicon (Si)-Total		<0.10	<0.10	RPD-NA	mg/L	N/A	20	23-OCT-20
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	23-OCT-20
Sodium (Na)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	23-OCT-20
Strontium (Sr)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	23-OCT-20
Sulfur (S)-Total		<0.50	<0.50	RPD-NA	mg/L	N/A	20	23-OCT-20
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	23-OCT-20
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	23-OCT-20
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	23-OCT-20
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	23-OCT-20
Titanium (Ti)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	23-OCT-20
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	23-OCT-20
Uranium (U)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	23-OCT-20
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	23-OCT-20
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	23-OCT-20
Zirconium (Zr)-Total		<0.00020	<0.00020		mg/L			23-OCT-20

Quality Control Report

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-SK	**Water**							
Batch R5267863								
WG3430437-2 DUP		**L2520496-7**						
Zirconium (Zr)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	23-OCT-20
WG3430437-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	23-OCT-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	23-OCT-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	23-OCT-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	23-OCT-20
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	23-OCT-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	23-OCT-20
Boron (B)-Total			<0.010		mg/L		0.01	23-OCT-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	23-OCT-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	23-OCT-20
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	23-OCT-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	23-OCT-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	23-OCT-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	23-OCT-20
Iron (Fe)-Total			<0.010		mg/L		0.01	23-OCT-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	23-OCT-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	23-OCT-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	23-OCT-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	23-OCT-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	23-OCT-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	23-OCT-20
Potassium (K)-Total			<0.050		mg/L		0.05	23-OCT-20
Phosphorus (P)-Total			<0.050		mg/L		0.05	23-OCT-20
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	23-OCT-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	23-OCT-20
Silicon (Si)-Total			<0.10		mg/L		0.1	23-OCT-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	23-OCT-20
Sodium (Na)-Total			<0.050		mg/L		0.05	23-OCT-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	23-OCT-20
Sulfur (S)-Total			<0.50		mg/L		0.5	23-OCT-20
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	23-OCT-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	23-OCT-20
Thorium (Th)-Total			<0.00010		mg/L		0.0001	23-OCT-20

Quality Control Report

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-SK	**Water**							
Batch R5267863								
WG3430437-1 MB								
Tin (Sn)-Total			<0.00010		mg/L		0.0001	23-OCT-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	23-OCT-20
Tungsten (W)-Total			<0.00010		mg/L		0.0001	23-OCT-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	23-OCT-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	23-OCT-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	23-OCT-20
Zirconium (Zr)-Total			<0.00020		mg/L		0.0002	23-OCT-20
WG3430437-4 MS		**L2520108-6**						
Aluminum (Al)-Total			93.1		%		70-130	23-OCT-20
Antimony (Sb)-Total			108.2		%		70-130	23-OCT-20
Arsenic (As)-Total			100.2		%		70-130	23-OCT-20
Barium (Ba)-Total			N/A	MS-B	%		-	23-OCT-20
Beryllium (Be)-Total			96.2		%		70-130	23-OCT-20
Bismuth (Bi)-Total			94.8		%		70-130	23-OCT-20
Boron (B)-Total			104.4		%		70-130	23-OCT-20
Cadmium (Cd)-Total			99.7		%		70-130	23-OCT-20
Calcium (Ca)-Total			N/A	MS-B	%		-	23-OCT-20
Cesium (Cs)-Total			102.7		%		70-130	23-OCT-20
Chromium (Cr)-Total			101.0		%		70-130	23-OCT-20
Cobalt (Co)-Total			95.3		%		70-130	23-OCT-20
Copper (Cu)-Total			N/A	MS-B	%		-	23-OCT-20
Iron (Fe)-Total			99.4		%		70-130	23-OCT-20
Lead (Pb)-Total			92.4		%		70-130	23-OCT-20
Lithium (Li)-Total			100.8		%		70-130	23-OCT-20
Magnesium (Mg)-Total			N/A	MS-B	%		-	23-OCT-20
Manganese (Mn)-Total			96.8		%		70-130	23-OCT-20
Molybdenum (Mo)-Total			104.8		%		70-130	23-OCT-20
Nickel (Ni)-Total			93.1		%		70-130	23-OCT-20
Potassium (K)-Total			96.8		%		70-130	23-OCT-20
Phosphorus (P)-Total			98.6		%		70-130	23-OCT-20
Rubidium (Rb)-Total			97.5		%		70-130	23-OCT-20
Selenium (Se)-Total			104.3		%		70-130	23-OCT-20
Silicon (Si)-Total			94.3		%		70-130	23-OCT-20
Silver (Ag)-Total			99.8		%		70-130	23-OCT-20

Quality Control Report

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-SK	**Water**							
Batch R5267863								
WG3430437-4 MS		**L2520108-6**						
Sodium (Na)-Total			N/A	MS-B	%		-	23-OCT-20
Strontium (Sr)-Total			N/A	MS-B	%		-	23-OCT-20
Sulfur (S)-Total			N/A	MS-B	%		-	23-OCT-20
Tellurium (Te)-Total			95.7		%		70-130	23-OCT-20
Thallium (Tl)-Total			91.0		%		70-130	23-OCT-20
Thorium (Th)-Total			95.8		%		70-130	23-OCT-20
Tin (Sn)-Total			102.0		%		70-130	23-OCT-20
Titanium (Ti)-Total			104.2		%		70-130	23-OCT-20
Tungsten (W)-Total			98.8		%		70-130	23-OCT-20
Uranium (U)-Total			96.9		%		70-130	23-OCT-20
Vanadium (V)-Total			102.7		%		70-130	23-OCT-20
Zinc (Zn)-Total			91.6		%		70-130	23-OCT-20
Zirconium (Zr)-Total			104.0		%		70-130	23-OCT-20
NH3-F-CL	**Water**							
Batch R5270613								
WG3434201-18 LCS								
Ammonia, Total (as N)			97.5		%		85-115	28-OCT-20
WG3434201-17 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	28-OCT-20
P-T-COL-CL	**Water**							
Batch R5268849								
WG3432310-30 LCS								
Phosphorus (P)-Total			93.6		%		80-120	26-OCT-20
WG3432310-29 MB								
Phosphorus (P)-Total			<0.0050		mg/L		0.005	26-OCT-20
PH-15C-MAN-CL	**Water**							
Batch R5269319								
WG3432999-2 DUP		**L2520252-1**						
pH at 15C, WSER		7.84	7.80	J	pH	0.04	0.2	27-OCT-20
WG3432999-1 LCS								
pH at 15C, WSER			7.00		pH		6.9-7.1	27-OCT-20
PH-SK	**Water**							

Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-SK	**Water**							
Batch R5267099								
WG3430888-1 DUP		**L2520369-1**						
pH		7.90	7.95	J	pH	0.05	0.2	23-OCT-20
WG3430888-2 LCS								
pH			6.87		pH		6.76-6.96	23-OCT-20
SOLIDS-VOLSUS-CL	**Water**							
Batch R5268239								
WG3431507-4 MB								
Volatile Suspended Solids			<10		mg/L		10	24-OCT-20
TC,EC-QT51-SK	**Water**							
Batch R5268144								
WG3431124-1 DUP		**L2520673-1**						
Total Coliforms		11	10		MPN/100mL	11	65	23-OCT-20
Escherichia Coli		1	0	J	MPN/100mL	1	2	23-OCT-20
WG3431124-2 MB								
Total Coliforms			0		MPN/100mL		1	23-OCT-20
Escherichia Coli			0		MPN/100mL		1	23-OCT-20
TKN-F-CL	**Water**							
Batch R5268090								
WG3431420-1 LCS								
Total Kjeldahl Nitrogen			94.6		%		75-125	24-OCT-20
WG3431420-10 LCS								
Total Kjeldahl Nitrogen			80.2		%		75-125	24-OCT-20
WG3431420-4 LCS								
Total Kjeldahl Nitrogen			84.4		%		75-125	24-OCT-20
WG3431420-6 LCS								
Total Kjeldahl Nitrogen			81.2		%		75-125	24-OCT-20
WG3431420-8 LCS								
Total Kjeldahl Nitrogen			79.5		%		75-125	24-OCT-20
WG3431420-2 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	24-OCT-20
WG3431420-3 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	24-OCT-20
WG3431420-5 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	24-OCT-20
WG3431420-7 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	24-OCT-20

Quality Control Report

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-F-CL	**Water**							
Batch R5268090								
WG3431420-9 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	24-OCT-20
TSS-CL	**Water**							
Batch R5268239								
WG3431507-3 DUP		**L2521116-1**						
Total Suspended Solids		4.3	4.1		mg/L	4.8	20	24-OCT-20
WG3431507-2 LCS								
Total Suspended Solids			95.5		%		85-115	24-OCT-20
WG3431507-1 MB								
Total Suspended Solids			<3.0		mg/L		3	24-OCT-20

Quality Control Report

Workorder: L2520369 Report Date: 29-OCT-20

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Legend:

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

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
LCS-ND	Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.
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: L2520369 Report Date: 29-OCT-20

Client: KGS Group Consultants (Regina)
Suite 200 4561 Parliament Avenue
Regina SK S4W 0G3
Contact: Jon Nachtigall

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH							
	1	22-OCT-20 11:20	23-OCT-20 00:00	0.25	13	hours	EHTR-FM
pH in Water (at 15C)							
	1	22-OCT-20 11:20	27-OCT-20 10:00	0.25	119	hours	EHTR-FM

Legend & Qualifier Definitions:

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

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2520369 were received on 22-OCT-20 14:07.

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.alsglobal.com

L2520369-COFC

ical

Affix ALS barcode label here
(lab use only)

COC Number: 17 - 789333

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	KGS Group
Contact:	Jon Nachtigall
Phone:	306-551-4523
	Company address below will appear on the final report
Street:	200 - 4561 Parliament Ave
City/Province:	Regina, SK
Postal Code:	S4W 0G3
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL | EDD (DIGITAL)
Quality Control (QC) Report with Report	☐ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☐ EMAIL | MAIL ☐ FAX
Email 1 or Fax	~~jonnachti~~
Email 2	jnachtigall@kgsgroup.com
Email 3	Sbayer@kgsgroup.com

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	Sbayer@kgsgroup.com
Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	20-1147-0001	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only):		ALS Contact:	Sampler:

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): ☐ 4 day [P4-20%] ☐ 3 day [P3-25%] ☐ 2 day [P2-50%]

EMERGENCY: ☐ 1 Business day [E - 100%] ☐ Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)]

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	CBOD	TSS	VSS	Nitrogen	Ammonia	Un-ionized Ammonia	TKN	Phosphorus	Total Coliforms	Metals	Water hardness	pH	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
	Crescent Creek	22-Oct-20	11:20	Water		X	X	X	X	X	X	X	X	X	X	X	X		

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human consumption/ use? | | YES | | NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C	FINAL COOLER TEMPERATURES °C
7.8	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Jon Nachtigall	Date:	Time:	Received by:	Date: 22 Oct 20	Time: 1350	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JUNE 2018 FRONT

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

KGS
GROUP

Experience in Action