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KAMLOOPS SEWAGE TREATMENT CENTRE - 2024 EFFLUENT DISCHARGE SUMMARY

Under OC 111009

The City of Kamloops

March 2025

Kamloops Sewage Treatment Centre –
2024 Effluent Discharge Summary

Report prepared for:

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1 Executive Summary

The City of Kamloops oversees the Kamloops Sewage Treatment Centre (KSTC), which treats wastewater in accordance with Operational Certificate (OC) 111009, issued on October 3, 2022. KSTC uses a Biological Nutrient Removal process to effectively reduce nitrogen, phosphorus, organics, and solids before discharging treated effluent into the Thompson River. Table 1.1 provides a summary of the OC requirements, and the treatment levels achieved at KSTC in 2024.

Table 1.1 Summary of Effluent Quality for Discharge and Reclaimed Water Quality at KSTC in 2024

Parameter	Treatment Levels Achieved at KSTC in 2024	OC 111009 Requirement
Effluent Discharge to Thompson River Post UV Disinfection (E297590)		
Effluent Flow	40,110 m^3/d (max) 26,992 m^3/d (avg)	≤ 45,000 m^3/d
5-day Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	Max: 8.5 mg/L Avg: <3.7 mg/L	Max: ≤30 mg/L Monthly Avg: ≤25 mg/L
Total Suspended Solids (TSS)	Max: 10.5 mg/L Avg: 5.9 mg/L	Max: ≤30 mg/L Monthly Avg: ≤25 mg/L
Total Phosphorus (TP)	Max: 1.13 mg/L Avg: 0.39 mg/L	Max: ≤1.5 mg/L Annual Avg≤ 1.0 mg/L
Fecal Coliforms	Max: 30 CFU/100 mL	Max: ≤200 CFU/100 mL
96-Hr Rainbow Trout Single Concentration (effluent toxicity)	0% Mortality	Must pass in 100% Effluent Concentration
Effluent for Reclaimed Water Use Post UV Disinfection at KSTC (E300693)		
Weekly Flow	5,871 m^3/d (max) 3,337 m^3/d (avg)	N/A
$CBOD_5$	Max: 4.9 mg/L	Max: ≤45 mg/L
TSS	Max: 10.5 mg/L	Max: ≤60 mg/L
Fecal Coliforms	Max: 85 CFU/100 mL	Max: <200 CFU/100 mL
Effluent for Reclaimed Water Use from Cell 4 Lagoon for Cinnamon Ridge Effluent Distribution System (CREDS) Across the Thompson River (E328532) During the Irrigation Season		
Weekly Flow	24,244 m^3/d (max) 10,049 m^3/d (avg)	N/A
$CBOD_5$	Max: 11.0 mg/L	Max: ≤45 mg/L
TSS	Max: 30 mg/L	Max: ≤60 mg/L
Fecal Coliforms	Max: 78 CFU/100 mL	Max: <200 CFU/100 mL

In 2024, there were no exceedances of OC 111009 during the reporting period indicating the authorized works were performing effectively.

The Ministry of Environment and Parks (ENV) was notified by email about a temporary emergency discharge to the Thompson River on October 3, 2024. Due to high water levels in the Cell 4 holding cell, treated effluent from Cell 4 was released to the river from October 5 to November 2, 2024. A summary of the 2024 temporary emergency discharge water quality is provided in Table 1.2. Weekly monitoring confirmed that the discharge to river met requirements under section 1.1 of OC 111009.

Table 1.2 Summary of Effluent Quality Discharged to the Thompson River during Temporary Emergency Discharge at KSTC in 2024

Parameter	Range and Average in Temporary Emergency Discharge	OC 111009 Requirements
Effluent Discharge to Thompson River Post UV Disinfection (E297590)		
Effluent Flow	8,670 – 40,110 m^3/d 22,012 m^3/d (avg)	≤ 45,000 m^3/d
$CBOD_5$	<3.7 mg/L – 8.5 mg/L <3.7 mg/L (avg)	Max: ≤30 mg/L Monthly Avg: ≤25 mg/L
TSS	<3.2 - 10.5 mg/L 6.1 mg/L (avg)	Max: ≤30 mg/L Monthly Avg: ≤25 mg/L
TP	0.87 mg/L – 1.13 mg/L 0.99 mg/L (avg)	Max: ≤1.5 mg/L Annual Avg≤ 1.0 mg/L
Fecal Coliforms	<1 CFU/100 mL - 5 CFU/100 mL 2 CFU/100 mL (avg)	Max: ≤200 CFU/100 mL

2 Authorized Discharges

The City of Kamloops operates the Kamloops Sewage Treatment Centre (KSTC) to manage and treat sewage from residents and businesses within the city, as well as those from the neighbouring Tk'emlúps te Secwépemc First Nation. Local and regional sewage haulers also contribute to the sewage stream prior to treatment. In addition to KSTC, City staff oversee the Cinnamon Ridge Effluent Distribution System (CREDS), and a Qualified Laboratory listed under the Environmental Data Quality Assurance Regulation (EDQA) Directory.

KSTC operates under operational certificate (OC) 111009, issued on October 3, 2022 (Appendix A). The OC outlines the water quality requirements for treated effluent released into the Thompson River (E297590) and permits a portion of the treated effluent to be

reused as reclaimed water. On-site, reclaimed water is used for process and wash-down water (E300693). KSTC also supplies treated effluent to CREDS (E328532) for agricultural irrigation on a large City-owned parcel, several smaller private farms, the Kamloops Golf and Country Club, and the British Columbia Provincial Air Tanker Centre for wildfire operations.

To evaluate potential impacts of reclaimed water irrigation, groundwater (E328533 – E328538) and soil (E328568 – E328574) monitoring is conducted at designated locations within the CREDS site.

3 Monitoring Requirements

The KSTC Laboratory (Laboratory Number: 3060) is recognized as a qualified laboratory under the Environmental Data Quality Assurance Regulation (EDQA). The KSTC Lab is proficient in conducting chemical analyses for: $CBOD_5$, TSS, Ammonia, Nitrate, Phosphate, Total Phosphorus and Fecal (Thermotolerant) Coliforms. Analysis for Nitrite, Total Kjeldahl Nitrogen (TKN), Total Nitrogen (calculated), Organic Nitrogen (calculated), Alkalinity, Chloride, Sulphate, as well as Total and Dissolved Metals aqueous samples are outsourced to an external qualified laboratory. Groundwater and soils samples are also sent to external qualified laboratories for analysis.

Sampling procedures and analytical laboratory protocols at KSTC are outlined in the *Kamloops Sewage Treatment Centre Sampling and Laboratory Protocols* manual. These protocols adhere to the *British Columbia Field Sampling Manual (2013)* and the *British Columbia Environmental Laboratory Manual (2023)*, both accessible online.

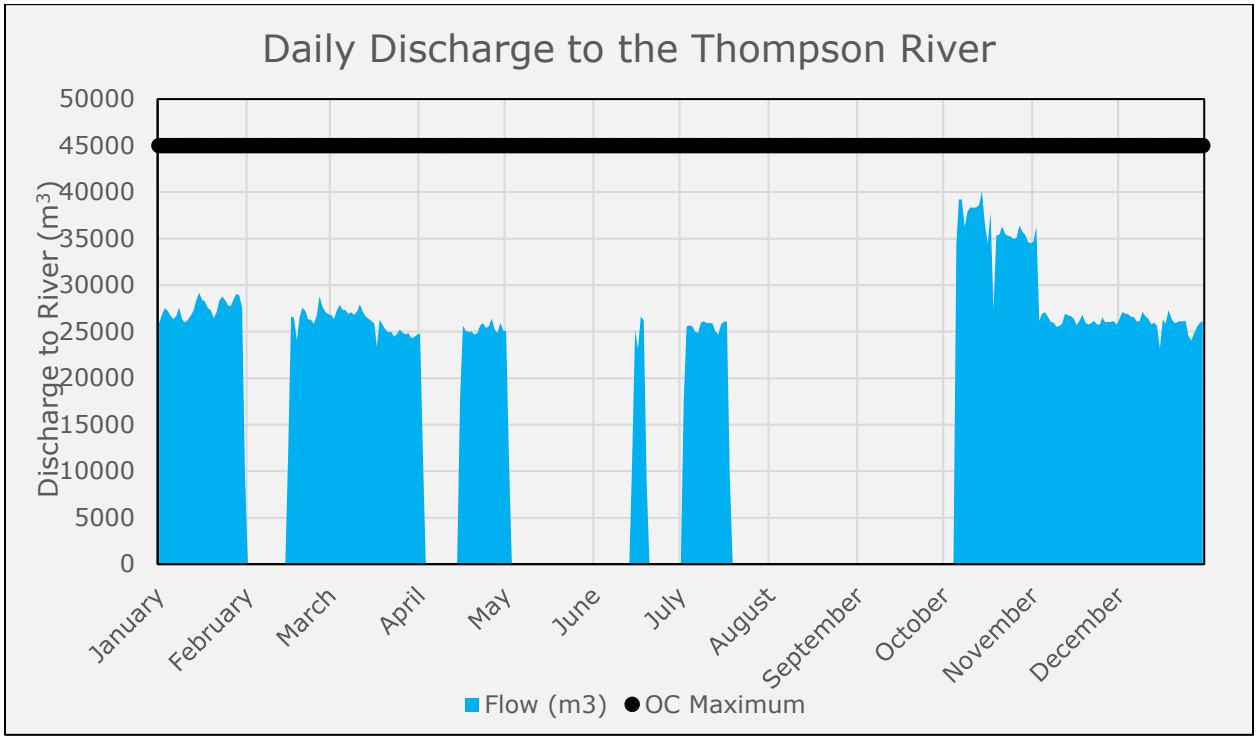
The monitoring plan specified in OC 111009 remained unchanged in 2024.

3.1 Effluent Discharge to the Thompson River (E297590)

3.1.1 Facility Flows

Effluent flows into the Thompson River are monitored daily, as required by Section 3.1.1 of OC 111009, with a maximum allowable limit of 45,000 m^3/d, as specified in Section 1.1.1. Figure 3.1 illustrates the daily effluent flow data for 2024. Instances of zero discharge indicate when KSTC did not release effluent into the Thompson River.

Figure 3.1: Effluent Discharge to the Thompson River – Daily Data for 2024



In 2024, effluent was discharged into the Thompson River on 208 days. On 158 days, discharge was temporarily halted to accommodate demands of irrigation system users. However, low usage by irrigation users late in the year led to an excess of treated effluent in KSTC's holding cells, necessitating a temporary emergency discharge. The Ministry of Environment and Parks (ENV) was notified by email on October 3, 2024 (Appendix B). The temporary emergency discharge to the Thompson River from the Cell 4 holding cell occurred from October 5 to November 2. According to Section 1.1.3, the Cell 4 secondary outfall is designated for temporary emergency use only, and the use in 2024 was aligned with the requirement for both temporary and emergency. The daily temporary emergency discharge flows were added to the daily treated effluent discharges to the river from October 18 to November 2.

Throughout 2024, both regular and temporary emergency discharges remained within the permissible limit of ≤ 45,000 m^3/d. The highest daily discharge was 40,110 m^3/d on October 14, with an average daily flow of 26,992 m^3/d during discharge periods.

3.1.2 Final Effluent Quality

Effluent flows discharged to the Thompson River are monitored in accordance with Section 3.1.1 of OC 111009, which establishes specific water quality standards outlined

in Section 1.1.2. A comprehensive review of the 2024 effluent quality data is provided below, with corresponding datasets available in Appendix C (for KSTC laboratory and external laboratory data) and Appendix D (for external laboratory data reports). Only data collected during periods of discharge were used in the analysis presented in this section.

Composite samples were collected hourly over a 24-hour period from the UV disinfection train immediately after treatment using a Refrigerated Composite Sampler.

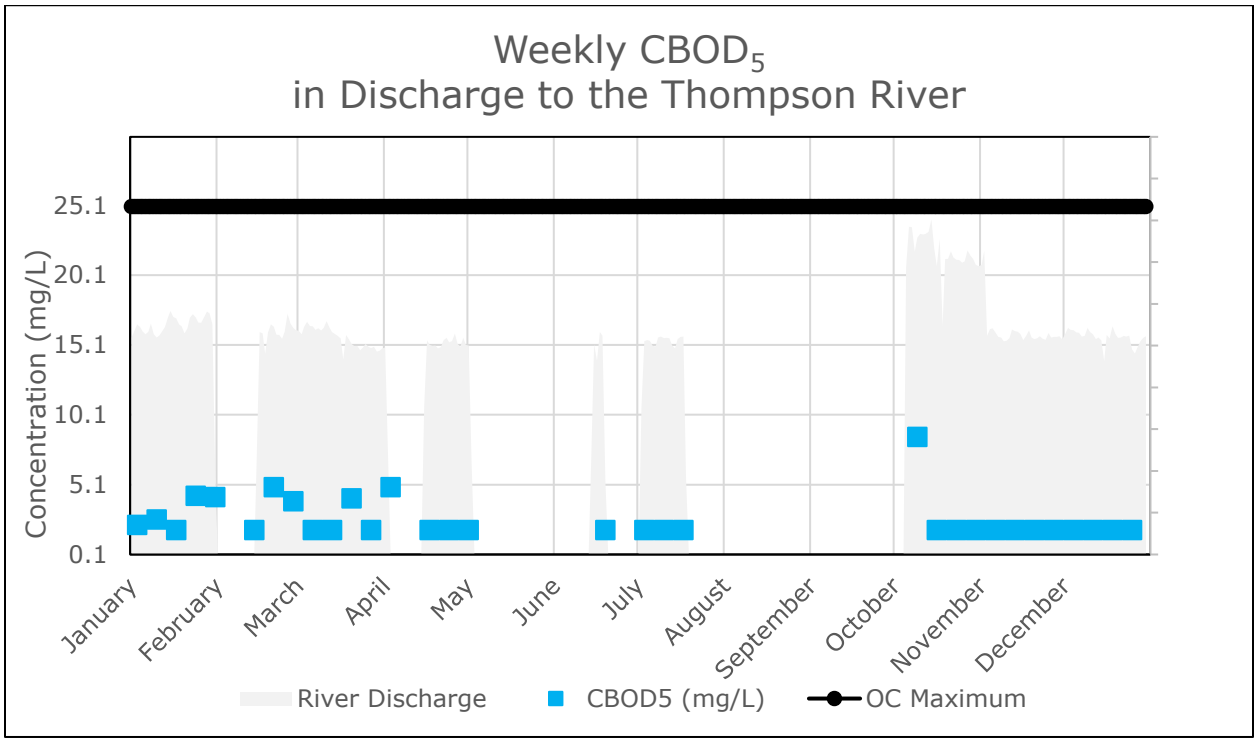
During the temporary emergency discharge, grab samples analyses of the temporary emergency discharge were combined (on a per-volume basis) with the concurrent treated effluent discharge data to estimate the overall parameter levels/concentrations entering the Thompson River. Temporary emergency discharge water parameters must meet the Effluent Discharge to the Thompson River (E297590) requirements specified in Section 1.1 of the OC.

3.1.2.1 $CBOD_5$

$CBOD_5$ concentrations are analyzed weekly using composite effluent samples designated for discharge into the Thompson River. As specified in the OC (Section 1.1.2), effluent must meet a maximum $CBOD_5$ concentration of ≤ 30 mg/L, with an average monthly limit of ≤ 25 mg/L before entering surface waters.

Figure 3.2 presents weekly $CBOD_5$ data for effluent discharged into the Thompson River throughout 2024. For values below the analytical detection limit, half the detection limit was used for graphical representation.

Figure 3.2: Summary of Weekly Effluent $CBOD_5$ Concentrations in 2024



The analysis confirms that effluent discharged into the Thompson River consistently met high treatment standards, maintaining $CBOD_5$ concentrations well below OC limits. The highest recorded monthly average during periods of discharge to the river was 3.6 mg/L in February.

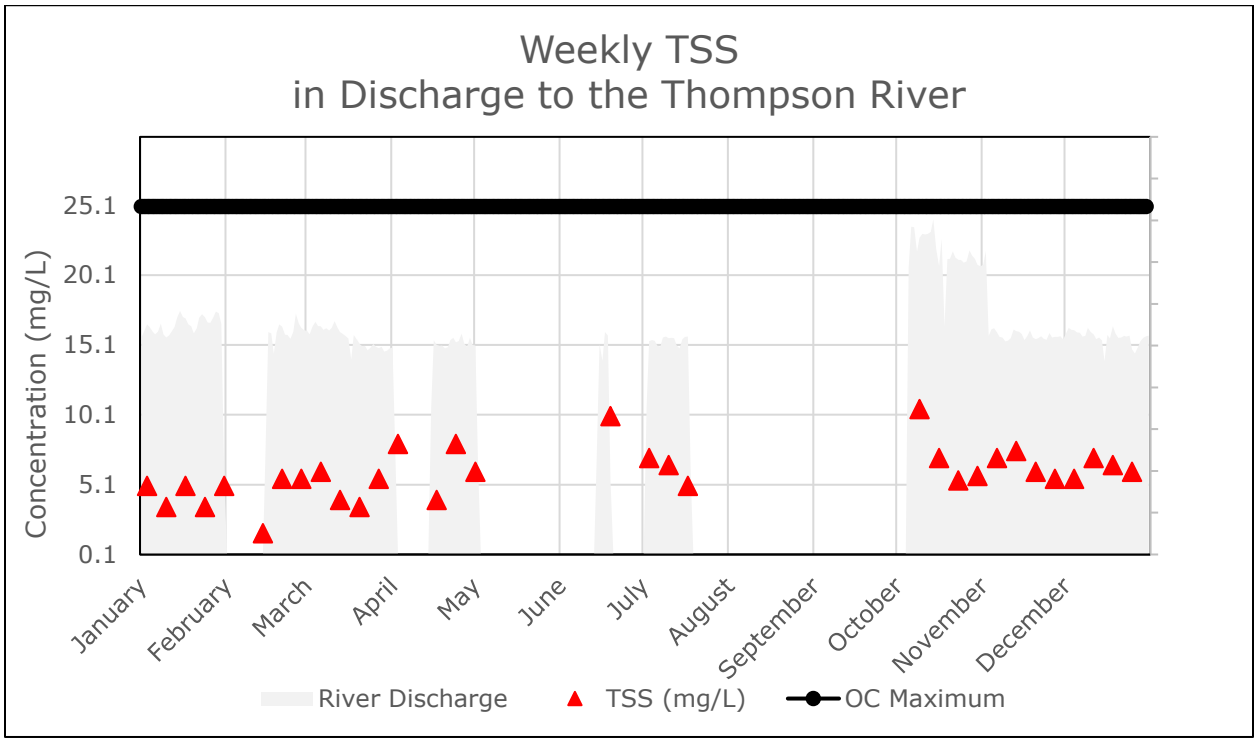
$CBOD_5$ concentrations in the temporary emergency discharge (October 5 - November 2) ranged from <3.7 mg/L to 8.5 mg/L, demonstrating compliance with OC requirements.

3.1.2.2 TSS

TSS concentrations are analyzed weekly in composite samples of effluent designated for discharge into the Thompson River. As specified in the OC (Section 1.1.2), the effluent quality standard before entering surface waters is set at a maximum of ≤ 30 mg/L, with a further requirement that the monthly average remains ≤ 25 mg/L for TSS.

Figure 3.3 presents the weekly TSS data for the effluent discharged into the Thompson River throughout 2024. In cases where data fell below the analytical detection limit, half the detection limit was used for graphical representation.

Figure 3.3: Summary of Weekly Effluent TSS Concentrations in 2024



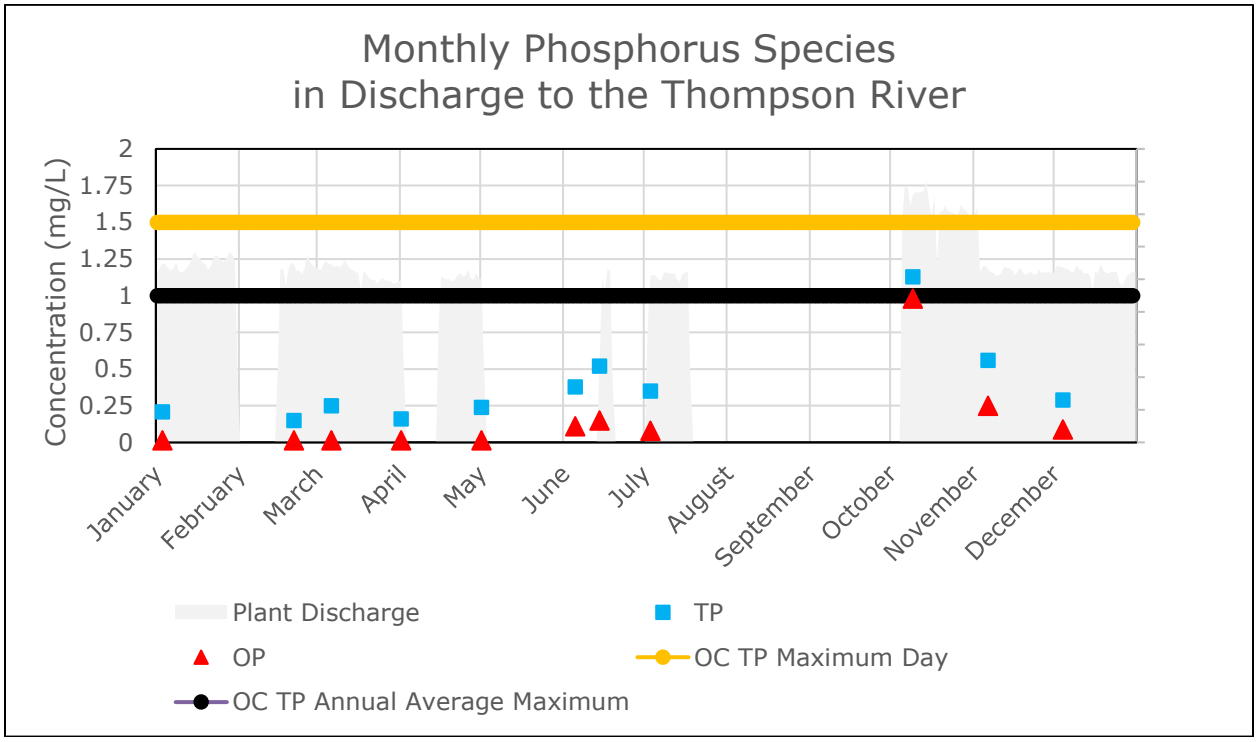
The analysis indicates a consistently high level of treatment, with TSS concentrations remaining below the OC targets for effluent discharged into the Thompson River. The highest monthly average TSS recorded during periods of discharge to the river was 10.0 mg/L in June.

For the temporary emergency discharge from October 5 to November 2, TSS concentrations ranged from <3.2 mg/L to 10.5 mg/L confirming compliance with the OC requirements for TSS during this period.

3.1.2.3 Phosphorus

Total Phosphorus (TP) and ortho phosphate (OP) concentrations in effluent discharged to the Thompson River are monitored monthly. Compliance is assessed based on the standards outlined in Section 1.1.2 of the OC, which requires an annual average TP concentration of ≤ 1.0 mg/L and a daily maximum of ≤ 1.5 mg/L. A summary of the phosphorus data for 2024 is presented in Figure 3.4.

Figure 3.4: Summary of Monthly Effluent Phosphorus Concentrations in 2024



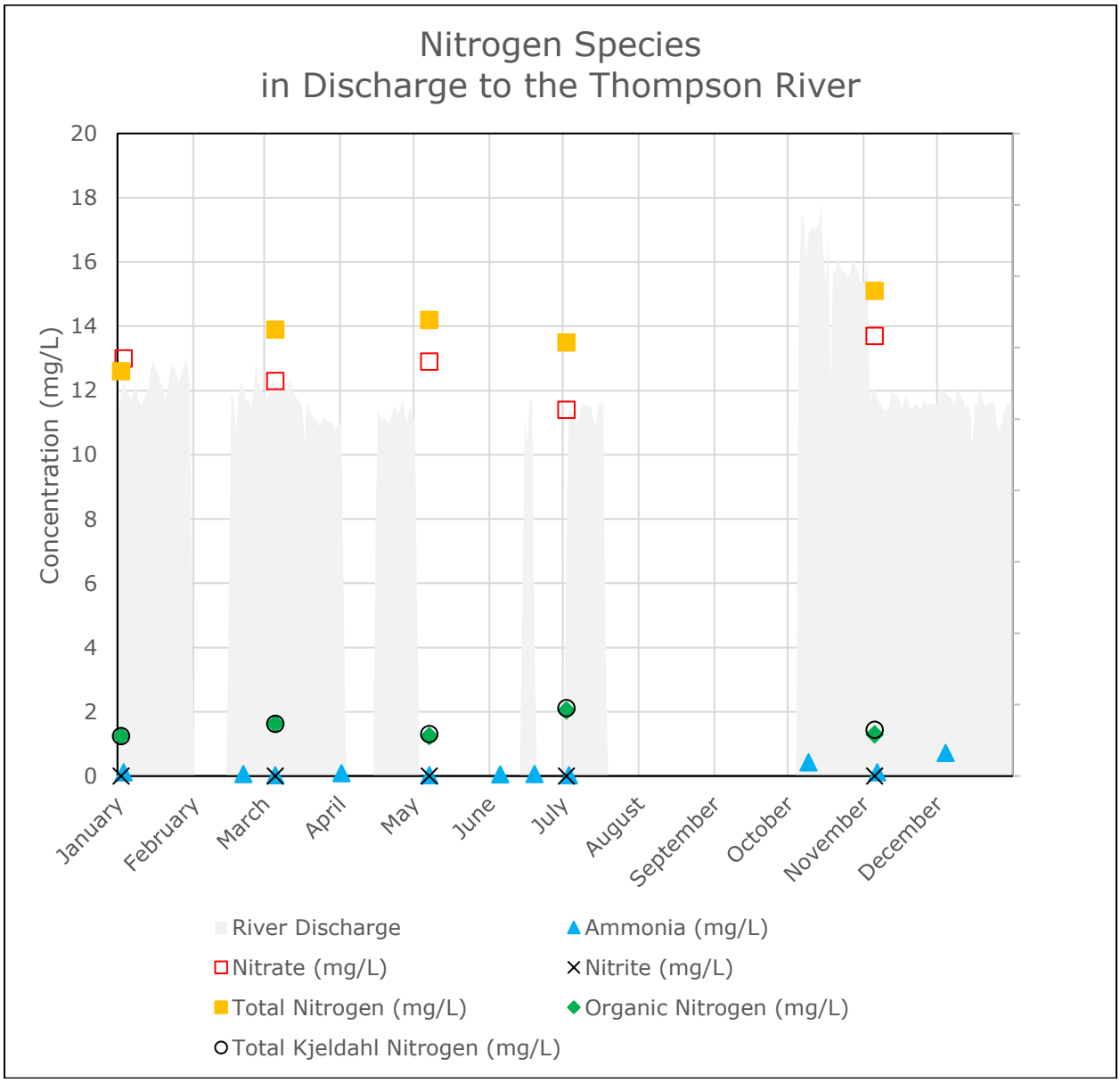
The 2024 data indicate consistent compliance with regulatory standards, with TP concentrations never exceeding 1.5 mg/L. The highest recorded TP level was 1.13 mg/L on October 9, while the annual average TP concentration was 0.39 mg/L.

For the temporary emergency discharge from October 5 to November 2, TP concentrations ranged from 0.87 mg/L to 1.13 mg/L, confirming compliance with the OC requirements during this period.

3.1.2.4 Nitrogen

Ammonia was assessed monthly, while nitrate, nitrite, and TKN were assessed bi-monthly (in odd-numbered months) for effluent discharged into the Thompson River. Based on these measurements, TN and Org-N concentrations were calculated. A summary of the nitrogen-related findings for effluent discharged during operational periods in 2024 is presented in Figure 3.5. In cases where data fell below the analytical detection limits, half the detection limits were used for graphical representation. The OC does not specify maximum concentration limits for nitrogen species.

Figure 3.5: Summary of Effluent Ammonia and Nitrite Concentrations in 2024



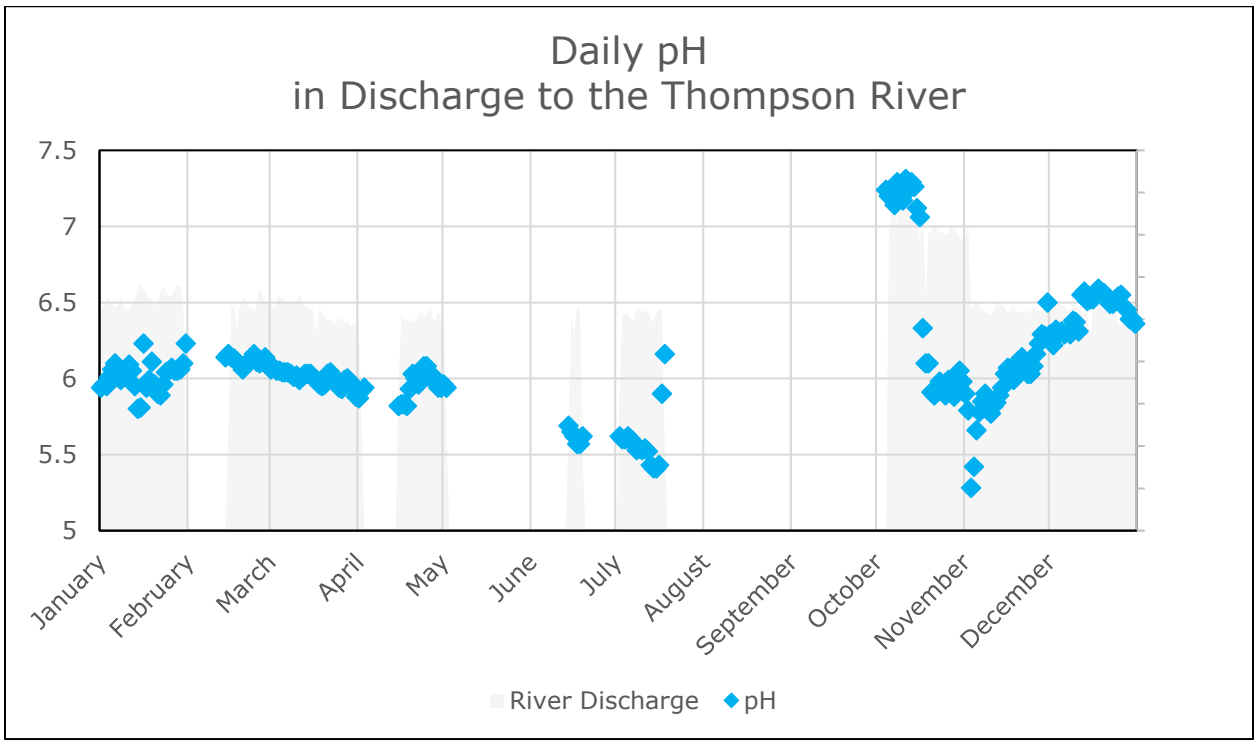
For effluent discharged into the Thompson River, TN concentrations averaged 15.1 mg/L, with nitrate being the predominant nitrogen form. Notably, in January, nitrate concentrations exceeded TN concentrations. This discrepancy was attributed to differences in sampling dates and testing conducted at separate qualified laboratories.

Nitrogen concentrations in the temporary emergency discharge (October 5 to November 2) were consistent with those observed in the plant effluent during the same period.

3.1.2.5 pH

As outlined in Section 3.1.1 of the OC, effluent pH is continuously monitored using an insertion pH sensor. A summary of daily average pH readings for effluent discharged in 2024 is presented in Figure 3.6. The OC does not define maximum or minimum pH limits for effluent discharged to the Thompson River.

Figure 3.6: Summary of Daily Effluent pH Levels in 2024

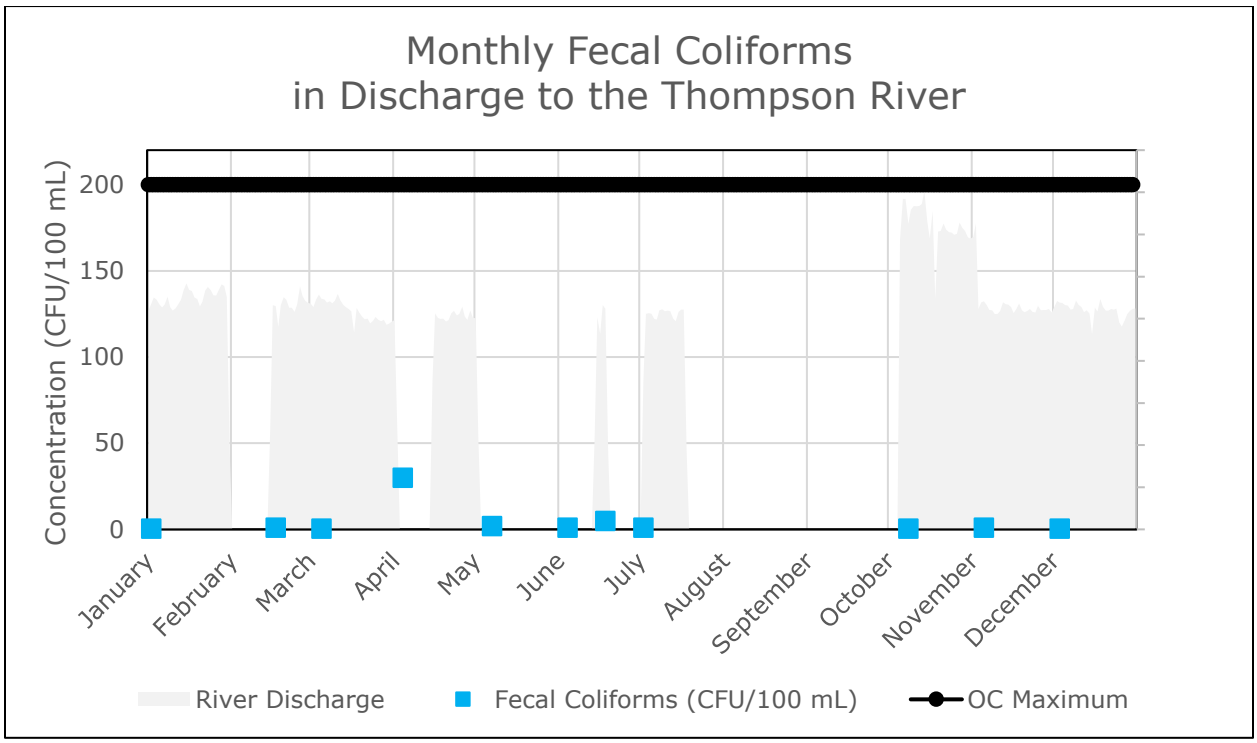


pH levels in the temporary emergency discharge from October 5 to November 2 ranged from 7.0 to 7.3. While slightly elevated compared to typical treated effluent pH, these values are not expected to have a detrimental impact on the Thompson River.

3.1.2.6 Fecal Coliforms

The OC establishes a maximum fecal coliform concentration of 200 CFU/100 mL, as specified in Section 1.1.2. To ensure compliance, fecal coliform testing was conducted monthly using grab samples collected from the UV disinfection immediately post-treatment (at the same location as composite sampling). A summary of fecal coliform data for 2024 is presented in Figure 3.7**.**

Figure 3.7: Summary of Monthly Effluent Fecal Coliform Concentrations in 2024



The UV disinfection system at KSTC effectively eliminated fecal coliforms from the final effluent, maintaining concentrations well within regulatory limits.

Fecal coliform levels in the temporary emergency discharge from October 5 to November 2 ranged from <1 to 5 CFU/100 mL, confirming compliance with OC requirements during this period.

3.1.2.7 Effluent Toxicity

As outlined in Section 1.1.2 of the OC, effluent toxicity is assessed annually using a 96-hour rainbow trout single concentration test. Effluent is classified as acutely toxic if

mortality exceeds 50% during the test conducted according to the EPS 1/RM/13 methodology, which does not involve pH stabilization.

On July 9, a toxicity test was performed, with 40 liters of effluent sent to Nautilus Environmental Company Inc. in Burnaby, BC for analysis utilizing the EPS 1/RM/13 methodology. The results showed a 0% mortality rate, confirming that the final effluent from KSTC does not pose acute lethality to rainbow trout.

3.1.2.8 Exceedances for E297590

There were no exceedances for location E297590 (effluent discharge to the Thompson River) under OC 111009 observed in 2024. The results discussed in Section 3.1 indicate that the KSTC authorized works were successful at treating effluent to OC requirements.

3.2 Reclaimed Water Use at KSTC (E300693)

Treated effluent is repurposed as reclaimed water for operational use at KSTC. The process begins with drawing treated effluent from the end of the UV disinfection train, which is then stored in an underground vault situated in the UV Building. Before distribution, the water undergoes disinfection with a hypochlorite system.

Reclaimed water is primarily used for equipment operation and wash-down, foam management within the bioreactor system, and irrigation surrounding the administration building at KSTC.

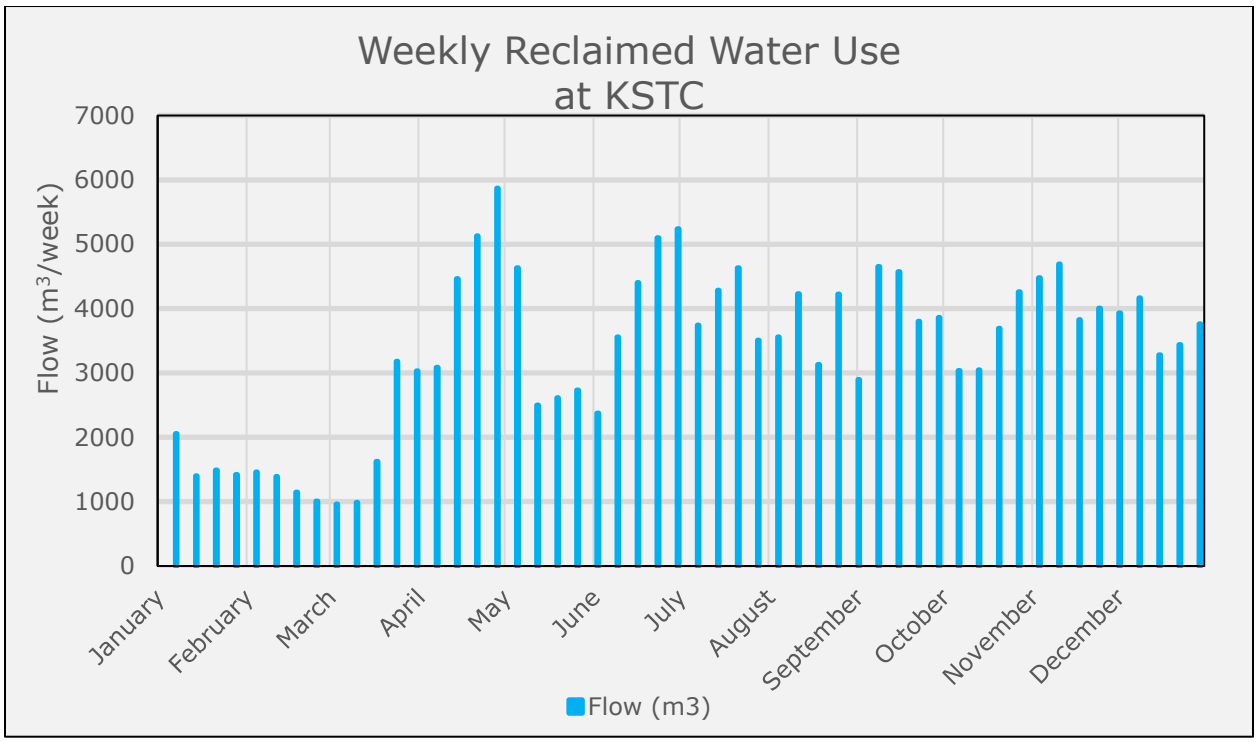
According to Section 3.1 of OC 111009, reclaimed water monitoring is required only when reclaimed water is actively in use at KSTC.

3.2.1 Reclaimed Water Flows at KSTC

Section 1.2.1 of the OC states that is no maximum limit on the beneficial use of reclaimed water, providing there is no effluent surfacing, overland flow, or groundwater breakout. Throughout 2024, no such occurrences were observed at KSTC.

Additionally, as required by Section 3.1.2 of the OC, reclaimed water usage at KSTC is monitored weekly. Flow rates are tracked using a flow meter located downstream of the reclaimed water vault located within the UV disinfection building. A summary of weekly reclaimed water usage for 2024 is presented in Figure 3.8, with a comprehensive dataset provided in Appendix E.

Figure 3.8: Summary of Weekly Reclaimed Water Use at KSTC in 2024



In accordance with OC 111009, reclaimed water flows were reported on a weekly basis (m^3/week). Although data submissions to EMS followed this format, downloads from EMS displayed the information as average daily flows (m^3/d). This discrepancy was addressed with ENV via email on January 20, 2023. Moving forward, KSTC will continue reporting data in the required m^3/week format to ensure consistency.

3.2.2 Reclaimed Water Quality in Use at KSTC

The quality of the reclaimed water used at KSTC is systematically monitored in accordance with Section 3.1.2 of OC 111009, which outlines specific water quality thresholds in Section 1.2.2. The 2024 reclaimed water quality data are summarized below, with a full dataset available in Appendix E.

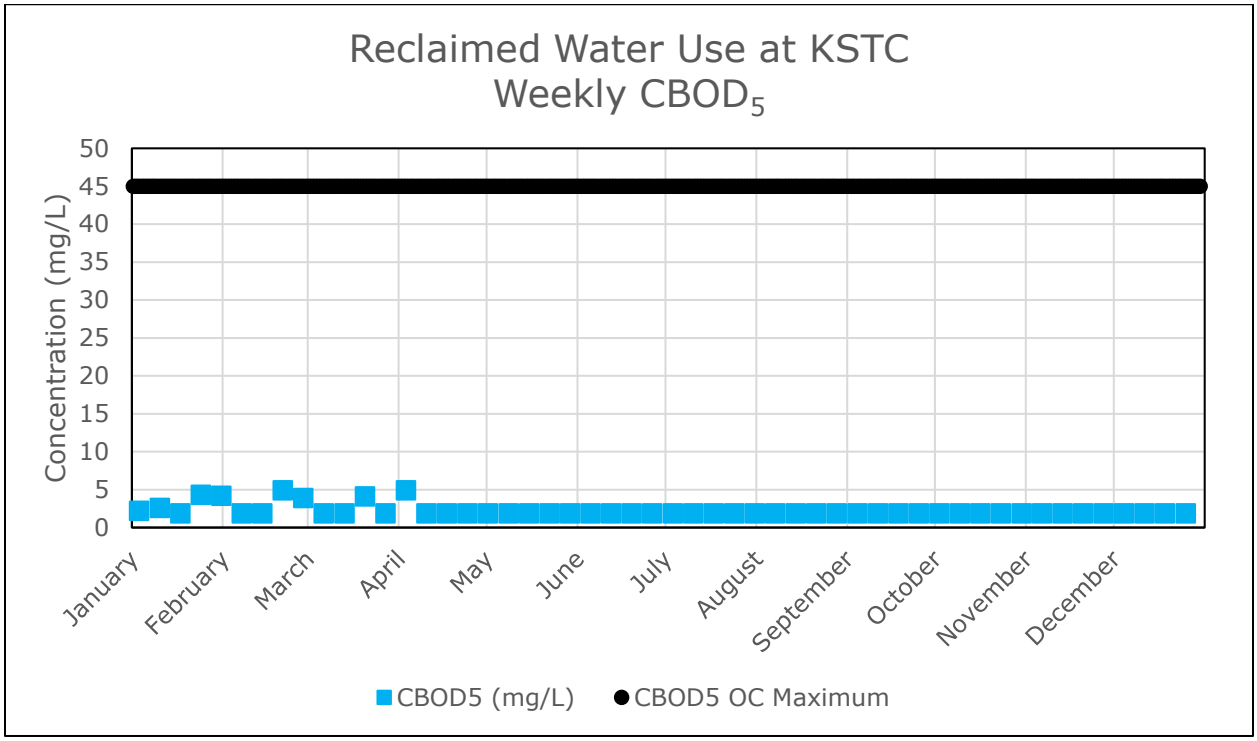
Composite samples for $CBOD_5$ and TSS analysis were collected hourly over a 24-hour period using a refrigerated composite sampler located within the UV disinfection train immediately post-treatment. Additionally, pH levels were continuously monitored with an insertion sensor within the UV disinfection train.

Fecal coliforms and total residual chlorine assessments were conducted at a designated sampling point within the KSTC DAFT building. This location was selected to ensure sufficient residence time for an accurate chlorine assessment.

3.2.2.1 $CBOD_5$

$CBOD_5$ in reclaimed water at KSTC is tested weekly using composite effluent samples. According to OC Section 1.2.2, the maximum allowable $CBOD_5$ concentration for reclaimed water is ≤ 45 mg/L. The weekly $CBOD_5$ data for 2024 are presented in Figure 3.9. For values below the analytical detection limit, half the detection limit was used for graphical representation.

Figure 3.9: Summary of Weekly $CBOD_5$ Concentrations in Reclaimed Water in 2024

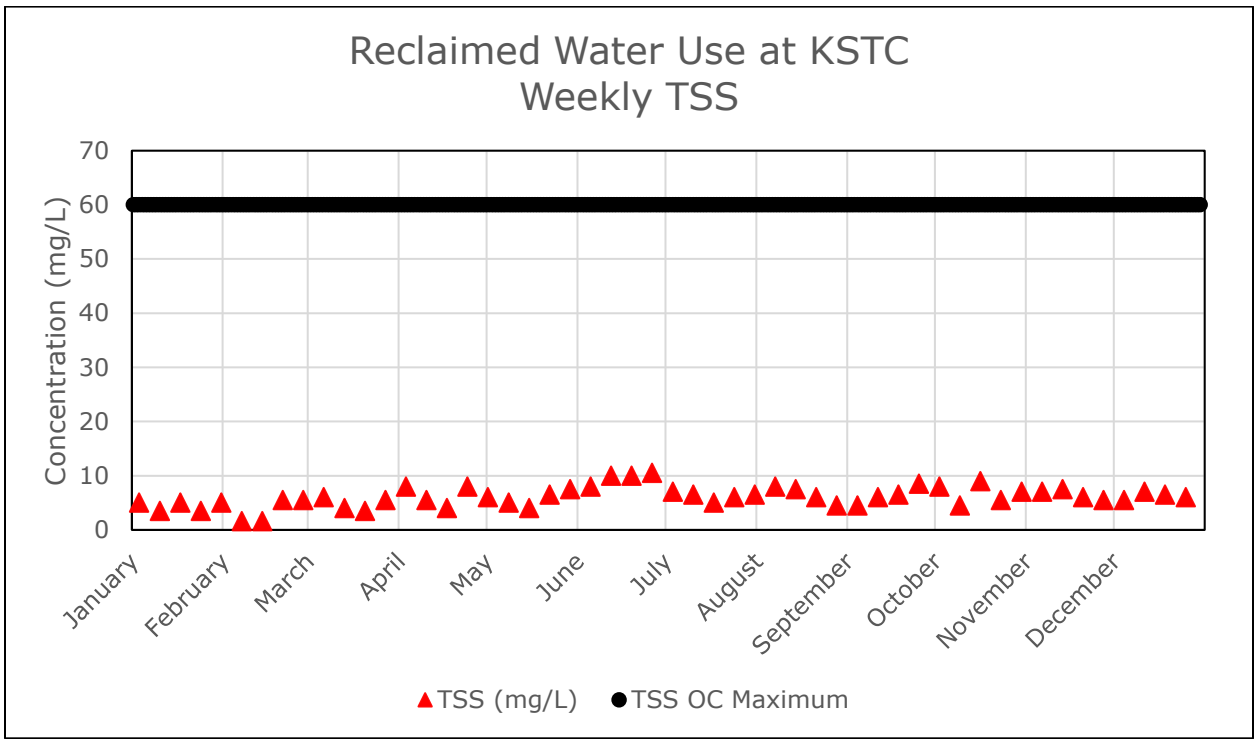


The data confirmed a consistently high standard of treatment, with $CBOD_5$ concentrations remaining within regulatory limits throughout the year.

3.2.2.2 TSS

TSS in reclaimed water at KSTC is tested weekly using composite effluent samples. According to OC Section 1.2.2, the maximum allowable TSS for reclaimed water is ≤ 60 mg/L. The weekly TSS data for 2024 are presented in Figure 3.10. For values below the analytical detection limit, half the detection limit was used for graphical representation.

Figure 3.10: Summary of Weekly TSS Concentrations in Reclaimed Water in 2024

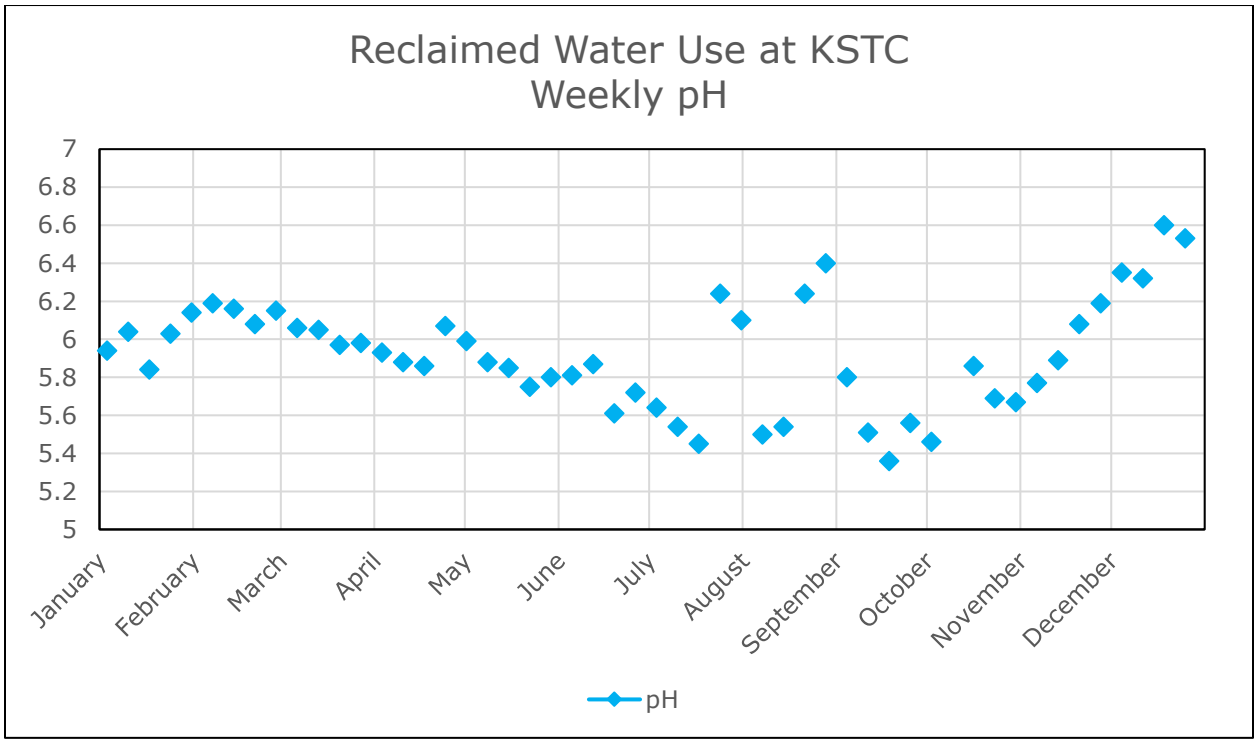


The data confirm a consistent high standard of treatment, with TSS concentrations remaining within regulatory limits throughout the year.

3.2.2.3 pH

pH levels in reclaimed water at KSTC are monitored weekly every Wednesday at 8:00 am using a continuously monitored pH insertion probe. The summarized pH data for 2024 is presented in Figure 3.11. The OC does not specify maximum or minimum pH levels for reclaimed water use.

Figure 3.11: Summary of Weekly pH Levels in Reclaimed Water in 2024

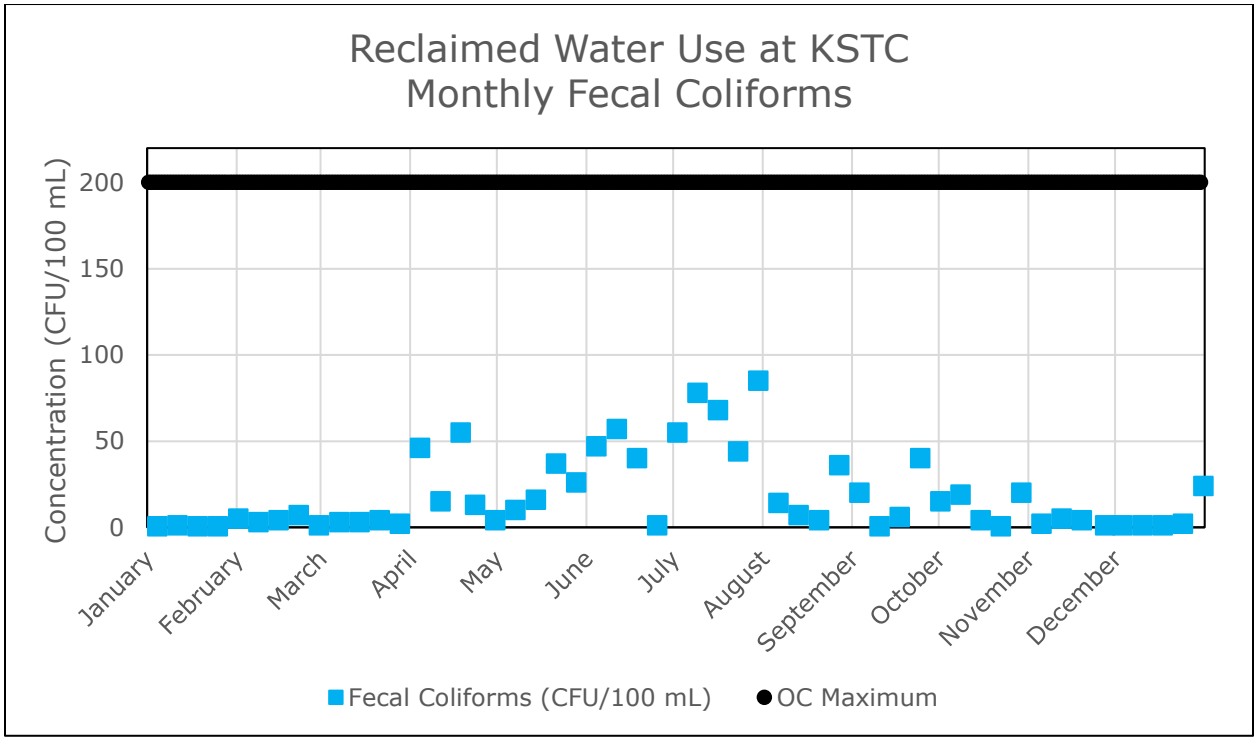


The pH trend in the reclaimed water closely aligns with those observed in the effluent (Section 3.1.2.4).

3.2.2.4 Fecal Coliforms

Weekly fecal coliform assessments were conducted on grab samples collected from the hose bib inside the DAFT Building at KSTC. According to OC Section 1.2.2, the maximum allowable concentration for fecal coliforms in reclaimed water is 200 CFU/100 mL. A summary of the 2024 data is presented in Figure 3.12.

Figure 3.12: Summary of Weekly Fecal Coliform Levels in Reclaimed Water in 2024



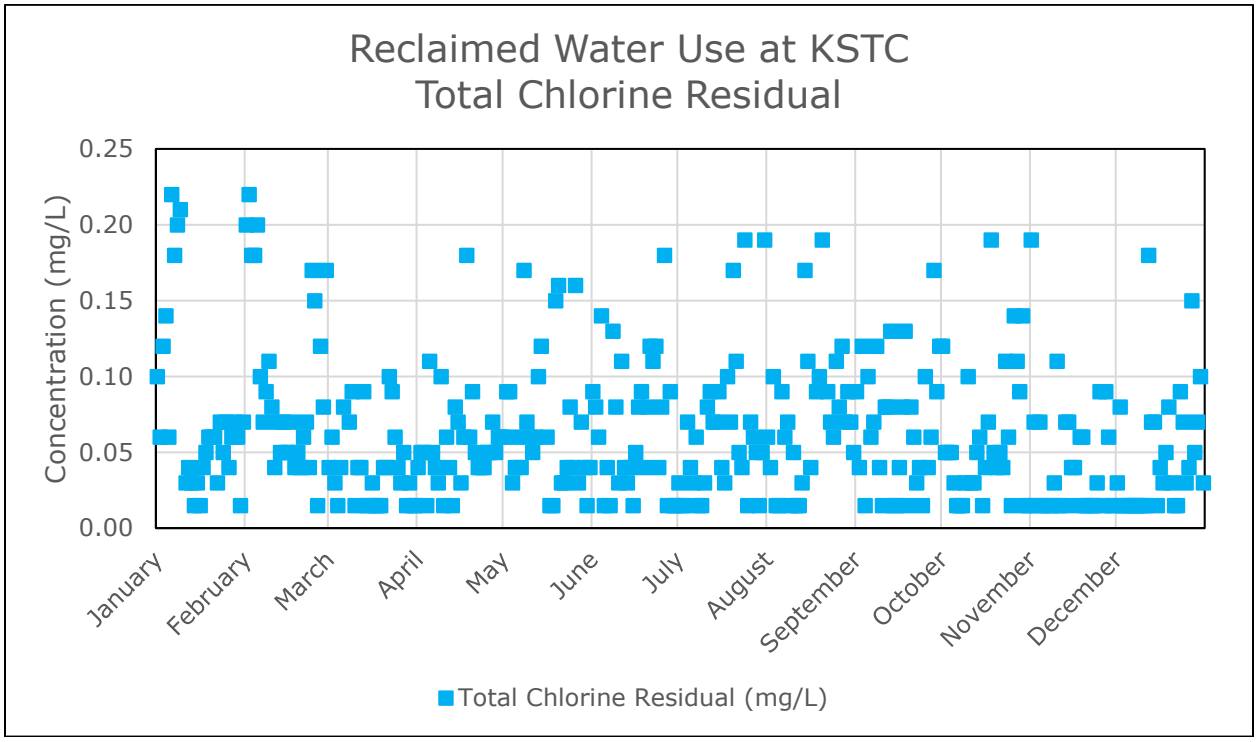
The UV disinfection system at KSTC proved highly effective in eliminating bacteriological contaminants. Throughout the monitoring period, fecal coliform levels consistently remained well below the 200 CFU/100 mL threshold.

3.2.2.5 Total Residual Chlorine Analysis

Section 3.1.2 of the OC requires daily analysis of total residual chlorine in reclaimed water grab samples. At KSTC, disinfection is conducted using a flow-paced hypochlorite system, with dosage adjustments based on water quality parameters. Hypochlorite is introduced as reclaimed water exits the underground vault within the UV Building, and chlorine samples are collected inside the DAFT building to ensure adequate contact time.

A summary of the 2024 data is provided in Figure 3.13. When measurements fell below the analytical detection limit, half the detection limit was used for graphical representation. Notably, the OC does not define minimum total residual chlorine concentrations for reclaimed water use at KSTC.

Figure 3.13: Summary of Daily Total Residual Chlorine Levels in Reclaimed Water in 2024



Consistently low fecal coliform levels in the reclaimed water (Section 3.2.2.3) confirm the effectiveness of the chlorine dosing regimen in maintaining compliance with the 200 CFU/100 mL threshold.

3.2.2.6 Exceedances for E300693

There were no exceedances for location E300693 (reclaimed water use at KSTC) under OC 111009 in 2024. The results discussed in Section 3.2 indicate that the KSTC authorized works were successful at treating reclaimed water used at KSTC to OC requirements.

3.3 Reclaimed Water Use at CREDS (E328531)

According to Section 3.1 of the OC, reclaimed water monitoring applies only when reclaimed water is actively used at CREDS.

3.3.1 CREDS Introduction

The diversion of treated reclaimed water for irrigation at Cinnamon Ridge began in 1984. Each year, from April to October, treated effluent from KSTC is directed to storage lagoons (Cell 3 and Cell 4). It is then pumped from the Cell 4 pump chamber beneath the Thompson River to the CREDS site. The reclaimed water is used for the following uses:

- Irrigation across City-owned agriculture lands
- Irrigation of privately-owned agricultural lands
- Irrigation of landscape and golf greens at the Kamloops Golf and Country Club
- Supplying make-down water for fire retardant at the Kamloops airport, aiding wildfire suppression efforts by the Provincial Fire Control Centre
- Operational and process water for a compost center

The City of Kamloops has formal agreements with private landowners/lessees for the use of reclaimed water on their properties. To ensure they are informed, the City distributes annual updates and materials regarding reclaimed water use (Appendix F).

The annual volume of reclaimed water allocated to CREDS ranges between 1,500,000 and 3,300,000 m^3, depending on weather conditions and agricultural needs (irrigation pauses during haying seasons). This reclaimed water helps reduce approximately 20% of the annual discharge from the City's sewage treatment, preventing it from entering the Thompson River. During wetter periods, irrigation demand decreases, leading to a higher direct discharge into the river.

In 2024, reclaimed water used at CREDS from April 15 to October 15, totaling 1,923,443 m^3.

Figure 3.14 shows the layout of each parcel at Cinnamon Ridge. Parcel 7, located west of KSTC and owned by Kruger (leased to the Extreme Cattle Company), does not currently receive irrigation services.

Figure 3.14: Reclaimed Water Use Locations



3.3.2 Reclaimed Water Flows at CREDS

Section 1.2.1 of the OC specifies that there is no maximum authorized irrigation rate for reclaimed water use, provided there are no instances of effluent surfacing, overland flow, or groundwater breakout. Throughout 2024, no such occurrences were observed at CREDS.

As per Section 3.1.3 of the OC, reclaimed water use at CREDS is monitored weekly during irrigation periods. The metered flow data for reclaimed water usage in 2024 is shown in Figure 3.15. Each parcel (excluding parcel 3) listed in Table 3.1 is individually metered, with readings taken weekly. Detailed flow data for each parcel is provided in Appendix G.

For Parcel 3, which lacks a dedicated meter, the flow rate was calculated based by subtracting the combined flows to the other parcels and the total flow directed to CREDS. It is important to note that KSTC has initiated the process for obtaining E-designations from ENV, following the OC Amendment Request submitted on February 9, 2023. Once these designations are granted, individual parcel flows will be included in EMS reporting.

Figure 3.15: Summary of Weekly Reclaimed Water Use at CREDS in 2024

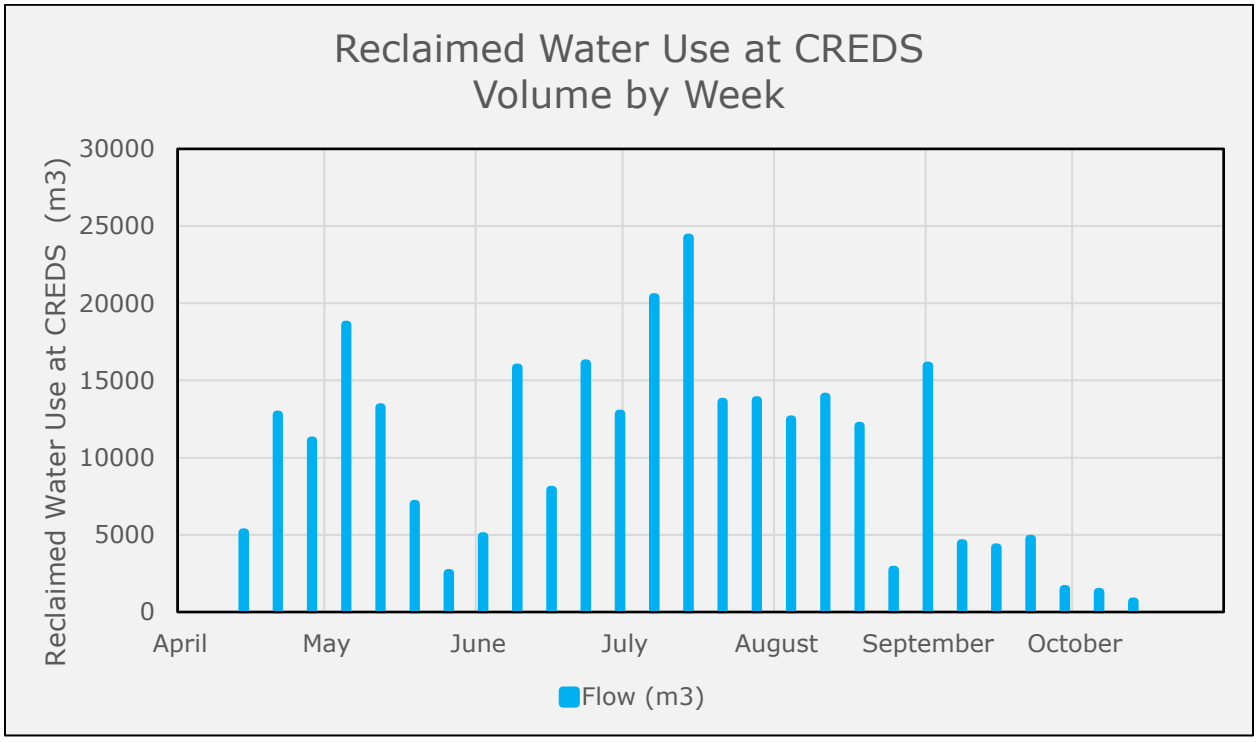


Table 3.1: Reclaimed Water Flow to Individual Parcels at CREDS in 2024

Discharge Location	Volume Discharged in 2024
Parcel 3 (City-Owned)	1,164,420
Parcel 4	127,380
Parcel 5	65,508
Parcel 6	38,529
Parcel 8	163,564
Parcel 9	61,406
Parcel 10 + 11	6,900
Parcel 12	33,055
Parcel 13	202,377
Parcel 14	54,912
Parcel 15	1,146
Fire Centre	4,246

3.3.2 Reclaimed Water Quality at CREDS

The reclaimed water used at CREDS is closely monitored in accordance with Section 3.1.3 of OC 111009, which includes specific water quality thresholds outlined in Section 1.2.2. The 2024 reclaimed water quality data pertinent to CREDS is summarized below, with a complete dataset available in Appendices H and I.

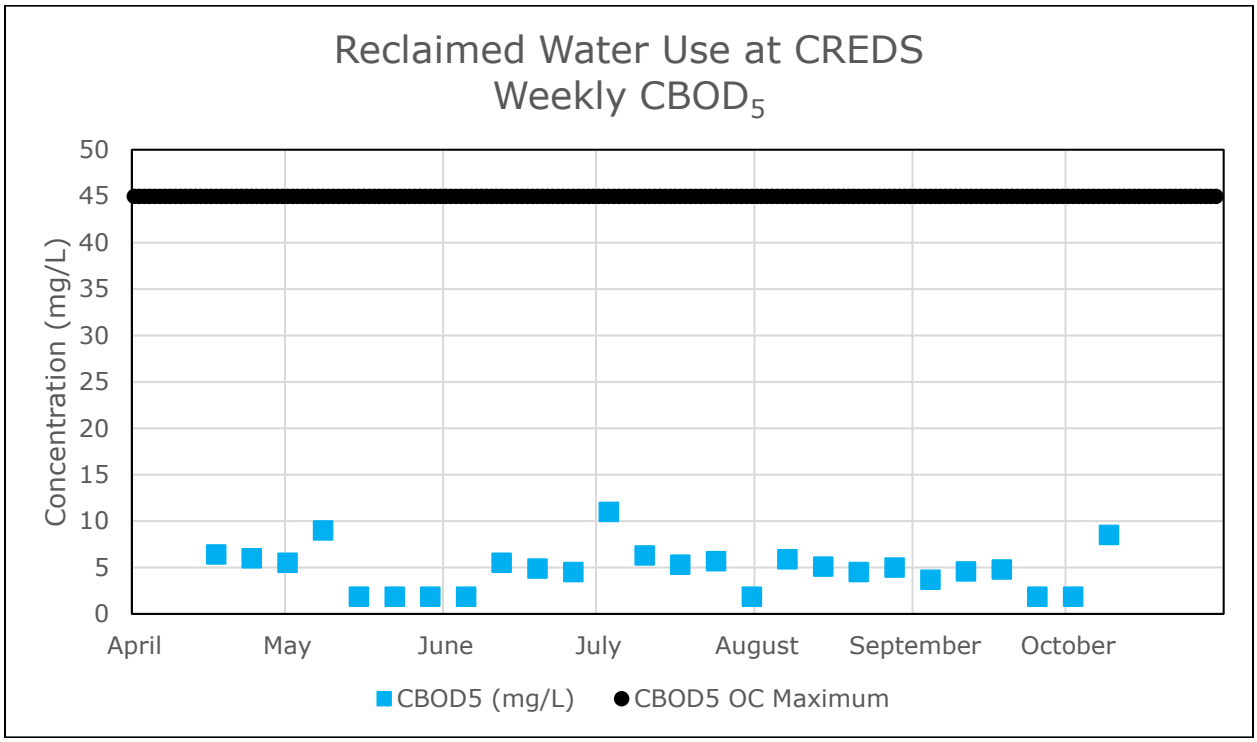
Water quality parameters for treated reclaimed water are assessed through weekly grab samples collected from the Cell 4 pump chamber, just before the water is conveyed across the river to CREDS. pH levels are continuously monitored via an insertion pH probe located in the Cell 4 outlet chamber.

In addition, fecal coliforms and total chlorine residuals are measured at the designated sample port on the pump discharge header, downstream of the chlorine contact pond within the CREDS pump house. It is important to note that reclaimed water data for CREDS is collected only during the irrigation season, from mid-April to mid-October.

3.3.2.1 $CBOD_5$

Weekly grab samples were collected from the Cell 4 outlet chamber for the analysis of $CBOD_5$. As per OC requirements, reclaimed water must meet a maximum threshold of ≤ 45 mg/L for $CBOD_5$. The weekly $CBOD_5$ concentrations in the reclaimed water used at CREDS throughout 2024 are shown in Figure 3.16. When data points were below the analytical detection limit (3.7 mg/L for $CBOD_5$), half the detection limit was used for graphical representation.

Figure 3.16: Summary of 2024 Weekly $CBOD_5$ Concentrations in Reclaimed Water at CREDS

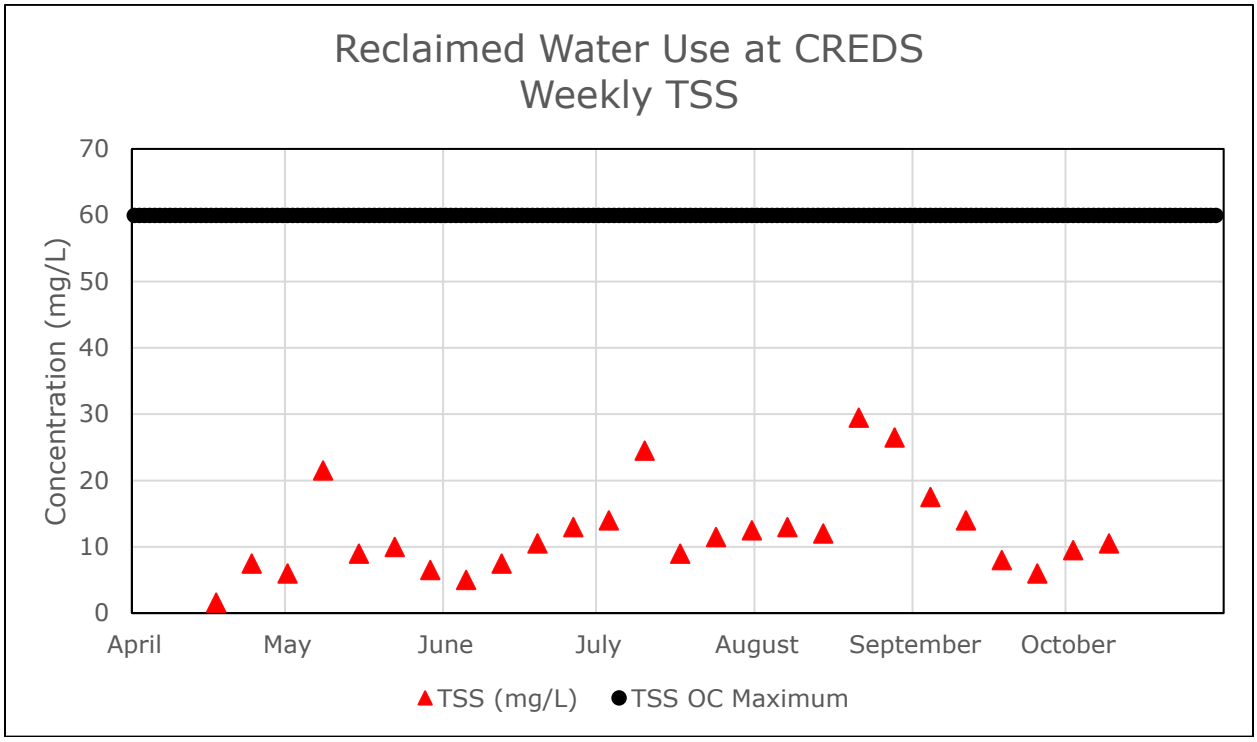


The data analysis demonstrates that the reclaimed water consistently meets the regulatory threshold for $CBOD_5$, reflecting a high standard of treatment.

3.3.2.2 TSS

Weekly grab samples were collected from the Cell 4 outlet chamber for analysis of TSS. According to OC requirements, the reclaimed water must meet a maximum threshold of ≤ 60 mg/L for TSS. The TSS concentrations in the reclaimed water used at CREDS throughout 2024 are shown in Figure 3.17. When data were below the analytical detection limit (3.2 mg/L for TSS), half the detection limit was used for graphical representation.

Figure 3.17: Summary of 2024 Weekly TSS Concentrations in Reclaimed Water at CREDS

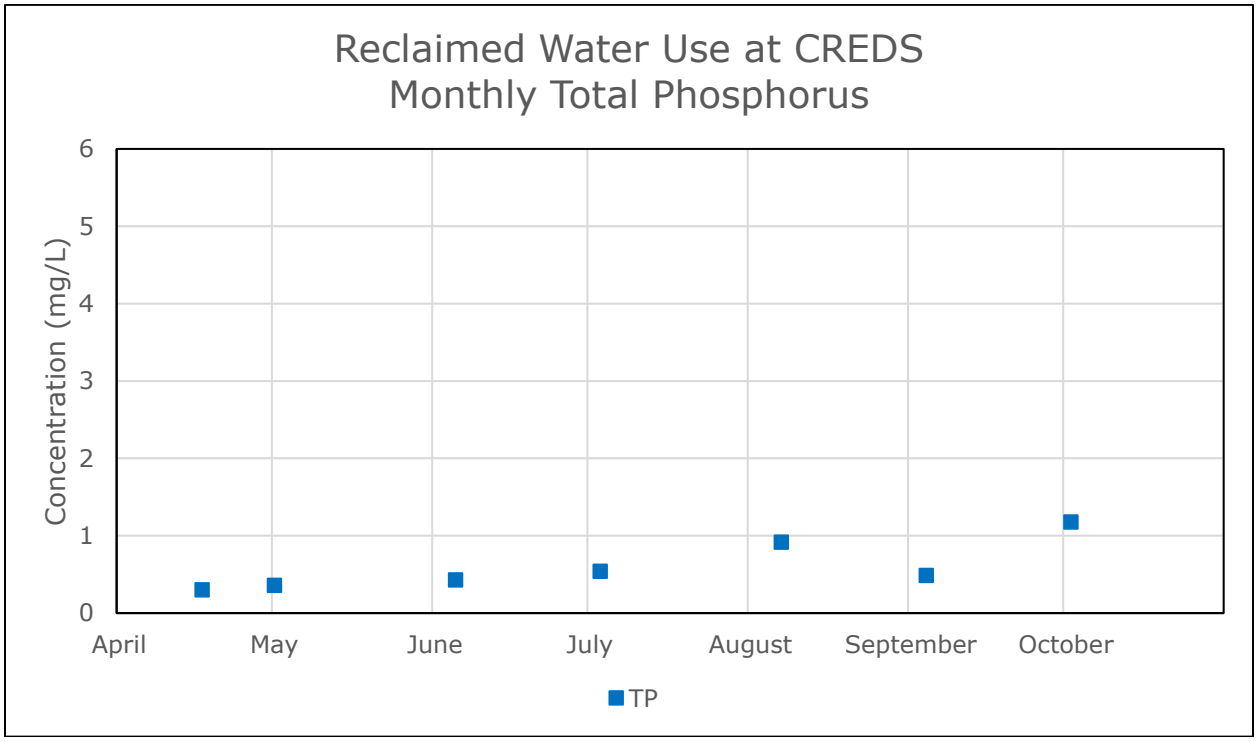


The data analysis shows that the reclaimed water consistently meets regulatory thresholds for TSS, reflecting a high standard of treatment.

3.3.2.3 Phosphorus

Total phosphorus concentrations are monitored monthly through grab samples collected from the reclaimed water. Although the OC does not specify a limit for phosphorus concentration in reclaimed water, the summarized data for total phosphorus concentrations in 2024 are shown in Figure 3.18.

Figure 3.18: Summary of 2024 Monthly Total Phosphorus Concentrations in Reclaimed Water at CREDS



3.3.2.4 Nitrogen

Monthly assessments of ammonia, nitrate, nitrite, and TKN are conducted on reclaimed water samples. From this data, concentrations of TN and Org-N are calculated. Notably, the OC does not specify established limits for nitrogen species concentrations in reclaimed water.

The nitrogen data for reclaimed water during the 2024 irrigation period is shown in Figures 3.19. When data points were below the analytical detection limits, half the detection limits were used for graphical representation.

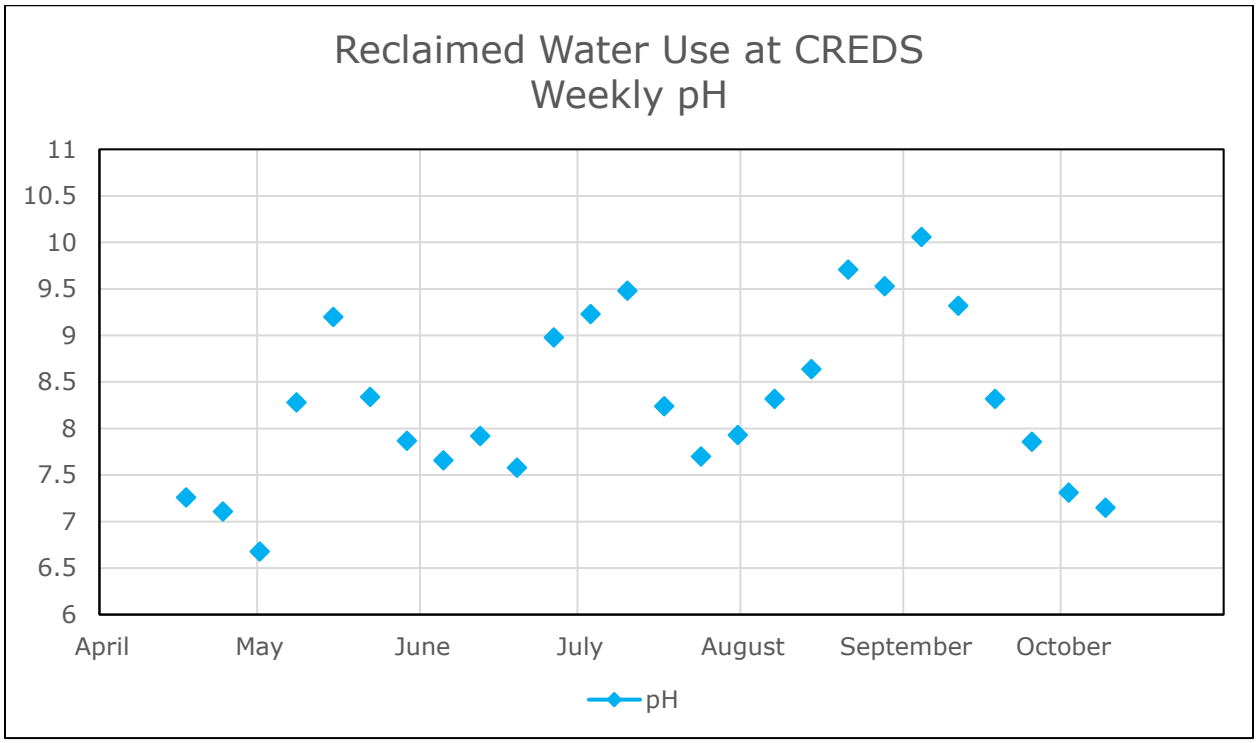
Figure 3.19: Summary of 2024 Monthly Reclaimed Water Nitrogen Species in Reclaimed Water at CREDS



3.3.2.5 pH

Weekly pH levels for CREDS reclaimed water are monitored every Wednesday at 8:00 am using a continuously monitored pH insertion probe at the Cell 4 pump chamber. A summary of the reclaimed water pH levels observed throughout 2024 is shown in Figure 3.20. The OC does not define maximum or minimum pH levels for reclaimed water.

Figure 3.20: Summary of 2024 Weekly pH Levels in Reclaimed Water at CREDS

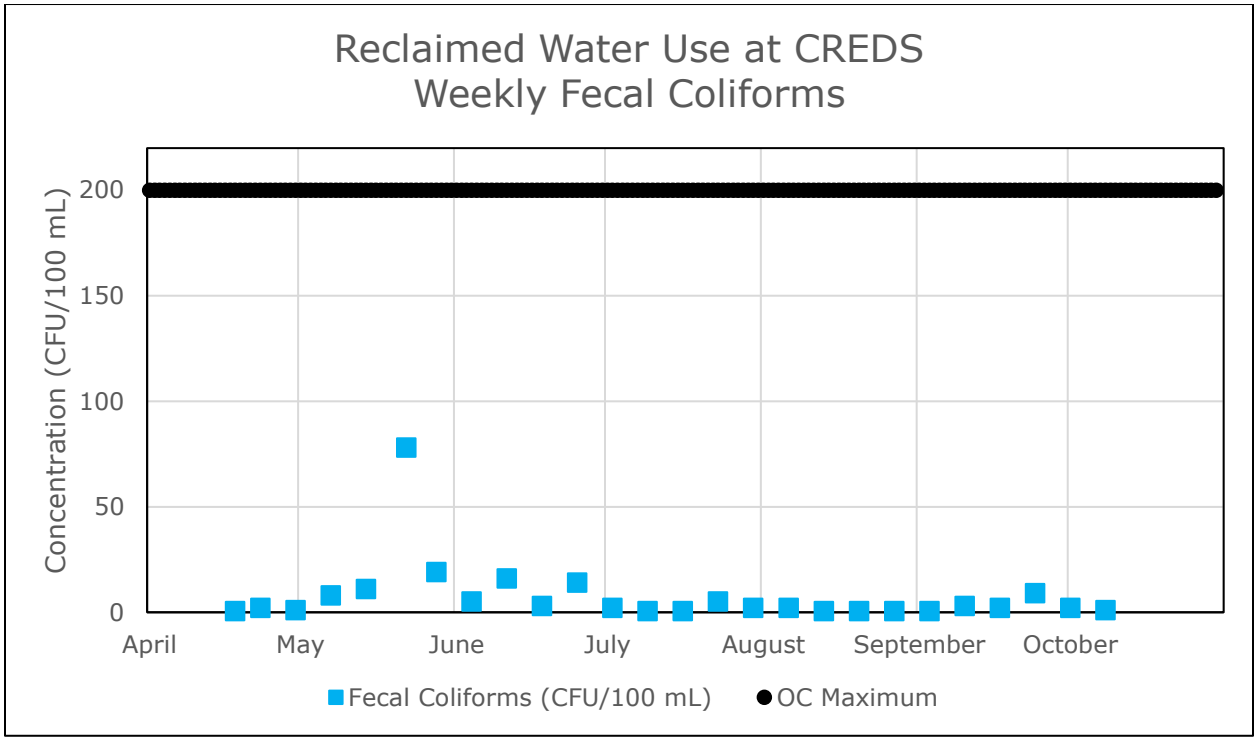


According to OC directives, a protocol for soil pH measurement at CREDS would be triggered if the reclaimed water pH exceeded 9.5 for five consecutive readings. In 2024, pH in reclaimed water did not remain above 9.5 for 5 consecutive readings.

3.3.2.6 Fecal Coliforms

Section 1.2.2 of the OC outlines bacteriological requirements for reclaimed water used in irrigation, specifying a maximum fecal coliform concentration of 200 CFU/100 mL. Weekly fecal coliforms assessments were conducted on grab samples obtained from the valve at the CREDS pump house. The summarized data for 2024 is shown in Figure 3.21.

Figure 3.21: Summary of 2024 Weekly Fecal Coliform Levels in Reclaimed Water at CREDS

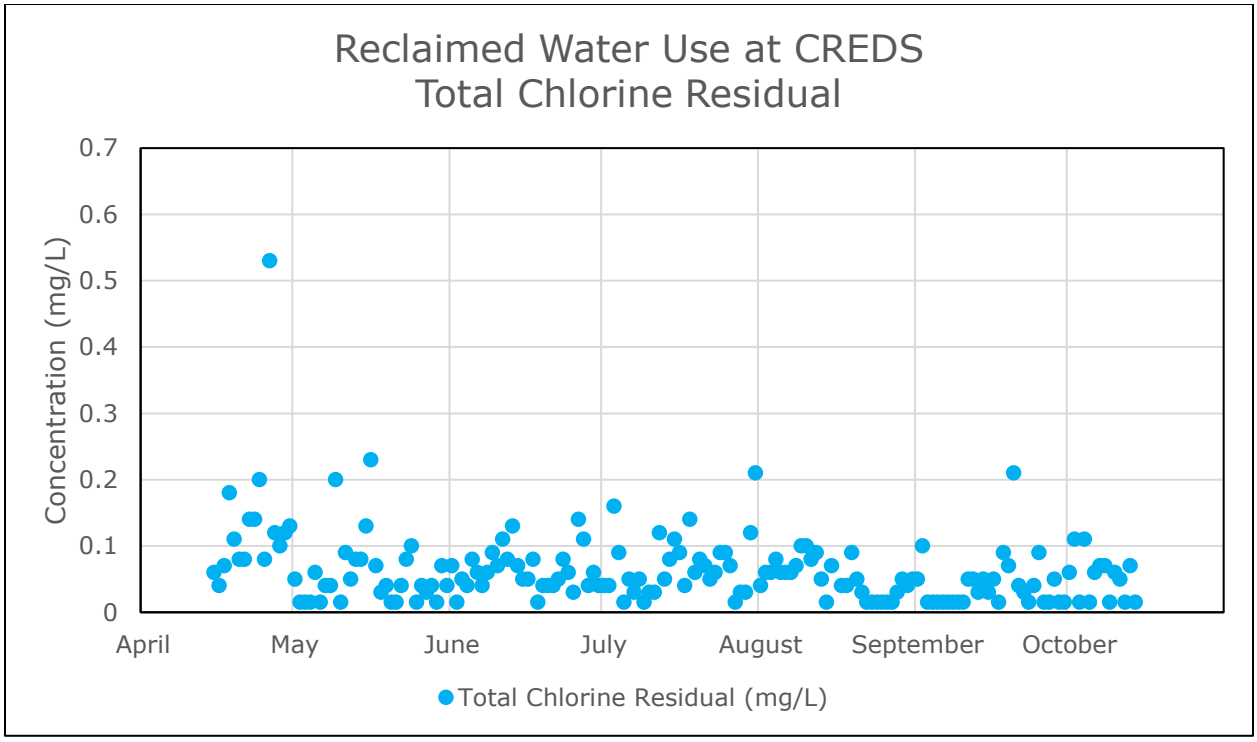


The analysis shows that fecal coliform levels in irrigation water consistently remained below the maximum threshold of 200 CFU/100 mL throughout the 2024 irrigation season.

3.3.2.7 Total Residual Chlorine

As per Section 3.1.2 of the OC, daily grab samples were taken for total residual chlorine throughout 2024. Hypochlorite is introduced into the reclaimed water stream as it flows from the balancing tank outside the CREDS pump house into the contact basin. Samples were collected from the valve inside the CREDS pump house. The summarized data is shown in Figure 3.22. When data points fell below the analytical detection limit, half the detection limit was used for graphical clarity.

Figure 3.22: Summary of 2024 Daily Total Residual Chlorine Levels in Reclaimed Water at CREDS

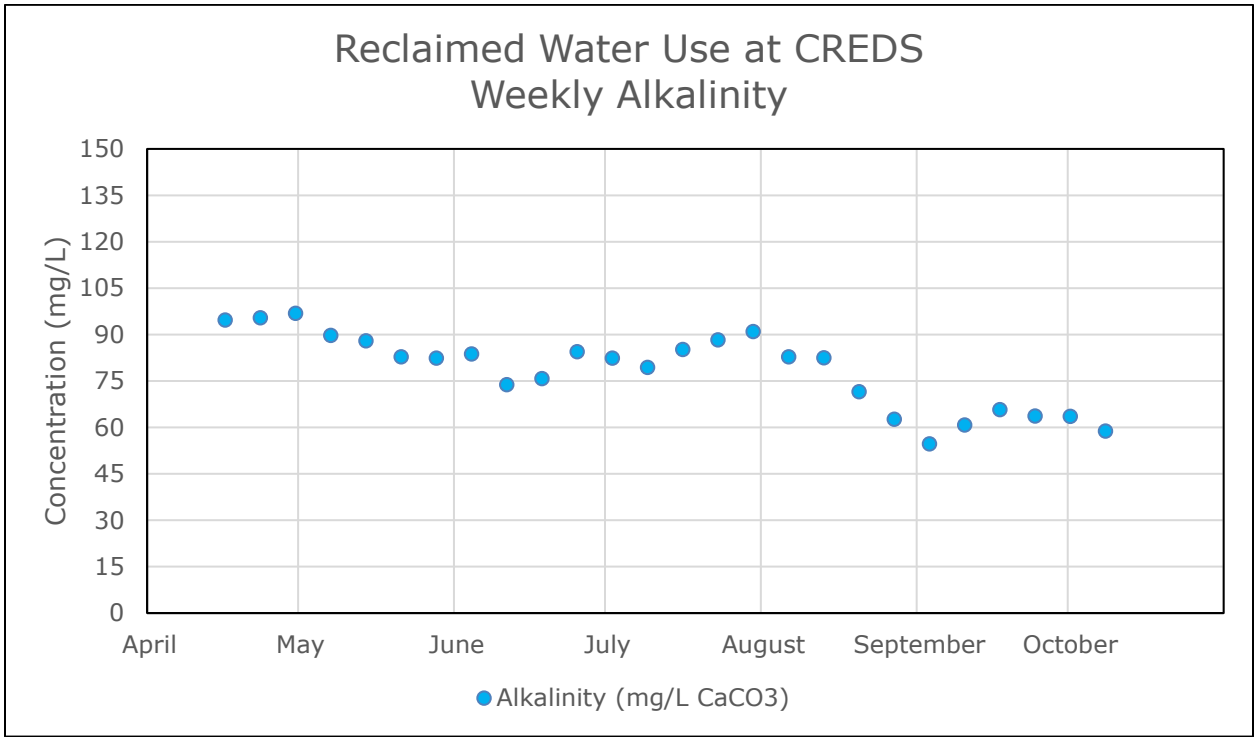


The analysis fecal coliform levels, as outlined in Section 3.3.3.6 of this report, confirms that the disinfection measures were effective in keeping fecal coliform concentrations below the prescribed threshold of ≤200 CFU/100 mL.

3.3.2.8 Alkalinity

Weekly alkalinity assessments for reclaimed water were conducted through grab samples collected from the Cell 4 outlet chamber. Samples were sent to Caro Analytical in Kelowna, BC, for analysis. The summarized data for 2024 is shown in Figure 3.23. The OC does not specify threshold limits for alkalinity in reclaimed water.

Figure 3.23: Summary of 2024 Weekly Alkalinity Levels in Reclaimed Water at CREDS

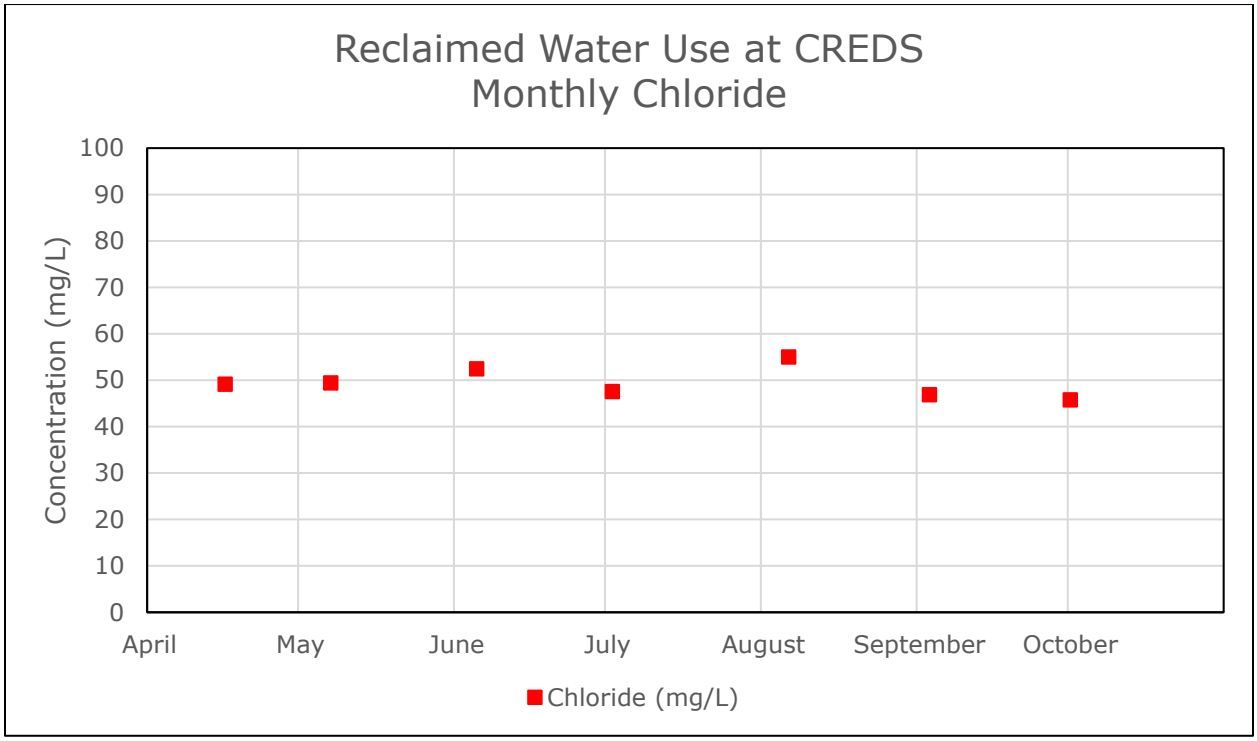


Throughout the irrigation season, alkalinity levels in the reclaimed water consistently ranged between 50-100 mg/L $CaCO_3$.

3.3.2.9 Chloride

Monthly chloride measurements in reclaimed water were obtained from grab samples collected at the Cell 4 outlet chamber. Samples were sent to Caro Analytical in Kelowna, BC, for analysis. The OC does not specify a maximum chloride concentration. The chloride data for 2024 is illustrated in Figure 3.24**.**

Figure 3.24: Summary of 2024 Monthly Chloride Concentrations in Reclaimed Water at CREDS



Chloride concentrations in CREDS reclaimed water ranged from 46.8 to 55.0 mg/L Cl throughout 2024.

3.3.2.10 Sulphate

Annual sulphate concentration assessments are conducted using grab samples from the Cell 4 outlet chamber. In 2024, a single sample was obtained on October 1 and sent to Caro Analytical, yielding a concentration of 54.2 mg/L. Due to the limited dataset, no graphical analysis was performed. The OC does not specify a maximum for sulphate concentrations.

3.3.2.11 Total Metals

Annual total metals assessments in the reclaimed water are conducted through grab samples, as specified in Section 3.1.3 of the OC. In 2024, testing was performed on a sample collected from the Cell 4 outlet chamber on October 22 and was sent to Caro Analytical in Kelowna, BC, for analysis. The OC does not specify target levels for total metals. The summarized data for October 22, is presented in Table 3.2.

Table 3.2: Summary of Annual Total Metals Concentrations in Reclaimed Water at CREDS on October 22nd, 2024

Parameter	Historical Data 2022-2023 (mg/L)			2024 Concen-tration (mg/L)	BCWQG for Irrigation
	Minimum	Average	Maximum		
Aluminum	0.386	0.546	0.707	0.089	Approved Guideline: ≤5 mg/L (acute)
Antimony	<0.00020	0.00027	0.00038	0.00027	No Guideline for Irrigation
Arsenic	<0.00050	<0.00050	<0.00050	<0.00050	Interim Guideline: ≤0.1 mg/L (acute)
Barium	<0.0050	<0.0050	<0.0050	<0.0050	No Guideline for Irrigation
Beryllium	<0.00010	<0.00010	<0.00010	<0.00010	Working Guideline: 0.1 mg/L (chronic)
Bismuth	<0.00010	<0.00010	<0.00010	<0.00010	No Guideline for Irrigation
Boron	0.156	0.18	0.201	0.180	Approved Guideline: ≤0.5 mg/L for low tolerance crops (chronic), ≤4 mg/L for medium tolerance crops (chronic), ≤15 mg/L for very tolerant crops (chronic)
Cadmium	<0.000010	0.00002	0.000034	0.000043	Working Guideline: ≤0.0051 mg/L (acute)
Calcium	15.7	20.2	24	21.7	No Guideline for Irrigation
Chromium	<0.00050	0.0018	0.00532	<0.00050	Working Guideline: 0.008 mg/L (30d avg) Cr (VI) (chronic); 0.0049 mg/L (30d avg), Cr (III) (chronic)
Cobalt	0.00015	0.00033	0.00044	0.00028	Working Guideline: 0.050 mg/L (chronic)
Copper	0.0015	0.0042	0.0057	0.0057	Approved Guideline: ≤0.200 mg/L (acute)
Iron	0.037	0.116	0.177	0.032	No Guideline for Irrigation
Lead	0.00025	0.00045	0.00058	0.00028	Approved Guideline: Acidic Soils ≤0.2 mg/L (acute), Alkaline/Neutral ≤0.4 mg/L (acute)
Lithium	0.00171	0.00312	0.00385	0.00317	Working Guideline: Citrus fruits, ≤0.75 mg/L (chronic), all others ≤2.5 mg/L (chronic)
Magnesium	5.3	7.4	8.5	6.1	No Guideline for Irrigation
Manganese	0.0125	0.0221	0.0353	0.0058	Working Guideline: 0.20 mg/L (chronic)
Mercury	<0.000010	<0.000010	<0.000010	<0.000010	Approved Guideline: ≤0.002 mg/L (acute)

Parameter	Historical Data 2022-2023 (mg/L)			2024 Concen-tration (mg/L)	BCWQG for Irrigation
	Minimum	Average	Maximum		
Molybdenum	0.00065	0.00104	0.0015	0.00087	Approved Guideline: ≤0.01 mg/L for poor-drained soils (chronic), ≤0.02 mg/L for well-drained soils (chronic)
Nickel	0.00096	0.00189	0.00314	0.00184	Working Guideline: ≤0.200 mg/L (chronic)
Phosphorus	0.92	1.08	1.31	1.01	No Guideline for Irrigation
Potassium	13.6	14.7	15.6	15.2	No Guideline for Irrigation
Selenium	<0.00050	<0.00050	<0.00050	<0.00050	Approved guideline: ≤0.01 mg/L (chronic)
Silicon	2	3	4	2	No Guideline for Irrigation
Silver	<0.000050	0.000078	0.000100	<0.000050	No Guideline for Irrigation
Sodium	45.2	47.3	50.0	47	No Guideline for Irrigation
Strontium	0.097	0.121	0.143	0.113	No Guideline for Irrigation
Sulfur	16.5	17.4	19.5	19.7	No Guideline for Irrigation
Tellurium	<0.00050	<0.00050	<0.00050	<0.00050	No Guideline for Irrigation
Thallium	<0.000020	<0.000020	<0.000020	<0.000020	No Guideline for Irrigation
Thorium	<0.00010	<0.00010	<0.00010	<0.00010	No Guideline for Irrigation
Tin	<0.00020	0.00027	0.00039	<0.00020	No Guideline for Irrigation
Titanium	<0.0050	<0.0050	0.0060	<0.0050	No Guideline for Irrigation
Tungsten	<0.0010	<0.0010	<0.0010	<0.0010	No Guideline for Irrigation
Uranium	0.000076	0.000094	0.000132	0.000025	Working Guideline: ≤0.01 mg/L (chronic)
Vanadium	<0.0050	<0.0050	<0.0050	<0.0050	Working Guideline: ≤0.10 mg/L (chronic)
Zinc	<0.0040	0.0085	0.0141	0.0171	Approved Guideline: ≤2 mg/L (chronic)
Zirconium	<0.00010	<0.00010	0.00010	<0.00010	No Guideline for Irrigation

In 2024, all irrigation guidelines for reclaimed water were met. Cadmium, sulfur, and zinc concentrations were slightly above historical levels, while concentrations of aluminum, iron, manganese, and uranium were slightly below historical levels.

3.3.2.12 Exceedances for E328531

There were no exceedances for location E328531 (reclaimed water use at CREDS) under OC 111009 in 2024. The results discussed in Section 3.3 indicate that the KSTC authorized works were successful at treating reclaimed water used at CREDS to OC requirements.

3.4 Groundwater Monitoring Program at CREDS (E328533-E328538)

The groundwater monitoring program, outlined in Section 3.5 of the OC, includes testing at multiple locations within the City-owned parcel at Cinnamon Ridge. This program evaluates potential impacts on the water table resulting from the reclaimed water irrigation. The locations of the groundwater monitoring wells are shown in Figure 3.25.

Figure 3.25. Groundwater Monitoring Wells and Soils Sampling Locations at CREDS



3.4.1 Groundwater Well Levels

The City's Environmental Services Unit measures groundwater well levels twice annually, at the start and at the end of the irrigation season. Well elevations are presented in Table 3.3.

Table 3.3 Groundwater Monitoring Well Levels in 2024

EMS ID	Location	Elevation (m) April 17	Elevation (m) October 23
E328534	MW03-01	337.34	337.92
E328535	MW03-02	337.18	337.91
E328536	MW03-03W	337.4	338.14
E328537	MW03-04	337.53	338.28
E328538	CR15	337.88	338.59
E328533	A&A Well (background)	339.80	339.27

The background well level (A&A Well) showed a decrease in water level between the two measurement dates, while all test wells exhibited an increase during the same period. This suggests that the background well may not be hydraulically connected to the test wells.

The rise in test well levels in 2024 may be due irrigation water usage on the site.

3.4.2 Groundwater Well Water Quality

The City's Environmental Services Unit conducts annual water quality sampling of groundwater wells at the end of each irrigation season. Samples collected on October 22-23, 2024, were sent to ALS Kamloops for analysis. The results are presented in Table 3.4, with minimum, average and maximum levels from 2022-2023 included for comparison. For a comprehensive dataset, including Quality Assurance/Quality Control (QA/QC) information, refer to Appendix J.

Table 3.4 Groundwater Monitoring Well Water Quality (October 22-23, 2024)

Parameter	Historical Data 2022-2023			2024 Data					
				MW03-01	MW03-02	MW03-03W	MW03-04	CR15	A&A Well (background)
	Minimum	Average	Maximum	(E328534)	(E328535)	(E328536)	(E328537)	(E328538)	(E328533)
Field Parameters									
pH	6.3	6.5	6.7	6.6	6.6	7.0	7.3	7.1	8.3
Conductivity (µS/cm)	450	702	888	989	821	943	657	728	821
Nutrients (mg/L)									
Total Nitrogen	0.37	1.5	3.05	4.7	1.7	1.8	0.9	0.4	7.3
TKN	0.37	1.53	2.98	4.8	1.6	2.1	0.9	0.5	8.8
Nitrate	<0.0050	<0.0250	<0.0250	<0.0050	<0.0050	<0.0050	0.005	<0.0050	<0.0250
Nitrite	<0.0010	<0.0050	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0093
Ammonia	0.2	1.26	2.65	4.62	1.6	1.48	0.55	0.23	7.88
Ortho Phosphate	<0.0010	<0.1000	<0.1000	<0.0010	<0.0010	0.0012	<0.0010	<0.0010	0.118
Chloride	6.1	36.3	69.1	39.4	41.9	33.2	16.1	71.5	19.2
Sulphate	<0.3	9.6	38.8	<0.3	<0.3	<0.3	4.1	3.9	33.3
Bacteriological (CFU/100 mL)									
Fecal Coliforms	<1	<10	<10	<1	<1	<10	<10	<10	5
Dissolved Metals (mg/L)									
Aluminum	0.0016	0.004	0.0059	0.0058	0.0066	0.0034	0.0025	0.001	0.0048
Antimony	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	0.00011	0.00103	0.00297	0.00031	0.00314	0.00014	0.00062	0.00031	0.00042
Barium	0.0479	0.0955	0.144	0.102	0.128	0.12	0.0623	0.0762	0.0182
Beryllium	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron	<0.010	0.062	0.162	0.020	0.048	0.070	0.058	0.067	0.340
Cadmium	<0.000005	0.000008	0.000019	<0.000005	<0.000005	<0.000005	0.000015	<0.000005	<0.000005
Calcium	27.5	38.3	56.3	52.9	46.7	30	28.2	37.5	21.0
Chromium	<0.00050	0.0005	0.00052	0.00056	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	<0.0001	0.0003	0.0008	0.0003	0.0001	0.0002	0.0002	<0.0001	<0.0001
Copper	<0.0002	0.0002	0.0004	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.0002
Iron	24.4	47.3	104	69.7	91.9	42.2	28.1	25.9	1.1
Lead	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Lithium	0.0032	0.005	0.0066	0.0058	0.0056	0.005	0.0036	0.0042	0.0016
Magnesium	15.1	26.1	38.8	25.6	28.4	15.8	29	28.5	10.7
Manganese	0.70	1.51	2.67	1.03	2.15	0.97	1.7	1.23	0.2
Mercury	<0.000005	0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Molybdenum	0.00007	0.000599	0.00330	0.000216	0.000359	0.00012	0.00041	0.00026	0.00926
Nickel	<0.0005	0.0009	0.0027	<0.0005	<0.0005	0.0008	<0.0005	<0.0005	<0.0005
Phosphorus	0.17	0.47	0.72	0.35	0.51	0.24	0.62	<0.05	0.56
Potassium	4.2	6.2	8.4	7.6	7.0	7.2	4.4	6.0	9.3
Selenium	<0.00005	0.00008	0.0002	0.00013	0.00007	0.00005	0.00012	<0.00005	<0.00005
Silicon	15.6	22.2	27	27	24.2	21.2	24	16.8	15.1
Silver	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Sodium	15.1	35.1	52.5	27.5	29.1	44.4	21.2	33.5	275
Strontium	0.170	0.270	0.430	0.387	0.363	0.227	0.187	0.253	0.375
Sulphur	<0.5	3.7	13.9	<0.5	<0.5	<0.5	<0.5	1.4	12.5
Tellurium	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Thallium	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Thorium	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Tin	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Titanium	<0.0003	0.0005	0.0009	0.0007	0.0007	0.0004	0.0006	<0.0003	<0.0003
Tungsten	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00063
Uranium	<0.000010	0.000231	0.000917	<0.000010	0.000075	0.000022	0.00099	<0.000010	0.000654
Vanadium	<0.0005	0.0007	0.001	0.001	0.0008	<0.0005	0.0007	<0.0005	<0.0005
Zinc	<0.0010	0.0016	0.0047	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zirconium	<0.0002	0.0002	0.0003	0.0002	0.0003	<0.0002	<0.0002	<0.0002	<0.0002

For field parameters:

- pH and conductivity were generally similar to or somewhat higher than historical ranges for the site.
- The background well showed higher pH than the test wells.

Regarding nutrient concentrations:

- An increase in nitrate concentrations from high-nitrate irrigation water was expected but was not observed at any well site.
- MW03-01 showed higher concentrations of TN, TKN and ammonia compared to historical concentrations of the test wells.
- CR15 showed slightly higher concentrations of chloride compared to the historical concentrations in the test wells.
- All other wells remained within historical ranges for nutrient concentrations.
- The background well showed higher levels of TN, TKN, nitrite, ammonia, ortho phosphate and sulfate compared to the test wells in 2024.

Regarding dissolved metals:

- MW03-02 had higher aluminum and arsenic concentrations compared to historical concentrations of the test wells.
- CR15 had higher uranium but lower aluminum and phosphorus compared to historical concentrations of the test wells.
- Overall, there appeared to be no significant changes in dissolved metals in the test wells compared to historical concentrations.

Regarding dissolved metals in the background (A&A Well):

- Boron, molybdenum, potassium, sodium, sulphur, tungsten, and uranium concentrations were higher compared to the test wells.
- Barium, calcium, iron, lithium, magnesium, manganese, and silicon concentrations were lower compared to the test wells.

These results suggest that irrigation at the site has not significantly impacted nutrient levels or dissolved metal concentrations in the test wells compared to the background well.

3.5 Soils Monitoring Program at CREDS (E328568-E328574)

The soil quality monitoring program, as outlined in Section 3.6 of the OC, involves soil testing on the City-owned parcel (Parcel 3) at Cinnamon Ridge. This initiative evaluates potential impacts on soil chemistry resulting from the use of reclaimed water for irrigation. The locations of the soil sampling sites are shown in Figure 3.25.

- Soil pH levels are assessed monthly when required, as per OC guidelines.
- Soil pH, nutrient and metal concentrations are analyzed annually following the irrigation season at the CREDS site.
- The City's Environmental Services Unit conducts the soil sampling.

3.5.1 Soils Monitoring When High pH Irrigation Water Present

Section 3.6 of the OC specifies that if the reclaimed water pH exceeds 9.5 for five consecutive readings, the frequency of soil pH testing will increase from annually to monthly. However, based on the 2024 reclaimed water pH data (Figure 3.20), this threshold was not reached, so soil pH was reported only annually (October 2024).

3.5.2 Annual CREDS Soils Monitoring

The annual soils quality monitoring program, outlined in Section 3.6 of the OC, includes sampling at sites shown in Figure 3.25. Each sample consists of a composite of eight cores from a depth of 0–30 cm at each site. The samples were sent to Element in Surrey, BC for analysis.

- Data from the sampling event on October 22, 2024, is provided for general parameters and nutrients in Table 3.5 and total metals in Table 3.6.
- Alkalinity testing in soils was not conducted due to the absence of approved methods for alkalinity in soils.

The complete dataset is presented in Appendix K.

Table 3.5 General Parameters and Nutrient Concentrations for Soils at CREDS (October 22, 2024)

Parameter	Historical Data 2022-2023			2024 CREDS Soils						
	Minimum	Average	Maximum	CR1	CR4	CR5	CR7	CR18	CR19	CR20
General Parameters										
pH	5.7	6.5	8.2	6.3	6.5	6.9	6.4	6.3	6.8	6.6
Conductivity (us/cm)	240	673	2,120	380	910	250	500	490	3,380	380
Salinity (dS/m)	0.21	1.3	4.95	0.64	1.34	0.43	0.96	0.28	4.15	0.6
Fecal Coliforms (MPN/g)	<3.7	17.7	130	12	4.4	<3.8	4.6	<3.9	<4.0	58
Nutrients										
Total Nitrogen (ug/g)	900	1,779	2,800	1,100	3,700	1,300	1,700	1,000	2,500	900
Total Kjeldahl Nitrogen (ug/g)	300	1,793	2,920	596	3,450	1,070	1,330	1,400	3,150	1,820
Available Nitrate (ppm)	<2	4	7	<2	3	3	<2	<2	5	2
Nitrite (ug/g)	0.3	0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ammonium (ug/g)	<0.4	0.4	0.6	10.8	0.4	0.5	<0.4	<0.4	<0.4	<0.4
Total Phosphorus (ug/g)	<5	22	>80	<5	10	<5	<5	<5	>80	<5
Available Phosphorus (ppm)	<5	11	30	<5	13	<5	<5	<5	760	<5
Available Sulphate (ppm)	20	108	602	26	66	13	31	19	524	29
Available Chloride (ppm)	24	95	299	<26	145	<20	54	356	38	92

Table 3.6 Total Metals Concentrations in CREDS Soils (October 22, 2024)

Parameter	Historical Data 2022-2023			Soil Sampling Locations						
	Minimum	Average	Maximum	CR1	CR4	CR5	CR7	CR18	CR19	CR20
Total Metals (ug/g)										
Aluminum	17,000	22,143	24,000	20,500	21,800	19,300	23,100	18,500	24,200	20,600
Antimony	0.1	0.23	0.36	0.14	0.14	0.14	0.16	0.1	0.16	0.14
Arsenic	2.4	3.8	5.6	3.4	2.6	3.5	3.4	2.4	2.6	3.4
Barium	94	137	180	130	143	124	139	113	130	136
Beryllium	<0.5	0.6	0.9	0.5	0.5	0.5	0.6	0.3	0.5	0.5
Cadmium	0.18	0.29	0.47	0.19	0.39	0.2	0.21	0.14	0.29	0.13
Chromium	38	48	59	42	43	40	47	39	46	43
Cobalt	13	17	20	14	13	13	15	13	13	14
Copper	22	35	44	32	33	30	30	26	48	33
Iron	33,000	39,714	46,000	35,300	35,000	35,000	38,400	31,800	33,600	37,400
Lead	6.4	9.5	13	7.4	8.6	8.0	9.0	6.0	9.6	7.3
Lithium	23	31.6	38	27.6	27.6	26.6	30.1	26.4	27.1	28.1
Manganese	260	394	570	420	327	429	380	340	290	409
Mercury	0.01	0.02	0.03	0.011	0.066	0.012	0.011	0.023	0.015	0.021
Molybdenum	0.4	1.01	1.9	1.2	1.3	1	1.4	0.9	1.3	1
Nickel	30	40.36	47	34.8	33.5	33.6	39.3	31.7	32.5	35.8
Selenium	0.4	0.58	1	0.7	1.1	0.6	0.6	0.5	0.8	0.8
Silver	0.06	0.29	0.53	0.09	0.1	0.1	0.09	0.06	1.22	0.1
Strontium	34	46.4	72	38.1	57.9	40.1	40.6	33.4	49.7	43.9
Tellurium	<0.20	0.35	0.88	<0.05	<0.05	<0.05	<0.05	<0.05	0.13	<0.05
Thallium	0.1	0.21	0.88	0.11	0.18	0.12	0.13	0.12	0.16	0.13
Thorium	6.6	7.8	8.9	6.9	5.5	6.9	6.8	6.1	5.2	6.9
Tin	0.69	1.02	2	0.8	0.9	0.7	0.9	0.7	2.8	0.8
Tungsten	<0.2	1.1	1.7	<0.2	0.2	0.2	0.3	0.3	0.2	0.2
Uranium	1.4	2.5	3.8	2.3	2.1	2	3	2.3	2.7	1.9
Vanadium	42	52.5	63	42.7	42.9	39.4	47.5	38.5	44.4	42.6
Zinc	74	89.1	120	71.3	92	73.5	80.4	66.1	80.2	73.4

Historical soils sampling at CREDS was summarized in the City of Kamloops Reclaimed Water Use Final Report – Updated October 2022, which was officially submitted for approval to the director on February 10, 2023 (Authorization Number: 111009, Tracking Number: 422072). The report noted the following observations for CREDS soils:

- Nitrogen, phosphorus, and potassium are limited, but this would be expected at the end of the growing season.
- Sulphate and calcium were frequently present in excess.
- The soil pH conditions were neutral (pH 6-7) to alkaline (pH >7.3). Neutral to alkaline soils are typical for the Kamloops area.

An analysis of 2024 CREDS soil data (Table 3.5) indicates that the results are largely consistent with historical data, with only a few outliers. The similarities between the

current and historical data suggest that the use of reclaimed water is not significantly altering the soil quality at CREDS for general soil parameters and soil nutrients.

Regarding total metals in CREDS soils (Table 3.6), the concentrations were generally in line with historical levels, with some exceptions. Specifically:

- CR18 showed lower concentrations than historical data for cadmium, iron, lead, strontium, thorium, vanadium, and zinc.
- CR19 had higher concentrations than historical data for aluminum, copper, silver, and strontium, but lower for thorium.
- CR4 had higher levels for mercury and selenium, but lower levels for thorium.

However, assessing the 'available' concentrations of these elements would provide a clearer understanding of their potential impact on growing conditions in CREDS soils.

3.6 Quality Assurance/Quality Control

Quality assurance and quality control (QA/QC) procedures were conducted at the KSTC laboratory throughout 2024. Weekly QA/QC samples were completed for TSS, $CBOD_5$, ammonia, and ortho phosphate, while monthly testing was performed for total phosphorus, nitrate, and fecal coliforms. Method blanks and commercially purchased reference standards were tested weekly, with laboratory standards prepared whenever commercial standards were unavailable. The summarized QA/QC results for the KSTC laboratory in 2024 are provided in Table 3.7.

Table 3.7: QA/QC Recoveries for KSTC Laboratory in 2024

Parameter	MDL	Blanks	Accuracy (%)	Precision (% RSD)
$CBOD_5$ (mg/L)	3.7	0.1	99.5	8.6
TSS (mg/L)	3.2	0	96.4	13.3
Ammonia (NH_3-N) (mg/L)	0.01	0	102.2	3.5
Nitrate (NO_3-N) (mg/L)	0.03	-0.08	100.3	1.4
Ortho phosphate (PO_4-P) (mg/L)	0.03	0	97.8	24
Total Phosphorus (mg/L)	0.01	-0.02	101.3	4.6
Fecal Coliforms (CFU/100 mL)	<1	<1	-	111

The accuracy levels demonstrate reasonable performance across all parameters. Precision levels were observed to be slightly elevated for TSS, ortho phosphate and fecal coliforms, mainly due to duplicate samples approaching detection limits, which is expected given the high treatment efficacy at KSTC.

Comprehensive reports of all external sampling results, including QA/QC data, are provided in Appendices C, H, I, and J. While QA/QC data were not submitted to EMS in 2024 due to software challenges, communications with the EMS helpdesk have advised maintaining paper copies of the QA/QC data, which are readily available upon request.

Throughout the year, no significant quality control issues were observed, ensuring the integrity and reliability of the laboratories' analyses.

3.7 Receiving Environment Monitoring Program

The City of Kamloops is required to establish a comprehensive receiving environment monitoring program, developed under the guidance of a qualified professional. This program was prepared and officially submitted for approval to the director on February 10, 2023 (Authorization Number: 111009, Tracking Number: 422072). As of December 31, 2024, the City of Kamloops has not yet received a formal response regarding the approval status of the receiving environment monitoring plan.

3.8 Thompson River Joint Monitoring Program

The City of Kamloops actively participates in the Thompson River Joint Monitoring Program (TRJMP) alongside BC ENV and key stakeholders, including Kruger Pulp Mill and the Village of Ashcroft. This collaborative effort focuses on monitoring nutrient loading and its potential impact on the Thompson River's water quality. The City's involvement is guided by the program's terms of reference, established through regular partnership meetings.

This summary is based on the *Thompson River Water Quality and Biological Monitoring Survey* prepared for Kruger Inc. by Hatfield Consultants LLP in September 2024.

The 2023-2024 monitoring program was conducted from October 2023 to March 2024 and included monthly water quality sampling at nine stations extending from upstream of Kamloops Lake to Spences Bridge. Water quality results from the lower Deadman and Bonaparte rivers, tributaries to the lower Thompson River, also were included in the 2023-2024 program. Biological monitoring was exclusively conducted for periphyton biomass and taxonomy, which occurred at two stations of Savona and Walhachin at downstream of Kamloops Lake in February and March 2024, with additional periphyton data for the lower Thompson River at Ashcroft and Spences Bridge contributed by the City of Kamloops.

Results of the 2023-2024 TRJMP indicated that water quality conditions were generally within the historical normal ranges and confirmed decreasing trends over time in most nitrogen and phosphorus species at most Thompson River monitoring locations

(sometimes but not always including the South and North Thompson rivers). These decreases have occurred concurrently with reduced nutrient discharges from the pulp mill and the City of Kamloops wastewater treatment plant.

Periphyton biomass (measured as chlorophyll-a) in 2024 was within the defined normal range downstream of Kamloops Lake at Savona, Walhachin, Ashcroft, and Spences Bridge. Taxonomic composition of periphyton communities (i.e., richness, evenness, and Simpson's Diversity Index) were within two standard deviations of the defined normal mean, while evenness and Simpson's Diversity Index was above three standard deviations at Savona.

4 Completed and Proposed Works

4.1 Works Completed in 2024

- Installed and commissioned third blower for aerated cell.
- Worked with a qualified professional to produce a Receiving Environment Monitoring Plan for KSTC.

4.2 Proposed Works for 2025

- Finish design stage for an improved step screen and grit removal system.
- Work with a qualified professional to update KSTC and collection system contingency plans.
- Work with a qualified professional to update Kamloops Liquid Waste Management Plan.

5 General Information

5.1 Municipal Wastewater Collection System – Infiltration, Inflow and Cross Connection

5.1.1 Infiltration and Inflow

The City of Kamloops remains committed to closely monitoring Infiltration and Inflow (I&I), understanding the significant impact it can have on the capacity of the sanitary system. The operations team has conducted a comprehensive assessment of I&I for 2024, with the following key findings:

Overall System Demand
When comparing the 2023 and 2024 data for water production and sewer flow, the following insights were noted:

- A ~2% reduction in sanitary flows from 2023 to 2024.
- A ~11% reduction in water production over the same period.
- The ratio of water produced to sanitary flows decreased from 1.61 to 1.47, a ~14% reduction. The ideal ratio is generally accepted to be between 1.0 and 1.5.

This decrease in the ratio suggests that the higher ratio of water production relative to sanitary flows in 2023 was likely driven by higher water usage rather than excessive I&I.

Supporting Observations
Additional data analysis further supports this conclusion:

- Rainfall Impact: A weak positive correlation between rainfall and sanitary demand was observed, indicating that precipitation has a limited effect on the system's flows.
- Temperature Influence: A weak negative correlation between temperature and sanitary flows during the transition from freezing to thawing weather suggests that snowmelt also has a minimal impact on system behavior.

One exception worth noting is that on August 24, 2024, Kamloops recorded 24.9 mm of precipitation, representing 11% of the total annual rainfall. On this day, sanitary flows increased by approximately 12% compared to the 7-day average. While this increase is noteworthy, it does not indicate a cause for concern regarding I&I levels.

Conclusion
The 2024 I&I assessment confirms that the City of Kamloops' sewer system is performing well, with I&I levels remaining within acceptable limits. The City will continue to monitor trends closely and implement proactive measures to ensure the system remains efficient and well-managed.

5.1.2 Cross Connection

The City of Kamloops has enacted the standalone Cross Connection Control Bylaw No. 12-71, replacing section 30 of Waterworks Bylaw No. 12-31. This updated bylaw is crafted to align with the Municipal Ticket Information Bylaw, allowing for the imposition of fines in cases of non-compliance. Oversight and enforcement of the Cross Connection Control Bylaw are jointly managed by the City of Kamloops Utilities Operations and Community Services.

The Cross Connection Control Bylaw serves the crucial purpose of establishing a robust framework for the organization and utility to meet Interior Health's requirements for operating a water system under the Drinking Water Protection Act. Its core objective is to protect public health by preventing the contamination of the City's pristine drinking water supply through backflow incidents. The formulation of this bylaw and its accompanying procedures is informed by industry best practices and closely reflects similar frameworks adopted by municipalities across British Columbia.

This proactive measure underscores our unwavering dedication to ensuring the uninterrupted provision of high-quality drinking water to our residents, all while upholding regulatory standards and safeguarding public health.

In 2024, the City began the Cross Connection Surveys within City facilities and launched an online mechanism for submitting back flow testing reports.

5.2 Municipal Wastewater Collection System – Water Conservation Program

The City of Kamloops Water Conservation Strategy was published in 2009. The main focus of this strategy was to implement Universal Water Metering. The City implemented this program over the following four years and realized a 15-20% decrease in peak water use. The 2023 Water Master Plan recommended that a new Water Conservation Plan be created to identify future opportunities for water conservation. This plan was developed through Q4 of 2024 and is currently being refined. The updated Water Conservation Plan will focus on these initiatives: Public education, incentivizing lower water use developments, provisions to ban outdoor water use during fires and heat domes, implement a rate structure that incentivizes water conservation, and implement a leak detection program.

5.3 Integrated Stormwater/Rainwater Management

The Integrated Stormwater Master Plan (ISMP) underwent an internal review in 2022, confirming that the 2009 ISMP is still valid. The City continues to implement relevant recommendations and complete master watershed plans for remaining drainage basins. Regular reviews will determine when an update is needed.

In 2024, the City advanced two key components of the 2009 ISMP:

1. Strategic Watershed Plans (formerly Master Watershed Plans) – The next watersheds for master planning were identified. Plans for the Dallas, Campbell Creek and Barnhartvale watersheds are set for completion in Q1 of 2025. The City will revisit the West Batchelor Heights, Brocklehurst, and North Shore plans in 2025/26.

2. Watercourse Regulations Bylaw 17-6 Update – The ISMP recommended updating this bylaw, which is now under legal review. Staff will present it to Council for adoption in 2025.

The Kamloops Stormwater Management Plan is included in Appendix L.

5.4 Sanitary Sewer Bylaw

Sanitary Sewer Bylaw No. 32-35 was amended in 2024, with Bylaw No. 32-85 adopted in November to update certain rates effective January 1, 2025. This amendment replaces Schedules A, B, and C of the previous version.

The current Kamloops Sanitary Sewer Bylaw is included in Appendix M.

5.5 Liquid Waste Management Plan Review

Throughout 2024, the City of Kamloops remained actively involved in amending its Liquid Waste Management Plan. Key developments include:

- Formation of steering committee
- Council resolution obtained
- Retention of a consultant
- Drafting of a status report and other key documents
- Ongoing engagement with local First Nations to finalize consultation terms of reference

6 Summary

6.1 Effluent Discharge to the Thompson River (E297590)

Table 6.1 summarizes the OC requirements, and the level of treatment achieved at KSTC in 2024, including data from the temporary emergency discharge to the river (October 5 - November 2).

Table 6.1 Summary of Effluent Quality Discharged to the Thompson River at KSTC in 2024

Parameter	Treatment Levels Achieved at KSTC (2024)	OC 111009 Requirements
Effluent Discharge to Thompson River Post UV Disinfection (E297590)		
Effluent Flow	40,110 m^3/d (max) 26,992 m^3/d (avg)	≤ 45,000 m^3/d
$CBOD_5$	Max: 8.5 mg/L Avg: <3.7 mg/L	Max: ≤30 mg/L Monthly Avg: ≤25 mg/L
TSS	Max: 10.5 mg/L Avg: 5.9 mg/L	Max: ≤30 mg/L Monthly Avg: ≤25 mg/L
TP	Max: 1.13 mg/L Avg: 0.39 mg/L	Max: ≤1.5 mg/L Annual Avg≤ 1.0 mg/L
Fecal Coliforms	Max: 30 CFU/100 mL	Max: ≤200 CFU/100 mL
96-Hr Rainbow Trout Single Concentration (effluent toxicity)	0% Mortality	Must pass in 100% Effluent Concentration

In 2024, there were no exceedances of OC 111009 for E297590 indicating the authorized works are performing effectively.

In 2024, KSTC conducted a temporary emergency discharge from the Cell 4 holding cell to the Thompson River between October 5 and November 2. Table 6.2 summarizes of the OC requirements and the treatment levels achieved during this discharge.

Table 6.2 Summary of Effluent Quality Discharged to the Thompson River during Temporary Emergency Discharge at KSTC in 2024

Parameter	Range and Average in Temporary Emergency Discharge	OC 111009 Requirements
Effluent Discharge to Thompson River Post UV Disinfection (E297590)		
Effluent Flow	8,670 – 40,110 m^3/d 22.012 m^3/d (avg)	≤ 45,000 m^3/d
$CBOD_5$	<3.7 mg/L – 8.5 mg/L <3.7 mg/L (avg)	Max: ≤30 mg/L Monthly Avg: ≤25 mg/L
TSS	<3.2 - 10.5 mg/L 6.1 mg/L (avg)	Max: ≤30 mg/L Monthly Avg: ≤25 mg/L
TP	0.87 mg/L – 1.13 mg/L 0.99 mg/L (avg)	Max: ≤1.5 mg/L Annual Avg≤ 1.0 mg/L
Fecal Coliforms	<1 CFU/100 mL - 5 CFU/100 mL 2 CFU/100 mL (avg)	Max: ≤200 CFU/100 mL

All measured parameters of the temporary emergency discharge met the Effluent Discharge to the Thompson River (E297590) requirements outlined in section 1.1 of the OC.

6.2 Reclaimed Water Use

6.2.1 Water Quality for Reclaimed Water Used at KSTC (E300693)

Table 6.3 summarizes the OC requirements for reclaimed water use at KSTC and the treatment levels achieved at KSTC in 2024.

Table 6.3 Summary of Reclaimed Water Quality for Use at KSTC in 2024

Parameter	Treatment Levels Achieved at KSTC (2024)	OC 111009 Requirements
Effluent for Reclaimed Water Use Post UV Disinfection at KSTC (E300693)		
Weekly Flow	5,871 m^3/d (max) 3,337 m^3/d (avg)	N/A
$CBOD_5$	Max: 4.9 mg/L	Max: ≤45 mg/L
TSS	Max: 10.5 mg/L	Max: ≤60 mg/L
Fecal Coliforms	Max: 85 CFU/100 mL	Max: <200 CFU/100 mL

In 2024, there were no exceedances of OC 111009 for E300693 indicating the authorized works are performing effectively.

6.2.2 Water Quality for Reclaimed Water Used at CREDS (E328532)

Table 6.4 summarizes the OC requirements for reclaimed water at CREDS and the treatment levels achieved at KSTC in 2024.

Table 6.4 Summary of Reclaimed Water Quality for Use at CREDS in 2024

Parameter	Treatment Levels Achieved at KSTC (2024)	OC 111009 Requirements
Effluent for Reclaimed Water Use from Cell 4 Lagoon for Cinnamon Ridge Effluent Distribution System (CREDS) Across the Thompson River (E328532)		
Weekly Flow	24,244 m^3/d (max) 10,049 m^3/d (avg)	N/A
$CBOD_5$	Max: 11.0 mg/L	Max: ≤45 mg/L
TSS	Max: 30 mg/L	Max: ≤60 mg/L
Fecal Coliforms	Max: 78 CFU/100 mL	Max: <200 CFU/100 mL

In 2024, there were no exceedances of OC 111009 for E328532 indicating the authorized works are performing effectively.

Appendix A: Operational Certificate OC111009

BRITISH COLUMBIA

October 3, 2022

Tracking Number: 409240
Authorization Number: 111009

REGISTERED MAIL

CITY OF KAMLOOPS
7 VICTORIA STREET WEST
KAMLOOPS, BC
V2C 1A2

Dear Operational Certificate Holder:

Enclosed is Operational Certificate 111009 issued under the provisions of the *Environmental Management Act*. Your attention is respectfully directed to the terms and conditions outlined in the operational certificate. An annual fee will be determined according to the Permit and Approvals Fees and Charges Regulation.

This operational certificate does not authorize entry upon, crossing over, or use for any purpose of private or Crown lands or works, unless and except as authorized by the owner of such lands or works. The responsibility for obtaining such authority rests with the Operational Certificate Holder. It is also the responsibility of the Operational Certificate Holder to ensure that all activities conducted under this authorization are carried out with regard to the rights of third parties, and comply with other applicable legislation that may be in force.

When a spill occurs, or there is an imminent risk of one occurring, the responsible person must ensure that it is reported in accordance with the Spill Reporting Regulation, which among other things, requires notification to Emergency Management BC at 1-800-663-3456. Additional information on spill reporting requirements is available at gov.bc.ca/reportaspill.

This decision may be appealed to the Environmental Appeal Board in accordance with Part 8 of the *Environmental Management Act*. An appeal must be delivered within 30 days from the date that notice of this decision is given. For further information, please contact the Environmental Appeal Board at (250) 387-3464.

Administration of this operational certificate will be carried out by staff from the Environmental Protection Division's Regional Operations Branch. Documents pertinent to the operational certificate must submitted by email or electronic transfer to the director in accordance with the Ministry Data & Report Submissions website at: https://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/comply, or as further instructed.

Ministry of Environment and Climate Change Strategy

Regional Operations Branch
Environmental Protection Division

Authorizations - South Region

Please be reminded that the director may, for the protection of the environment in accordance with Section 16 of the *Environmental Management Act*, require the operational certificate holder to do one or more of the following at any time:

- repair, alter, remove, improve or add to existing works, or construct new works, and submit plans and specifications for works specified in this authorization.
- conduct monitoring, and may specify procedures for monitoring and analysis, and procedures or requirements respecting the handling, treatment, transportation, discharge or storage of waste.
- conduct studies and report information in accordance with the specifications of the director.
- recycle certain wastes and recover certain reusable resources, including energy potential from wastes, in accordance with the specifications of the director.
- submit copies of reports and notifications to specified Indigenous Groups, within specified timelines, in accordance with the specifications of the director.

For more information about how the Ministry will assess compliance with your operational certificate please refer to: https://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/comply.

For more information about how to make changes to your operational certificate and to access waste discharge amendment forms and guidance, please refer to: https://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/change.

If you have any questions or concerns, please contact Regional Operations Branch staff at Authorizations.South@gov.bc.ca.

Yours truly,

Liz Archibald, P.Ag.
for Director, *Environmental Management Act*
Authorizations - South Region

BRITISH COLUMBIA

MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY

OPERATIONAL CERTIFICATE

111009

Under the Provisions of the Environmental Management Act, and in accordance with the City of Kamloops' approved Liquid Waste Management Plan,

CITY OF KAMLOOPS

7 VICTORIA STREET WEST
KAMLOOPS, BC
V2C 1A2

is authorized to discharge municipal effluent to the Thompson River from a municipal wastewater treatment facility located in Kamloops, British Columbia, and to discharge reclaimed water for beneficial purposes subject to the requirements listed below.

Contravention of any of these requirements is a violation of the *Environmental Management Act* and may lead to prosecution.

This operational certificate supersedes Permit 399 issued under the *Environmental Management Act*.

General Provisions

Where this authorization provides that the director may require an action to be carried out, the Operational Certificate Holder must carry out the action in accordance with the requirements of the director.

Publication of Documents

The Ministry of Environment and Climate Change Strategy publishes Regulatory Documents on its website for the purpose of research, public education and to provide transparency in the administration of environmental laws. The Operational Certificate

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Holder acknowledges that the Province may publish any Regulatory Documents submitted by the Operational Certificate Holder, excluding information that would be exempted from disclosure if the document was disclosed pursuant to a request under Section 5 of the *Freedom of Information and Protection of Privacy Act*, and the Operational Certificate Holder consents to such publication by the Province.

"Province" means His Majesty the King in right of British Columbia;

"Regulatory Document" means any document that the Operational Certificate Holder is required to provide to the director or the Province pursuant to:
(i) this authorization;

(ii) any regulation made under the *Environmental Management Act* that regulates the facility described in this authorization or the discharge of waste from that facility; or

(iii) any order issued under the *Environmental Management Act* directed against the Operational Certificate Holder that is related to the facility described in this authorization or the discharge of waste from that facility.

1 AUTHORIZED DISCHARGE

1.1 Authorized Source

This section applies to the discharge of municipal effluent from the City of Kamloops' municipal wastewater treatment facility to the Thompson River. The site reference number for this discharge is E297590.

1.1.1 The maximum rate of discharge is as follows:

Year(s)	Maximum rate of discharge
2022 – 2032 inclusive	45,000 m3/day
2033 onwards	55,000 m3/day

1.1.2 The characteristics of the discharge must be equivalent to or better than the following:

(a) Carbonaceous 5-day Biochemical Oxygen Demand ($cBOD_5$)	Maximum: 30 mg/L Monthly Average: 25 mg/L

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Monthly average is based on four (4) weekly samples collected over a calendar month

(b) Total Suspended Solids (TSS) Maximum: 30 mg/L
Monthly Average: 25 mg/L
Monthly average is based on four (4) weekly samples collected over a calendar month

(c) Total Phosphorus Maximum: 1.5 mg/L
Annual Average: 1.0 mg/L
Annual average is based on 12 monthly samples collected over the calendar year

(d) Fecal Coliforms Maximum: 200/100 mL
Units in CFU or MPN depending on laboratory method used.

(e) 96-Hr Rainbow Trout single concentration - test must Pass in 100% effluent concentration

96-Hr RBT single concentration – Effluent is acutely toxic if there is greater than 50% mortality during a 96-hour Rainbow Trout (Oncorhynchus mykiss) single concentration acute toxicity test in a 100% effluent concentration using:

"Biological test Method: Reference Method for Determining Acute Lethality of Effluent to Rainbow Trout, EPS 1/RM/13 Second Edition December 2000" and if applicable, Procedure for pH Stabilization During the Testing of Acute Lethality of Wastewater Effluent to Rainbow Trout, EPS 1/RM/50.

For the Pass/Fail of a single concentration test an effluent sample is considered to have passed (Pass) if at 100% effluent concentration $\leq$ 50% of the test fish die after 96-hours of exposure, the test is considered to have failed (Fail) if > 50% of the test fish die after 96-hours. Test results must be reported in percent (%) mortality.

1.1.3 The authorized works are secondary treatment facilities (activated sludge system and lagoon system), UV disinfection facilities, sludge management facilities, storage lagoons, primary outfall located between Cell 2C and Cell 3, a secondary outfall from Cell 4 for temporary emergency use only, and related appurtenances approximately located as shown on Site Plan A.

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1.1.4 The wastewater collection system services the City of Kamloops and surrounding areas.

1.1.5 The location of the facilities from which the discharge is authorized to originate is Lot 1, District Lot B, Group 2, Plan 12919, Kamloops Division Yale District, West of the Sixth Meridian.

1.1.6 The location of the point where the discharge is authorized to occur is the Thompson River, approximately located at Latitude 50.6958 N and Longitude 120.4657 W.

1.1.7 The Operational Certificate Holder must not discharge under this authorization unless the authorized works are complete and fully operational.

1.2 Authorized Source

This section applies to the discharge of reclaimed water from the City of Kamloops' municipal wastewater treatment facility for beneficial uses that are categorized as having lower exposure potential. The beneficial uses include irrigation of agricultural, City lands, and a golf course, fire suppression, and industrial uses (i.e. process water, dust control, equipment washing) at a compost facility and municipal wastewater treatment facility. The site reference number for the discharge for beneficial use at the Kamloops municipal wastewater treatment facility is E300693 and for the discharge from Cell 4 Lagoon to the distribution system (across the Thompson River) for beneficial use by the reclaimed water users at Cinnamon Ridge is E328531.

Lower Exposure Potential refers to uses:

(a) For which public access to the reclaimed water is restricted and users are not likely to have contact with the reclaimed water,
(b) That are commercial or industrial in nature and users are educated as to the risks posed by the use of the reclaimed water, or
(c) That present a low risk to the receiving environment.

1.2.1 There is no maximum authorized rate of reclaimed water that may be beneficially used provided there is no effluent surfacing, overland flow and groundwater breakout.

1.2.2 The characteristics of the reclaimed water must be equivalent to or better than the following:

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(a) Carbonaceous 5-Day Biochemical Oxygen Demand ($cBOD_5$)	Maximum: 45 mg/L
(b) Total Suspended Solids (TSS)	Maximum: 60 mg/L
(c) Fecal Coliforms	Less than: 200/100 mL

Units in CFU or MPN depending on the applicable lab method used.

1.2.3 The authorized works are secondary treatment facilities (activated sludge system and lagoon-based system), UV disinfection facilities, sludge management facilities, storage lagoons, chlorination disinfection facilities, Cinnamon Ridge distribution system, and related appurtenances required for the beneficial use of reclaimed water.

1.2.4 The location of the area where reclaimed water may be beneficially used is described as Cinnamon Ridge, Kamloops Golf and Country Club, Provincial Fire Control Centre at the Kamloops Airport, Kamloops' Compost Centre as per legal land descriptions in the approved Reclaimed Water Use Plan identified in Section 2.10.

1.2.5 The Operational Certificate Holder must not discharge under this authorization unless the authorized works are complete and fully operational.

2 GENERAL REQUIREMENTS

2.1 Maintenance of Works

The Operational Certificate Holder must regularly inspect the authorized works, and maintain them in good working order.

If components of the authorized works have a manufacturer's recommended maintenance schedule, then those components must, at a minimum, be maintained in accordance with that schedule.

The Operational Certificate Holder must maintain a record of inspections and maintenance and any shut down periods of the authorized works.

2.2 Emergency Procedures

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In the event of an emergency or other condition which prevents normal operation of the authorized works or leads to an unauthorized discharge, the Operational Certificate Holder must take remedial action immediately to restore the normal operation of the authorized works and to prevent any unauthorized discharges. The Operational Certificate Holder must immediately report the emergency or other condition and the remedial action that has and will be taken to the EnvironmentalCompliance@gov.bc.ca email address or as otherwise instructed by the director.

2.3 Bypasses

The Operational Certificate Holder must not allow any discharge authorized by this authorization to bypass the authorized works, except with the prior written approval of the director.

2.4 Process Modification

The Operational Certificate Holder must notify the director prior to implementing changes to any process that may affect the quality and/or quantity of the discharge.

2.5 Qualified Professional

The Operational Certificate Holder must cause all documents submitted to the director by a Qualified Professional to be signed and sealed by the author(s). In addition, a completed Declaration of Competency Form and Conflict of Interest Disclosure Statement Form must accompany documents submitted to the director by a Qualified Professional.

"Qualified Professional" means an applied scientist or technologist specializing in an applied science or technology applicable to the duty or function, including, if applicable and without limiting this, agrology, biology, chemistry, engineering, geology or hydrogeology and who:

(a) is registered with the appropriate professional organization, is acting under that organization's code of ethics and is subject to disciplinary action by that organization, and
(b) through suitable education, experience, accreditation and/or knowledge, may be reasonably relied on to provide advice within their area of expertise.

2.6 Facility Classification and Operator Certification

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The Operational Certificate Holder must have the authorized works classified, and the classification must be maintained by the Environmental Operators Certification Program (EOCP).

The Operational Certificate Holder must cause the authorized works to be operated and maintained by:

(a) persons certified within and according to the program provided by the EOCP to the satisfaction of the director, or
(b) persons who are qualified in the safe and proper operation of the facility for the protection of the environment, as demonstrated to the satisfaction of the director.

The Operational Certificate Holder must notify the director of the classification level of the facility and certification levels of the operators, and changes of operators and/or operator certification levels within 30 days of any change.

2.7 Operating Plan

2.7.1 The Operational Certificate Holder must implement and maintain an operating plan prepared by a Qualified Professional for the lift stations, wastewater treatment facility and effluent disposal works. The operating plan must detail the proper operation, maintenance, and monitoring of the lift stations, wastewater treatment facility, and effluent disposal works. The operating plan is to be continually updated, as necessary, to reflect the current operation.

2.7.2 The Operational Certificate Holder must retain a copy of the operating plan at the municipal wastewater treatment facility and be made available for inspection by a designated officer upon request.

2.8 Contingency Plan

2.8.1 The Operational Certificate Holder must implement and maintain a contingency plan prepared by a Qualified Professional that will address the appropriate course of action to be taken in any pre-conceived emergency. The plan must include, but is not limited to, flood preparedness, toxic substances in plant influent, chlorine and sulphur dioxide leaks or spills and any potential point of concern in the collection, treatment and disposal systems. Attention is to be given to the public safety and protection of the environment. The plan is to be continually updated as necessary to reflect current operation.

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2.8.2 The Operational Certificate Holder must retain a copy of the contingency plan at the municipal wastewater treatment facility and be made available for inspection by a designated officer upon request.

2.9 Liquid Waste Management Plan (LWMP) Review

The Operational Certificate Holder must review their Liquid Waste Management Plan and prepare a formal report every five (5) years.

The review must determine whether an amendment or update is required. To ensure the plan is still relevant and current, the review must include an assessment of:

(a) Cost estimates,
(b) Objectives and outcomes,
(c) Approach and technologies,
(d) Regulations and standards,
(e) Official community plan and Regional Growth Strategy, and
(f) Public support for the plan.

2.10 Reclaimed Water Use Plan

The Operational Certificate Holder must implement a reclaimed water use plan prepared by a Qualified Professional(s) that describes the management of all beneficial uses of reclaimed water by the Operational Certificate Holder. The plan must adhere to the BC Ministry of Environment 2013 Reclaimed Water Guideline Document, or most recent version.

The most recent reclaimed water use plan is "City of Kamloops Reclaimed Water Use Final Report – Updated" dated November 2021.

Where changes are proposed to the reclaimed water use plan, the Operational Certificate Holder must obtain written approval from the director. Changes include, but are not limited to, adding new or expanding existing uses or areas, or modifying monitoring programs.

2.11 Sludge Management

The Operational Certificate Holder must dispose of sludge wasted from the treatment plant at a site and in a manner approved by the director, or as authorized by regulation under the *Environmental Management Act*.

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The Operational Certificate Holder must retain records of volume of sludge produced, the dates and location where sludge was discharged, and the amount of sludge discharged at each location for inspection by a designated officer upon request.

2.12 Lagoons

The Operational Certificate Holder must operate the lagoons such that:
(a) there is no overflow from each lagoon to the surrounding environment; and
(b) surface drainage is diverted away from each lagoon.

2.13 Odour Control

Should objectionable odours, attributable to the operation of the wastewater facility, occur beyond the property on which the municipal wastewater treatment facility is located, the Operational Certificate Holder must undertake measures or additional works to reduce odour to acceptable levels.

2.14 Access Security

The Operational Certificate Holder must provide adequate security for the facility and restrict access to authorized personnel.

2.15 Signage

The Operational Certificate Holder must cause a suitable sign to be erected at the main entrance to the municipal wastewater treatment facility that must have the appropriate emergency contact person(s) and phone numbers for use by the general public or others.

2.16 Posting of Outfall

The Operational Certificate Holder must erect and maintain a sign along the alignment of the outfall above the high-water mark. The Operational Certificate Holder must ensure that the sign meets the following criteria:
(a) identifies the nature of the works;
(b) indicates the length and depth of the outfall;
(c) has a surface area of at least 1 m^2;
(d) the colours of the lettering and the background of the sign contrast sufficiently with each other; and
(e) is located such that the wording is clearly visible from both land and water.

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2.17 Outfall Inspection

The Operational Certificate Holder must cause the outfall to be inspected by **October 31, 2023**, and once every five (5) years thereafter by a Qualified Professional to ensure it is in good working condition.

2.18 Backup Power

The Operational Certificate Holder must provide an independent backup power system capable of maintaining critical systems, wastewater pumping and primary treatment equipment during power outages.

2.19 Municipal Wastewater Collection System – Infiltration, Inflow and Cross Connections

The Operational Certificate Holder must cause the municipal wastewater collection system to be inspected and maintained to minimize the possibility of cross connections between the storm sewer and sanitary sewer systems, to minimize infiltration of groundwater, to minimize inflow of water from basement sump pump and roof drains, and to minimize exfiltration of the collected wastewater from the collection system to the ground.

2.20 Municipal Wastewater Collection System - Water Conservation Program

The Operational Certificate Holder must implement a water conservation program to encourage a reduction in the volume of domestic, industrial, and commercial wastewater discharged to the municipal wastewater collection system.

2.21 Integrated Stormwater/Rainwater Management

The Operational Certificate Holder must implement an Integrated Stormwater/Rainwater Management Plan. The plan must summarize actions pertaining to integrated stormwater/rainwater planning and implementation, which are consistent with the Liquid Waste Management Planning and Stormwater Planning guidance documents. The plan must include, but not be limited to the following:

(a) Inventories of the physical and biological systems to identify catchment and streams condition and identify areas at risk;
(b) Component plans or priority actions to protect resources, resolve identified problems and accommodate land development and growth; and

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(c) An implementation program incorporating Phasing and Budgets, Community Education and provide an annual Performance and Monitoring report to the director.

A copy of each of the above guidance documents are available on the Ministry's webpage at:
https://www2.gov.bc.ca/gov/content/environment/waste-management/sewage/liquid-waste-management-plans

2.22 Sanitary Sewer Bylaw

In order to minimize the potential effect of heavy metals or other toxic materials in the effluent and/or sludge, the Operational Certificate Holder must prepare, or review and if necessary, update and implement a Sanitary Sewer Bylaw to regulate the input of such wastes to the wastewater collection system.

3 MONITORING REQUIREMENTS

3.1 Effluent Monitoring Program

The Operational Certificate Holder must conduct the effluent monitoring program identified in Sections 3.1.1, 3.1.2, and 3.1.3.

Section 3.1.2 and 3.1.3 are applicable when reclaimed water is being utilized.

3.1.1 Monitoring Location: Effluent Discharge to the Thompson River Post UV Disinfection

Site Reference Number: E297590 (50.690235, -120.466200)

Parameter	Frequency	Type
Flow to the Thompson River (m^3/day)	Once per day over a 24-hr period (Daily) or Continuous	In-line flow meter
$cBOD_5$ (mg/L)	Weekly	Composite
TSS (mg/L)	Weekly	Composite
pH	Daily or Continuous	Meter
Fecal Coliforms (CFU/100 ml or MPN/100 ml)	Monthly	Grab
Ammonia (mg/L)	Monthly	Composite

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Total Nitrogen, Nitrate, Nitrite, Organic Nitrogen, and Total Kjeldahl Nitrogen (mg/L)	Once every two months	Composite
Total Phosphorus, ortho phosphate (mg/L)	Monthly	Composite
Toxicity (96-hr RBT single concentration)	Annually	Composite

Composite Sample Type: The sample must consist of a 24-hour composite containing samples collected on an hourly basis.

3.1.2 Monitoring Location: Effluent for Reclaimed Water Use Post UV Disinfection

Site Reference Number: E300693 (50.690235, -120.466200)

Parameter	Frequency	Type
Water Usage (m^3/week)	Weekly	readings from meter(s)
$cBOD_5$ (mg/L)	Weekly	Composite
TSS (mg/L)	Weekly	Composite
pH	Weekly	Meter
Fecal Coliforms (CFU/100 ml or MPN/100 ml)	Weekly	Grab
Total Chlorine Residual	Daily	Grab

3.1.3 Monitoring Location: Effluent for Reclaimed Water Use from Cell 4 Lagoon at Cinnamon Ridge Reclaimed Water Distribution System (across the Thompson River)

Site Reference Number: E328531 (50.696931, -120.473661)

Parameter	Frequency	Type
Reclaimed Water usage (m^3/week)	Weekly	readings from meter(s) during irrigation
$cBOD_5$ (mg/L)	Weekly	Grab
TSS (mg/L)	Weekly	Grab
pH	Weekly	Grab
Fecal Coliforms (CFU/100 ml or MPN/100 ml)	Weekly	Grab
Alkalinity	Weekly	Grab

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Total Nitrogen, Ammonia, Nitrate, Nitrite, Organic Nitrogen, and Total Kjeldahl Nitrogen (mg/L)	Monthly	Grab
Total Phosphorus (mg/L)	Monthly	Grab
Chloride	Monthly	Grab
Total Metals	Annually	Grab
Sulphate	Annually	Grab
Total Chlorine Residual	Daily	Grab

3.2 Toxicity Monitoring of Effluent

If a discharge fails a toxicity test under Section 3.1.1, the Operational Certificate Holder must conduct a confirmation toxicity test (96-hr RBT single concentration) within 14 days of the date the previous toxicity sample was taken.

When conducting a confirmation toxicity test and when monitoring after a confirmed failure of a toxicity test, a discharger must monitor ammonia concentrations and record the pH and temperature of the sample at the time of sampling.

If a discharge fails two consecutive toxicity tests, the discharger must conduct toxicity monitoring twice a month until the discharge passes three consecutive toxicity tests, after which time testing reverts to an annual frequency.

3.3 Receiving Environment Monitoring Program

The Operational Certificate Holder must establish a receiving environment monitoring program prepared by a Qualified Professional that, at minimum, includes:

(a) at least one control sampling station located upstream, upgradient or outside the influence of the initial dilution zone of the municipal effluent,
(b) at least one impact sampling station located downstream of the discharge, near the edge of the initial dilution zone of the municipal effluent,
(c) sufficient data to assess the potential impact of the discharge to the Thompson River, and
(d) sufficient data to ensure that any potential exceedances of BC Water Quality Guidelines outside of the initial dilution zone as a result of the discharge will be detected promptly.

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The Operational Certificate Holder must submit the monitoring program to the director for approval by **March 31, 2023.**

3.4 Thompson River Joint Monitoring Program

The Operational Certificate Holder must participate in the development, funding, and implementation of a Thompson River joint monitoring program (TRJMP). The monitoring program is intended to provide high quality, integrated and timely water quality information to enable sustainable environmental management of Thompson River including understanding cumulative effects.

3.5 Groundwater Monitoring Program

The Operational Certificate Holder must conduct the groundwater monitoring program identified below.

Monitoring Locations and Coordinates:

EMS ID	Description (well name)	Coordinates
E328533	A&A	50.7218, -120.4872
E328534	MW03-01	50.7192, -120.4895
E328535	MW03-02	50.7142, -120.4907
E328536	MW03-03W	50.7109, -120.4821
E328537	MW03-04	50.7068, -120.4724
E328538	CR15	50.7087, -120.4673

Groundwater Monitoring Program:

EMS ID	Parameter	Frequency & Sample Type
E328533 E328534	Water Level/Elevation	Twice annually at the start and end of the irrigation season
E328535 E328536 E328537 E328538	pH, Conductivity	Annually at the end of the irrigation season
	Total Nitrogen, TKN, Nitrate, Nitrite, Ammonia	
	Dissolved Orthophosphate	
	Chloride	
	Dissolved Metals	
	Sulphate	
	Fecal Coliforms	

3.6 Soil Quality Monitoring Program

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The Operational Certificate Holder must conduct the soil quality monitoring program identified in below.

Monitoring Locations and Coordinates:

EMS ID	Description	Coordinates
E328568	CR1	50.7139, -120.4825
E328569	CR4	50.7177, -120.4780
E328570	CR5	50.7118, -120.4779
E328571	CR7	50.7132, -120.4755
E328572	CR18	50.7152, -120.4865
E328573	CR19	50.7156, -120.4857
E328574	CR20	50.7198, -120.4840

Soil Quality Monitoring Program:

EMS ID	Parameter	Frequency and Sampling Type
E328568 E328569 E328570 E328571	pH and Alkalinity	Monthly during irrigation season if reclaimed water pH is above 9.5 after 5 consecutive readings taken on a weekly basis.
E328572 E328573 E328574	Fecal coliforms	Once annually at the end of the irrigation season The sample for each site is to be a composite for the 0 to 30 cm depth.
	Conductivity	
	pH and Alkalinity	
	Total Nitrogen, TKN, Nitrate, Nitrite, Ammonia	
	Total Phosphorus, Orthophosphate	
	Chloride	
	Total Metals	
	Sulphate	
	Salinity	

3.7 Modification of Monitoring Programs

(a) The monitoring programs in Section 3 may only be modified with the prior written approval of the director; and

(b) The modified monitoring program must be designed by a Qualified Professional.

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3.8 Sampling Facilities

(a) The Operational Certificate Holder must maintain sampling facilities; and

(b) The Operational Certificate Holder must take due care in sampling, storing and transporting the samples to control temperature and avoid contamination, breakage, and any other factor or influence that may compromise the integrity of the samples.

3.9 Sampling Procedures

The Operational Certificate Holder must carry out sampling in accordance with the procedures described in the most recent edition of the "British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples, (Permittee Edition", or by alternative procedures as authorized by the director.

A copy of the above manual is available on the Ministry web page at https://www2.gov.bc.ca/gov/content/environment/research-monitoring-reporting/monitoring/laboratory-standards-quality-assurance/bc-field-sampling-manual.

3.10 Analytical Procedures

The Operational Certificate Holder must carry out analyses in accordance with procedures described in the most recent edition of the "British Columbia Environmental Laboratory Manual (Permittee Edition)", or by alternative procedures as authorized by the director.

A copy of the above manual is available on the ministry web page at https://www2.gov.bc.ca/gov/content/environment/research-monitoring-reporting/monitoring/laboratory-standards-quality-assurance/bc-environmental-laboratory-manual.

3.11 Quality Assurance

3.11.1 The Operational Certificate Holder must obtain from the analytical laboratory(ies) their precision, accuracy and blank data for each sample set submitted by the Operational Certificate Holder and an evaluation of the data acceptability, based on criteria set by such laboratory.

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3.11.2 The Operational Certificate holder must prepare and submit for analysis by the analytical laboratory(ies) blank and replicate samples that meet the minimum level of effort outlined in the most recent edition of the "British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples, (Permittee Edition)".

3.11.3 The Operational Certificate Holder must submit samples to analytical laboratory(ies) that meet the definition of a qualified laboratory under the Environmental Data Quality Assurance Regulation.

4 REPORTING REQUIREMENTS

The Operational Certificate Holder must collect and maintain data of analyses and flow measurements required under this authorization for inspection by a designated officer upon request.

4.1 Environmental Monitoring System (EMS) Reporting

The Operational Certificate Holder must ensure all monitoring data analyzed by a qualified laboratory is uploaded to the EMS database within 30 days of the date of sample collection.

4.2 Annual Report

The Operational Certificate Holder must, on or before March 31st of each year, submit to the director an Annual Report for the previous calendar year prepared by a Qualified Professional that includes, but is not limited to:

(a) A statement outlining the number of exceedances of permitted discharges that occurred during the reporting period, the dates of each such exceedance, an explanation as to the cause of the exceedances, and a description of the measures taken by the Operational Certificate Holder to rectify the cause of each such exceedance. If no exceedances occurred over the reporting period, the required statement must indicate that no exceedance of permitted discharges occurred during the reporting period;

(b) a review and interpretation of all the monitoring data for the preceding calendar year;

(c) a graphical analysis with interpretation of any trends in all monitoring results;

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(d) all laboratory reports of data collected under this authorization;

(e) a summary of all quality assurance/quality control issues during the calendar year;

(f) an evaluation of the performance of the authorized works and identify any changes;

(g) an implementation schedule for any alterations to the authorized works which may impact the discharge under this authorization;

(h) an update on the efforts to reduce infiltration, inflow and cross connections required in Section 2.19;

(i) an update on the Water Conservation Program required in Section 2.20. The update must include details on the efforts made to seek active cooperation from the public and industry through the program and the effectiveness of the program to reduce volume of domestic, industrial, and commercial wastewater discharged to the wastewater collection system;

(j) a copy of the Integrated Stormwater/Rainwater Management Plan required in Section 2.21 and a summary of actions completed during the year;

(k) an update on the efforts to administer the Sanitary Sewer Bylaw stated in Section 2.22. Also, a copy of existing influent waste bylaws, or amendments from the reporting year, or similar bylaws or building codes must be included as attachments;

(l) When applicable, the formal Liquid Waste Management Plan Review Report

The Operational Certificate Holder must submit the Annual Report to the director by email at EnvAuthorizationsReporting@gov.bc.ca, or as otherwise instructed by the director.

The Operational Certificate Holder must make the Annual Report available to the public.

4.3 Outfall Inspection Reporting

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Liz Archibald, P.Ag.
for Director, *Environmental Management Act*
Authorizations - South Region

The Operational Certificate Holder must within 30 days after each outfall inspection required under Section 2.17 cause a Qualified Professional to prepare and submit an outfall inspection report to the director by email at EnvAuthorizationsReporting@gov.bc.ca, or as instructed by the director.

4.4 Non-compliance Notification

The Operational Certificate Holder must immediately notify the director by email at EnvironmentalCompliance@gov.bc.ca, or as otherwise instructed by the director, of any non-compliance with the requirements of this authorization and must immediately take remedial action to remedy any effects of such non-compliance.

4.5 Non-compliance Reporting

The Operational Certificate Holder must, within 30 days of any non-compliance event, submit to the director a written report that includes, but is not necessarily limited to, the following:

(a) all relevant test results obtained by the Operational Certificate Holder related to the non-compliance,
(b) an explanation of the most probable cause(s) of the non-compliance, and
(c) a description of remedial action planned and/or taken by the Operational Certificate Holder to prevent similar non-compliance(s) in the future.

The Operational Certificate Holder must submit all non-compliance reporting required to be submitted under this section by email to the Ministry's Compliance Reporting Submission Mailbox (CRSM) at EnvironmentalCompliance@gov.bc.ca or as otherwise instructed by the director.

For guidelines on how to report a non-compliance or for more information visit the Ministry website:
https://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/comply

Date issued: October 3, 2022

Liz Archibald, P.Ag.
for Director, *Environmental Management Act*
Authorizations - South Region

PROVINCE OF
BRITISH COLUMBIA

Environmental Protection

Site Plan A



Date issued: October 3, 2022

Liz Archibald, P.Ag.
for Director, *Environmental Management Act*
Authorizations - South Region

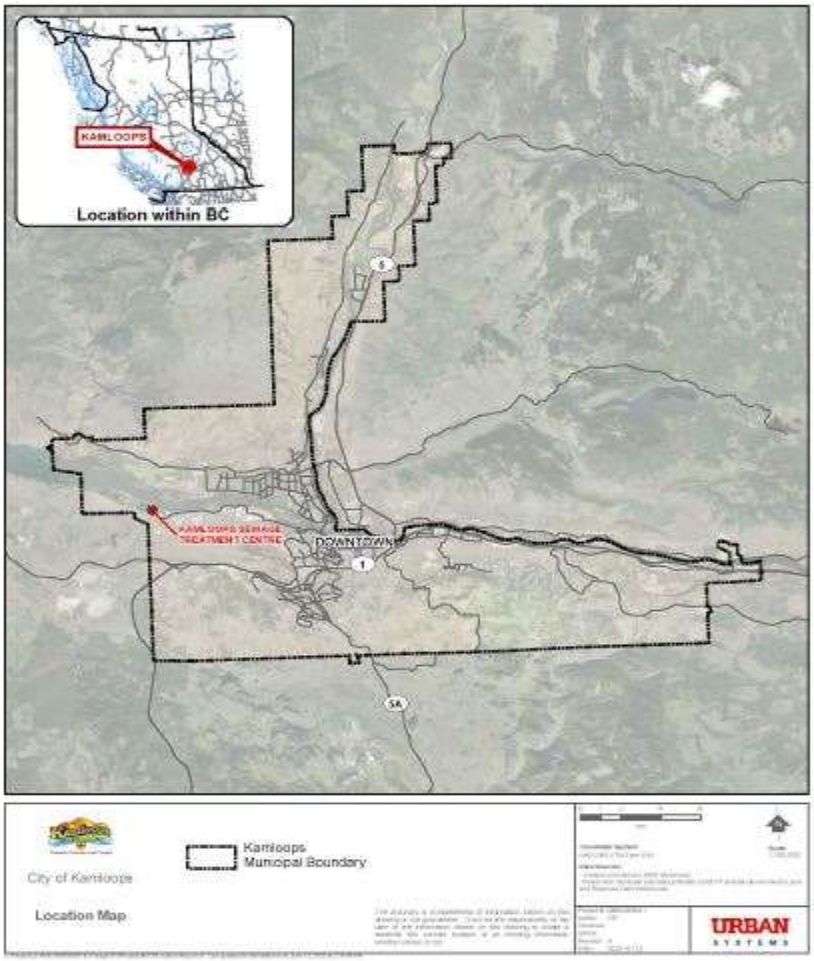
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Operational Certificate Number: 111009

PROVINCE OF
BRITISH COLUMBIA

Environmental Protection

Location Map



Date issued: October 3, 2022

Liz Archibald, P.Ag.
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Authorizations - South Region

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Operational Certificate Number: 111009

Appendix B: KSTC Notification to ENV for Temporary Emergency Discharge

City of Kamloops
Civic Operations
955 Concordia Way
Kamloops, BC V2C 6V3
Ph: 250-828-3311
E-mail: info@kamloops.ca

Date:	October 3rd, 2024
To:	EnvironmentalCompliance@gov.bc.ca
Subject:	Notification for Authorisation #111009 Release through emergency outfall.
Date of Non-compliance:	2024-10-03;15:00
Location of Non-compliance:	Kamloops Sewage Treatment Centre 3330 Mission Flats Road, Kamloops BC Lat: 50.6894; Long: 120.4627. Site Ref #E297590

Nature of Non-compliance:

This report is to notify that the discharge from the primary outfall located between Cell 2C and Cell 3 has been terminated and the effluent is being discharged via the secondary Cell 4 outfall. The secondary outfall is recognised as part of the authorised works in Section 1.1.3 of the OC, with the intent being that this outfall is to be used temporarily in an emergency situation. The reason for initiating the discharge from Cell 4 is due to the loss of biological phosphorus treatment. As a result, the total phosphorus concentration is not able to meet the maximum concentration requirement in Section 1.1.2(c) of the OC. The effluent in Cell 4 is able to meet all the quality requirements in Section 1.1.2 of the OC.

Release of effluent from the Cell 4 outfall is outside the normal operation of the authorised works, as per Section 2.2 of the OC. The decision to discharge from the Cell 4 outfall was due to the following factors:

- Concerns with the ability to manage storage capacity.
- Allows the ability to manage the discharge during conditions when river flows are elevated, compared with winter months when there will be less dilution due to lower river flows.

Initial Response:

N/A.

Monitoring Conducted:

Monitoring of the treatment process will be undertaken to determine whether biological phosphorus treatment has resumed. This will guide the decision to terminate the discharge from the Cell 4 outfall and resume discharge from the primary outfall.

During the discharge from the Cell 4 outfall, the Cell 4 effluent will be monitored to confirm compliance with Section 1.1.2 of the OC. Additional monitoring of the river upstream and downstream of the outfall will be implemented as considered appropriate, based on field observations.

Future Actions:

Biological phosphorus treatment can be challenging to achieve during certain times of the year, due to the lack of incoming food. Operations staff have already been liaising with technical experts regarding

City of Kamloops
Civic Operations
955 Concordia Way
Kamloops, BC V2C 6V3
Ph: 250-828-3311
E-mail: info@kamloops.ca

how best to stimulate and achieve biological phosphorus treatment. The following actions are being implemented:

- Increase wasting and decrease MLSS.
- Review options to increase food to the wastewater treatment plant.
- Review options to limit and manage DO levels.
- Reprogramming of the blower control.

Contact Information:

Dan Steinke, Acting Utilities Services Supervisor
Phone: 250-319-4618
Email: dsteinke@kamloops.ca

Attachments: None added.

Appendix C: KSTC Raw Water Quality Data for Effluent Discharged to River in 2024 (E297590)

Date	Discharge to the Thompson River (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	NH_3–N (mg/L)	TN-N [A,B] (mg/L)	NO_3-N (mg/L)	NO_2–N [B] (mg/L)	Org-N[A,B] (mg/L)	TKN-N [B] (mg/L)	TP-P (mg/L)	Ortho P-P (mg/L)	Toxicity (% mortality)
Jan 01	25944			5.94										
Jan 02	26746			5.96	<1		12.6		<0.01	1.24	1.24			
Jan 03	27526	2.2	5.0	5.95		0.12		13				0.21	<0.03	
Jan 04	27237			6.01										
Jan 05	26718			6.06										
Jan 06	26354			6.1										
Jan 07	26659			6.04										
Jan 08	27605			5.99										
Jan 09	26355			6.01										
Jan 10	25974	2.6	3.5	6.04										
Jan 11	26240			6.09										
Jan 12	26682			6.05										
Jan 13	27243			5.95										
Jan 14	28363			5.8										
Jan 15	29167			5.81										
Jan 16	28409			6.23										
Jan 17	28255	<3.7	5.0	5.94										
Jan 18	27525			5.99										
Jan 19	27312			6.11										
Jan 20	26464			5.96										
Jan 21	27031			5.9										
Jan 22	28333			5.89										
Jan 23	28763			5.96										
Jan 24	28372	4.3	3.5	6.04										
Jan 25	27784			6.05										
Jan 26	27733			6.07										
Jan 27	28398			6.05										
Jan 28	29081			6.05										
Jan 29	28882			6.06										
Jan 30	27575			6.1										
Jan 31	9514	4.2	5.0	6.23										

[A] Calculated Result, [B] Samples Analyzed at Caro Analytical Services

Date	Discharge to the Thompson River (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	NH_3–N (mg/L)	TN-N [A,B] (mg/L)	NO_3-N (mg/L)	NO_2–N [B] (mg/L)	Org-N[A,B] (mg/L)	TKN-N [B] (mg/L)	TP-P (mg/L)	Ortho P-P (mg/L)	Toxicity (% mortality)
Feb 01	0													
Feb 02	0													
Feb 03	0													
Feb 04	0													
Feb 05	0													
Feb 06	0													
Feb 07	0													
Feb 08	0													
Feb 09	0													
Feb 10	0													
Feb 11	0													
Feb 12	0													
Feb 13	0													
Feb 14	0	2	<3.2	6.14										
Feb 15	12037			6.16										
Feb 16	26612			6.14										
Feb 17	26472			6.13	1									
Feb 18	24034			6.11										
Feb 19	26602			6.09										
Feb 20	27556			6.06										
Feb 21	27263	4.9	5.5	6.09		0.06						0.15	<0.03	
Feb 22	26307			6.1										
Feb 23	26288			6.12										
Feb 24	25823			6.16										
Feb 25	26678			6.11										
Feb 26	28803			6.1										
Feb 27	27675			6.12										
Feb 28	27117	3.9	5.5	6.14										
Feb 29	26855			6.1										

[A] Calculated Result, [B] Samples Analyzed at Caro Analytical Services

Date	Discharge to the Thompson River (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	NH_3–N (mg/L)	TN-N [A,B] (mg/L)	NO_3-N (mg/L)	NO_2–N [B] (mg/L)	Org-N[A,B] (mg/L)	TKN-N [B] (mg/L)	TP-P (mg/L)	Ortho P-P (mg/L)	Toxicity (% mortality)
Mar 01	26782			6.06										
Mar 02	26362			6.07										
Mar 03	27265			6.05										
Mar 04	27860			6.05										
Mar 05	27350			6.04	<1	<0.05[B]	13.9	12.3[B]	<0.01	1.63	1.63			
Mar 06	27304	<3.7	6	6.04								0.25	<0.03	
Mar 07	26893			6.04										
Mar 08	27065			6.03										
Mar 09	26812			6.01										
Mar 10	27132			6.02										
Mar 11	27940			5.99										
Mar 12	27157			6.01										
Mar 13	26623	<3.7	4	6.03										
Mar 14	26387			6.03										
Mar 15	26150			6.03										
Mar 16	25872			6										
Mar 17	23341			5.99										
Mar 18	26269			5.96										
Mar 19	25736			5.95										
Mar 20	25225	4.1	3.5	5.96										
Mar 21	24923			6.03										
Mar 22	24990			6.04										
Mar 23	24447			6.01										
Mar 24	24758			5.98										
Mar 25	25202			5.94										
Mar 26	24859			5.93										
Mar 27	24707	<3.7	5.5	5.99										
Mar 28	24844			6										
Mar 29	24278			5.98										
Mar 30	24410			5.94										
Mar 31	24668			5.88										

[A] Calculated Result, [B] Samples Analyzed at Caro Analytical Services

Date	Discharge to the Thompson River (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	NH_3–N (mg/L)	TN-N [A,B] (mg/L)	NO_3-N (mg/L)	NO_2–N [B] (mg/L)	Org-N[A,B] (mg/L)	TKN-N [B] (mg/L)	TP-P (mg/L)	Ortho P-P (mg/L)	Toxicity (% mortality)
Apr 01	24799		8	5.87		0.09						0.16	<0.03	
Apr 02	11672			5.92										
Apr 03	0	4.9		5.94										
Apr 04	0			5.97	30									
Apr 05	0			5.95										
Apr 06	0			5.94										
Apr 07	0			5.86										
Apr 08	0			5.9										
Apr 09	0			5.87										
Apr 10	0	<3.7	5.5	5.89										
Apr 11	0			5.95										
Apr 12	0			5.94										
Apr 13	0			5.91										
Apr 14	0			5.86										
Apr 15	17646			5.82										
Apr 16	25620			5.83										
Apr 17	25074	<3.7	4	5.83										
Apr 18	24961			5.82										
Apr 19	24997			5.93										
Apr 20	24676			6.03										
Apr 21	24832			6										
Apr 22	25652			5.96										
Apr 23	25915			5.99										
Apr 24	25389	<3.7	8	6.08										
Apr 25	25558			6.08										
Apr 26	26425			6.03										
Apr 27	25227			6.02										
Apr 28	24859			5.97										
Apr 29	25947			5.94										
Apr 30	25102			5.94										

[A] Calculated Result, [B] Samples Analyzed at Caro Analytical Services

Date	Discharge to the Thompson River (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	NH_3–N (mg/L)	TN-N [A,B] (mg/L)	NO_3-N (mg/L)	NO_2–N [B] (mg/L)	Org-N[A,B] (mg/L)	TKN-N [B] (mg/L)	TP-P (mg/L)	Ortho P-P (mg/L)	Toxicity (% mortality)
May 01	25031	<3.7	6	5.96								0.24	<0.03	
May 02	11068			5.94										
May 03	0			5.94										
May 04	0			5.91										
May 05	0			5.87										
May 06	0			5.84										
May 07	0			5.86	2	<0.05[B]	14.2	12.9[B]	<0.01	1.24	1.31			
May 08	0	<3.7	5	5.85										
May 09	0			5.81										
May 10	0			5.78										
May 11	0			5.75										
May 12	0			5.78										
May 13	0			5.76										
May 14	0			5.77										
May 15	0	<3.7	4	5.82										
May 16	0			5.86										
May 17	0			5.93										
May 18	0			5.92										
May 19	0			5.88										
May 20	0			5.77										
May 21	0			5.69										
May 22	0	<3.7	6.5	5.74										
May 23	0			5.73										
May 24	0			5.74										
May 25	0			5.75										
May 26	0			5.69										
May 27	0			5.67										
May 28	0			5.71										
May 29	0	<3.7	7.5	5.78										
May 30	0			5.77										
May 31	0			5.74										

[A] Calculated Result, [B] Samples Analyzed at Caro Analytical Services

Date	Discharge to the Thompson River (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	NH_3–N (mg/L)	TN-N [A,B] (mg/L)	NO_3-N (mg/L)	NO_2–N [B] (mg/L)	Org-N[A,B] (mg/L)	TKN-N [B] (mg/L)	TP-P (mg/L)	Ortho P-P (mg/L)	Toxicity (% mortality)
Jun 01	0			5.72										
Jun 02	0			5.73										
Jun 03	0			5.73										
Jun 04	0			5.77	1									
Jun 05	0	<3.7	8	5.78		0.05						0.38	0.11	
Jun 06	0			5.81										
Jun 07	0			5.82										
Jun 08	0			5.78										
Jun 09	0			5.76										
Jun 10	0			5.78										
Jun 11	0			5.84										
Jun 12	0	<3.7	10	5.84										
Jun 13	0			5.79										
Jun 14	11356			5.69								0.52	0.15	
Jun 15	25151			5.65										
Jun 16	23169			5.62										
Jun 17	26618			5.57										
Jun 18	26198			5.57	5									
Jun 19	8989	<3.7	10	5.62		0.06								
Jun 20	0			5.68										
Jun 21	0			5.73										
Jun 22	0			5.78										
Jun 23	0			5.77										
Jun 24	0			5.72										
Jun 25	0			5.72										
Jun 26	0	<3.7	10.5	5.71										
Jun 27	0			5.77										
Jun 28	0			5.74										
Jun 29	0			5.73										
Jun 30	0			5.68										

[A] Calculated Result, [B] Samples Analyzed at Caro Analytical Services

Date	Discharge to the Thompson River (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	NH_3–N (mg/L)	TN-N [A,B] (mg/L)	NO_3-N (mg/L)	NO_2–N [B] (mg/L)	Org-N[A,B] (mg/L)	TKN-N [B] (mg/L)	TP-P (mg/L)	Ortho P-P (mg/L)	Toxicity (% mortality)
Jul 01	0			5.64										
Jul 02	17573			5.62	1		13.5	11.4[B]	<0.01	2.04	2.11			
Jul 03	25562	<3.7	7	5.6		0.03						0.35	0.08	
Jul 04	25664			5.6										
Jul 05	25572			5.62										
Jul 06	24968			5.6										
Jul 07	24883			5.57										
Jul 08	25988			5.53										
Jul 09	26096			5.54										0
Jul 10	25896	<3.7	6.5	5.53										
Jul 11	25949			5.54										
Jul 12	25883			5.52										
Jul 13	25008			5.47										
Jul 14	24685			5.43										
Jul 15	25800			5.41										
Jul 16	26065			5.41										
Jul 17	26089	<3.7	5	5.43										
Jul 18	9363			5.9										
Jul 19	0			6.16										
Jul 20	0			6.15										
Jul 21	0			6.12										
Jul 22	0			6.14										
Jul 23	0			6.19										
Jul 24	0	<3.7	6	6.22										
Jul 25	0			6.24										
Jul 26	0			6.21										
Jul 27	0			6.18										
Jul 28	0			6.14										
Jul 29	0			6.11										
Jul 30	0			6.08										
Jul 31	0	<3.7	6.5	6.06										

[A] Calculated Result, [B] Samples Analyzed at Caro Analytical Services

Date	Discharge to the Thompson River (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	NH_3–N (mg/L)	TN-N [A,B] (mg/L)	NO_3-N (mg/L)	NO_2–N [B] (mg/L)	Org-N[A,B] (mg/L)	TKN-N [B] (mg/L)	TP-P (mg/L)	Ortho P-P (mg/L)	Toxicity (% mortality)
Aug 01	0													
Aug 02	0													
Aug 03	0													
Aug 04	0													
Aug 05	0													
Aug 06	0													
Aug 07	0													
Aug 08	0													
Aug 09	0													
Aug 10	0													
Aug 11	0													
Aug 12	0													
Aug 13	0													
Aug 14	0													
Aug 15	0													
Aug 16	0													
Aug 17	0													
Aug 18	0													
Aug 19	0													
Aug 20	0													
Aug 21	0													
Aug 22	0													
Aug 23	0													
Aug 24	0													
Aug 25	0													
Aug 26	0													
Aug 27	0													
Aug 28	0													
Aug 29	0													
Aug 30	0													
Aug 31	0													

[A] Calculated Result, [B] Samples Analyzed at Caro Analytical Services

Date	Discharge to the Thompson River (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	NH_3–N (mg/L)	TN-N [A,B] (mg/L)	NO_3-N (mg/L)	NO_2–N [B] (mg/L)	Org-N[A,B] (mg/L)	TKN-N [B] (mg/L)	TP-P (mg/L)	Ortho P-P (mg/L)	Toxicity (% mortality)
Sep 01	0													
Sep 02	0													
Sep 03	0													
Sep 04	0													
Sep 05	0													
Sep 06	0													
Sep 07	0													
Sep 08	0													
Sep 09	0													
Sep 10	0													
Sep 11	0													
Sep 12	0													
Sep 13	0													
Sep 14	0													
Sep 15	0													
Sep 16	0													
Sep 17	0													
Sep 18	0													
Sep 19	0													
Sep 20	0													
Sep 21	0													
Sep 22	0													
Sep 23	0													
Sep 24	0													
Sep 25	0													
Sep 26	0													
Sep 27	0													
Sep 28	0													
Sep 29	0													
Sep 30	0													

[A] Calculated Result, [B] Samples Analyzed at Caro Analytical Services

Date	Discharge to the Thompson River (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	NH_3–N (mg/L)	TN-N [A,B] (mg/L)	NO_3-N (mg/L)	NO_2–N [B] (mg/L)	Org-N[A,B] (mg/L)	TKN-N [B] (mg/L)	TP-P (mg/L)	Ortho P-P (mg/L)	Toxicity (% mortality)
Oct 01	0													
Oct 02	0													
Oct 03	0													
Oct 04	0			7.24										
Oct 05	34370			7.2										
Oct 06	39210			7.18										
Oct 07	39200			7.14										
Oct 08	36240			7.29	<1									
Oct 09	37920	8.5	10.5	7.26		0.43						1.13	0.98	
Oct 10	38370			7.17										
Oct 11	38320			7.31										
Oct 12	38370			7.24										
Oct 13	38610			7.29										
Oct 14	40110			7.26										
Oct 15	36560			7.12										
Oct 16	34510	<3.7	7	7.06										
Oct 17	37780			6.33										
Oct 18	27272			6.1										
Oct 19	35354			6.1										
Oct 20	35399			5.91										
Oct 21	36286			5.89										
Oct 22	35551			5.94										
Oct 23	35277	<3.7	5.4	5.98										
Oct 24	35232			5.92										
Oct 25	34947			5.89										
Oct 26	35084			5.99										
Oct 27	36383			5.94										
Oct 28	35764			5.88										
Oct 29	35396			5.97										
Oct 30	34654	<3.7	5.7	6.05										
Oct 31	34504			5.98										

[A] Calculated Result, [B] Samples Analyzed at Caro Analytical Services

Date	Discharge to the Thompson River (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	NH_3–N (mg/L)	TN-N [A,B] (mg/L)	NO_3-N (mg/L)	NO_2–N [B] (mg/L)	Org-N[A,B] (mg/L)	TKN-N [B] (mg/L)	TP-P (mg/L)	Ortho P-P (mg/L)	Toxicity (% mortality)
Nov 01	34675			5.9										
Nov 02	36298			5.79										
Nov 03	26164			5.28										
Nov 04	26951			5.42										
Nov 05	27065			5.66	1		15.1	13.7[B]	<0.01	1.3	1.44			
Nov 06	26594	<3.7	7	5.78		0.12						0.56	0.25	
Nov 07	26042			5.85										
Nov 08	25984			5.9										
Nov 09	25527			5.79										
Nov 10	25588			5.77										
Nov 11	25905			5.82										
Nov 12	26926			5.84										
Nov 13	26724	<3.7	7.5	5.89										
Nov 14	26666			5.94										
Nov 15	26390			6.03										
Nov 16	25667			6.07										
Nov 17	26173			6.03										
Nov 18	26798			5.99										
Nov 19	25979			6.02										
Nov 20	25775	<3.7	6	6.12										
Nov 21	25910			6.14										
Nov 22	26141			6.09										
Nov 23	25807			6.03										
Nov 24	25722			6.03										
Nov 25	26522			6.08										
Nov 26	25990			6.16										
Nov 27	26048	<3.7	5.5	6.23										
Nov 28	26036			6.29										
Nov 29	26138			6.28										
Nov 30	25745			6.5										

[A] Calculated Result, [B] Samples Analyzed at Caro Analytical Services

Date	Discharge to the Thompson River (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	NH_3–N (mg/L)	TN-N [A,B] (mg/L)	NO_3-N (mg/L)	NO_2–N [B] (mg/L)	Org-N[A,B] (mg/L)	TKN-N [B] (mg/L)	TP-P (mg/L)	Ortho P-P (mg/L)	Toxicity (% mortality)
Dec 01	26379			6.29										
Dec 02	27112			6.22										
Dec 03	26897			6.32	<1									
Dec 04	26865	<3.7	5.5	6.3		0.72						0.29	0.09	
Dec 05	26586			6.31										
Dec 06	26548			6.29										
Dec 07	26080			6.31										
Dec 08	26150			6.29										
Dec 09	27130			6.38										
Dec 10	26640			6.37										
Dec 11	26370	<3.7	7	6.31										
Dec 12	25780			6.55										
Dec 13	25980			6.57										
Dec 14	25610			6.51										
Dec 15	23150			6.52										
Dec 16	26280			6.52										
Dec 17	25840			6.57										
Dec 18	27320	<3.7	6.5	6.59										
Dec 19	26400			6.57										
Dec 20	25950			6.56										
Dec 21	25970			6.53										
Dec 22	26160			6.49										
Dec 23	26070			6.49										
Dec 24	26190			6.52										
Dec 25	24560	<3.7	6	6.54										
Dec 26	24050			6.55										
Dec 27	24790			6.47										
Dec 28	25530			6.45										
Dec 29	25950			6.39										
Dec 30	26140			6.39										
Dec 31	26210			6.36										

[A] Calculated Result, [B] Samples Analyzed at Caro Analytical Services

Appendix D: External Laboratory Raw Water Quality Data for Effluent Discharged to River in 2024 (E297590)

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24A0133
PO NUMBER		**RECEIVED / TEMP**	2024-01-03 09:43 / 4.9°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-01-08 11:01
PROJECT INFO	Biannual Water Sampling		

Introduction:

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Big Picture Sidekicks

You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

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Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

By engaging our services, you are agreeing to CARO Analytical Service's Standard Terms and Conditions outlined here: https://www.caro.ca/terms-conditions

If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

1-888-311-8846 | www.caro.ca
#110 4011 Viking Way Richmond, BC V6V 2K9 | #102 3677 Highway 97N Kelowna, BC V1X 5C3 | 17225 109 Avenue Edmonton, AB T5S 1H7 | #108 4475 Wayburne Drive Burnaby, BC V5G 4X4

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24A0133
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-01-08 11:01

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
UV Permit (24A0133-01) | Matrix: Water | Sampled: 2024-01-02						
Anions						
Nitrate (as N)	11.3	MAC = 10	0.010	mg/L	2024-01-04	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-01-04	
Calculated Parameters						
Nitrate+Nitrite (as N)	11.3	N/A	0.100	mg/L	N/A	
Nitrogen, Total	12.6	N/A	0.100	mg/L	N/A	
General Parameters						
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2024-01-04	
Nitrogen, Total Kjeldahl	1.24	N/A	0.050	mg/L	2024-01-05	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24A0133
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-01-08 11:01

Analysis Description	Method Ref.	Technique	Accredited	Location
Ammonia, Total in Water	SM 4500-NH3 G* (2021)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2020)	Ion Chromatography	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2021)	Block Digestion and Flow Injection Analysis	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Health Canada, September 2022)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

General Comments:

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Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager:bwhitehead@caro.ca

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24A0133
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-01-08 11:01

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup)**: An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- **Blank Spike (BS)**: A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS)**: A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- **Reference Material (SRM)**: A homogenous material of similar matrix to the samples, certified for the parameter(s) listed. Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B4A1241										
Blank (B4A1241-BLK1)				Prepared: 2024-01-04, Analyzed: 2024-01-04						
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
LCS (B4A1241-BS1)				Prepared: 2024-01-04, Analyzed: 2024-01-04						
Nitrate (as N)	4.04	0.010	mg/L	4.00		101	90-110			
Nitrite (as N)	2.05	0.010	mg/L	2.00		102	85-115			
General Parameters, Batch B4A1280										
Blank (B4A1280-BLK1)				Prepared: 2024-01-04, Analyzed: 2024-01-04						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4A1280-BLK2)				Prepared: 2024-01-04, Analyzed: 2024-01-04						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4A1280-BLK3)				Prepared: 2024-01-04, Analyzed: 2024-01-04						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4A1280-BLK4)				Prepared: 2024-01-04, Analyzed: 2024-01-04						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
LCS (B4A1280-BS1)				Prepared: 2024-01-04, Analyzed: 2024-01-04						
Ammonia, Total (as N)	1.08	0.050	mg/L	1.00		108	85-115			
LCS (B4A1280-BS2)				Prepared: 2024-01-04, Analyzed: 2024-01-04						
Ammonia, Total (as N)	1.09	0.050	mg/L	1.00		109	85-115			
LCS (B4A1280-BS3)				Prepared: 2024-01-04, Analyzed: 2024-01-04						
Ammonia, Total (as N)	1.15	0.050	mg/L	1.00		115	85-115			
LCS (B4A1280-BS4)				Prepared: 2024-01-04, Analyzed: 2024-01-04						
Ammonia, Total (as N)	1.09	0.050	mg/L	1.00		109	85-115			
General Parameters, Batch B4A1328										

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24A0133
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-01-08 11:01

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4A1328, Continued										
Blank (B4A1328-BLK1)				Prepared: 2024-01-04, Analyzed: 2024-01-05						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
LCS (B4A1328-BS1)				Prepared: 2024-01-04, Analyzed: 2024-01-05						
Nitrogen, Total Kjeldahl	1.01	0.050	mg/L	1.00		101	85-115			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Dan Steinke	**WORK ORDER**	24C0712
PO NUMBER		**RECEIVED / TEMP**	2024-03-06 10:07 / 0.8°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-03-11 16:49
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No #

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Brent Whitehead
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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24C0712
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-03-11 16:49

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
UV Permit (24C0712-01) | Matrix: Water | Sampled: 2024-03-05						
Anions						
Nitrate (as N)	12.3	MAC = 10	0.010	mg/L	2024-03-07	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-03-08	
Calculated Parameters						
Nitrate+Nitrite (as N)	12.3	N/A	0.100	mg/L	N/A	
Nitrogen, Total	13.9	N/A	0.100	mg/L	N/A	
General Parameters						
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2024-03-11	
Nitrogen, Total Kjeldahl	1.63	N/A	0.050	mg/L	2024-03-11	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24C0712
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-03-11 16:49

Analysis Description	Method Ref.	Technique	Accredited	Location
Ammonia, Total in Water	SM 4500-NH3 G* (2021)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2020)	Ion Chromatography	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2021)	Block Digestion and Flow Injection Analysis	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

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PROJECT	KSTC Water System Analysis	**REPORTED**	2024-03-11 16:49

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Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B4C1860										
Blank (B4C1860-BLK1)				Prepared: 2024-03-07, Analyzed: 2024-03-07						
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
LCS (B4C1860-BS1)				Prepared: 2024-03-07, Analyzed: 2024-03-07						
Nitrate (as N)	3.93	0.010	mg/L	4.00		98	90-110			
Nitrite (as N)	2.07	0.010	mg/L	2.00		103	85-115			
General Parameters, Batch B4C1975										
Blank (B4C1975-BLK1)				Prepared: 2024-03-08, Analyzed: 2024-03-11						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
Blank (B4C1975-BLK2)				Prepared: 2024-03-08, Analyzed: 2024-03-11						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
LCS (B4C1975-BS1)				Prepared: 2024-03-08, Analyzed: 2024-03-11						
Nitrogen, Total Kjeldahl	0.982	0.050	mg/L	1.00		98	85-115			
LCS (B4C1975-BS2)				Prepared: 2024-03-08, Analyzed: 2024-03-11						
Nitrogen, Total Kjeldahl	0.920	0.050	mg/L	1.00		92	85-115			
Duplicate (B4C1975-DUP2)		Source: 24C0712-01		Prepared: 2024-03-08, Analyzed: 2024-03-11						
Nitrogen, Total Kjeldahl	1.48	0.050	mg/L		1.63			10	15	
Matrix Spike (B4C1975-MS2)		Source: 24C0712-01		Prepared: 2024-03-08, Analyzed: 2024-03-11						
Nitrogen, Total Kjeldahl	2.44	0.050	mg/L	1.00	1.63	82	65-135			
General Parameters, Batch B4C2150										
Blank (B4C2150-BLK1)				Prepared: 2024-03-11, Analyzed: 2024-03-11						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4C2150-BLK2)				Prepared: 2024-03-11, Analyzed: 2024-03-11						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24C0712
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-03-11 16:49

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4C2150, Continued										
Blank (B4C2150-BLK3)				Prepared: 2024-03-11, Analyzed: 2024-03-11						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4C2150-BLK4)				Prepared: 2024-03-11, Analyzed: 2024-03-11						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
LCS (B4C2150-BS1)				Prepared: 2024-03-11, Analyzed: 2024-03-11						
Ammonia, Total (as N)	1.06	0.050	mg/L	1.00		106	85-115			
LCS (B4C2150-BS2)				Prepared: 2024-03-11, Analyzed: 2024-03-11						
Ammonia, Total (as N)	1.03	0.050	mg/L	1.00		103	85-115			
LCS (B4C2150-BS3)				Prepared: 2024-03-11, Analyzed: 2024-03-11						
Ammonia, Total (as N)	1.05	0.050	mg/L	1.00		105	85-115			
LCS (B4C2150-BS4)				Prepared: 2024-03-11, Analyzed: 2024-03-11						
Ammonia, Total (as N)	1.09	0.050	mg/L	1.00		109	85-115			
Duplicate (B4C2150-DUP3)		Source: 24C0712-01		Prepared: 2024-03-11, Analyzed: 2024-03-11						
Ammonia, Total (as N)	< 0.050	0.050	mg/L		< 0.050				15	
Matrix Spike (B4C2150-MS3)		Source: 24C0712-01		Prepared: 2024-03-11, Analyzed: 2024-03-11						
Ammonia, Total (as N)	0.270	0.050	mg/L	0.204	< 0.050	110	75-125			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24E1254
PO NUMBER		**RECEIVED / TEMP**	2024-05-08 10:09 / 5.1°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-05-15 14:34
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

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Authorized By:

Brent Whitehead
Account Manager

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24E1254
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-05-15 14:34

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24E1254-01) | Matrix: Water | Sampled: 2024-05-07						
Anions						
Chloride	49.4	AO ≤ 250	0.10	mg/L	2024-05-10	
Nitrate (as N)	0.999	MAC = 10	0.010	mg/L	2024-05-10	
Nitrite (as N)	0.013	MAC = 1	0.010	mg/L	2024-05-10	
Calculated Parameters						
Nitrate+Nitrite (as N)	1.01	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	2.31	N/A	0.0500	mg/L	N/A	
General Parameters						
Alkalinity, Total (as CaCO3)	89.8	N/A	1.0	mg/L	2024-05-15	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-05-15	
Alkalinity, Bicarbonate (as CaCO3)	89.8	N/A	1.0	mg/L	2024-05-15	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-05-15	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-05-15	
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2024-05-10	
Nitrogen, Total Kjeldahl	1.30	N/A	0.050	mg/L	2024-05-13	
UV Permit (24E1254-02) | Matrix: Water | Sampled: 2024-05-07						
Anions						
Nitrate (as N)	12.9	MAC = 10	0.010	mg/L	2024-05-10	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-05-10	
Calculated Parameters						
Nitrate+Nitrite (as N)	12.9	N/A	0.100	mg/L	N/A	
Nitrogen, Total	14.2	N/A	0.100	mg/L	N/A	
General Parameters						
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2024-05-10	
Nitrogen, Total Kjeldahl	1.31	N/A	0.050	mg/L	2024-05-13	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24E1254
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-05-15 14:34

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna
Ammonia, Total in Water	SM 4500-NH3 G* (2021)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2020)	Ion Chromatography	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2021)	Block Digestion and Flow Injection Analysis	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
AO	Aesthetic Objective
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Health Canada, September 2022)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

General Comments:

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Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted red. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager:bwhitehead@caro.ca

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline(s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24E1254
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-05-15 14:34

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup)**: An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- **Blank Spike (BS)**: A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS)**: A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- **Reference Material (SRM)**: A homogenous material of similar matrix to the samples, certified for the parameter(s) listed. Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B4E2207										
Blank (B4E2207-BLK1)				Prepared: 2024-05-09, Analyzed: 2024-05-09						
Chloride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
LCS (B4E2207-BS1)				Prepared: 2024-05-09, Analyzed: 2024-05-09						
Chloride	15.6	0.10	mg/L	16.0		98	90-110			
Nitrate (as N)	3.90	0.010	mg/L	4.00		98	90-110			
Nitrite (as N)	1.91	0.010	mg/L	2.00		96	85-115			
General Parameters, Batch B4E2374										
Blank (B4E2374-BLK1)				Prepared: 2024-05-10, Analyzed: 2024-05-13						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
Blank (B4E2374-BLK2)				Prepared: 2024-05-10, Analyzed: 2024-05-13						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
LCS (B4E2374-BS1)				Prepared: 2024-05-10, Analyzed: 2024-05-13						
Nitrogen, Total Kjeldahl	1.04	0.050	mg/L	1.00		104	85-115			
LCS (B4E2374-BS2)				Prepared: 2024-05-10, Analyzed: 2024-05-13						
Nitrogen, Total Kjeldahl	0.987	0.050	mg/L	1.00		99	85-115			
General Parameters, Batch B4E2375										
Blank (B4E2375-BLK1)				Prepared: 2024-05-10, Analyzed: 2024-05-10						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4E2375-BLK2)				Prepared: 2024-05-10, Analyzed: 2024-05-10						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
LCS (B4E2375-BS1)				Prepared: 2024-05-10, Analyzed: 2024-05-10						
Ammonia, Total (as N)	1.02	0.050	mg/L	1.00		102	85-115			
LCS (B4E2375-BS2)				Prepared: 2024-05-10, Analyzed: 2024-05-10						
Ammonia, Total (as N)	0.990	0.050	mg/L	1.00		99	85-115			

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24E1254
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-05-15 14:34

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4E2826										
Blank (B4E2826-BLK1)				Prepared: 2024-05-15, Analyzed: 2024-05-15						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4E2826-BS1)				Prepared: 2024-05-15, Analyzed: 2024-05-15						
Alkalinity, Total (as CaCO3)	100	1.0	mg/L	100		100	80-120			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24G0317
PO NUMBER		**RECEIVED / TEMP**	2024-07-03 10:27 / 10.8°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-07-09 08:01
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

Introduction:

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Big Picture Sidekicks

You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

We've Got Chemistry

It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Ahead of the Curve

Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

By engaging our services, you are agreeing to CARO Analytical Service's Standard Terms and Conditions outlined here:
https://www.caro.ca/terms-conditions

If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24G0317
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-07-09 08:01

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24G0317-01) | Matrix: Water | Sampled: 2024-07-02						
Anions						
Chloride	47.5	AO ≤ 250	0.10	mg/L	2024-07-04	
Nitrate (as N)	1.86	MAC = 10	0.010	mg/L	2024-07-04	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-07-04	
Calculated Parameters						
Nitrate+Nitrite (as N)	1.86	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	3.69	N/A	0.0500	mg/L	N/A	
General Parameters						
Alkalinity, Total (as CaCO3)	82.4	N/A	1.0	mg/L	2024-07-04	
Alkalinity, Phenolphthalein (as CaCO3)	39.3	N/A	1.0	mg/L	2024-07-04	
Alkalinity, Bicarbonate (as CaCO3)	3.8	N/A	1.0	mg/L	2024-07-04	
Alkalinity, Carbonate (as CaCO3)	78.5	N/A	1.0	mg/L	2024-07-04	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-07-04	
Ammonia, Total (as N)	0.050	None Required	0.050	mg/L	2024-07-05	
Nitrogen, Total Kjeldahl	1.82	N/A	0.050	mg/L	2024-07-05	
UV Permit (24G0317-02) | Matrix: Water | Sampled: 2024-07-02						
Anions						
Nitrate (as N)	11.4	MAC = 10	0.010	mg/L	2024-07-04	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-07-04	
Calculated Parameters						
Nitrate+Nitrite (as N)	11.4	N/A	0.100	mg/L	N/A	
Nitrogen, Total	13.5	N/A	0.100	mg/L	N/A	
General Parameters						
Ammonia, Total (as N)	0.054	None Required	0.050	mg/L	2024-07-05	
Nitrogen, Total Kjeldahl	2.11	N/A	0.050	mg/L	2024-07-05	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24G0317
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-07-09 08:01

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna
Ammonia, Total in Water	SM 4500-NH3 G* (2021)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2020)	Ion Chromatography	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2021)	Block Digestion and Flow Injection Analysis	✓	Kelowna

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24G0317
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-07-09 08:01

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Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B4G1866										
Blank (B4G1866-BLK1)				Prepared: 2024-07-04, Analyzed: 2024-07-04						
Chloride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
LCS (B4G1866-BS1)				Prepared: 2024-07-04, Analyzed: 2024-07-04						
Chloride	15.9	0.10	mg/L	16.0		99	90-110			
Nitrate (as N)	4.03	0.010	mg/L	4.00		101	90-110			
Nitrite (as N)	1.89	0.010	mg/L	2.00		94	85-115			
General Parameters, Batch B4G1836										
Blank (B4G1836-BLK1)				Prepared: 2024-07-04, Analyzed: 2024-07-04						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4G1836-BLK2)				Prepared: 2024-07-04, Analyzed: 2024-07-04						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4G1836-BS1)				Prepared: 2024-07-04, Analyzed: 2024-07-04						
Alkalinity, Total (as CaCO3)	97.6	1.0	mg/L	100		98	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	72.4	1.0	mg/L	50.0		145	0-200			
LCS (B4G1836-BS3)				Prepared: 2024-07-04, Analyzed: 2024-07-04						
Alkalinity, Total (as CaCO3)	97.6	1.0	mg/L	100		98	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	70.9	1.0	mg/L	50.0		142	0-200			
General Parameters, Batch B4G1885										

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24G0317
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-07-09 08:01

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4G1885, Continued										
Blank (B4G1885-BLK1)				Prepared: 2024-07-04, Analyzed: 2024-07-05						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
Blank (B4G1885-BLK2)				Prepared: 2024-07-04, Analyzed: 2024-07-05						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
LCS (B4G1885-BS1)				Prepared: 2024-07-04, Analyzed: 2024-07-05						
Nitrogen, Total Kjeldahl	1.02	0.050	mg/L	1.00		102	85-115			
LCS (B4G1885-BS2)				Prepared: 2024-07-04, Analyzed: 2024-07-05						
Nitrogen, Total Kjeldahl	1.04	0.050	mg/L	1.00		104	85-115			
General Parameters, Batch B4G1980										
Blank (B4G1980-BLK1)				Prepared: 2024-07-05, Analyzed: 2024-07-05						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4G1980-BLK2)				Prepared: 2024-07-05, Analyzed: 2024-07-05						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4G1980-BLK3)				Prepared: 2024-07-05, Analyzed: 2024-07-05						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4G1980-BLK4)				Prepared: 2024-07-05, Analyzed: 2024-07-05						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
LCS (B4G1980-BS1)				Prepared: 2024-07-05, Analyzed: 2024-07-05						
Ammonia, Total (as N)	0.963	0.050	mg/L	1.00		96	85-115			
LCS (B4G1980-BS2)				Prepared: 2024-07-05, Analyzed: 2024-07-05						
Ammonia, Total (as N)	0.975	0.050	mg/L	1.00		98	85-115			
LCS (B4G1980-BS3)				Prepared: 2024-07-05, Analyzed: 2024-07-05						
Ammonia, Total (as N)	0.959	0.050	mg/L	1.00		96	85-115			
LCS (B4G1980-BS4)				Prepared: 2024-07-05, Analyzed: 2024-07-05						
Ammonia, Total (as N)	0.943	0.050	mg/L	1.00		94	85-115			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24I0434
PO NUMBER		**RECEIVED / TEMP**	2024-09-04 09:36 / 4.4°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-11 11:12
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

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Authorized By:

Brent Whitehead
Account Manager

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24I0434
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-11 11:12

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24I0434-01) | Matrix: Water | Sampled: 2024-09-03						
Anions						
Chloride	46.8	AO ≤ 250	0.10	mg/L	2024-09-06	
Nitrate (as N)	2.19	MAC = 10	0.010	mg/L	2024-09-06	
Nitrite (as N)	0.041	MAC = 1	0.010	mg/L	2024-09-06	
Calculated Parameters						
Nitrate+Nitrite (as N)	2.24	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	3.96	N/A	0.0500	mg/L	N/A	
General Parameters						
Alkalinity, Total (as CaCO3)	54.7	N/A	1.0	mg/L	2024-09-06	
Alkalinity, Phenolphthalein (as CaCO3)	29.0	N/A	1.0	mg/L	2024-09-06	
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-09-06	
Alkalinity, Carbonate (as CaCO3)	51.4	N/A	1.0	mg/L	2024-09-06	
Alkalinity, Hydroxide (as CaCO3)	3.3	N/A	1.0	mg/L	2024-09-06	
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2024-09-09	
Nitrogen, Total Kjeldahl	1.73	N/A	0.050	mg/L	2024-09-09	
UV Permit (24I0434-02) | Matrix: Water | Sampled: 2024-09-03						
Anions						
Nitrate (as N)	13.7	MAC = 10	0.010	mg/L	2024-09-06	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-09-06	
Calculated Parameters						
Nitrate+Nitrite (as N)	13.7	N/A	0.100	mg/L	N/A	
Nitrogen, Total	14.9	N/A	0.100	mg/L	N/A	
General Parameters						
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2024-09-09	
Nitrogen, Total Kjeldahl	1.26	N/A	0.050	mg/L	2024-09-09	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24I0434
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-11 11:12

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna
Ammonia, Total in Water	SM 4500-NH3 G* (2021)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2020)	Ion Chromatography	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2021)	Block Digestion and Flow Injection Analysis	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
AO	Aesthetic Objective
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Health Canada, September 2022)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

General Comments:

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24I0434
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-11 11:12

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup)**: An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- **Blank Spike (BS)**: A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS)**: A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- **Reference Material (SRM)**: A homogenous material of similar matrix to the samples, certified for the parameter(s) listed. Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B4I1905										
Blank (B4I1905-BLK1)				Prepared: 2024-09-05, Analyzed: 2024-09-05						
Chloride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
LCS (B4I1905-BS1)				Prepared: 2024-09-05, Analyzed: 2024-09-05						
Chloride	16.0	0.10	mg/L	16.0		100	90-110			
Nitrate (as N)	3.84	0.010	mg/L	4.00		96	90-110			
Nitrite (as N)	2.06	0.010	mg/L	2.00		103	85-115			
General Parameters, Batch B4I1990										
Blank (B4I1990-BLK1)				Prepared: 2024-09-06, Analyzed: 2024-09-09						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
Blank (B4I1990-BLK2)				Prepared: 2024-09-06, Analyzed: 2024-09-09						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
LCS (B4I1990-BS1)				Prepared: 2024-09-06, Analyzed: 2024-09-09						
Nitrogen, Total Kjeldahl	1.01	0.050	mg/L	1.00		101	85-115			
LCS (B4I1990-BS2)				Prepared: 2024-09-06, Analyzed: 2024-09-09						
Nitrogen, Total Kjeldahl	1.02	0.050	mg/L	1.00		102	85-115			
General Parameters, Batch B4I2028										
Blank (B4I2028-BLK1)				Prepared: 2024-09-06, Analyzed: 2024-09-06						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4I2028-BLK2)				Prepared: 2024-09-06, Analyzed: 2024-09-06						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24I0434
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-11 11:12

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4I2028, Continued										
Blank (B4I2028-BLK2), Continued				Prepared: 2024-09-06, Analyzed: 2024-09-06						
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4I2028-BS1)				Prepared: 2024-09-06, Analyzed: 2024-09-06						
Alkalinity, Total (as CaCO3)	92.4	1.0	mg/L	100		92	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	42.9	1.0	mg/L	50.0		86	0-200			
LCS (B4I2028-BS3)				Prepared: 2024-09-06, Analyzed: 2024-09-06						
Alkalinity, Total (as CaCO3)	93.9	1.0	mg/L	100		94	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	40.8	1.0	mg/L	50.0		82	0-200			
General Parameters, Batch B4I2152										
Blank (B4I2152-BLK1)				Prepared: 2024-09-09, Analyzed: 2024-09-09						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4I2152-BLK2)				Prepared: 2024-09-09, Analyzed: 2024-09-09						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4I2152-BLK3)				Prepared: 2024-09-09, Analyzed: 2024-09-09						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4I2152-BLK4)				Prepared: 2024-09-09, Analyzed: 2024-09-09						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4I2152-BLK5)				Prepared: 2024-09-09, Analyzed: 2024-09-09						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
LCS (B4I2152-BS1)				Prepared: 2024-09-09, Analyzed: 2024-09-09						
Ammonia, Total (as N)	1.00	0.050	mg/L	1.00		100	85-115			
LCS (B4I2152-BS2)				Prepared: 2024-09-09, Analyzed: 2024-09-09						
Ammonia, Total (as N)	0.962	0.050	mg/L	1.00		96	85-115			
LCS (B4I2152-BS3)				Prepared: 2024-09-09, Analyzed: 2024-09-09						
Ammonia, Total (as N)	0.973	0.050	mg/L	1.00		97	85-115			
LCS (B4I2152-BS4)				Prepared: 2024-09-09, Analyzed: 2024-09-09						
Ammonia, Total (as N)	0.945	0.050	mg/L	1.00		94	85-115			
LCS (B4I2152-BS5)				Prepared: 2024-09-09, Analyzed: 2024-09-09						
Ammonia, Total (as N)	0.957	0.050	mg/L	1.00		96	85-115			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24K0798
PO NUMBER		**RECEIVED / TEMP**	2024-11-06 09:34 / 1.4°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-13 13:28
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO/IEC 17025:2017 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks

You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

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It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

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By engaging our services, you are agreeing to CARO Analytical Service's Standard Terms and Conditions outlined here: https://www.caro.ca/terms-conditions

If you have any questions or concerns, please contact me at hhannaoui@caro.ca

Authorized By:

Hanane El Hannaoui
Junior Account Manager

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24K0798
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-13 13:28

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
UV Permit (24K0798-01) | Matrix: Water | Sampled: 2024-11-05						
Anions						
Nitrate (as N)	13.7	MAC = 10	0.010	mg/L	2024-11-07	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-11-07	
Calculated Parameters						
Nitrate+Nitrite (as N)	13.7	N/A	0.100	mg/L	N/A	
Nitrogen, Total	15.1	N/A	0.100	mg/L	N/A	
General Parameters						
Ammonia, Total (as N)	0.085	None Required	0.050	mg/L	2024-11-08	
Nitrogen, Total Kjeldahl	1.44	N/A	0.050	mg/L	2024-11-13	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24K0798
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-13 13:28

Analysis Description	Method Ref.	Technique	Accredited	Location
Ammonia, Total in Water	SM 4500-NH3 G* (2021)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2020)	Ion Chromatography	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2021)	Block Digestion and Flow Injection Analysis	✓	Kelowna

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<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24K0798
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-13 13:28

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- **Matrix Spike (MS)**: A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- **Reference Material (SRM)**: A homogenous material of similar matrix to the samples, certified for the parameter(s) listed. Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B4K2040										
Blank (B4K2040-BLK1)				Prepared: 2024-11-07, Analyzed: 2024-11-07						
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
LCS (B4K2040-BS1)				Prepared: 2024-11-07, Analyzed: 2024-11-07						
Nitrate (as N)	3.93	0.010	mg/L	4.00		98	90-110			
Nitrite (as N)	2.05	0.010	mg/L	2.00		102	85-115			
General Parameters, Batch B4K2037										
Blank (B4K2037-BLK1)				Prepared: 2024-11-08, Analyzed: 2024-11-08						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4K2037-BLK2)				Prepared: 2024-11-08, Analyzed: 2024-11-08						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4K2037-BLK3)				Prepared: 2024-11-08, Analyzed: 2024-11-08						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4K2037-BLK4)				Prepared: 2024-11-08, Analyzed: 2024-11-08						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
LCS (B4K2037-BS1)				Prepared: 2024-11-08, Analyzed: 2024-11-08						
Ammonia, Total (as N)	0.949	0.050	mg/L	1.00		95	85-115			
LCS (B4K2037-BS2)				Prepared: 2024-11-08, Analyzed: 2024-11-08						
Ammonia, Total (as N)	0.942	0.050	mg/L	1.00		94	85-115			
LCS (B4K2037-BS3)				Prepared: 2024-11-08, Analyzed: 2024-11-08						
Ammonia, Total (as N)	0.918	0.050	mg/L	1.00		92	85-115			
LCS (B4K2037-BS4)				Prepared: 2024-11-08, Analyzed: 2024-11-08						
Ammonia, Total (as N)	0.914	0.050	mg/L	1.00		91	85-115			
General Parameters, Batch B4K2323										

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24K0798
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-13 13:28

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4K2323, Continued										
Blank (B4K2323-BLK1)				Prepared: 2024-11-12, Analyzed: 2024-11-13						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
Blank (B4K2323-BLK2)				Prepared: 2024-11-12, Analyzed: 2024-11-13						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
LCS (B4K2323-BS1)				Prepared: 2024-11-12, Analyzed: 2024-11-13						
Nitrogen, Total Kjeldahl	0.976	0.050	mg/L	1.00		98	85-115			
LCS (B4K2323-BS2)				Prepared: 2024-11-12, Analyzed: 2024-11-13						
Nitrogen, Total Kjeldahl	0.951	0.050	mg/L	1.00		95	85-115			

NAUTILUS ENVIRONMENTAL

Acute Toxicity Test Results

Sample Effluent,
collected July 9, 2024

Final Report

August 2, 2024

Submitted to: **City of Kamloops**
Kamloops, BC

8664 Commerce Court, Burnaby, BC V5A 4N7

NAUTILUS ENVIRONMENTAL

SAMPLE INFORMATION

Sample ID	Dates			Receipt temperature
	Collected	Received	Rainbow trout test initiation	
Effluent	2024-07-09 at N/A	2024-07-10 at 0858h	2024-07-11 at 1130h	17.6-19.0°C

N/A = Not Available

TESTS

- Rainbow trout 96-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample
Effluent	100

QA/QC

QA/QC summary	Rainbow trout
Reference toxicant LC50 (95% CL)	1.5 (1.2-1.9) g/L KCl
Reference toxicant historical mean (2 SD range)	1.6 (0.8-3.3) g/L KCl
Reference toxicant CV	36%
Organism health history	Acceptable
Protocol deviations	None
Water quality range deviations	None
Control performance	Acceptable
Test performance	Valid

Test date: 2024-07-11, LC = Lethal Concentration, CL = Confidence Limits, SD = Standard Deviation, CV = Coefficient of Variation

NAUTILUS ENVIRONMENTAL

Report By:
Angi Yuan, M.Sc.
Laboratory Biologist

Reviewed By:
Ditty Kakkassery, R.P. Bio.
Laboratory Supervisor

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

NAUTILUS ENVIRONMENTAL

APPENDIX A – Summary of test conditions

NAUTILUS ENVIRONMENTAL

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) LC50 test.

Test species	*Oncorhynchus mykiss*
Organism source	Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	20-L glass aquarium
Test volume	10 to 20 L (depending on size of fish)
Test solution depth	≥15 cm
Test concentrations	Five concentrations, plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	Dechlorinated Metro Vancouver municipal tapwater
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	6.5 – 1 mL/min/L
Test measurements	Temperature, dissolved oxygen, pH, and conductivity measured at test initiation and termination; salinity measured in the undiluted sample at test initiation; survival checked daily; if ≥ 30% mortality is observed, temperature, dissolved oxygen, and pH are reversed to daily measurements until test termination.
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	CETIS Version 2.1.4
Test endpoints	Survival (96-hour LC50)
Test acceptability criterion for controls	Survival ≥90%
Reference toxicant	KCl (Potassium chloride)

NAUTILUS ENVIRONMENTAL

APPENDIX B – **Toxicity test data**

96-Hour Rainbow Trout Control Sharing Data Sheet

Control Initiation Date/Time: 2024-07-11 / 1120h
Control Termination Date/Time: 2024-07-15 / 1120h
CER #: 2
Setup By: AGY

RBT Source: Trout Lodge
7-d % Holding Mortality: 0.03
Number Fish/Volume: 10/12L
Control/Dilution Water: Dechlorinated Municipal Tap Water
Control Water Aeration Rate: Adjusted to 8.5 ± 1 mL/min·L
Control/Dilution Water H/A (mg/L as CaCO3): 41.2 / 41.6

		Control																				
Fish Batch #	Control #	# Survivors				Temperature (°C)					Dissolved Oxygen (mg/L)					pH					Conductivity (µS/cm)	
		24	48	72	96(+)	0	24	48	72	96(+)	0	24	48	72	96(+)	0	24	48	72	96(+)	0	96(+)
060524	C	10	10	10	10	15.0	15.0	15.0	14.9	15.0	10.1	9.8	10.0	9.7	9.8	7.4	7.6	7.8	7.9	7.4	54	54
Initials		AGY	AGY	AGY	AGY	AGY	AGY	AGY	AGY	AGY	AGY	AGY	AGY	AGY	AGY	AGY	AGY	AGY	AGY	AGY	AGY	AGY

Instruments: Thermometer: CER#2 D.O. meter/probe: 1491 / D1 Cond./Salinity meter/probe: 1491 / C1 pH meter/probe: 1491 / P1

WO#: RBTkids, 24104C(1), 24105C(1)
WO#: 24104C(1), 24104C(1), 24104C(1)

Fish Description at termination: All appear normal
Number of Stressed Control Fish at test termination: 0
Test solution depth in each vessel ≥15 cm? (Y/N): Y
Other Observations:

Length and Weight Summary:

Balance ID: Bal-3
Date/Time Measured: 2024-07-15/1200h
Total Length (mm): 349
Total Weight (g): 3.54
Mean Length (mm): 35
Mean Weight (g): 0.35
Length Std. Dev.: 2
Weight Std. Dev.: 0.06
Loading Density (g/L): 0.30
Initials: AGY

Reviewed by: JR

Version 1.0; Issued March 5, 2024

Length and Weight Data

	Length (mm)	Weight (g)
1	33	0.33
2	31	0.28
3	35	0.40
4	35	0.33
5	37	0.42
6	40	0.46
7	36	0.39
8	33	0.30
9	35	0.33
10	34	0.30
Min:	31	0.28
Max:	40	0.46

Date Reviewed: 2024-07-19

Rainbow Environmental Company Inc.

96-Hour Rainbow Trout Toxicity Test Data Sheet

Client/Project #:	City of Kamloops	**RBT Source/Batch #:**	Troutlodge / Oct 24
W.O. #	341242	**Number Fish/Volume:**	10 / 2L
Sample I.D.	Effluent	**7-d % Holding Mortality:**	0.03
Date Collected/Time:	2024-07-08 / not recorded	**Total Pre-aeration Time (min.):**	30
Date Setup/Time:	2024-07-11 / 1130h	**Aeration rate adjusted to 6.8 ± 1 mL/min·L (Y/N):**	Y
Date Terminated/Time:	2024-07-15 / 1225h	**Dilution Water Type:**	Dechlorinated Municipal Tap Water
CER #:	2.	**Dilution Water H/A (mg/L as CaCO3):**	42.2 – 46.6
Sample Setup By:	ABY		

Reference Toxicant ID/Date:	RBTk105 / 2024-07-1	
KCl Lot#	213248	
96-h LC50 (95% CL) [g/L KCl]:	1.5 (1.2–1.9)	
Mean and Historical Range [g/L KCl]:	1.6 (0.8–3.3)	
Reference Toxicant CV (%):	36.3	

Undiluted Sample WQ

Parameters	Initial WQ	Adjustment	30 min WQ
Temp °C	15.5		15.5
D.O. (mg/L)	9.3		9.7
pH	6.5		7.2
Cond. (µS/cm)	623		635
Salinity (ppt)	0.3	ABY	0.3

Concentration	# Survivors							Temperature (°C)					Dissolved Oxygen (mg/L)					pH					Conductivity (µS/cm)	
(% v/v)	1	2	4	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
100				10	10	10	10	15.5	—	[illegible]	—	15.5	9.7	—	[illegible]	—	9.8	7.2	—	[illegible]	—	7.3	635	420
Initials				ABY	ESP	DP	DP	ABY	—	[illegible]	—	ESP	ABY	—	[illegible]	—	DP	ABY	—	[illegible]	—	DP	ABY	ESP

Instruments used: Thermometer CER 42 D.O. meter/probe: YSI / 01 Cond./Salinity meter/probe: YSI / 01 pH meter/probe: YSI / 01

Sample Description/Comments: clear, green colour, no particulates

Fish Description at 96 h: All fish appear normal

Number of Stressed Control Fish at 96 h: N/A

Other Observations: Control C

Test solution depth in each vessel ≥15 cm? (Y/N): Y

Reviewed by: [signature]

Date Reviewed: 2024-08-02

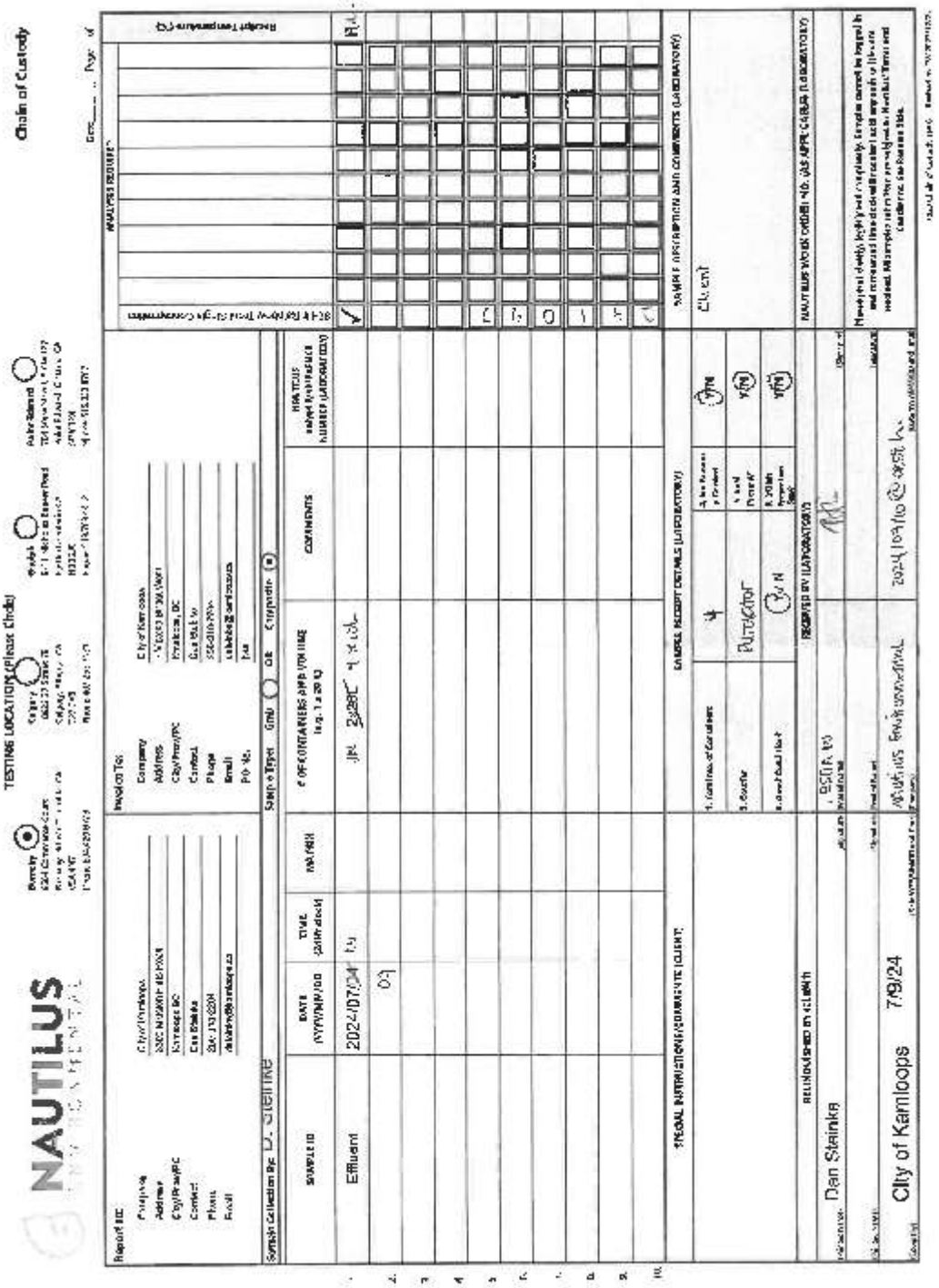
Civic Operations: 955 Concordia Way, Kamloops, BC, V2C 6V3

P: 250-828-3461 | F: 250-828-3790 | E: civicoperations@kamloops.ca | Kamloops.ca

MAKING KAMLOOPS SHINE

NAUTILUS ENVIRONMENTAL

APPENDIX C – **Chain-of-custody form**


NAUTILUS
Chain of Custody
TESTING LOCATION (Please Circle)
Report To:
Project No:
Address:
City/Prov/PC:
Contact:
Phone:
Email:
Invoice To:
Company:
Address:
City/Prov/PC:
Contact:
Phone:
Email:
P/O No.:
Sample Collection By: Dan Steinke
Sample Type: Grab Composite
SAMPLE ID
DATE (YYYY/MM/DD)
TIME (24hr clock)
MATRIX
OF CONTAINERS SUBMITTED (eg. 1 x 250 mL)
COMMENTS
Effluent
2024/07/09
09:
City of Kamloops
7/9/24
2024/07/09

NAUTILUS ENVIRONMENTAL

END OF REPORT

Appendix E: KSTC Raw Water Quality Data for Reclaimed Water Use at KSTC in 2024 (E300693)

Date	Reclaimed Water Use Weekly Total (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	Total Residual Chlorine (mg/L)
Jan 01						0.10
Jan 02						0.06
Jan 03		2.2	5	5.94		0.12
Jan 04					<1	0.14
Jan 05						0.06
Jan 06						0.22
Jan 07	2054					0.18
Jan 08						0.20
Jan 09						0.21
Jan 10		2.6	3.5	6.04		0.26
Jan 11					1	0.03
Jan 12						0.04
Jan 13						<0.03
Jan 14	1400					0.03
Jan 15						<0.03
Jan 16						0.03
Jan 17		<3.7	5	5.84		0.04
Jan 18					<1	0.05
Jan 19						0.06
Jan 20						0.06
Jan 21	1489					0.06
Jan 22						0.03
Jan 23						0.07
Jan 24		4.3	3.5	6.03		0.05
Jan 25					<1	0.07
Jan 26						0.04
Jan 27						0.06
Jan 28	1418					0.07
Jan 29						0.06
Jan 30						<0.03
Jan 31		4.2	5	6.14		0.07

Date	Reclaimed Water Use Weekly Total (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	Total Residual Chlorine (mg/L)
Feb 01					5	0.20
Feb 02						0.22
Feb 03						0.18
Feb 04	1458					0.18
Feb 05						0.20
Feb 06						0.10
Feb 07		<3.7	<3.2	6.19		0.07
Feb 08					3	0.09
Feb 09						0.11
Feb 10						0.08
Feb 11	1391					0.04
Feb 12						0.07
Feb 13						0.05
Feb 14		<3.7	<3.2	6.16		0.07
Feb 15					4	0.05
Feb 16						0.05
Feb 17						0.07
Feb 18	1147					0.04
Feb 19						0.05
Feb 20						0.04
Feb 21		4.9	5.5	6.08		0.06
Feb 22					7	0.07
Feb 23						0.04
Feb 24						0.17
Feb 25	1007					0.15
Feb 26						<0.03
Feb 27						0.12
Feb 28		3.9	5.5	6.15		0.08
Feb 29					1	0.17

Date	Reclaimed Water Use Weekly Total (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	Total Residual Chlorine (mg/L)
Mar 01						0.04
Mar 02						0.06
Mar 03	963					0.03
Mar 04						<0.03
Mar 05						0.04
Mar 06		<3.7	6	6.06		0.08
Mar 07					3	0.27
Mar 08						0.07
Mar 09						0.09
Mar 10	986					<0.03
Mar 11						0.04
Mar 12						0.04
Mar 13		<3.7	4	6.05		0.09
Mar 14					3	<0.03
Mar 15						<0.03
Mar 16						0.03
Mar 17	1626					<0.03
Mar 18						<0.03
Mar 19						<0.03
Mar 20		4.1	3.5	5.97		0.04
Mar 21					4	0.04
Mar 22						0.10
Mar 23						0.09
Mar 24	3179					0.06
Mar 25						0.04
Mar 26						0.03
Mar 27		<3.7	5.5	5.98		0.05
Mar 28					2	<0.03
Mar 29						0.03
Mar 30						<0.03
Mar 31	3032					<0.03

Date	Reclaimed Water Use Weekly Total (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	Total Residual Chlorine (mg/L)
Apr 01						0.04
Apr 02						0.05
Apr 03		4.9	8	5.93		0.05
Apr 04					46	<0.03
Apr 05						0.11
Apr 06						0.05
Apr 07	3085					0.04
Apr 08						0.03
Apr 09						0.10
Apr 10		<3.7	5.5	5.88		<0.03
Apr 11					15	0.06
Apr 12						0.04
Apr 13						<0.03
Apr 14	4462					0.08
Apr 15						0.07
Apr 16						0.03
Apr 17		<3.7	4	5.86		0.06
Apr 18					55	0.18
Apr 19						0.06
Apr 20						0.09
Apr 21	5127					0.05
Apr 22						0.04
Apr 23					13	0.04
Apr 24		<3.7	8	6.07		0.04
Apr 25						0.05
Apr 26						0.05
Apr 27						0.07
Apr 28	5871					0.05
Apr 29						0.06
Apr 30					4	0.06

Date	Reclaimed Water Use Weekly Total (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	Total Residual Chlorine (mg/L)
May 01		<3.7	6	5.99		0.06
May 02						0.09
May 03						0.09
May 04						0.03
May 05	4634					0.04
May 06						0.06
May 07					10	0.04
May 08		<3.7	5	5.88		0.17
May 09						0.07
May 10						0.06
May 11						0.05
May 12	2501					0.06
May 13						0.10
May 14					16	0.12
May 15		<3.7	4	5.85		0.35
May 16						0.06
May 17						<0.03
May 18						<0.03
May 19	2615					0.15
May 20						0.16
May 21					37	0.03
May 22		<3.7	6.5	5.75		0.03
May 23						0.04
May 24						0.08
May 25						0.04
May 26	2734					0.16
May 27						0.03
May 28					26	0.07
May 29		<3.7	7.5	5.8		0.04
May 30						<0.03
May 31						0.04

Date	Reclaimed Water Use Weekly Total (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	Total Residual Chlorine (mg/L)
Jun 01						0.09
Jun 02	2374					0.08
Jun 03						0.06
Jun 04					47	0.14
Jun 05		<3.7	8	5.81		<0.03
Jun 06						0.04
Jun 07						<0.03
Jun 08						0.13
Jun 09	3558					0.08
Jun 10						0.03
Jun 11					57	0.11
Jun 12		<3.7	10	5.87		0.04
Jun 13						0.03
Jun 14						0.04
Jun 15						<0.03
Jun 16	4402					0.05
Jun 17						0.08
Jun 18					40	0.09
Jun 19		<3.7	10	5.61		0.04
Jun 20						0.08
Jun 21						0.12
Jun 22						0.11
Jun 23	5098					0.12
Jun 24						0.04
Jun 25					1	0.08
Jun 26		<3.7	10.5	5.72		0.18
Jun 27						<0.03
Jun 28						0.09
Jun 29						<0.03
Jun 30	5240					<0.03

Date	Reclaimed Water Use Weekly Total (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	Total Residual Chlorine (mg/L)
Jul 01						0.03
Jul 02					55	<0.03
Jul 03		<3.7	7	5.64		<0.03
Jul 04						0.07
Jul 05						0.04
Jul 06						0.03
Jul 07	3741					0.06
Jul 08						<0.03
Jul 09					78	<0.03
Jul 10		<3.7	6.5	5.54		0.03
Jul 11						0.08
Jul 12						0.09
Jul 13						0.07
Jul 14	4285					0.07
Jul 15						0.09
Jul 16					68	0.04
Jul 17		<3.7	5	5.45		0.03
Jul 18						0.1
Jul 19						0.07
Jul 20						0.17
Jul 21	4634					0.11
Jul 22						0.05
Jul 23					44	0.04
Jul 24		<3.7	6	6.24		0.19
Jul 25						<0.03
Jul 26						0.07
Jul 27						0.06
Jul 28	3510					0.05
Jul 29						<0.03
Jul 30					85	0.05
Jul 31		<3.7	6.5	6.1		0.19

Date	Reclaimed Water Use Weekly Total (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	Total Residual Chlorine (mg/L)
Aug 01						0.06
Aug 02						0.04
Aug 03						0.10
Aug 04	3558					<0.03
Aug 05						<0.03
Aug 06					14	0.09
Aug 07		<3.7	8	5.5		0.06
Aug 08						0.07
Aug 09						<0.03
Aug 10						0.05
Aug 11	4229					<0.03
Aug 12						<0.03
Aug 13					7	0.03
Aug 14		<3.7	7.5	5.54		0.17
Aug 15						0.11
Aug 16						0.04
Aug 17						0.43
Aug 18	3129					0.09
Aug 19						0.10
Aug 20					4	0.19
Aug 21		<3.7	6	6.24		0.60
Aug 22						0.09
Aug 23						0.07
Aug 24						0.06
Aug 25	426					0.11
Aug 26						0.08
Aug 27					36	0.12
Aug 28		<3.7	4.5	6.4		0.07
Aug 29						0.09
Aug 30						0.07
Aug 31						0.05

Date	Reclaimed Water Use Weekly Total (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	Total Residual Chlorine (mg/L)
Sep 01	2895					0.09
Sep 02						0.04
Sep 03					20	0.12
Sep 04		<3.7	4.5	5.8		<0.03
Sep 05						0.10
Sep 06						0.06
Sep 07						0.07
Sep 08	4653					0.12
Sep 09						0.04
Sep 10					<1	<0.03
Sep 11		<3.7	6	5.51		0.08
Sep 12						0.08
Sep 13						0.13
Sep 14						<0.03
Sep 15	4570					<0.03
Sep 16						0.04
Sep 17					6	0.08
Sep 18		<3.7	6.5	5.36		0.13
Sep 19						<0.03
Sep 20						0.08
Sep 21						0.06
Sep 22	3801					0.03
Sep 23						0.04
Sep 24					40	<0.03
Sep 25		<3.7	8.5	5.56		0.10
Sep 26						0.04
Sep 27						0.06
Sep 28						0.17
Sep 29	3860					0.09
Sep 30						0.12

Date	Reclaimed Water Use Weekly Total (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	Total Residual Chlorine (mg/L)
Oct 01					15	0.12
Oct 02		<3.7	8	5.46		0.05
Oct 03						0.05
Oct 04						0.05
Oct 05						0.03
Oct 06	3034					<0.03
Oct 07						<0.03
Oct 08					19	<0.03
Oct 09		<3.7	4.5	4.92		0.03
Oct 10						0.10
Oct 11						0.03
Oct 12						0.03
Oct 13	3045					0.05
Oct 14						0.06
Oct 15					4	<0.03
Oct 16		<3.7	9	5.86		0.04
Oct 17						0.07
Oct 18						0.19
Oct 19						0.05
Oct 20	3690					0.04
Oct 21						0.05
Oct 22					<1	0.04
Oct 23		<3.7	5.5	5.69		0.11
Oct 24						0.06
Oct 25						<0.03
Oct 26						0.14
Oct 27	4259					0.11
Oct 28						0.09
Oct 29					20	0.14
Oct 30		<3.7	7	5.67		<0.03
Oct 31						<0.03

Date	Reclaimed Water Use Weekly Total (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	Total Residual Chlorine (mg/L)
Nov 01						0.19
Nov 02						0.07
Nov 03	4478					<0.03
Nov 04						0.07
Nov 05					2	<0.03
Nov 06		<3.7	7	5.77		0.27
Nov 07						<0.03
Nov 08						<0.03
Nov 09						0.03
Nov 10	4691					0.11
Nov 11						<0.03
Nov 12					5	<0.03
Nov 13		<3.7	7.5	5.89		0.07
Nov 14						0.07
Nov 15						0.04
Nov 16						0.04
Nov 17	3824					<0.03
Nov 18						0.06
Nov 19					4	0.06
Nov 20		<3.7	6	6.08		<0.03
Nov 21						<0.03
Nov 22						<0.03
Nov 23						<0.03
Nov 24	4007					0.03
Nov 25						0.09
Nov 26					1	<0.03
Nov 27		<3.7	5.5	6.19		0.09
Nov 28						0.06
Nov 29						<0.03
Nov 30						<0.03

Date	Reclaimed Water Use Weekly Total (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	Total Residual Chlorine (mg/L)
Dec 01	3930					0.03
Dec 02						0.08
Dec 03					1	<0.03
Dec 04		<3.7	5.5	6.35		<0.03
Dec 05						<0.03
Dec 06						<0.03
Dec 07						<0.03
Dec 08	4165					<0.03
Dec 09						<0.03
Dec 10					1	<0.03
Dec 11		<3.7	7	6.32		<0.03
Dec 12						0.18
Dec 13						0.07
Dec 14						0.07
Dec 15	3279					<0.03
Dec 16						0.04
Dec 17					1	<0.03
Dec 18		<3.7	6.5	6.6		0.05
Dec 19						0.08
Dec 20						0.03
Dec 21						<0.03
Dec 22	3440					<0.03
Dec 23						0.09
Dec 24					2	0.07
Dec 25		<3.7	6	6.53		0.03
Dec 26						0.04
Dec 27						0.15
Dec 28						0.05
Dec 29	3760					0.07
Dec 30						0.1
Dec 31					24	0.03

Appendix F: General Requirements for Reclaimed Water Users

A copy of this Appendix is provided to each user prior to the commencement of irrigation each year.

1. GENERAL REQUIRMENTS

1.1 Plans - New Works

1.1.1 Plans for modifications and/or extensions to the existing reclaimed water irrigation system shall be approved by a person qualified in the design of irrigation systems and the Irrigation Plan and Soils Assessment is to be submitted to the Director for authorization prior to the commencement of irrigation on the subject property.

1.1.2 Design and construct the irrigation works in accordance with best current agricultural practice and the “Pollution Control Guidelines for Municipal Effluent Application to Land”, dated January 1983, and any amendments thereto, issued by the BC Ministry of Environment, and also in accordance with the “BC Sprinkler Irrigation Manual”, dated 1989, prepared by the BC Ministry of Agriculture and Fisheries, or the “BC Trickle Irrigation Manual”, dated 1987, prepared by the BC Ministry of Agricultural and Fisheries.

1.2 Construction Criteria

1.2.1 All reclaimed water user valves shall be of a type, or secured in a manner, which permits operation by only personnel authorized by each wastewater user. All piping, valves and outlets should be clearly marked to differentiate reclaimed water from domestic water. Al reclaimed water controllers, valves, etc., shall be affixed with reclaimed water warning signs. It is recommended that, where possible, purple coloured pipe and fixtures by utilized to facilitate identification of reclaimed water piping and fixtures.

1.2.2 Use or installation of hose-bibs on any irrigation system presently operating, or designated to operate with reclaimed water, regardless of the hose-bib construction or identification is not permitted.

1.2.3 There shall be at least 3 metre horizontal and a 0.3 metre vertical separation (with domestic water pipeline above the reclaimed water pipeline) between all pipelines transporting reclaimed water and those transporting domestic water.

1.2.4 There shall be no connection between a potable water supply, irrigation water or industrial well, and piping containing reclaimed water, except through an air gap separation or reduced pressure principal device.

1.3 Fencing

1.3.1 The reclaimed water user may be required by the Director to erect a fence around the reclaimed water irrigation area to restrict public access. The height and type of fencing shall meet the approval of the Director.

1.4 Signage

1.4.1 Prominent “NO TRESPASSING”, signs shall be erected around agricultural and silvicultural sites irrigated with reclaimed water, warning persons of the possible health hazard during the irrigation season and advising that the water used for irrigation is NOT POTABLE. The wording shall be in language or symbols readily comprehensible by the general public, e.g., “NO TRESPASSING - RECLAIMED WATER - DO NOT DRINK.”

1.4.2 Warning signs shall be posted in sufficient numbers and size and at strategic locations to advise the public that reclaimed water is being used. Additional signage may be required as directed by the Director.

2. GENERAL REQUIRMENTS – RECLAIMED WATER IRRIGATION

2.1 Buffer Zones

2.1.1 The requirement for formal buffer zones surrounding lands irrigated with reclaimed water is no longer in effect, however, a buffer zone may be specified by the Director.

2.1.2 Reclaimed water applied by irrigation shall not be applied to the ground any closer than 15 metres from the edge of flowing streams or bodies of water.

2.1.3 There shall be no reclaimed water used for irrigation or impounded within 30 metres of any well or in-ground reservoir used for domestic supply, unless a Director authorizes a lesser distance on the basis that special circumstances exist.

2.2 Surface Run-off

2.2.1 There shall be no surface run-off of irrigated reclaimed water from the irrigated lands.

2.2.2 The maximum ground slope shall not exceed 20% without the written consent of the Director.

2.3 Surfacing Reclaimed Water

2.3.1 Irrigation shall be managed in such a fashion as to preclude surfacing of irrigation tail water down slope of the point of irrigation.

2.3.2 Irrigation shall be managed as to prevent ponding.

2.4 Spray Irrigation Drift

2.4.1 Reclaimed water shall be confined to the area designated and approved for irrigation with reclaimed water. The reclaimed water irrigation system shall be managed in such a fashion as to prevent aerosol drift from leaving the irrigated lands.

2.4.2 Precautions shall be taken to ensure that reclaimed water will not have contact with any facility or area not designated for the reclamation activities, such as passing vehicles, buildings, domestic water facilities, fruit and vegetable gardens, or food handling facilities.

2.4.3 Drinking water facilities shall be protected from direct or wind-blown reclaimed water spray.

2.5 Irrigation Rates

2.5.1 Irrigation rates for spray irrigation shall not exceed the rates given in “BC Sprinkler Irrigation Manual”, dated 1989, prepared by the BC Ministry of Agriculture and Fisheries and irrigation rates for trickle irrigation shall not exceed the rates given in those given in “BC Trickle Irrigation Manual”, dated 1987, prepared by the BC Ministry of Agriculture and Fisheries.

2.5.2 Soils of the irrigated lands will be visually monitored by the landowner/lessee periodically or as otherwise directed by the Director or the City to prevent saturation, erosion, and instability.

2.6 Agricultural Products Lag Time

2.6.1 A three-day lag time is required before un-inspected livestock intended for human consumption are permitted on areas irrigated with reclaimed water. No lag time is required if livestock are subjected to the federal meat inspection program.

2.6.2 A six-day lag time is required before dairy cattle are permitted in areas irrigated with reclaimed water.

2.6.3 A three-day lag time, after irrigation has ceased, is required before a crop intended for animal feed is harvested.

2.7 Insect and Vector Control

Adequate measures shall be taken to prevent the breeding of insects and other vectors of health significance, and the creation of odours, slimes, or unsightly deposits.

2.8 Irrigation of Public Areas

2.8.1 Irrigation on golf courses, parks or cemeteries shall only be practised when the public are not present.

2.8.2 Golf score cards shall indicate that reclaimed water is used for irrigation on the golf course lands.

Appendix G: Reclaimed Water Use at CREDS – Weekly Flows to Each Parcel in 2024 (E328531)

Date	Parcel 3 [A] – City Owned (m^3)	Parcel 4 (m^3)	Parcel 5 (m^3)	Parcel 6 (m^3)	Parcel 8 (m^3)	Parcel 9 (m^3)	Parcel 10 + 11 (m^3)	Parcel 12 (m^3)	Parcel 13 (m^3)	Parcel 14 (m^3)	Parcel 15 (m^3)	Fire Centre (m^3)
Apr 14												
Apr 15												
Apr 16												
Apr 17												
Apr 18												
Apr 19												
Apr 20												
Apr 21												
Apr 22												
Apr 23												
Apr 24	61280	5399	0	1643	10252	0	390	610	14065	0	41	92
Apr 25												
Apr 26												
Apr 27												
Apr 28												
Apr 29												
Apr 30												
May 1	42977	5007	3731	1492	10441	0	222	1718	3433	0	29	41
May 2												
May 3												
May 4												
May 5												
May 6												
May 7												
May 8												
May 9	90364	6409	5189	3065	6283	0	432	1880	13466	0	42	33
May 10												
May 11												
May 12												
May 13												
May 14												
May 15	86144	5610	4430	2964	10072	0	327	2442	9422	630	39	27

[A] Calculated Volume

Date	Parcel 3 [A] – City Owned (m^3)	Parcel 4 (m^3)	Parcel 5 (m^3)	Parcel 6 (m^3)	Parcel 8 (m^3)	Parcel 9 (m^3)	Parcel 10 + 11 (m^3)	Parcel 12 (m^3)	Parcel 13 (m^3)	Parcel 14 (m^3)	Parcel 15 (m^3)	Fire Centre (m^3)
May 16												
May 17												
May 18												
May 19												
May 20												
May 21												
May 22	22399	6775	0	399	850	0	362	1126	6042	443	44	39
May 23												
May 24												
May 25												
May 26												
May 27												
May 28												
May 29												
May 30												
May 31												
Jun 1												
Jun 2												
Jun 3												
Jun 4												
Jun 5	24314	10170	6044	616	3273	0	389	844	6118	2311	101	131
Jun 6												
Jun 7												
Jun 8												
Jun 9												
Jun 10												
Jun 11												
Jun 12	42680	3643	2273	2102	12045	0	38	1524	12959	3346	60	108
Jun 13												
Jun 14												
Jun 15												

[A] Calculated Volume

Date	Parcel 3 [A] – City Owned (m^3)	Parcel 4 (m^3)	Parcel 5 (m^3)	Parcel 6 (m^3)	Parcel 8 (m^3)	Parcel 9 (m^3)	Parcel 10 + 11 (m^3)	Parcel 12 (m^3)	Parcel 13 (m^3)	Parcel 14 (m^3)	Parcel 15 (m^3)	Fire Centre (m^3)
Jun 16												
Jun 17												
Jun 18												
Jun 19												
Jun 20												
Jun 21	61,060	5,523	4,145	616	8,268	0	428	2270	9,629	3,103	88	91
Jun 22												
Jun 23												
Jun 24												
Jun 25												
Jun 26	43983	4126	0	1999	11943	1795	219	2328	9230	3238	29	207
Jun 27												
Jun 28												
Jun 29												
Jun 30												
Jul 1												
Jul 2												
Jul 3	53296	3840	1	541	2460	3688	98	1184	7167	2364	41	88
Jul 4												
Jul 5												
Jul 6												
Jul 7												
Jul 8												
Jul 9												
Jul 10	102761	7055	2218	2290	4764	6642	521	2634	14730	4567	58	156
Jul 11												
Jul 12												
Jul 13												
Jul 14												
Jul 15												

[A] Calculated Volume

Date	Parcel 3 [A] – City Owned (m^3)	Parcel 4 (m^3)	Parcel 5 (m^3)	Parcel 6 (m^3)	Parcel 8 (m^3)	Parcel 9 (m^3)	Parcel 10 + 11 (m^3)	Parcel 12 (m^3)	Parcel 13 (m^3)	Parcel 14 (m^3)	Parcel 15 (m^3)	Fire Centre (m^3)
Jul 16												
Jul 17	85788	6390	3686	3721	18409	10119	394	2883	15763	5766	61	447
Jul 18												
Jul 19												
Jul 20												
Jul 21												
Jul 22												
Jul 23												
Jul 24	98027	6188	1352	4025	10912	10065	517	2635	13923	2152	114	989
Jul 25												
Jul 26												
Jul 27												
Jul 28												
Jul 29												
Jul 30												
Jul 31	35893	4887	3392	1912	9562	5045	287	1308	6162	475	87	230
Aug 1												
Aug 2												
Aug 3												
Aug 4												
Aug 5												
Aug 6												
Aug 7	30455	6656	3354	3846	11767	6683	385	1036	13222	2566	60	408
Aug 8												
Aug 9												
Aug 10												
Aug 11												
Aug 12												
Aug 13												
Aug 14	70564	5405	4371	1861	0	0	410	2396	10040	3860	73	416
Aug 15												

[A] Calculated Volume

Date	Parcel 3 [A] – City Owned (m^3)	Parcel 4 (m^3)	Parcel 5 (m^3)	Parcel 6 (m^3)	Parcel 8 (m^3)	Parcel 9 (m^3)	Parcel 10 + 11 (m^3)	Parcel 12 (m^3)	Parcel 13 (m^3)	Parcel 14 (m^3)	Parcel 15 (m^3)	Fire Centre (m^3)
Aug 16												
Aug 17												
Aug 18												
Aug 19												
Aug 20												
Aug 21	63628	6755	5177	1890	13616	6868	425	1905	8058	0	108	231
Aug 22												
Aug 23												
Aug 24												
Aug 25												
Aug 26												
Aug 27												
Aug 28	13078	1835	2581	930	1	0	84	162	2335	11329	5	123
Aug 29												
Aug 30												
Aug 31												
Sep 1												
Sep 2												
Sep 3												
Sep 4	46374	5935	3588	0	2699	1259	278	363	11538	3433	3	121
Sep 5												
Sep 6												
Sep 7												
Sep 8												
Sep 9												
Sep 10												
Sep 11	44482	4372	3877	892	7196	3676	181	1616	7728	3365	45	82
Sep 12												
Sep 13												
Sep 14												
Sep 15												

[A] Calculated Volume

Date	Parcel 3 [A] – City Owned (m^3)	Parcel 4 (m^3)	Parcel 5 (m^3)	Parcel 6 (m^3)	Parcel 8 (m^3)	Parcel 9 (m^3)	Parcel 10 + 11 (m^3)	Parcel 12 (m^3)	Parcel 13 (m^3)	Parcel 14 (m^3)	Parcel 15 (m^3)	Fire Centre (m^3)
Sep 16												
Sep 17												
Sep 18	5297	5029	1429	464	839	1230	109	191	2947	3	12	53
Sep 19												
Sep 20												
Sep 21												
Sep 22												
Sep 23												
Sep 24												
Sep 25	21558	4282	3056	1260	7912	4336	163	0	4184	1023	6	66
Sep 26												
Sep 27												
Sep 28												
Sep 29												
Sep 30												
Oct 1												
Oct 2	0	2514	1612	1	0	0	44	0	216	0	0	55
Oct 3												
Oct 4												
Oct 5												
Oct 6												
Oct 7												
Oct 8												
Oct 9	9380	3366	0	0	0	0	174	0	0	0	0	12
Oct 10												
Oct 11												
Oct 12												
Oct 13												
Oct 14												
Oct 15												
Oct 16												
Oct 17												
Oct 18	8638	209	2	0	0	0	23	0	0	938	0	0

[A] Calculated Volume

Appendix H: KSTC Raw Quality Data for Reclaimed Water Use at CREDS in 2024 (E328531)

Date	CREDS Flow Meter Weekly Use (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	Total Residual Chlorine (mg/L)	Alkalinity[B] (mg/L CaCO3)	NH_3-N[B] (mg/L)	TN-N[A,B] (mg/L)	NO_3-N (mg/L)	NO_2-N[B] (mg/L)	Org-N[A,B] (mg/L)	TKN-N[B] (mg/L)	TP (mg/L)	Chloride[B] (mg/L)	Sulphate[B] (mg SO_4/mL)
Apr 14	5166															
Apr 15						0.06										
Apr 16						0.04	94.8	0.29	2.67	1.38	0.02	0.99	1.28		49.1	
Apr 17		6.4	<3.2	7.26		0.07								0.3		
Apr 18					<1	0.18										
Apr 19						0.11										
Apr 20						0.08										
Apr 21	12797					0.08										
Apr 22						0.14										
Apr 23					2	0.14	95.5									
Apr 24		6	7.5	7.11		0.20										
Apr 25						0.08										
Apr 26						0.53										
Apr 27						0.12										
Apr 28	11117					0.10										
Apr 29						0.12										
Apr 30					1	0.13	96.9									
May 1		5.5	6	6.68		0.05								0.36		
May 2						<0.03										
May 3						<0.03										
May 4						<0.03										
May 5	18623					0.06										
May 6						<0.03										
May 7					8	0.04	89.8	<0.05	2.31	0.99	0.01	1.25	1.3		49.4	
May 8		9	21.5	8.28		0.04										
May 9						0.20										
May 10						<0.03										
May 11						0.09										
May 12	13260					0.05										
May 13						0.08										
May 14					11	0.08	88									
May 15		<3.7	9	9.2		0.13										

[A] Calculated Results

[B] Samples Analyzed at Caro Analytical Services

Date	CREDS Flow Meter Weekly Use (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	Total Residual Chlorine (mg/L)	Alkalinity[B] (mg/L CaCO3)	NH_3-N[B] (mg/L)	TN-N[A,B] (mg/L)	NO_3-N (mg/L)	NO_2-N[B] (mg/L)	Org-N[A,B] (mg/L)	TKN-N[B] (mg/L)	TP (mg/L)	Chloride[B] (mg/L)	Sulphate[B] (mg SO_4/mL)
May 16						0.23										
May 17						0.07										
May 18						0.03										
May 19	7004					0.04										
May 20						<0.03										
May 21						<0.03	82.9									
May 22		<3.7	10	8.34	78	0.04										
May 23						0.08										
May 24						0.10										
May 25						<0.03										
May 26	2523					0.04										
May 27						0.03										
May 28					19	0.04	82.4									
May 29		<3.7	6.5	7.87		<0.03										
May 30						0.07										
May 31						0.04										
Jun 1						0.07										
Jun 2	4909					<0.03										
Jun 3						0.05										
Jun 4					5	0.04	83.8									
Jun 5		<3.7	5	7.66		0.08		0.13	3.5	2.34	0.03	1	1.18	0.43	52.4	
Jun 6						0.06										
Jun 7						0.04										
Jun 8						0.06										
Jun 9	15826					0.09										
Jun 10						0.07										
Jun 11					16	0.11	73.9									
Jun 12		5.5	7.5	7.92		0.08										
Jun 13						0.13										
Jun 14						0.07										
Jun 15						0.05										

[A] Calculated Results

[B] Samples Analyzed at Caro Analytical Services

Date	CREDS Flow Meter Weekly Use (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	Total Residual Chlorine (mg/L)	Alkalinity[B] (mg/L CaCO3)	NH_3-N[B] (mg/L)	TN-N[A,B] (mg/L)	NO_3-N (mg/L)	NO_2-N[B] (mg/L)	Org-N[A,B] (mg/L)	TKN-N[B] (mg/L)	TP (mg/L)	Chloride[B] (mg/L)	Sulphate[B] (mg SO_4/mL)
Jun 16	7909					0.05										
Jun 17						0.08										
Jun 18					3	<0.03	75.8									
Jun 19		4.9	10.5	7.58		0.04										
Jun 20						0.04										
Jun 21						0.04										
Jun 22						0.05										
Jun 23	16114					0.08										
Jun 24						0.06										
Jun 25					14	0.03	84.5									
Jun 26		4.5	13	8.98		0.14										
Jun 27						0.11										
Jun 28						0.04										
Jun 29						0.06										
Jun 30	12859					0.04										
Jul 1						0.04										
Jul 2					2	0.04	82.4	0.05	3.69	1.86	<0.01	1.77	1.82		47.5	
Jul 3		11	14	9.23		0.16								0.54		
Jul 4						0.09										
Jul 5						<0.03										
Jul 6						0.05										
Jul 7	20389					0.03										
Jul 8						0.05										
Jul 9					<1	<0.03	79.4									
Jul 10		6.3	24.5	9.48		0.03										
Jul 11						0.03										
Jul 12						0.12										
Jul 13						0.05										
Jul 14	24244					0.08										
Jul 15						0.11										

[A] Calculated Results

[B] Samples Analyzed at Caro Analytical Services

Date	CREDS Flow Meter Weekly Use (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	Total Residual Chlorine (mg/L)	Alkalinity[B] (mg/L CaCO3)	NH_3-N[B] (mg/L)	TN-N[A,B] (mg/L)	NO_3-N (mg/L)	NO_2-N[B] (mg/L)	Org-N[A,B] (mg/L)	TKN-N[B] (mg/L)	TP (mg/L)	Chloride[B] (mg/L)	Sulphate[B] (mg SO_4/mL)
Jul 16					<1	0.09	85.2									
Jul 17		5.3	9	8.24		0.04										
Jul 18						0.14										
Jul 19						0.06										
Jul 20						0.08										
Jul 21	13619					0.07										
Jul 22						0.05										
Jul 23					5	0.06	88.3									
Jul 24		5.7	11.5	7.7		0.09										
Jul 25						0.09										
Jul 26						0.07										
Jul 27						<0.03										
Jul 28	13719					0.03										
Jul 29						0.03										
Jul 30					2	0.12	91									
Jul 31		<3.7	12.5	7.93		0.21										
Aug 1						0.04										
Aug 2						0.06										
Aug 3						0.06										
Aug 4	12487					0.08										
Aug 5						0.06										
Aug 6					2	0.06	82.9	0.06	4.28	1.44	0.036	2.74	2.81		55	
Aug 7		5.9	13	8.32		0.06								0.92		
Aug 8						0.07										
Aug 9						0.10										
Aug 10						0.10										
Aug 11	13939					0.08										
Aug 12						0.09										
Aug 13					<1	0.05	82.5									
Aug 14		5.1	12	8.64		<0.03										
Aug 15						0.07										

[A] Calculated Results

[B] Samples Analyzed at Caro Analytical Services

Date	CREDS Flow Meter Weekly Use (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	Total Residual Chlorine (mg/L)	Alkalinity[B] (mg/L CaCO3)	NH_3-N[B] (mg/L)	TN-N[A,B] (mg/L)	NO_3-N (mg/L)	NO_2-N[B] (mg/L)	Org-N[A,B] (mg/L)	TKN-N[B] (mg/L)	TP (mg/L)	Chloride[B] (mg/L)	Sulphate[B] (mg SO_4/mL)
Aug 16						1.14										
Aug 17						0.04										
Aug 18	12067					0.04										
Aug 19						0.09										
Aug 20					<1	0.05	71.6									
Aug 21		4.5	29.5	9.71		0.03										
Aug 22						<0.03										
Aug 23						<0.03										
Aug 24						<0.03										
Aug 25	2736					<0.03										
Aug 26						<0.03										
Aug 27					<1	<0.03	62.7									
Aug 28		5	26.5	9.53		0.03										
Aug 29						0.05										
Aug 30						0.04										
Aug 31						0.05										
Sep 1	15960					0.05										
Sep 2						0.10										
Sep 3					<1	<0.03	54.7	<0.05	3.96	2.19	0.041	1.68	1.73		46.8	
Sep 4		3.7	17.5	10.06		<0.03								0.49		
Sep 5						<0.03										
Sep 6						<0.03										
Sep 7						<0.03										
Sep 8	4456					<0.03										
Sep 9						<0.03										
Sep 10					3	<0.03	60.8									
Sep 11		4.6	14	9.32		0.05										
Sep 12						0.05										
Sep 13						0.03										
Sep 14						0.05										
Sep 15	4189					0.03										

[A] Calculated Results

[B] Samples Analyzed at Caro Analytical Services

Date	CREDS Flow Meter Weekly Use (m^3)	$CBOD_5$ (mg/L)	TSS (mg/L)	pH	Fecal Coliforms (CFU/100 mL)	Total Residual Chlorine (mg/L)	Alkalinity[B] (mg/L CaCO3)	NH_3-N[B] (mg/L)	TN-N[A,B] (mg/L)	NO_3-N (mg/L)	NO_2-N[B] (mg/L)	Org-N[A,B] (mg/L)	TKN-N[B] (mg/L)	TP (mg/L)	Chloride[B] (mg/L)	Sulphate[B] (mg SO_4/mL)
Sep 16						0.05										
Sep 17					2	<0.03	65.8									
Sep 18		4.8	8	8.32		0.09										
Sep 19						0.07										
Sep 20						0.21										
Sep 21						0.04										
Sep 22	4750					<0.03										
Sep 23						0.04										
Sep 24					9	0.04	63.7									
Sep 25		<3.7	6	7.86		0.09										
Sep 26						<0.03										
Sep 27						<0.03										
Sep 28						0.05										
Sep 29	1499					<0.03										
Sep 30						<0.03										
Oct 1					2	0.06	63.6	0.52	2.58	0.04	0.355	1.66	2.19		45.7	54.2
Oct 2		<3.7	9.5	7.31		0.11								1.18		
Oct 3						<0.03										
Oct 4						0.11										
Oct 5						<0.03										
Oct 6	1296					0.06										
Oct 7						0.07										
Oct 8					1	0.07	58.9									
Oct 9		8.5	10.5	7.15		<0.03										
Oct 10						0.06										
Oct 11						0.05										
Oct 12						<0.03										
Oct 13	684					0.07										
Oct 14						<0.03										
Oct 15																
Oct 16																
Oct 17																
Oct 18																

[A] Calculated Results

[B] Samples Analyzed at Caro Analytical Services

Appendix I: External Laboratory Raw Quality Data for Reclaimed Water Use at CREDS in 2024 (E328531)

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24D2343
PO NUMBER		**RECEIVED / TEMP**	2024-04-17 09:40 / 4.8°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-04-23 10:34
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO/IEC 17025:2017 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks

You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

We've Got Chemistry

It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Ahead of the Curve

Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

By engaging our services, you are agreeing to CARO Analytical Service's Standard Terms and Conditions outlined here: https://www.caro.ca/terms-conditions

If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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Caring About Results, Obviously.

Page 1 of 5

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24D2343
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-04-23 10:34

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24D2343-01) | Matrix: Water | Sampled: 2024-04-16						
Anions						
Chloride	49.1	AO ≤ 250	0.10	mg/L	2024-04-19	
Nitrate (as N)	1.38	MAC = 10	0.010	mg/L	2024-04-19	
Nitrite (as N)	0.022	MAC = 1	0.010	mg/L	2024-04-19	
Calculated Parameters						
Nitrate+Nitrite (as N)	1.40	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	2.67	N/A	0.0500	mg/L	N/A	
General Parameters						
Alkalinity, Total (as CaCO3)	94.8	N/A	1.0	mg/L	2024-04-19	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-04-19	
Alkalinity, Bicarbonate (as CaCO3)	94.8	N/A	1.0	mg/L	2024-04-19	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-04-19	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-04-19	
Ammonia, Total (as N)	0.286	None Required	0.050	mg/L	2024-04-22	
Nitrogen, Total Kjeldahl	1.28	N/A	0.050	mg/L	2024-04-22	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24D2343
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-04-23 10:34

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna
Ammonia, Total in Water	SM 4500-NH3 G* (2021)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2020)	Ion Chromatography	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2021)	Block Digestion and Flow Injection Analysis	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
AO	Aesthetic Objective
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Health Canada, September 2022)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

General Comments:

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24D2343
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-04-23 10:34

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup)**: An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- **Blank Spike (BS)**: A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS)**: A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- **Reference Material (SRM)**: A homogenous material of similar matrix to the samples, certified for the parameter(s) listed. Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B4D3179										
Blank (B4D3179-BLK1)				Prepared: 2024-04-19, Analyzed: 2024-04-19						
Chloride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
LCS (B4D3179-BS1)				Prepared: 2024-04-19, Analyzed: 2024-04-19						
Chloride	15.8	0.10	mg/L	16.0		99	90-110			
Nitrate (as N)	4.05	0.010	mg/L	4.00		101	90-110			
Nitrite (as N)	2.11	0.010	mg/L	2.00		105	85-115			
General Parameters, Batch B4D3220										
Blank (B4D3220-BLK1)				Prepared: 2024-04-19, Analyzed: 2024-04-19						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4D3220-BLK2)				Prepared: 2024-04-19, Analyzed: 2024-04-19						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4D3220-BLK3)				Prepared: 2024-04-19, Analyzed: 2024-04-19						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4D3220-BS1)				Prepared: 2024-04-19, Analyzed: 2024-04-19						
Alkalinity, Total (as CaCO3)	95.2	1.0	mg/L	100		95	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	67.6	1.0	mg/L	50.0		135	0-200			

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	WORK ORDER	24D2343
PROJECT	KSTC Water System Analysis	REPORTED	2024-04-23 10:34

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4D3220, Continued										
LCS (B4D3220-BS2)				Prepared: 2024-04-19, Analyzed: 2024-04-19						
Alkalinity, Total (as CaCO3)	94.5	1.0	mg/L	100		94	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	65.5	1.0	mg/L	50.0		131	0-200			
LCS (B4D3220-BS3)				Prepared: 2024-04-19, Analyzed: 2024-04-19						
Alkalinity, Total (as CaCO3)	94.2	1.0	mg/L	100		94	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	62.9	1.0	mg/L	50.0		126	0-200			
General Parameters, Batch B4D3270										
Blank (B4D3270-BLK1)				Prepared: 2024-04-19, Analyzed: 2024-04-22						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
Blank (B4D3270-BLK2)				Prepared: 2024-04-19, Analyzed: 2024-04-22						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
LCS (B4D3270-BS1)				Prepared: 2024-04-19, Analyzed: 2024-04-22						
Nitrogen, Total Kjeldahl	0.908	0.050	mg/L	1.00		91	85-115			
LCS (B4D3270-BS2)				Prepared: 2024-04-19, Analyzed: 2024-04-22						
Nitrogen, Total Kjeldahl	0.906	0.050	mg/L	1.00		91	85-115			
General Parameters, Batch B4D3422										
Blank (B4D3422-BLK1)				Prepared: 2024-04-22, Analyzed: 2024-04-22						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4D3422-BLK2)				Prepared: 2024-04-22, Analyzed: 2024-04-22						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4D3422-BLK3)				Prepared: 2024-04-22, Analyzed: 2024-04-22						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
LCS (B4D3422-BS1)				Prepared: 2024-04-22, Analyzed: 2024-04-22						
Ammonia, Total (as N)	0.931	0.050	mg/L	1.00		93	85-115			
LCS (B4D3422-BS2)				Prepared: 2024-04-22, Analyzed: 2024-04-22						
Ammonia, Total (as N)	0.923	0.050	mg/L	1.00		92	85-115			
LCS (B4D3422-BS3)				Prepared: 2024-04-22, Analyzed: 2024-04-22						
Ammonia, Total (as N)	0.896	0.050	mg/L	1.00		90	85-115			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24D3125
PO NUMBER		**RECEIVED / TEMP**	2024-04-24 09:28 / 4.4°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-04-26 09:36
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

Introduction:

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If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24D3125
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-04-26 09:36

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24D3125-01) | Matrix: Water | Sampled: 2024-04-23						
General Parameters						
Alkalinity, Total (as CaCO3)	95.5	N/A	1.0	mg/L	2024-04-25	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-04-25	
Alkalinity, Bicarbonate (as CaCO3)	95.5	N/A	1.0	mg/L	2024-04-25	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-04-25	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-04-25	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24D3125
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-04-26 09:36

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

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<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
mg/L	Milligrams per litre
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24D3125
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-04-26 09:36

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Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4D3837										
Blank (B4D3837-BLK1)				Prepared: 2024-04-25, Analyzed: 2024-04-25						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4D3837-BLK2)				Prepared: 2024-04-25, Analyzed: 2024-04-25						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4D3837-BLK3)				Prepared: 2024-04-25, Analyzed: 2024-04-25						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4D3837-BS1)				Prepared: 2024-04-25, Analyzed: 2024-04-25						
Alkalinity, Total (as CaCO3)	97.5	1.0	mg/L	100		98	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	62.0	1.0	mg/L	50.0		124	0-200			
LCS (B4D3837-BS2)				Prepared: 2024-04-25, Analyzed: 2024-04-25						
Alkalinity, Total (as CaCO3)	94.3	1.0	mg/L	100		94	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	60.5	1.0	mg/L	50.0		121	0-200			
LCS (B4D3837-BS3)				Prepared: 2024-04-25, Analyzed: 2024-04-25						
Alkalinity, Total (as CaCO3)	95.1	1.0	mg/L	100		95	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	59.4	1.0	mg/L	50.0		119	0-200			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24E0245
PO NUMBER		**RECEIVED / TEMP**	2024-05-01 09:36 / 5.4°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-05-03 17:14
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

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Authorized By:

Brent Whitehead
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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24E0245
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-05-03 17:14

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24E0245-01) | Matrix: Water | Sampled: 2024-04-30						
General Parameters						
Alkalinity, Total (as CaCO3)	96.9	N/A	1.0	mg/L	2024-05-03	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-05-03	
Alkalinity, Bicarbonate (as CaCO3)	96.9	N/A	1.0	mg/L	2024-05-03	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-05-03	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-05-03	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24E0245
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-05-03 17:14

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24E0245
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-05-03 17:14

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
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- **Blank Spike (BS)**: A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS)**: A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
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Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4E1524										
Blank (B4E1524-BLK1)				Prepared: 2024-05-03, Analyzed: 2024-05-03						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4E1524-BLK2)				Prepared: 2024-05-03, Analyzed: 2024-05-03						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4E1524-BLK3)				Prepared: 2024-05-03, Analyzed: 2024-05-03						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4E1524-BS1)				Prepared: 2024-05-03, Analyzed: 2024-05-03						
Alkalinity, Total (as CaCO3)	94.5	1.0	mg/L	100		95	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	66.3	1.0	mg/L	50.0		133	0-200			
LCS (B4E1524-BS2)				Prepared: 2024-05-03, Analyzed: 2024-05-03						
Alkalinity, Total (as CaCO3)	97.1	1.0	mg/L	100		97	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	58.7	1.0	mg/L	50.0		117	0-200			
LCS (B4E1524-BS3)				Prepared: 2024-05-03, Analyzed: 2024-05-03						
Alkalinity, Total (as CaCO3)	103	1.0	mg/L	100		103	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	62.3	1.0	mg/L	50.0		125	0-200			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24E1254
PO NUMBER		**RECEIVED / TEMP**	2024-05-08 10:09 / 5.1°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-05-15 14:34
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

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Big Picture Sidekicks

You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

We've Got Chemistry

It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Ahead of the Curve

Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

By engaging our services, you are agreeing to CARO Analytical Service's Standard Terms and Conditions outlined here: https://www.caro.ca/terms-conditions

If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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#110 4011 Viking Way Richmond, BC V6V 2K9 | #102 3677 Highway 97N Kelowna, BC V1X 5C3 | 17225 109 Avenue Edmonton, AB T5S 1H7 | #108 4475 Wayburne Drive Burnaby, BC V5G 4X4

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24E1254
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-05-15 14:34

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24E1254-01) | Matrix: Water | Sampled: 2024-05-07						
Anions						
Chloride	49.4	AO ≤ 250	0.10	mg/L	2024-05-10	
Nitrate (as N)	0.999	MAC = 10	0.010	mg/L	2024-05-10	
Nitrite (as N)	0.013	MAC = 1	0.010	mg/L	2024-05-10	
Calculated Parameters						
Nitrate+Nitrite (as N)	1.01	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	2.31	N/A	0.0500	mg/L	N/A	
General Parameters						
Alkalinity, Total (as CaCO3)	89.8	N/A	1.0	mg/L	2024-05-15	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-05-15	
Alkalinity, Bicarbonate (as CaCO3)	89.8	N/A	1.0	mg/L	2024-05-15	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-05-15	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-05-15	
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2024-05-10	
Nitrogen, Total Kjeldahl	1.30	N/A	0.050	mg/L	2024-05-13	
UV Permit (24E1254-02) | Matrix: Water | Sampled: 2024-05-07						
Anions						
Nitrate (as N)	12.9	MAC = 10	0.010	mg/L	2024-05-10	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-05-10	
Calculated Parameters						
Nitrate+Nitrite (as N)	12.9	N/A	0.100	mg/L	N/A	
Nitrogen, Total	14.2	N/A	0.100	mg/L	N/A	
General Parameters						
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2024-05-10	
Nitrogen, Total Kjeldahl	1.31	N/A	0.050	mg/L	2024-05-13	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24E1254
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-05-15 14:34

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna
Ammonia, Total in Water	SM 4500-NH3 G* (2021)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2020)	Ion Chromatography	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2021)	Block Digestion and Flow Injection Analysis	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
AO	Aesthetic Objective
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Health Canada, September 2022)

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24E1254
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-05-15 14:34

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Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B4E2207										
Blank (B4E2207-BLK1)				Prepared: 2024-05-09, Analyzed: 2024-05-09						
Chloride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
LCS (B4E2207-BS1)				Prepared: 2024-05-09, Analyzed: 2024-05-09						
Chloride	15.6	0.10	mg/L	16.0		98	90-110			
Nitrate (as N)	3.90	0.010	mg/L	4.00		98	90-110			
Nitrite (as N)	1.91	0.010	mg/L	2.00		96	85-115			
General Parameters, Batch B4E2374										
Blank (B4E2374-BLK1)				Prepared: 2024-05-10, Analyzed: 2024-05-13						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
Blank (B4E2374-BLK2)				Prepared: 2024-05-10, Analyzed: 2024-05-13						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
LCS (B4E2374-BS1)				Prepared: 2024-05-10, Analyzed: 2024-05-13						
Nitrogen, Total Kjeldahl	1.04	0.050	mg/L	1.00		104	85-115			
LCS (B4E2374-BS2)				Prepared: 2024-05-10, Analyzed: 2024-05-13						
Nitrogen, Total Kjeldahl	0.987	0.050	mg/L	1.00		99	85-115			
General Parameters, Batch B4E2375										
Blank (B4E2375-BLK1)				Prepared: 2024-05-10, Analyzed: 2024-05-10						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4E2375-BLK2)				Prepared: 2024-05-10, Analyzed: 2024-05-10						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
LCS (B4E2375-BS1)				Prepared: 2024-05-10, Analyzed: 2024-05-10						
Ammonia, Total (as N)	1.02	0.050	mg/L	1.00		102	85-115			
LCS (B4E2375-BS2)				Prepared: 2024-05-10, Analyzed: 2024-05-10						
Ammonia, Total (as N)	0.990	0.050	mg/L	1.00		99	85-115			

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24E1254
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-05-15 14:34

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4E2626										
Blank (B4E2626-BLK1)				Prepared: 2024-05-15, Analyzed: 2024-05-15						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4E2626-BS1)				Prepared: 2024-05-15, Analyzed: 2024-05-15						
Alkalinity, Total (as CaCO3)	100	1.0	mg/L	100		100	80-120			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24E2023
PO NUMBER		**RECEIVED / TEMP**	2024-05-15 09:30 / 8.0°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-05-23 11:55
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

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Authorized By:

Brent Whitehead
Account Manager

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24E2023
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-05-23 11:55

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24E2023-01) | Matrix: Water | Sampled: 2024-05-14						
General Parameters						
Alkalinity, Total (as CaCO3)	**88.0**	N/A	1.0	mg/L	2024-05-23	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-05-23	
Alkalinity, Bicarbonate (as CaCO3)	**88.0**	N/A	1.0	mg/L	2024-05-23	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-05-23	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-05-23	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24E2023
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-05-23 11:55

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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mg/L	Milligrams per litre
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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24E2023
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-05-23 11:55

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Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4E3525										
Blank (B4E3525-BLK1)				Prepared: 2024-05-23, Analyzed: 2024-05-23						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4E3525-BS1)				Prepared: 2024-05-23, Analyzed: 2024-05-23						
Alkalinity, Total (as CaCO3)	98.0	1.0	mg/L	100		98	80-120			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24E2741
PO NUMBER		**RECEIVED / TEMP**	2024-05-22 09:45 / 4.6°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-05-29 14:31
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

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Account Manager

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24E2741
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-05-29 14:31

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24E2741-01) | Matrix: Water | Sampled: 2024-05-21						
General Parameters						
Alkalinity, Total (as CaCO3)	82.9	N/A	1.0	mg/L	2024-05-28	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-05-28	
Alkalinity, Bicarbonate (as CaCO3)	82.9	N/A	1.0	mg/L	2024-05-28	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-05-28	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-05-28	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24E2741
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-05-29 14:31

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
mg/L	Milligrams per litre
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Health Canada, September 2022)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24E2741
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-05-29 14:31

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
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Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4E3999										
Blank (B4E3999-BLK1)				Prepared: 2024-05-28, Analyzed: 2024-05-28						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4E3999-BLK2)				Prepared: 2024-05-28, Analyzed: 2024-05-28						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4E3999-BS1)				Prepared: 2024-05-28, Analyzed: 2024-05-28						
Alkalinity, Total (as CaCO3)	94.8	1.0	mg/L	100		95	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	54.2	1.0	mg/L	50.0		108	0-200			
LCS (B4E3999-BS2)				Prepared: 2024-05-28, Analyzed: 2024-05-28						
Alkalinity, Total (as CaCO3)	97.0	1.0	mg/L	100		97	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	48.0	1.0	mg/L	50.0		96	0-200			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24E3676
PO NUMBER		**RECEIVED / TEMP**	2024-05-29 09:38 / 11.0°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-06-05 13:31
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24E3676
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-06-05 13:31

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24E3676-01) | Matrix: Water | Sampled: 2024-05-28						
General Parameters						
Alkalinity, Total (as CaCO3)	62.4	N/A	1.0	mg/L	2024-06-04	
Alkalinity, Phenolphthalein (as CaCO3)	5.2	N/A	1.0	mg/L	2024-06-04	
Alkalinity, Bicarbonate (as CaCO3)	71.9	N/A	1.0	mg/L	2024-06-04	
Alkalinity, Carbonate (as CaCO3)	10.5	N/A	1.0	mg/L	2024-06-04	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-06-04	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24E3676
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-06-05 13:31

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24E3676
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-06-05 13:31

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Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4F1697										
Blank (B4F1697-BLK1)				Prepared: 2024-06-04, Analyzed: 2024-06-04						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4F1697-BLK2)				Prepared: 2024-06-04, Analyzed: 2024-06-04						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4F1697-BLK3)				Prepared: 2024-06-04, Analyzed: 2024-06-04						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4F1697-BS1)				Prepared: 2024-06-04, Analyzed: 2024-06-04						
Alkalinity, Total (as CaCO3)	96.4	1.0	mg/L	100		96	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	44.7	1.0	mg/L	50.0		89	0-200			
LCS (B4F1697-BS2)				Prepared: 2024-06-04, Analyzed: 2024-06-04						
Alkalinity, Total (as CaCO3)	97.0	1.0	mg/L	100		97	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	43.0	1.0	mg/L	50.0		86	0-200			
LCS (B4F1697-BS3)				Prepared: 2024-06-04, Analyzed: 2024-06-04						
Alkalinity, Total (as CaCO3)	96.9	1.0	mg/L	100		97	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	43.0	1.0	mg/L	50.0		86	0-200			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24F0552
PO NUMBER		**RECEIVED / TEMP**	2024-06-05 09:40 / 3.2°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-06-11 15:04
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24F0552
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-06-11 15:04

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24F0552-01) | Matrix: Water | Sampled: 2024-06-04						
Anions						
Chloride	47.4	AO ≤ 250	0.10	mg/L	2024-06-06	
Nitrate (as N)	2.35	MAC = 10	0.010	mg/L	2024-06-06	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-06-06	
Calculated Parameters						
Nitrate+Nitrite (as N)	2.35	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	3.72	N/A	0.0500	mg/L	N/A	
General Parameters						
Alkalinity, Total (as CaCO3)	83.8	N/A	1.0	mg/L	2024-06-11	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-06-11	
Alkalinity, Bicarbonate (as CaCO3)	83.8	N/A	1.0	mg/L	2024-06-11	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-06-11	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-06-11	
Ammonia, Total (as N)	0.165	None Required	0.050	mg/L	2024-06-07	
Nitrogen, Total Kjeldahl	1.37	N/A	0.050	mg/L	2024-06-11	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24F0552
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-06-11 15:04

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna
Ammonia, Total in Water	SM 4500-NH3 G* (2021)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2020)	Ion Chromatography	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2021)	Block Digestion and Flow Injection Analysis	✓	Kelowna

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AO	Aesthetic Objective
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
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CARO ANALYTICAL SERVICES

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PROJECT	KSTC Water System Analysis	**REPORTED**	2024-06-11 15:04

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Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B4F1881										
Blank (B4F1881-BLK1)				Prepared: 2024-06-06, Analyzed: 2024-06-06						
Chloride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
LCS (B4F1881-BS1)				Prepared: 2024-06-06, Analyzed: 2024-06-06						
Chloride	15.8	0.10	mg/L	16.0		99	90-110			
Nitrate (as N)	4.01	0.010	mg/L	4.00		100	90-110			
Nitrite (as N)	2.01	0.010	mg/L	2.00		100	85-115			
General Parameters, Batch B4F2038										
Blank (B4F2038-BLK1)				Prepared: 2024-06-07, Analyzed: 2024-06-07						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4F2038-BLK2)				Prepared: 2024-06-07, Analyzed: 2024-06-07						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4F2038-BLK3)				Prepared: 2024-06-07, Analyzed: 2024-06-07						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4F2038-BLK4)				Prepared: 2024-06-07, Analyzed: 2024-06-07						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
LCS (B4F2038-BS1)				Prepared: 2024-06-07, Analyzed: 2024-06-07						
Ammonia, Total (as N)	1.01	0.050	mg/L	1.00		101	85-115			
LCS (B4F2038-BS2)				Prepared: 2024-06-07, Analyzed: 2024-06-07						
Ammonia, Total (as N)	0.988	0.050	mg/L	1.00		99	85-115			
LCS (B4F2038-BS3)				Prepared: 2024-06-07, Analyzed: 2024-06-07						
Ammonia, Total (as N)	0.959	0.050	mg/L	1.00		96	85-115			
LCS (B4F2038-BS4)				Prepared: 2024-06-07, Analyzed: 2024-06-07						
Ammonia, Total (as N)	0.972	0.050	mg/L	1.00		97	85-115			
General Parameters, Batch B4F2347										

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	WORK ORDER	24F0552
PROJECT	KSTC Water System Analysis	REPORTED	2024-06-11 15:04

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4F2347, Continued										
Blank (B4F2347-BLK1)				Prepared: 2024-06-10, Analyzed: 2024-06-11						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
Blank (B4F2347-BLK2)				Prepared: 2024-06-10, Analyzed: 2024-06-11						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
LCS (B4F2347-BS1)				Prepared: 2024-06-10, Analyzed: 2024-06-11						
Nitrogen, Total Kjeldahl	0.953	0.050	mg/L	1.00		95	85-115			
LCS (B4F2347-BS2)				Prepared: 2024-06-10, Analyzed: 2024-06-11						
Nitrogen, Total Kjeldahl	0.983	0.050	mg/L	1.00		98	85-115			
Duplicate (B4F2347-DUP1)		Source: 24F0552-01		Prepared: 2024-06-10, Analyzed: 2024-06-11						
Nitrogen, Total Kjeldahl	1.41	0.050	mg/L		1.37			3	15	
Matrix Spike (B4F2347-MS1)		Source: 24F0552-01		Prepared: 2024-06-10, Analyzed: 2024-06-11						
Nitrogen, Total Kjeldahl	2.42	0.050	mg/L	1.00	1.37	105	65-135			
General Parameters, Batch B4F2436										
Blank (B4F2436-BLK1)				Prepared: 2024-06-11, Analyzed: 2024-06-11						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4F2436-BLK2)				Prepared: 2024-06-11, Analyzed: 2024-06-11						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4F2436-BS1)				Prepared: 2024-06-11, Analyzed: 2024-06-11						
Alkalinity, Total (as CaCO3)	97.6	1.0	mg/L	100		98	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	46.7	1.0	mg/L	50.0		93	0-200			
LCS (B4F2436-BS3)				Prepared: 2024-06-11, Analyzed: 2024-06-11						
Alkalinity, Total (as CaCO3)	97.7	1.0	mg/L	100		98	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	46.9	1.0	mg/L	50.0		94	0-200			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24F1535
PO NUMBER		**RECEIVED / TEMP**	2024-06-12 10:07 / 12.4°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-06-18 16:22
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

Introduction:

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If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24F1535
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-06-18 16:22

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24F1535-01) | Matrix: Water | Sampled: 2024-06-11						
General Parameters						
Alkalinity, Total (as CaCO3)	73.9	N/A	1.0	mg/L	2024-06-18	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-06-18	
Alkalinity, Bicarbonate (as CaCO3)	73.9	N/A	1.0	mg/L	2024-06-18	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-06-18	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-06-18	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24F1535
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-06-18 16:22

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
mg/L	Milligrams per litre
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Health Canada, September 2022)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

General Comments:

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Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted red. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager:bwhitehead@caro.ca

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24F1535
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-06-18 16:22

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup)**: An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- **Blank Spike (BS)**: A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS)**: A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- **Reference Material (SRM)**: A homogenous material of similar matrix to the samples, certified for the parameter(s) listed. Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4F3306										
Blank (B4F3306-BLK1)				Prepared: 2024-06-18, Analyzed: 2024-06-18						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4F3306-BS1)				Prepared: 2024-06-18, Analyzed: 2024-06-18						
Alkalinity, Total (as CaCO3)	89.9	1.0	mg/L	100		90	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	44.1	1.0	mg/L	50.0		88	0-200			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Dan Steinke	**WORK ORDER**	24F2382
PO NUMBER		**RECEIVED / TEMP**	2024-06-19 09:07 / 5.4°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-06-21 12:17
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

Introduction:

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Authorized By:

Brent Whitehead
Account Manager

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24F2382
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-06-21 12:17

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24F2382-01) | Matrix: Water | Sampled: 2024-06-18						
General Parameters						
Alkalinity, Total (as CaCO3)	75.8	N/A	1.0	mg/L	2024-06-20	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-06-20	
Alkalinity, Bicarbonate (as CaCO3)	75.8	N/A	1.0	mg/L	2024-06-20	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-06-20	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-06-20	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24F2382
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-06-21 12:17

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

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<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
mg/L	Milligrams per litre
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24F2382
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-06-21 12:17

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- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
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- **Blank Spike (BS)**: A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
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Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4F3632										
Blank (B4F3632-BLK1)				Prepared: 2024-06-20, Analyzed: 2024-06-20						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4F3632-BLK2)				Prepared: 2024-06-20, Analyzed: 2024-06-20						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4F3632-BLK3)				Prepared: 2024-06-20, Analyzed: 2024-06-20						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4F3632-BS1)				Prepared: 2024-06-20, Analyzed: 2024-06-20						
Alkalinity, Total (as CaCO3)	90.6	1.0	mg/L	100		91	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	42.4	1.0	mg/L	50.0		85	0-200			
LCS (B4F3632-BS3)				Prepared: 2024-06-20, Analyzed: 2024-06-20						
Alkalinity, Total (as CaCO3)	91.3	1.0	mg/L	100		91	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	37.1	1.0	mg/L	50.0		74	0-200			
LCS (B4F3632-BS5)				Prepared: 2024-06-20, Analyzed: 2024-06-20						
Alkalinity, Total (as CaCO3)	90.3	1.0	mg/L	100		90	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	35.8	1.0	mg/L	50.0		72	0-200			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Dan Steinke	**WORK ORDER**	24F3260
PO NUMBER		**RECEIVED / TEMP**	2024-06-26 10:04 / 13.6°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-06-28 15:06
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24F3260
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-06-28 15:06

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24F3260-01) | Matrix: Water | Sampled: 2024-06-25						
General Parameters						
Alkalinity, Total (as CaCO3)	84.5	N/A	1.0	mg/L	2024-06-28	
Alkalinity, Phenolphthalein (as CaCO3)	12.0	N/A	1.0	mg/L	2024-06-28	
Alkalinity, Bicarbonate (as CaCO3)	60.5	N/A	1.0	mg/L	2024-06-28	
Alkalinity, Carbonate (as CaCO3)	24.0	N/A	1.0	mg/L	2024-06-28	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-06-28	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24F3260
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-06-28 15:06

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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General Comments:

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24F3260
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-06-28 15:06

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup)**: An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- **Blank Spike (BS)**: A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS)**: A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
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Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4F4422										
Blank (B4F4422-BLK1)				Prepared: 2024-06-28, Analyzed: 2024-06-28						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4F4422-BLK2)				Prepared: 2024-06-28, Analyzed: 2024-06-28						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4F4422-BLK3)				Prepared: 2024-06-28, Analyzed: 2024-06-28						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4F4422-BS1)				Prepared: 2024-06-28, Analyzed: 2024-06-28						
Alkalinity, Total (as CaCO3)	97.9	1.0	mg/L	100		98	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	61.2	1.0	mg/L	50.0		122	0-200			
LCS (B4F4422-BS3)				Prepared: 2024-06-28, Analyzed: 2024-06-28						
Alkalinity, Total (as CaCO3)	96.6	1.0	mg/L	100		97	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	71.5	1.0	mg/L	50.0		143	0-200			
LCS (B4F4422-BS5)				Prepared: 2024-06-28, Analyzed: 2024-06-28						
Alkalinity, Total (as CaCO3)	98.0	1.0	mg/L	100		98	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	59.8	1.0	mg/L	50.0		120	0-200			

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MAKING KAMLOOPS SHINE

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24G0317
PO NUMBER		**RECEIVED / TEMP**	2024-07-03 10:27 / 10.8°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-07-09 08:01
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

Introduction:

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You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

We've Got Chemistry

It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Ahead of the Curve

Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

By engaging our services, you are agreeing to CARO Analytical Service's Standard Terms and Conditions outlined here: https://www.caro.ca/terms-conditions

If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24G0317
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-07-09 08:01

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24G0317-01) | Matrix: Water | Sampled: 2024-07-02						
Anions						
Chloride	47.5	AO ≤ 250	0.10	mg/L	2024-07-04	
Nitrate (as N)	1.86	MAC = 10	0.010	mg/L	2024-07-04	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-07-04	
Calculated Parameters						
Nitrate+Nitrite (as N)	1.86	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	3.69	N/A	0.0500	mg/L	N/A	
General Parameters						
Alkalinity, Total (as CaCO3)	82.4	N/A	1.0	mg/L	2024-07-04	
Alkalinity, Phenolphthalein (as CaCO3)	39.3	N/A	1.0	mg/L	2024-07-04	
Alkalinity, Bicarbonate (as CaCO3)	3.8	N/A	1.0	mg/L	2024-07-04	
Alkalinity, Carbonate (as CaCO3)	78.5	N/A	1.0	mg/L	2024-07-04	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-07-04	
Ammonia, Total (as N)	0.050	None Required	0.050	mg/L	2024-07-05	
Nitrogen, Total Kjeldahl	1.82	N/A	0.050	mg/L	2024-07-05	
UV Permit (24G0317-02) | Matrix: Water | Sampled: 2024-07-02						
Anions						
Nitrate (as N)	11.4	MAC = 10	0.010	mg/L	2024-07-04	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-07-04	
Calculated Parameters						
Nitrate+Nitrite (as N)	11.4	N/A	0.100	mg/L	N/A	
Nitrogen, Total	13.5	N/A	0.100	mg/L	N/A	
General Parameters						
Ammonia, Total (as N)	0.054	None Required	0.050	mg/L	2024-07-05	
Nitrogen, Total Kjeldahl	2.11	N/A	0.050	mg/L	2024-07-05	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24G0317
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-07-09 08:01

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna
Ammonia, Total in Water	SM 4500-NH3 G* (2021)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2020)	Ion Chromatography	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2021)	Block Digestion and Flow Injection Analysis	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
AO	Aesthetic Objective
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Health Canada, September 2022)

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24G0317
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-07-09 08:01

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Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B4G1866										
Blank (B4G1866-BLK1)				Prepared: 2024-07-04, Analyzed: 2024-07-04						
Chloride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
LCS (B4G1866-BS1)				Prepared: 2024-07-04, Analyzed: 2024-07-04						
Chloride	15.9	0.10	mg/L	16.0		99	90-110			
Nitrate (as N)	4.03	0.010	mg/L	4.00		101	90-110			
Nitrite (as N)	1.89	0.010	mg/L	2.00		94	85-115			
General Parameters, Batch B4G1836										
Blank (B4G1836-BLK1)				Prepared: 2024-07-04, Analyzed: 2024-07-04						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4G1836-BLK2)				Prepared: 2024-07-04, Analyzed: 2024-07-04						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4G1836-BS1)				Prepared: 2024-07-04, Analyzed: 2024-07-04						
Alkalinity, Total (as CaCO3)	97.6	1.0	mg/L	100		98	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	72.4	1.0	mg/L	50.0		145	0-200			
LCS (B4G1836-BS3)				Prepared: 2024-07-04, Analyzed: 2024-07-04						
Alkalinity, Total (as CaCO3)	97.6	1.0	mg/L	100		98	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	70.9	1.0	mg/L	50.0		142	0-200			
General Parameters, Batch B4G1885										

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	WORK ORDER	24G0317
PROJECT	KSTC Water System Analysis	REPORTED	2024-07-09 08:01

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4G1885, Continued										
Blank (B4G1885-BLK1)				Prepared: 2024-07-04, Analyzed: 2024-07-05						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
Blank (B4G1885-BLK2)				Prepared: 2024-07-04, Analyzed: 2024-07-05						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
LCS (B4G1885-BS1)				Prepared: 2024-07-04, Analyzed: 2024-07-05						
Nitrogen, Total Kjeldahl	1.02	0.050	mg/L	1.00		102	85-115			
LCS (B4G1885-BS2)				Prepared: 2024-07-04, Analyzed: 2024-07-05						
Nitrogen, Total Kjeldahl	1.04	0.050	mg/L	1.00		104	85-115			
General Parameters, Batch B4G1980										
Blank (B4G1980-BLK1)				Prepared: 2024-07-05, Analyzed: 2024-07-05						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4G1980-BLK2)				Prepared: 2024-07-05, Analyzed: 2024-07-05						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4G1980-BLK3)				Prepared: 2024-07-05, Analyzed: 2024-07-05						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4G1980-BLK4)				Prepared: 2024-07-05, Analyzed: 2024-07-05						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
LCS (B4G1980-BS1)				Prepared: 2024-07-05, Analyzed: 2024-07-05						
Ammonia, Total (as N)	0.963	0.050	mg/L	1.00		96	85-115			
LCS (B4G1980-BS2)				Prepared: 2024-07-05, Analyzed: 2024-07-05						
Ammonia, Total (as N)	0.975	0.050	mg/L	1.00		98	85-115			
LCS (B4G1980-BS3)				Prepared: 2024-07-05, Analyzed: 2024-07-05						
Ammonia, Total (as N)	0.959	0.050	mg/L	1.00		96	85-115			
LCS (B4G1980-BS4)				Prepared: 2024-07-05, Analyzed: 2024-07-05						
Ammonia, Total (as N)	0.943	0.050	mg/L	1.00		94	85-115			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24G1283
PO NUMBER		**RECEIVED / TEMP**	2024-07-10 09:45 / 20.8°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-07-12 13:03
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24G1283
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-07-12 13:03

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24G1283-01) | Matrix: Water | Sampled: 2024-07-09						
General Parameters						
Alkalinity, Total (as CaCO3)	79.4	N/A	1.0	mg/L	2024-07-11	
Alkalinity, Phenolphthalein (as CaCO3)	55.2	N/A	1.0	mg/L	2024-07-11	
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-07-11	
Alkalinity, Carbonate (as CaCO3)	48.5	N/A	1.0	mg/L	2024-07-11	
Alkalinity, Hydroxide (as CaCO3)	31.0	N/A	1.0	mg/L	2024-07-11	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24G1283
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-07-12 13:03

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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mg/L	Milligrams per litre
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24G1283
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-07-12 13:03

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Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4G2553										
Blank (B4G2553-BLK1)				Prepared: 2024-07-11, Analyzed: 2024-07-11						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4G2553-BLK2)				Prepared: 2024-07-11, Analyzed: 2024-07-11						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4G2553-BS1)				Prepared: 2024-07-11, Analyzed: 2024-07-11						
Alkalinity, Total (as CaCO3)	96.5	1.0	mg/L	100		96	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	71.5	1.0	mg/L	50.0		143	0-200			
LCS (B4G2553-BS3)				Prepared: 2024-07-11, Analyzed: 2024-07-11						
Alkalinity, Total (as CaCO3)	96.6	1.0	mg/L	100		97	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	69.4	1.0	mg/L	50.0		139	0-200			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24G2101
PO NUMBER		**RECEIVED / TEMP**	2024-07-17 09:17 / 17.1°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-07-18 16:30
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24G2101
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-07-18 16:30

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24G2101-01) | Matrix: Water | Sampled: 2024-07-16						
General Parameters						
Alkalinity, Total (as CaCO3)	85.2	N/A	1.0	mg/L	2024-07-18	
Alkalinity, Phenolphthalein (as CaCO3)	33.4	N/A	1.0	mg/L	2024-07-18	
Alkalinity, Bicarbonate (as CaCO3)	18.3	N/A	1.0	mg/L	2024-07-18	
Alkalinity, Carbonate (as CaCO3)	66.9	N/A	1.0	mg/L	2024-07-18	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-07-18	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24G2101
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-07-18 16:30

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
mg/L	Milligrams per litre
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Health Canada, September 2022)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

General Comments:

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24G2101
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-07-18 16:30

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Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4G3355										
Blank (B4G3355-BLK1)				Prepared: 2024-07-18, Analyzed: 2024-07-18						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4G3355-BLK2)				Prepared: 2024-07-18, Analyzed: 2024-07-18						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4G3355-BS1)				Prepared: 2024-07-18, Analyzed: 2024-07-18						
Alkalinity, Total (as CaCO3)	98.0	1.0	mg/L	100		98	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	79.3	1.0	mg/L	50.0		159	0-200			
LCS (B4G3355-BS3)				Prepared: 2024-07-18, Analyzed: 2024-07-18						
Alkalinity, Total (as CaCO3)	97.1	1.0	mg/L	100		97	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	73.3	1.0	mg/L	50.0		147	0-200			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Dan Steinke	**WORK ORDER**	24G3107
PO NUMBER		**RECEIVED / TEMP**	2024-07-24 09:42 / 17.1°C
PROJECT	C4 Permit Alk	**REPORTED**	2024-07-25 14:07
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

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Authorized By:

Brent Whitehead
Account Manager

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24G3107
PROJECT	C4 Permit Alk	**REPORTED**	2024-07-25 14:07

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24G3107-01) | Matrix: Water | Sampled: 2024-07-23						
General Parameters						
Alkalinity, Total (as CaCO3)	**88.3**	N/A	1.0	mg/L	2024-07-25	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-07-25	
Alkalinity, Bicarbonate (as CaCO3)	**88.3**	N/A	1.0	mg/L	2024-07-25	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-07-25	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-07-25	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24G3107
PROJECT	C4 Permit Alk	**REPORTED**	2024-07-25 14:07

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24G3107
PROJECT	C4 Permit Alk	**REPORTED**	2024-07-25 14:07

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Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4G4183										
Blank (B4G4183-BLK1)				Prepared: 2024-07-25, Analyzed: 2024-07-25						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4G4183-BLK2)				Prepared: 2024-07-25, Analyzed: 2024-07-25						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4G4183-BS1)				Prepared: 2024-07-25, Analyzed: 2024-07-25						
Alkalinity, Total (as CaCO3)	103	1.0	mg/L	100		103	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	93.0	1.0	mg/L	50.0		186	0-200			
LCS (B4G4183-BS3)				Prepared: 2024-07-25, Analyzed: 2024-07-25						
Alkalinity, Total (as CaCO3)	99.0	1.0	mg/L	100		99	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	85.9	1.0	mg/L	50.0		172	0-200			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24H0025
PO NUMBER		**RECEIVED / TEMP**	2024-07-31 09:51 / 12.1°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-08-02 09:42
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24H0025
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-08-02 09:42

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24H0025-01) | Matrix: Water | Sampled: 2024-07-30						
General Parameters						
Alkalinity, Total (as CaCO3)	91.0	N/A	1.0	mg/L	2024-08-01	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-08-01	
Alkalinity, Bicarbonate (as CaCO3)	91.0	N/A	1.0	mg/L	2024-08-01	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-08-01	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-08-01	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24H0025
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-08-02 09:42

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24H0025
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-08-02 09:42

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Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4H1453										
Blank (B4H1453-BLK1)				Prepared: 2024-08-01, Analyzed: 2024-08-01						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4H1453-BLK2)				Prepared: 2024-08-01, Analyzed: 2024-08-01						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4H1453-BS1)				Prepared: 2024-08-01, Analyzed: 2024-08-01						
Alkalinity, Total (as CaCO3)	108	1.0	mg/L	100		108	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	94.3	1.0	mg/L	50.0		189	0-200			
LCS (B4H1453-BS3)				Prepared: 2024-08-01, Analyzed: 2024-08-01						
Alkalinity, Total (as CaCO3)	106	1.0	mg/L	100		106	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	93.0	1.0	mg/L	50.0		186	0-200			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24H0808
PO NUMBER		**RECEIVED / TEMP**	2024-08-07 09:57 / 13.9°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-08-09 16:24
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

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If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24H0808
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-08-09 16:24

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24H0808-01) | Matrix: Water | Sampled: 2024-08-06						
Anions						
Chloride	55.0	AO ≤ 250	0.10	mg/L	2024-08-09	
Nitrate (as N)	1.44	MAC = 10	0.010	mg/L	2024-08-09	
Nitrite (as N)	0.036	MAC = 1	0.010	mg/L	2024-08-09	
Calculated Parameters						
Nitrate+Nitrite (as N)	1.47	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	4.28	N/A	0.0500	mg/L	N/A	
General Parameters						
Alkalinity, Total (as CaCO3)	82.9	N/A	1.0	mg/L	2024-08-08	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-08-08	
Alkalinity, Bicarbonate (as CaCO3)	82.9	N/A	1.0	mg/L	2024-08-08	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-08-08	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-08-08	
Ammonia, Total (as N)	0.061	None Required	0.050	mg/L	2024-08-09	
Nitrogen, Total Kjeldahl	2.81	N/A	0.050	mg/L	2024-08-09	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24H0808
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-08-09 16:24

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna
Ammonia, Total in Water	SM 4500-NH3 G* (2021)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2020)	Ion Chromatography	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2021)	Block Digestion and Flow Injection Analysis	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
AO	Aesthetic Objective
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Health Canada, September 2022)

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24H0808
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-08-09 16:24

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
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- **Blank Spike (BS)**: A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS)**: A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
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Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B4H1910										
Blank (B4H1910-BLK1)				Prepared: 2024-08-08, Analyzed: 2024-08-08						
Chloride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
LCS (B4H1910-BS1)				Prepared: 2024-08-08, Analyzed: 2024-08-08						
Chloride	15.9	0.10	mg/L	16.0		99	90-110			
Nitrate (as N)	3.77	0.010	mg/L	4.00		94	90-110			
Nitrite (as N)	1.97	0.010	mg/L	2.00		98	85-115			
LCS (B4H1910-BS2)				Prepared: 2024-08-09, Analyzed: 2024-08-09						
Chloride	16.0	0.10	mg/L	16.0		100	90-110			
Nitrate (as N)	3.79	0.010	mg/L	4.00		95	90-110			
Nitrite (as N)	1.97	0.010	mg/L	2.00		99	85-115			
General Parameters, Batch B4H2001										
Blank (B4H2001-BLK1)				Prepared: 2024-08-08, Analyzed: 2024-08-08						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4H2001-BLK2)				Prepared: 2024-08-08, Analyzed: 2024-08-08						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4H2001-BS1)				Prepared: 2024-08-08, Analyzed: 2024-08-08						
Alkalinity, Total (as CaCO3)	99.9	1.0	mg/L	100		100	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	74.7	1.0	mg/L	50.0		149	0-200			
LCS (B4H2001-BS3)				Prepared: 2024-08-08, Analyzed: 2024-08-08						
Alkalinity, Total (as CaCO3)	101	1.0	mg/L	100		101	80-120			

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	WORK ORDER	24H0808
PROJECT	KSTC Water System Analysis	REPORTED	2024-08-09 16:24

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4H2001, Continued										
LCS (B4H2001-BS3), Continued				Prepared: 2024-08-08, Analyzed: 2024-08-08						
Alkalinity, Phenolphthalein (as CaCO3)	80.6	1.0	mg/L	50.0		161	0-200			
Duplicate (B4H2001-DUP2)	Source: 24H0808-01			Prepared: 2024-08-08, Analyzed: 2024-08-08						
Alkalinity, Total (as CaCO3)	84.3	1.0	mg/L		82.9			2	10	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L		< 1.0				10	
Alkalinity, Bicarbonate (as CaCO3)	84.3	1.0	mg/L		82.9			2	10	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L		< 1.0				10	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L		< 1.0				10	
General Parameters, Batch B4H2016										
Blank (B4H2016-BLK1)				Prepared: 2024-08-08, Analyzed: 2024-08-09						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
Blank (B4H2016-BLK2)				Prepared: 2024-08-08, Analyzed: 2024-08-09						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
LCS (B4H2016-BS1)				Prepared: 2024-08-08, Analyzed: 2024-08-09						
Nitrogen, Total Kjeldahl	1.01	0.050	mg/L	1.00		101	85-115			
LCS (B4H2016-BS2)				Prepared: 2024-08-08, Analyzed: 2024-08-09						
Nitrogen, Total Kjeldahl	1.02	0.050	mg/L	1.00		102	85-115			
General Parameters, Batch B4H2079										
Blank (B4H2079-BLK1)				Prepared: 2024-08-09, Analyzed: 2024-08-09						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4H2079-BLK2)				Prepared: 2024-08-09, Analyzed: 2024-08-09						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4H2079-BLK3)				Prepared: 2024-08-09, Analyzed: 2024-08-09						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4H2079-BLK4)				Prepared: 2024-08-09, Analyzed: 2024-08-09						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
LCS (B4H2079-BS1)				Prepared: 2024-08-09, Analyzed: 2024-08-09						
Ammonia, Total (as N)	1.03	0.050	mg/L	1.00		103	85-115			
LCS (B4H2079-BS2)				Prepared: 2024-08-09, Analyzed: 2024-08-09						
Ammonia, Total (as N)	1.01	0.050	mg/L	1.00		101	85-115			
LCS (B4H2079-BS3)				Prepared: 2024-08-09, Analyzed: 2024-08-09						
Ammonia, Total (as N)	1.04	0.050	mg/L	1.00		104	85-115			
LCS (B4H2079-BS4)				Prepared: 2024-08-09, Analyzed: 2024-08-09						
Ammonia, Total (as N)	0.975	0.050	mg/L	1.00		98	85-115			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24H1925
PO NUMBER		**RECEIVED / TEMP**	2024-08-14 09:29 / 16.4°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-08-21 15:38
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24H1925
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-08-21 15:38

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24H1925-01) | Matrix: Water | Sampled: 2024-08-13						
General Parameters						
Alkalinity, Total (as CaCO3)	62.5	N/A	1.0	mg/L	2024-08-21	
Alkalinity, Phenolphthalein (as CaCO3)	7.5	N/A	1.0	mg/L	2024-08-21	
Alkalinity, Bicarbonate (as CaCO3)	67.5	N/A	1.0	mg/L	2024-08-21	
Alkalinity, Carbonate (as CaCO3)	15.0	N/A	1.0	mg/L	2024-08-21	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-08-21	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24H1925
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-08-21 15:38

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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mg/L	Milligrams per litre
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24H1925
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-08-21 15:38

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Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4H3190										
LCS (B4H3190-BS2)				Prepared: 2024-08-21, Analyzed: 2024-08-21						
Alkalinity, Total (as CaCO3)	97.5	1.0	mg/L	100		98	80-120			

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CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24H2760
PO NUMBER		**RECEIVED / TEMP**	2024-08-21 09:24 / 11.1°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-08-26 13:29
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

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Account Manager

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24H2760
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-08-26 13:29

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24H2760-01) | Matrix: Water | Sampled: 2024-08-20						
General Parameters						
Alkalinity, Total (as CaCO3)	71.6	N/A	1.0	mg/L	2024-08-26	
Alkalinity, Phenolphthalein (as CaCO3)	26.2	N/A	1.0	mg/L	2024-08-26	
Alkalinity, Bicarbonate (as CaCO3)	19.1	N/A	1.0	mg/L	2024-08-26	
Alkalinity, Carbonate (as CaCO3)	52.5	N/A	1.0	mg/L	2024-08-26	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-08-26	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24H2760
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-08-26 13:29

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
mg/L	Milligrams per litre
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Health Canada, September 2022)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

General Comments:

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24H2760
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-08-26 13:29

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

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- **Blank Spike (BS)**: A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS)**: A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
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Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4H3881										
Blank (B4H3881-BLK1)				Prepared: 2024-08-26, Analyzed: 2024-08-26						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4H3881-BLK2)				Prepared: 2024-08-26, Analyzed: 2024-08-26						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4H3881-BS1)				Prepared: 2024-08-26, Analyzed: 2024-08-26						
Alkalinity, Total (as CaCO3)	94.1	1.0	mg/L	100		94	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	3.4	1.0	mg/L	50.0		7	0-200			
LCS (B4H3881-BS3)				Prepared: 2024-08-26, Analyzed: 2024-08-26						
Alkalinity, Total (as CaCO3)	95.2	1.0	mg/L	100		95	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	4.0	1.0	mg/L	50.0		8	0-200			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24H3705
PO NUMBER		**RECEIVED / TEMP**	2024-08-28 09:57 / 7.4°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-04 09:56
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

Introduction:

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Big Picture Sidekicks

You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

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If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24H3705
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-04 09:56

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24H3705-01) | Matrix: Water | Sampled: 2024-08-27						
General Parameters						
Alkalinity, Total (as CaCO3)	62.7	N/A	1.0	mg/L	2024-08-30	
Alkalinity, Phenolphthalein (as CaCO3)	25.4	N/A	1.0	mg/L	2024-08-30	
Alkalinity, Bicarbonate (as CaCO3)	12.0	N/A	1.0	mg/L	2024-08-30	
Alkalinity, Carbonate (as CaCO3)	50.7	N/A	1.0	mg/L	2024-08-30	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-08-30	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24H3705
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-04 09:56

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24H3705
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-04 09:56

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Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4H4507										
Blank (B4H4507-BLK1)				Prepared: 2024-08-30, Analyzed: 2024-08-30						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4H4507-BLK2)				Prepared: 2024-08-30, Analyzed: 2024-08-30						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4H4507-BS1)				Prepared: 2024-08-30, Analyzed: 2024-08-30						
Alkalinity, Total (as CaCO3)	93.9	1.0	mg/L	100		94	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	40.3	1.0	mg/L	50.0		81	0-200			
LCS (B4H4507-BS3)				Prepared: 2024-08-30, Analyzed: 2024-08-30						
Alkalinity, Total (as CaCO3)	94.0	1.0	mg/L	100		94	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	36.2	1.0	mg/L	50.0		72	0-200			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24I0434
PO NUMBER		**RECEIVED / TEMP**	2024-09-04 09:36 / 4.4°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-11 11:12
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	WORK ORDER	24I0434
PROJECT	KSTC Water System Analysis	REPORTED	2024-09-11 11:12

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24I0434-01) | Matrix: Water | Sampled: 2024-09-03						
Anions						
Chloride	46.8	AO ≤ 250	0.10	mg/L	2024-09-06	
Nitrate (as N)	2.19	MAC = 10	0.010	mg/L	2024-09-06	
Nitrite (as N)	0.041	MAC = 1	0.010	mg/L	2024-09-06	
Calculated Parameters						
Nitrate+Nitrite (as N)	2.24	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	3.96	N/A	0.0500	mg/L	N/A	
General Parameters						
Alkalinity, Total (as CaCO3)	54.7	N/A	1.0	mg/L	2024-09-06	
Alkalinity, Phenolphthalein (as CaCO3)	29.0	N/A	1.0	mg/L	2024-09-06	
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-09-06	
Alkalinity, Carbonate (as CaCO3)	51.4	N/A	1.0	mg/L	2024-09-06	
Alkalinity, Hydroxide (as CaCO3)	3.3	N/A	1.0	mg/L	2024-09-06	
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2024-09-09	
Nitrogen, Total Kjeldahl	1.73	N/A	0.050	mg/L	2024-09-09	
UV Permit (24I0434-02) | Matrix: Water | Sampled: 2024-09-03						
Anions						
Nitrate (as N)	13.7	MAC = 10	0.010	mg/L	2024-09-06	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-09-06	
Calculated Parameters						
Nitrate+Nitrite (as N)	13.7	N/A	0.100	mg/L	N/A	
Nitrogen, Total	14.9	N/A	0.100	mg/L	N/A	
General Parameters						
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2024-09-09	
Nitrogen, Total Kjeldahl	1.26	N/A	0.050	mg/L	2024-09-09	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24I0434
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-11 11:12

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna
Ammonia, Total in Water	SM 4500-NH3 G* (2021)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2020)	Ion Chromatography	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2021)	Block Digestion and Flow Injection Analysis	✓	Kelowna

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

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PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-11 11:12

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Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B4I1905										
Blank (B4I1905-BLK1)				Prepared: 2024-09-05, Analyzed: 2024-09-05						
Chloride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
LCS (B4I1905-BS1)				Prepared: 2024-09-05, Analyzed: 2024-09-05						
Chloride	16.0	0.10	mg/L	16.0		100	90-110			
Nitrate (as N)	3.84	0.010	mg/L	4.00		96	90-110			
Nitrite (as N)	2.06	0.010	mg/L	2.00		103	85-115			
General Parameters, Batch B4I1990										
Blank (B4I1990-BLK1)				Prepared: 2024-09-06, Analyzed: 2024-09-09						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
Blank (B4I1990-BLK2)				Prepared: 2024-09-06, Analyzed: 2024-09-09						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
LCS (B4I1990-BS1)				Prepared: 2024-09-06, Analyzed: 2024-09-09						
Nitrogen, Total Kjeldahl	1.01	0.050	mg/L	1.00		101	85-115			
LCS (B4I1990-BS2)				Prepared: 2024-09-06, Analyzed: 2024-09-09						
Nitrogen, Total Kjeldahl	1.02	0.050	mg/L	1.00		102	85-115			
General Parameters, Batch B4I2028										
Blank (B4I2028-BLK1)				Prepared: 2024-09-06, Analyzed: 2024-09-06						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4I2028-BLK2)				Prepared: 2024-09-06, Analyzed: 2024-09-06						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	WORK ORDER	24I0434
PROJECT	KSTC Water System Analysis	REPORTED	2024-09-11 11:12

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4I2028, Continued										
Blank (B4I2028-BLK2), Continued				Prepared: 2024-09-06, Analyzed: 2024-09-06						
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4I2028-BS1)				Prepared: 2024-09-06, Analyzed: 2024-09-06						
Alkalinity, Total (as CaCO3)	92.4	1.0	mg/L	100		92	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	42.9	1.0	mg/L	50.0		86	0-200			
LCS (B4I2028-BS3)				Prepared: 2024-09-06, Analyzed: 2024-09-06						
Alkalinity, Total (as CaCO3)	93.9	1.0	mg/L	100		94	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	40.8	1.0	mg/L	50.0		82	0-200			
General Parameters, Batch B4I2152										
Blank (B4I2152-BLK1)				Prepared: 2024-09-09, Analyzed: 2024-09-09						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4I2152-BLK2)				Prepared: 2024-09-09, Analyzed: 2024-09-09						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4I2152-BLK3)				Prepared: 2024-09-09, Analyzed: 2024-09-09						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4I2152-BLK4)				Prepared: 2024-09-09, Analyzed: 2024-09-09						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4I2152-BLK5)				Prepared: 2024-09-09, Analyzed: 2024-09-09						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
LCS (B4I2152-BS1)				Prepared: 2024-09-09, Analyzed: 2024-09-09						
Ammonia, Total (as N)	1.00	0.050	mg/L	1.00		100	85-115			
LCS (B4I2152-BS2)				Prepared: 2024-09-09, Analyzed: 2024-09-09						
Ammonia, Total (as N)	0.962	0.050	mg/L	1.00		96	85-115			
LCS (B4I2152-BS3)				Prepared: 2024-09-09, Analyzed: 2024-09-09						
Ammonia, Total (as N)	0.973	0.050	mg/L	1.00		97	85-115			
LCS (B4I2152-BS4)				Prepared: 2024-09-09, Analyzed: 2024-09-09						
Ammonia, Total (as N)	0.945	0.050	mg/L	1.00		94	85-115			
LCS (B4I2152-BS5)				Prepared: 2024-09-09, Analyzed: 2024-09-09						
Ammonia, Total (as N)	0.957	0.050	mg/L	1.00		96	85-115			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24I1408
PO NUMBER		**RECEIVED / TEMP**	2024-09-11 09:47 / 11.4°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-13 10:25
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

Introduction:

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Authorized By:

Brent Whitehead
Account Manager

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24I1408
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-13 10:25

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24I1408-01) | Matrix: Water | Sampled: 2024-09-10						
General Parameters						
Alkalinity, Total (as CaCO3)	60.8	N/A	1.0	mg/L	2024-09-12	
Alkalinity, Phenolphthalein (as CaCO3)	23.2	N/A	1.0	mg/L	2024-09-12	
Alkalinity, Bicarbonate (as CaCO3)	14.4	N/A	1.0	mg/L	2024-09-12	
Alkalinity, Carbonate (as CaCO3)	46.4	N/A	1.0	mg/L	2024-09-12	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-09-12	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24I1408
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-13 10:25

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
mg/L	Milligrams per litre
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Health Canada, September 2022)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

General Comments:

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24I1408
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-13 10:25

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup)**: An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- **Blank Spike (BS)**: A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS)**: A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- **Reference Material (SRM)**: A homogenous material of similar matrix to the samples, certified for the parameter(s) listed. Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4I2659										
Blank (B4I2659-BLK1)				Prepared: 2024-09-12, Analyzed: 2024-09-12						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4I2659-BLK2)				Prepared: 2024-09-12, Analyzed: 2024-09-12						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4I2659-BS1)				Prepared: 2024-09-12, Analyzed: 2024-09-12						
Alkalinity, Total (as CaCO3)	94.9	1.0	mg/L	100		95	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	45.0	1.0	mg/L	50.0		90	0-200			
LCS (B4I2659-BS3)				Prepared: 2024-09-12, Analyzed: 2024-09-12						
Alkalinity, Total (as CaCO3)	93.7	1.0	mg/L	100		94	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	40.7	1.0	mg/L	50.0		81	0-200			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24I2442
PO NUMBER		**RECEIVED / TEMP**	2024-09-18 09:47 / 5.6°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-23 10:40
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

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Account Manager

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24I2442
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-23 10:40

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24I2442-01) | Matrix: Water | Sampled: 2024-09-17						
General Parameters						
Alkalinity, Total (as CaCO3)	65.8	N/A	1.0	mg/L	2024-09-20	
Alkalinity, Phenolphthalein (as CaCO3)	11.4	N/A	1.0	mg/L	2024-09-20	
Alkalinity, Bicarbonate (as CaCO3)	43.0	N/A	1.0	mg/L	2024-09-20	
Alkalinity, Carbonate (as CaCO3)	22.8	N/A	1.0	mg/L	2024-09-20	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-09-20	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24I2442
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-23 10:40

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24I2442
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-23 10:40

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Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4I3476										
Blank (B4I3476-BLK1)				Prepared: 2024-09-20, Analyzed: 2024-09-20						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4I3476-BLK2)				Prepared: 2024-09-20, Analyzed: 2024-09-20						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4I3476-BS1)				Prepared: 2024-09-20, Analyzed: 2024-09-20						
Alkalinity, Total (as CaCO3)	93.3	1.0	mg/L	100		93	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	45.0	1.0	mg/L	50.0		90	0-200			
LCS (B4I3476-BS3)				Prepared: 2024-09-20, Analyzed: 2024-09-20						
Alkalinity, Total (as CaCO3)	93.8	1.0	mg/L	100		94	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	45.3	1.0	mg/L	50.0		91	0-200			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24I3294
PO NUMBER		**RECEIVED / TEMP**	2024-09-25 09:23 / 11.6°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-28 16:06
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24I3294
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-28 16:06

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24I3294-01) | Matrix: Water | Sampled: 2024-09-24						
General Parameters						
Alkalinity, Total (as CaCO3)	63.7	N/A	1.0	mg/L	2024-09-27	
Alkalinity, Phenolphthalein (as CaCO3)	4.9	N/A	1.0	mg/L	2024-09-27	
Alkalinity, Bicarbonate (as CaCO3)	53.8	N/A	1.0	mg/L	2024-09-27	
Alkalinity, Carbonate (as CaCO3)	9.9	N/A	1.0	mg/L	2024-09-27	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-09-27	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24I3294
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-28 16:06

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24I3294
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-09-28 16:06

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- **Blank Spike (BS)**: A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS)**: A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- **Reference Material (SRM)**: A homogenous material of similar matrix to the samples, certified for the parameter(s) listed. Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4I4325										
Blank (B4I4325-BLK1)				Prepared: 2024-09-27, Analyzed: 2024-09-27						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4I4325-BLK2)				Prepared: 2024-09-27, Analyzed: 2024-09-27						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4I4325-BLK3)				Prepared: 2024-09-27, Analyzed: 2024-09-27						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Dan Steinke	**WORK ORDER**	24J0576
PO NUMBER		**RECEIVED / TEMP**	2024-10-03 10:09 / 17.4°C
PROJECT	C4 Permit Alk	**REPORTED**	2024-10-09 16:09
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO/IEC 17025:2017 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks

You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

We've Got Chemistry

It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Ahead of the Curve

Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

By engaging our services, you are agreeing to CARO Analytical Service's Standard Terms and Conditions outlined here: https://www.caro.ca/terms-conditions

If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

1-888-311-8846 | www.caro.ca

#110 4011 Viking Way Richmond, BC V6V 2K9 | #102 3677 Highway 97N Kelowna, BC V1X 5C3 | 17225 109 Avenue Edmonton, AB T5S 1H7 | #108 4475 Wayburne Drive Burnaby, BC V5G 4X4

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J0576
PROJECT	C4 Permit Alk	**REPORTED**	2024-10-09 16:09

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell 4 Permit (24J0576-01) | Matrix: Water | Sampled: 2024-10-01						
Anions						
Chloride	45.7	AO ≤ 250	0.10	mg/L	2024-10-04	
Nitrate (as N)	0.044	MAC = 10	0.010	mg/L	2024-10-04	
Nitrite (as N)	0.355	MAC = 1	0.010	mg/L	2024-10-04	
Sulfate	54.2	AO ≤ 500	1.0	mg/L	2024-10-04	
Calculated Parameters						
Nitrate+Nitrite (as N)	0.399	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	2.58	N/A	0.0500	mg/L	N/A	
General Parameters						
Alkalinity, Total (as CaCO3)	63.6	N/A	1.0	mg/L	2024-10-07	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-07	
Alkalinity, Bicarbonate (as CaCO3)	63.6	N/A	1.0	mg/L	2024-10-07	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-07	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-07	
Ammonia, Total (as N)	0.517	None Required	0.050	mg/L	2024-10-09	
Nitrogen, Total Kjeldahl	2.19	N/A	0.050	mg/L	2024-10-09	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J0576
PROJECT	C4 Permit Alk	**REPORTED**	2024-10-09 16:09

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna
Ammonia, Total in Water	SM 4500-NH3 G* (2021)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2020)	Ion Chromatography	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2021)	Block Digestion and Flow Injection Analysis	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
AO	Aesthetic Objective
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Health Canada, September 2022)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

General Comments:

The results in this report apply to the received samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Caro will dispose of all samples within 30 days of sample receipt, unless otherwise agreed.

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted red. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager:bwhitehead@caro.ca

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline(s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J0576
PROJECT	C4 Permit Alk	**REPORTED**	2024-10-09 16:09

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup)**: An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- **Blank Spike (BS)**: A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
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Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B4J2050										
Blank (B4J2050-BLK1)				Prepared: 2024-10-04, Analyzed: 2024-10-04						
Chloride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
Blank (B4J2050-BLK2)				Prepared: 2024-10-04, Analyzed: 2024-10-04						
Chloride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
LCS (B4J2050-BS1)				Prepared: 2024-10-04, Analyzed: 2024-10-04						
Chloride	16.1	0.10	mg/L	16.0		100	90-110			
Nitrate (as N)	4.05	0.010	mg/L	4.00		101	90-110			
Nitrite (as N)	2.01	0.010	mg/L	2.00		101	85-115			
Sulfate	16.2	1.0	mg/L	16.0		101	90-110			
LCS (B4J2050-BS2)				Prepared: 2024-10-04, Analyzed: 2024-10-04						
Chloride	16.0	0.10	mg/L	16.0		100	90-110			
Nitrate (as N)	4.01	0.010	mg/L	4.00		100	90-110			
Nitrite (as N)	2.08	0.010	mg/L	2.00		104	85-115			
Sulfate	16.5	1.0	mg/L	16.0		103	90-110			
General Parameters, Batch B4J2219										
Blank (B4J2219-BLK1)				Prepared: 2024-10-07, Analyzed: 2024-10-07						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4J2219-BLK2)				Prepared: 2024-10-07, Analyzed: 2024-10-07						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	WORK ORDER	24J0576
PROJECT	C4 Permit Alk	REPORTED	2024-10-09 16:09

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4J2219, Continued										
Blank (B4J2219-BLK2), Continued				Prepared: 2024-10-07, Analyzed: 2024-10-07						
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4J2219-BS1)				Prepared: 2024-10-07, Analyzed: 2024-10-07						
Alkalinity, Total (as CaCO3)	91.1	1.0	mg/L	100		91	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	42.8	1.0	mg/L	50.0		86	0-200			
LCS (B4J2219-BS3)				Prepared: 2024-10-07, Analyzed: 2024-10-07						
Alkalinity, Total (as CaCO3)	92.5	1.0	mg/L	100		92	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	42.6	1.0	mg/L	50.0		85	0-200			
General Parameters, Batch B4J2432										
Blank (B4J2432-BLK1)				Prepared: 2024-10-08, Analyzed: 2024-10-09						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
Blank (B4J2432-BLK2)				Prepared: 2024-10-08, Analyzed: 2024-10-09						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
LCS (B4J2432-BS1)				Prepared: 2024-10-08, Analyzed: 2024-10-09						
Nitrogen, Total Kjeldahl	0.987	0.050	mg/L	1.00		99	85-115			
LCS (B4J2432-BS2)				Prepared: 2024-10-08, Analyzed: 2024-10-09						
Nitrogen, Total Kjeldahl	0.977	0.050	mg/L	1.00		98	85-115			
General Parameters, Batch B4J2486										
Blank (B4J2486-BLK1)				Prepared: 2024-10-09, Analyzed: 2024-10-09						
Ammonia, Total (as N)	0.023	0.010	mg/L							
Blank (B4J2486-BLK2)				Prepared: 2024-10-09, Analyzed: 2024-10-09						
Ammonia, Total (as N)	0.018	0.010	mg/L							
Blank (B4J2486-BLK3)				Prepared: 2024-10-09, Analyzed: 2024-10-09						
Ammonia, Total (as N)	0.022	0.010	mg/L							
Blank (B4J2486-BLK4)				Prepared: 2024-10-09, Analyzed: 2024-10-09						
Ammonia, Total (as N)	0.023	0.010	mg/L							
LCS (B4J2486-BS1)				Prepared: 2024-10-09, Analyzed: 2024-10-09						
Ammonia, Total (as N)	0.969	0.010	mg/L	1.00		97	85-115			
LCS (B4J2486-BS2)				Prepared: 2024-10-09, Analyzed: 2024-10-09						
Ammonia, Total (as N)	0.993	0.010	mg/L	1.00		99	85-115			
LCS (B4J2486-BS3)				Prepared: 2024-10-09, Analyzed: 2024-10-09						
Ammonia, Total (as N)	1.02	0.010	mg/L	1.00		102	85-115			
LCS (B4J2486-BS4)				Prepared: 2024-10-09, Analyzed: 2024-10-09						
Ammonia, Total (as N)	1.03	0.010	mg/L	1.00		103	85-115			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Dan Steinke	**WORK ORDER**	24J1529
PO NUMBER		**RECEIVED / TEMP**	2024-10-10 09:44 / 6.2°C
PROJECT	C4 Permit Alk	**REPORTED**	2024-10-17 12:20
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

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If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J1529
PROJECT	C4 Permit Alk	**REPORTED**	2024-10-17 12:20

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Upstream River (24J1529-01) | Matrix: Water | Sampled: 2024-10-09						
Anions						
Chloride	1.22	AO ≤ 250	0.10	mg/L	2024-10-10	
Nitrate (as N)	0.060	MAC = 10	0.010	mg/L	2024-10-10	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-10-10	
Sulfate	7.9	AO ≤ 500	1.0	mg/L	2024-10-10	
Calculated Parameters						
Nitrate+Nitrite (as N)	0.0603	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	0.211	N/A	0.0500	mg/L	N/A	
General Parameters						
Alkalinity, Total (as CaCO3)	34.0	N/A	1.0	mg/L	2024-10-12	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-12	
Alkalinity, Bicarbonate (as CaCO3)	34.0	N/A	1.0	mg/L	2024-10-12	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-12	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-12	
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2024-10-11	
Nitrogen, Total Kjeldahl	0.151	N/A	0.050	mg/L	2024-10-17	
Cell 4 Permit (24J1529-02) | Matrix: Water | Sampled: 2024-10-09						
General Parameters						
Alkalinity, Total (as CaCO3)	58.9	N/A	1.0	mg/L	2024-10-12	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-12	
Alkalinity, Bicarbonate (as CaCO3)	58.9	N/A	1.0	mg/L	2024-10-12	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-12	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-12	
Downstream River (24J1529-03) | Matrix: Water | Sampled: 2024-10-09						
Anions						
Chloride	3.20	AO ≤ 250	0.10	mg/L	2024-10-10	
Nitrate (as N)	0.223	MAC = 10	0.010	mg/L	2024-10-10	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-10-10	
Sulfate	9.6	AO ≤ 500	1.0	mg/L	2024-10-10	
Calculated Parameters						
Nitrate+Nitrite (as N)	0.223	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	0.459	N/A	0.0500	mg/L	N/A	
General Parameters						
Alkalinity, Total (as CaCO3)	36.1	N/A	1.0	mg/L	2024-10-12	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-12	
Alkalinity, Bicarbonate (as CaCO3)	36.1	N/A	1.0	mg/L	2024-10-12	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-12	

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J1529
PROJECT	C4 Permit Alk	**REPORTED**	2024-10-17 12:20

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Downstream River (24J1529-03) | Matrix: Water | Sampled: 2024-10-09, Continued						
General Parameters, Continued						
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-12	
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2024-10-11	
Nitrogen, Total Kjeldahl	0.236	N/A	0.050	mg/L	2024-10-17	

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J1529
PROJECT	C4 Permit Alk	**REPORTED**	2024-10-17 12:20

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna
Ammonia, Total in Water	SM 4500-NH3 G* (2021)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2020)	Ion Chromatography	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2021)	Block Digestion and Flow Injection Analysis	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
AO	Aesthetic Objective
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Health Canada, September 2022)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

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The results in this report apply to the received samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Caro will dispose of all samples within 30 days of sample receipt, unless otherwise agreed.

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted red. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager:bwhitehead@caro.ca

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline(s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J1529
PROJECT	C4 Permit Alk	**REPORTED**	2024-10-17 12:20

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup)**: An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- **Blank Spike (BS)**: A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS)**: A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- **Reference Material (SRM)**: A homogenous material of similar matrix to the samples, certified for the parameter(s) listed. Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B4J2776										
Blank (B4J2776-BLK1)				Prepared: 2024-10-10, Analyzed: 2024-10-10						
Chloride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
Blank (B4J2776-BLK2)				Prepared: 2024-10-10, Analyzed: 2024-10-10						
Chloride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
LCS (B4J2776-BS1)				Prepared: 2024-10-10, Analyzed: 2024-10-10						
Chloride	15.9	0.10	mg/L	16.0		99	90-110			
Nitrate (as N)	4.02	0.010	mg/L	4.00		100	90-110			
Nitrite (as N)	2.17	0.010	mg/L	2.00		109	85-115			
Sulfate	16.0	1.0	mg/L	16.0		100	90-110			
LCS (B4J2776-BS2)				Prepared: 2024-10-10, Analyzed: 2024-10-10						
Chloride	16.0	0.10	mg/L	16.0		100	90-110			
Nitrate (as N)	4.03	0.010	mg/L	4.00		101	90-110			
Nitrite (as N)	1.86	0.010	mg/L	2.00		93	85-115			
Sulfate	16.2	1.0	mg/L	16.0		102	90-110			
General Parameters, Batch B4J2819										
Blank (B4J2819-BLK1)				Prepared: 2024-10-11, Analyzed: 2024-10-11						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4J2819-BLK2)				Prepared: 2024-10-11, Analyzed: 2024-10-11						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4J2819-BLK3)				Prepared: 2024-10-11, Analyzed: 2024-10-11						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4J2819-BLK4)				Prepared: 2024-10-11, Analyzed: 2024-10-11						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	WORK ORDER	24J1529
PROJECT	C4 Permit Alk	REPORTED	2024-10-17 12:20

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4J2819, Continued										
Blank (B4J2819-BLK5)				Prepared: 2024-10-11, Analyzed: 2024-10-11						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
Blank (B4J2819-BLK6)				Prepared: 2024-10-11, Analyzed: 2024-10-11						
Ammonia, Total (as N)	< 0.050	0.050	mg/L							
LCS (B4J2819-BS1)				Prepared: 2024-10-11, Analyzed: 2024-10-11						
Ammonia, Total (as N)	1.01	0.050	mg/L	1.00		101	85-115			
LCS (B4J2819-BS2)				Prepared: 2024-10-11, Analyzed: 2024-10-11						
Ammonia, Total (as N)	0.984	0.050	mg/L	1.00		98	85-115			
LCS (B4J2819-BS3)				Prepared: 2024-10-11, Analyzed: 2024-10-11						
Ammonia, Total (as N)	1.02	0.050	mg/L	1.00		102	85-115			
LCS (B4J2819-BS4)				Prepared: 2024-10-11, Analyzed: 2024-10-11						
Ammonia, Total (as N)	1.02	0.050	mg/L	1.00		102	85-115			
LCS (B4J2819-BS5)				Prepared: 2024-10-11, Analyzed: 2024-10-11						
Ammonia, Total (as N)	1.00	0.050	mg/L	1.00		100	85-115			
LCS (B4J2819-BS6)				Prepared: 2024-10-11, Analyzed: 2024-10-11						
Ammonia, Total (as N)	1.01	0.050	mg/L	1.00		101	85-115			
General Parameters, Batch B4J2967										
Blank (B4J2967-BLK1)				Prepared: 2024-10-12, Analyzed: 2024-10-12						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4J2967-BLK2)				Prepared: 2024-10-12, Analyzed: 2024-10-12						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B4J2967-BLK3)				Prepared: 2024-10-12, Analyzed: 2024-10-12						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B4J2967-BS1)				Prepared: 2024-10-12, Analyzed: 2024-10-12						
Alkalinity, Total (as CaCO3)	91.8	1.0	mg/L	100		92	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	43.6	1.0	mg/L	50.0		87	0-200			
LCS (B4J2967-BS3)				Prepared: 2024-10-12, Analyzed: 2024-10-12						
Alkalinity, Total (as CaCO3)	91.3	1.0	mg/L	100		91	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	41.6	1.0	mg/L	50.0		83	0-200			
LCS (B4J2967-BS5)				Prepared: 2024-10-12, Analyzed: 2024-10-12						
Alkalinity, Total (as CaCO3)	90.8	1.0	mg/L	100		91	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	38.3	1.0	mg/L	50.0		77	0-200			

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J1529
PROJECT	C4 Permit Alk	**REPORTED**	2024-10-17 12:20

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4J3272										
Blank (B4J3272-BLK1)				Prepared: 2024-10-16, Analyzed: 2024-10-17						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
Blank (B4J3272-BLK2)				Prepared: 2024-10-16, Analyzed: 2024-10-17						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
LCS (B4J3272-BS1)				Prepared: 2024-10-16, Analyzed: 2024-10-17						
Nitrogen, Total Kjeldahl	1.00	0.050	mg/L	1.00		100	85-115			
LCS (B4J3272-BS2)				Prepared: 2024-10-16, Analyzed: 2024-10-17						
Nitrogen, Total Kjeldahl	0.979	0.050	mg/L	1.00		98	85-115			

CARO ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre 3300 Mission Flats Road Kamloops, BC V2C 6V3		
ATTENTION	Derek Fisher	**WORK ORDER**	24J3248
PO NUMBER	497408	**RECEIVED / TEMP**	2024-10-24 09:29 / 11.3°C
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21
PROJECT INFO	Biannual Water Sampling	**COC NUMBER**	No Number

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CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO/IEC 17025:2017 for specific tests listed in the scope of accreditation approved by CALA.

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You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

We've Got Chemistry

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Ahead of the Curve

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If you have any questions or concerns, please contact me at hhannaoui@caro.ca

Authorized By:

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CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J3248
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
KSTC-01 (24J3248-01) | Matrix: Water | Sampled: 2024-10-23						
Anions						
Chloride	37.0	AO ≤ 250	0.10	mg/L	2024-10-25	
Fluoride	< 0.10	MAC = 1.5	0.10	mg/L	2024-10-25	
Nitrate (as N)	< 0.010	MAC = 10	0.010	mg/L	2024-10-25	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-10-25	
Sulfate	31.8	AO ≤ 500	1.0	mg/L	2024-10-25	
BCMOE Aggregate Hydrocarbons						
EPHw10-19	1560	N/A	250	µg/L	2024-10-30	
EPHw19-32	8600	N/A	250	µg/L	2024-10-30	
Surrogate: 2-Methylnonane (EPH/F2-4)	*110*		*60-140*	%	*2024-10-30*	
Calculated Parameters						
Hardness, Dissolved (as CaCO3)	66.4	N/A	0.500	mg/L	N/A	
Dissolved Metals						
Aluminum, dissolved	0.0473	N/A	0.0050	mg/L	2024-10-29	
Antimony, dissolved	0.00036	N/A	0.00020	mg/L	2024-10-29	
Arsenic, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-29	
Barium, dissolved	0.0095	N/A	0.0050	mg/L	2024-10-29	
Beryllium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-29	
Bismuth, dissolved	0.00038	N/A	0.00010	mg/L	2024-10-29	
Boron, dissolved	0.144	N/A	0.0500	mg/L	2024-10-29	
Cadmium, dissolved	0.000254	N/A	0.000010	mg/L	2024-10-29	
Calcium, dissolved	17.1	N/A	0.20	mg/L	2024-10-29	
Chromium, dissolved	0.00461	N/A	0.00050	mg/L	2024-10-29	
Cobalt, dissolved	0.00037	N/A	0.00010	mg/L	2024-10-29	
Copper, dissolved	0.0284	N/A	0.00040	mg/L	2024-10-29	
Iron, dissolved	0.181	N/A	0.010	mg/L	2024-10-29	
Lead, dissolved	0.00056	N/A	0.00020	mg/L	2024-10-29	
Lithium, dissolved	0.00378	N/A	0.00010	mg/L	2024-10-29	
Magnesium, dissolved	5.76	N/A	0.010	mg/L	2024-10-29	
Manganese, dissolved	0.0187	N/A	0.00020	mg/L	2024-10-29	
Mercury, dissolved	< 0.000010	N/A	0.000010	mg/L	2024-10-28	
Molybdenum, dissolved	0.00141	N/A	0.00010	mg/L	2024-10-29	
Nickel, dissolved	0.00176	N/A	0.00040	mg/L	2024-10-29	
Phosphorus, dissolved	5.42	N/A	0.050	mg/L	2024-10-29	
Potassium, dissolved	15.0	N/A	0.10	mg/L	2024-10-29	
Selenium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-29	
Silicon, dissolved	3.3	N/A	1.0	mg/L	2024-10-29	
Silver, dissolved	0.000066	N/A	0.000050	mg/L	2024-10-29	
Sodium, dissolved	46.5	N/A	0.10	mg/L	2024-10-29	
Strontium, dissolved	0.107	N/A	0.0010	mg/L	2024-10-29	
Sulfur, dissolved	11.9	N/A	3.0	mg/L	2024-10-29	
Tellurium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-29	

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J3248
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
KSTC-01 (24J3248-01) | Matrix: Water | Sampled: 2024-10-23, Continued						
Dissolved Metals, Continued						
Thallium, dissolved	< 0.000020	N/A	0.000020	mg/L	2024-10-29	
Thorium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-29	
Tin, dissolved	**0.00136**	N/A	0.00020	mg/L	2024-10-29	
Titanium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-10-29	
Tungsten, dissolved	< 0.0010	N/A	0.0010	mg/L	2024-10-29	
Uranium, dissolved	**0.000696**	N/A	0.000020	mg/L	2024-10-29	
Vanadium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-10-29	
Zinc, dissolved	**0.0402**	N/A	0.0040	mg/L	2024-10-29	
Zirconium, dissolved	**0.00124**	N/A	0.00010	mg/L	2024-10-29	
General Parameters						
Alkalinity, Total (as CaCO3)	**195**	N/A	1.0	mg/L	2024-10-26	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-26	
Alkalinity, Bicarbonate (as CaCO3)	**195**	N/A	1.0	mg/L	2024-10-26	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-26	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-26	
Ammonia, Total (as N)	**41.1**	None Required	0.050	mg/L	2024-10-25	
Colour, True	**250**	AO ≤ 15	5.0	CU	2024-10-27	HT1
Conductivity (EC)	**662**	N/A	2.0	µS/cm	2024-10-26	
pH	**7.46**	7.0-10.5	0.10	pH units	2024-10-26	HT2
Phosphorus, Total (as P)	**8.15**	N/A	0.0050	mg/L	2024-10-28	
Phosphorus, Dissolved Reactive	**4.92**	N/A	0.0050	mg/L	2024-10-25	
Solids, Total Dissolved	**277**	AO ≤ 500	15	mg/L	2024-10-29	
Solids, Total Suspended	**268**	N/A	2.0	mg/L	2024-10-30	
Sulfide, Total	**0.258**	AO ≤ 0.05	0.020	mg/L	2024-10-30	
Turbidity	**150**	OG < 1	0.10	NTU	2024-10-26	
Miscellaneous Subcontracted Parameters						
Phenolics, Total	**0.0210**	N/A	0.00200	mg/L	2024-10-28	
Total Metals						
Aluminum, total	**0.567**	OG < 0.1	0.0050	mg/L	2024-10-28	
Antimony, total	**0.00061**	MAC = 0.006	0.00020	mg/L	2024-10-28	
Arsenic, total	**0.00072**	MAC = 0.01	0.00050	mg/L	2024-10-28	
Barium, total	**0.0243**	MAC = 2	0.0050	mg/L	2024-10-28	
Beryllium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-28	
Bismuth, total	**0.00569**	N/A	0.00010	mg/L	2024-10-28	
Boron, total	**0.124**	MAC = 5	0.0500	mg/L	2024-10-28	
Cadmium, total	**0.000646**	MAC = 0.007	0.000010	mg/L	2024-10-28	
Calcium, total	**20.7**	None Required	0.20	mg/L	2024-10-28	
Chromium, total	**0.0110**	MAC = 0.05	0.00050	mg/L	2024-10-28	
Cobalt, total	**0.00076**	N/A	0.00010	mg/L	2024-10-28	
Copper, total	**0.0751**	MAC = 2	0.00040	mg/L	2024-10-28	
Iron, total	**0.889**	AO ≤ 0.3	0.010	mg/L	2024-10-28	

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J3248
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
KSTC-01 (24J3248-01) | Matrix: Water | Sampled: 2024-10-23, Continued						
Total Metals, Continued						
Lead, total	**0.00219**	MAC = 0.005	0.00020	mg/L	2024-10-28	
Lithium, total	**0.00350**	N/A	0.00010	mg/L	2024-10-28	
Magnesium, total	**6.42**	None Required	0.010	mg/L	2024-10-28	
Manganese, total	**0.0362**	MAC = 0.12	0.00020	mg/L	2024-10-28	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2024-10-28	
Molybdenum, total	**0.00311**	N/A	0.00010	mg/L	2024-10-29	
Nickel, total	**0.00318**	N/A	0.00040	mg/L	2024-10-28	
Phosphorus, total	**8.89**	N/A	0.050	mg/L	2024-10-28	
Potassium, total	**16.7**	N/A	0.10	mg/L	2024-10-28	
Selenium, total	**0.00076**	MAC = 0.05	0.00050	mg/L	2024-10-28	
Silicon, total	**3.8**	N/A	1.0	mg/L	2024-10-28	
Silver, total	**0.000361**	None Required	0.000050	mg/L	2024-10-28	
Sodium, total	**44.3**	AO ≤ 200	0.10	mg/L	2024-10-28	
Strontium, total	**0.118**	MAC = 7	0.0010	mg/L	2024-10-28	
Sulfur, total	**13.5**	N/A	3.0	mg/L	2024-10-28	
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2024-10-28	
Thallium, total	< 0.000020	N/A	0.000020	mg/L	2024-10-28	
Thorium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-28	
Tin, total	**0.00254**	N/A	0.00020	mg/L	2024-10-28	
Titanium, total	**0.0150**	N/A	0.0050	mg/L	2024-10-28	
Tungsten, total	< 0.0010	N/A	0.0010	mg/L	2024-10-28	
Uranium, total	**0.00180**	MAC = 0.02	0.000020	mg/L	2024-10-28	
Vanadium, total	**0.0060**	N/A	0.0050	mg/L	2024-10-28	
Zinc, total	**0.141**	AO ≤ 5	0.0040	mg/L	2024-10-28	
Zirconium, total	**0.00117**	N/A	0.00010	mg/L	2024-10-28	
KSTC-02 (24J3248-02) | Matrix: Water | Sampled: 2024-10-23						
Anions						
Chloride	**38.7**	AO ≤ 250	0.10	mg/L	2024-10-25	
Fluoride	< 0.10	MAC = 1.5	0.10	mg/L	2024-10-25	
Nitrate (as N)	**15.4**	MAC = 10	0.010	mg/L	2024-10-25	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-10-25	
Sulfate	**54.8**	AO ≤ 500	1.0	mg/L	2024-10-25	
BCMOE Aggregate Hydrocarbons						
EPHw10-19	< 250	N/A	250	µg/L	2024-10-30	
EPHw19-32	< 250	N/A	250	µg/L	2024-10-30	
Surrogate: 2-Methylnonane (EPH/F2-4)	*111*		*60-140*	%	*2024-10-30*	
Calculated Parameters						
Hardness, Dissolved (as CaCO3)	**74.0**	N/A	0.500	mg/L	N/A	
Dissolved Metals						

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J3248
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
KSTC-02 (24J3248-02) | Matrix: Water | Sampled: 2024-10-23, Continued						
Dissolved Metals, Continued						
Aluminum, dissolved	**0.0849**	N/A	0.0050	mg/L	2024-10-28	
Antimony, dissolved	**0.00038**	N/A	0.00020	mg/L	2024-10-28	
Arsenic, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-28	
Barium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-10-28	
Beryllium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-28	
Bismuth, dissolved	**0.00018**	N/A	0.00010	mg/L	2024-10-28	
Boron, dissolved	**0.135**	N/A	0.0500	mg/L	2024-10-28	
Cadmium, dissolved	**0.000038**	N/A	0.000010	mg/L	2024-10-28	
Calcium, dissolved	**19.5**	N/A	0.20	mg/L	2024-10-28	
Chromium, dissolved	**0.00420**	N/A	0.00050	mg/L	2024-10-28	
Cobalt, dissolved	**0.00033**	N/A	0.00010	mg/L	2024-10-28	
Copper, dissolved	**0.00564**	N/A	0.00040	mg/L	2024-10-28	
Iron, dissolved	**0.038**	N/A	0.010	mg/L	2024-10-28	
Lead, dissolved	**0.00023**	N/A	0.00020	mg/L	2024-10-28	
Lithium, dissolved	**0.00381**	N/A	0.00010	mg/L	2024-10-28	
Magnesium, dissolved	**6.15**	N/A	0.010	mg/L	2024-10-28	
Manganese, dissolved	**0.0286**	N/A	0.00020	mg/L	2024-10-28	
Mercury, dissolved	< 0.000010	N/A	0.000010	mg/L	2024-10-28	
Molybdenum, dissolved	**0.00032**	N/A	0.00010	mg/L	2024-10-28	
Nickel, dissolved	**0.00143**	N/A	0.00040	mg/L	2024-10-28	
Phosphorus, dissolved	**0.200**	N/A	0.050	mg/L	2024-10-28	
Potassium, dissolved	**14.7**	N/A	0.10	mg/L	2024-10-28	
Selenium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-28	
Silicon, dissolved	**3.4**	N/A	1.0	mg/L	2024-10-28	
Silver, dissolved	< 0.000050	N/A	0.000050	mg/L	2024-10-28	
Sodium, dissolved	**46.7**	N/A	0.10	mg/L	2024-10-28	
Strontium, dissolved	**0.106**	N/A	0.0010	mg/L	2024-10-28	
Sulfur, dissolved	**18.0**	N/A	3.0	mg/L	2024-10-28	
Tellurium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-28	
Thallium, dissolved	< 0.000020	N/A	0.000020	mg/L	2024-10-28	
Thorium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-28	
Tin, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-10-28	
Titanium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-10-28	
Tungsten, dissolved	< 0.0010	N/A	0.0010	mg/L	2024-10-28	
Uranium, dissolved	< 0.000020	N/A	0.000020	mg/L	2024-10-28	
Vanadium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-10-28	
Zinc, dissolved	**0.0330**	N/A	0.0040	mg/L	2024-10-28	
Zirconium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-28	
General Parameters						
Alkalinity, Total (as CaCO3)	**2.3**	N/A	1.0	mg/L	2024-10-26	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-26	
Alkalinity, Bicarbonate (as CaCO3)	**2.3**	N/A	1.0	mg/L	2024-10-26	

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J3248
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
KSTC-02 (24J3248-02) | Matrix: Water | Sampled: 2024-10-23, Continued						
General Parameters, Continued						
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-26	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-26	
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2024-10-25	
Colour, True	27	AO ≤ 15	5.0	CU	2024-10-27	HT1
Conductivity (EC)	421	N/A	2.0	µS/cm	2024-10-26	
pH	6.39	7.0-10.5	0.10	pH units	2024-10-26	HT2
Phosphorus, Total (as P)	0.367	N/A	0.0050	mg/L	2024-10-28	
Phosphorus, Dissolved Reactive	0.138	N/A	0.0050	mg/L	2024-10-25	
Solids, Total Dissolved	275	AO ≤ 500	15	mg/L	2024-10-29	
Solids, Total Suspended	5.0	N/A	2.0	mg/L	2024-10-30	
Sulfide, Total	< 0.020	AO ≤ 0.05	0.020	mg/L	2024-10-30	
Turbidity	1.89	OG < 1	0.10	NTU	2024-10-26	
Microbiological Parameters						
Coliforms, Total (Q-Tray)	20	MAC = 0	1	MPN/100 mL	2024-10-24	HT4
Coliforms, Fecal (Q-Tray)	1	N/A	1	MPN/100 mL	2024-10-24	HT4
E. coli (Q-Tray)	1	MAC = 0	1	MPN/100 mL	2024-10-24	HT4
Miscellaneous Subcontracted Parameters						
Phenolics, Total	< 0.00200	N/A	0.00200	mg/L	2024-10-28	
Total Metals						
Aluminum, total	0.212	OG < 0.1	0.0050	mg/L	2024-10-29	
Antimony, total	0.00039	MAC = 0.006	0.00020	mg/L	2024-10-29	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050	mg/L	2024-10-29	
Barium, total	< 0.0050	MAC = 2	0.0050	mg/L	2024-10-29	
Beryllium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-29	
Bismuth, total	0.00026	N/A	0.00010	mg/L	2024-10-29	
Boron, total	0.146	MAC = 5	0.0500	mg/L	2024-10-29	
Cadmium, total	0.000044	MAC = 0.007	0.000010	mg/L	2024-10-29	
Calcium, total	19.1	None Required	0.20	mg/L	2024-10-29	
Chromium, total	0.00458	MAC = 0.05	0.00050	mg/L	2024-10-29	
Cobalt, total	0.00036	N/A	0.00010	mg/L	2024-10-29	
Copper, total	0.00700	MAC = 2	0.00040	mg/L	2024-10-29	
Iron, total	0.080	AO ≤ 0.3	0.010	mg/L	2024-10-29	
Lead, total	0.00031	MAC = 0.005	0.00020	mg/L	2024-10-29	
Lithium, total	0.00366	N/A	0.00010	mg/L	2024-10-29	
Magnesium, total	5.69	None Required	0.010	mg/L	2024-10-29	
Manganese, total	0.0296	MAC = 0.12	0.00020	mg/L	2024-10-29	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2024-10-28	
Molybdenum, total	0.00059	N/A	0.00010	mg/L	2024-10-29	
Nickel, total	0.00141	N/A	0.00040	mg/L	2024-10-29	
Phosphorus, total	0.431	N/A	0.050	mg/L	2024-10-29	
Potassium, total	14.4	N/A	0.10	mg/L	2024-10-29	

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J3248
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
KSTC-02 (24J3248-02) | Matrix: Water | Sampled: 2024-10-23, Continued						
Total Metals, Continued						
Selenium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2024-10-29	
Silicon, total	3.5	N/A	1.0	mg/L	2024-10-29	
Silver, total	< 0.000050	None Required	0.000050	mg/L	2024-10-29	
Sodium, total	41.0	AO ≤ 200	0.10	mg/L	2024-10-29	
Strontium, total	0.105	MAC = 7	0.0010	mg/L	2024-10-29	
Sulfur, total	19.2	N/A	3.0	mg/L	2024-10-29	
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2024-10-29	
Thallium, total	< 0.000020	N/A	0.000020	mg/L	2024-10-29	
Thorium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-29	
Tin, total	0.00023	N/A	0.00020	mg/L	2024-10-29	
Titanium, total	< 0.0050	N/A	0.0050	mg/L	2024-10-29	
Tungsten, total	< 0.0010	N/A	0.0010	mg/L	2024-10-29	
Uranium, total	< 0.000020	MAC = 0.02	0.000020	mg/L	2024-10-29	
Vanadium, total	< 0.0050	N/A	0.0050	mg/L	2024-10-29	
Zinc, total	0.0327	AO ≤ 5	0.0040	mg/L	2024-10-29	
Zirconium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-29	
KSTC-03 (24J3248-03) | Matrix: Water | Sampled: 2024-10-23						
Anions						
Chloride	45.2	AO ≤ 250	0.10	mg/L	2024-10-25	
Fluoride	0.14	MAC = 1.5	0.10	mg/L	2024-10-25	
Nitrate (as N)	4.06	MAC = 10	0.010	mg/L	2024-10-25	
Nitrite (as N)	0.147	MAC = 1	0.010	mg/L	2024-10-25	
Sulfate	54.3	AO ≤ 500	1.0	mg/L	2024-10-25	
BCMOE Aggregate Hydrocarbons						
EPHw10-19	< 250	N/A	250	µg/L	2024-10-30	
EPHw19-32	< 250	N/A	250	µg/L	2024-10-30	
Surrogate: 2-Methylnonane (EPH/F2-4)	*111*		*60-140*	%	*2024-10-30*	
Calculated Parameters						
Hardness, Dissolved (as CaCO3)	82.3	N/A	0.500	mg/L	N/A	
Dissolved Metals						
Aluminum, dissolved	0.0719	N/A	0.0050	mg/L	2024-10-28	
Antimony, dissolved	0.00031	N/A	0.00020	mg/L	2024-10-28	
Arsenic, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-28	
Barium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-10-28	
Beryllium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-28	
Bismuth, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-28	
Boron, dissolved	0.165	N/A	0.0500	mg/L	2024-10-28	
Cadmium, dissolved	0.000046	N/A	0.000010	mg/L	2024-10-28	
Calcium, dissolved	22.2	N/A	0.20	mg/L	2024-10-28	

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J3248
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
KSTC-03 (24J3248-03) | Matrix: Water | Sampled: 2024-10-23, Continued						
Dissolved Metals, Continued						
Chromium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-28	
Cobalt, dissolved	0.00027	N/A	0.00010	mg/L	2024-10-28	
Copper, dissolved	0.00587	N/A	0.00040	mg/L	2024-10-28	
Iron, dissolved	0.016	N/A	0.010	mg/L	2024-10-28	
Lead, dissolved	0.00031	N/A	0.00020	mg/L	2024-10-28	
Lithium, dissolved	0.00338	N/A	0.00010	mg/L	2024-10-28	
Magnesium, dissolved	6.50	N/A	0.010	mg/L	2024-10-28	
Manganese, dissolved	0.00496	N/A	0.00020	mg/L	2024-10-28	
Mercury, dissolved	< 0.000010	N/A	0.000010	mg/L	2024-10-28	
Molybdenum, dissolved	0.00072	N/A	0.00010	mg/L	2024-10-28	
Nickel, dissolved	0.00180	N/A	0.00040	mg/L	2024-10-28	
Phosphorus, dissolved	1.02	N/A	0.050	mg/L	2024-10-28	
Potassium, dissolved	15.9	N/A	0.10	mg/L	2024-10-28	
Selenium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-28	
Silicon, dissolved	1.8	N/A	1.0	mg/L	2024-10-28	
Silver, dissolved	< 0.000050	N/A	0.000050	mg/L	2024-10-28	
Sodium, dissolved	54.3	N/A	0.10	mg/L	2024-10-28	
Strontium, dissolved	0.115	N/A	0.0010	mg/L	2024-10-28	
Sulfur, dissolved	18.7	N/A	3.0	mg/L	2024-10-28	
Tellurium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-28	
Thallium, dissolved	< 0.000020	N/A	0.000020	mg/L	2024-10-28	
Thorium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-28	
Tin, dissolved	0.00029	N/A	0.00020	mg/L	2024-10-28	
Titanium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-10-28	
Tungsten, dissolved	< 0.0010	N/A	0.0010	mg/L	2024-10-28	
Uranium, dissolved	< 0.000020	N/A	0.000020	mg/L	2024-10-28	
Vanadium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-10-28	
Zinc, dissolved	0.0186	N/A	0.0040	mg/L	2024-10-28	
Zirconium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-28	
General Parameters						
Alkalinity, Total (as CaCO3)	58.0	N/A	1.0	mg/L	2024-10-28	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-28	
Alkalinity, Bicarbonate (as CaCO3)	58.0	N/A	1.0	mg/L	2024-10-28	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-28	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-28	
Ammonia, Total (as N)	0.154	None Required	0.050	mg/L	2024-10-25	
Colour, True	21	AO ≤ 15	5.0	CU	2024-10-27	HT1
Conductivity (EC)	446	N/A	2.0	µS/cm	2024-10-28	
pH	7.51	7.0-10.5	0.10	pH units	2024-10-28	HT2
Phosphorus, Total (as P)	0.735	N/A	0.0050	mg/L	2024-10-28	
Phosphorus, Dissolved Reactive	0.820	N/A	0.0050	mg/L	2024-10-25	RE2
Solids, Total Dissolved	260	AO ≤ 500	15	mg/L	2024-10-29	

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J3248
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
KSTC-03 (24J3248-03) | Matrix: Water | Sampled: 2024-10-23, Continued						
General Parameters, Continued						
Solids, Total Suspended	**2.0**	N/A	2.0	mg/L	2024-10-31	
Sulfide, Total	< 0.020	AO ≤ 0.05	0.020	mg/L	2024-10-30	
Turbidity	**2.57**	OG < 1	0.10	NTU	2024-10-26	
Microbiological Parameters						
Coliforms, Total (Q-Tray)	**2280**	MAC = 0	1	MPN/100 mL	2024-10-24	HT4
Coliforms, Fecal (Q-Tray)	**2**	N/A	1	MPN/100 mL	2024-10-24	HT4
E. coli (Q-Tray)	**2**	MAC = 0	1	MPN/100 mL	2024-10-24	HT4
Miscellaneous Subcontracted Parameters						
Phenolics, Total	< 0.00200	N/A	0.00200	mg/L	2024-10-28	
Total Metals						
Aluminum, total	**0.0886**	OG < 0.1	0.0050	mg/L	2024-10-29	
Antimony, total	**0.00027**	MAC = 0.006	0.00020	mg/L	2024-10-29	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050	mg/L	2024-10-29	
Barium, total	< 0.0050	MAC = 2	0.0050	mg/L	2024-10-29	
Beryllium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-29	
Bismuth, total	< 0.00010	N/A	0.00010	mg/L	2024-10-29	
Boron, total	**0.180**	MAC = 5	0.0500	mg/L	2024-10-29	
Cadmium, total	**0.000043**	MAC = 0.007	0.000010	mg/L	2024-10-29	
Calcium, total	**21.7**	None Required	0.20	mg/L	2024-10-29	
Chromium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2024-10-29	
Cobalt, total	**0.00028**	N/A	0.00010	mg/L	2024-10-29	
Copper, total	**0.00567**	MAC = 2	0.00040	mg/L	2024-10-29	
Iron, total	**0.032**	AO ≤ 0.3	0.010	mg/L	2024-10-29	
Lead, total	**0.00028**	MAC = 0.005	0.00020	mg/L	2024-10-29	
Lithium, total	**0.00317**	N/A	0.00010	mg/L	2024-10-29	
Magnesium, total	**6.06**	None Required	0.010	mg/L	2024-10-29	
Manganese, total	**0.00584**	MAC = 0.12	0.00020	mg/L	2024-10-29	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2024-10-28	
Molybdenum, total	**0.00087**	N/A	0.00010	mg/L	2024-10-29	
Nickel, total	**0.00184**	N/A	0.00040	mg/L	2024-10-29	
Phosphorus, total	**1.01**	N/A	0.050	mg/L	2024-10-29	
Potassium, total	**15.2**	N/A	0.10	mg/L	2024-10-29	
Selenium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2024-10-29	
Silicon, total	**1.9**	N/A	1.0	mg/L	2024-10-29	
Silver, total	< 0.000050	None Required	0.000050	mg/L	2024-10-29	
Sodium, total	**47.0**	AO ≤ 200	0.10	mg/L	2024-10-29	
Strontium, total	**0.113**	MAC = 7	0.0010	mg/L	2024-10-29	
Sulfur, total	**19.7**	N/A	3.0	mg/L	2024-10-29	
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2024-10-29	
Thallium, total	< 0.000020	N/A	0.000020	mg/L	2024-10-29	
Thorium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-29	

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J3248
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
KSTC-03 (24J3248-03) | Matrix: Water | Sampled: 2024-10-23, Continued						
Total Metals, Continued						
Tin, total	< 0.00020	N/A	0.00020	mg/L	2024-10-29	
Titanium, total	< 0.0050	N/A	0.0050	mg/L	2024-10-29	
Tungsten, total	< 0.0010	N/A	0.0010	mg/L	2024-10-29	
Uranium, total	**0.000025**	MAC = 0.02	0.000020	mg/L	2024-10-29	
Vanadium, total	< 0.0050	N/A	0.0050	mg/L	2024-10-29	
Zinc, total	**0.0171**	AO ≤ 5	0.0040	mg/L	2024-10-29	
Zirconium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-29	
KSTC-04 (24J3248-04) | Matrix: Water | Sampled: 2024-10-23						
Anions						
Chloride	**9.48**	AO ≤ 250	0.10	mg/L	2024-10-25	
Fluoride	< 0.10	MAC = 1.5	0.10	mg/L	2024-10-25	
Nitrate (as N)	< 0.010	MAC = 10	0.010	mg/L	2024-10-25	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-10-25	
Sulfate	**2.0**	AO ≤ 500	1.0	mg/L	2024-10-25	
BCMOE Aggregate Hydrocarbons						
EPHw10-19	< 250	N/A	250	µg/L	2024-10-30	
EPHw19-32	< 250	N/A	250	µg/L	2024-10-30	
Surrogate: 2-Methylnonane (EPH/F2-4)	*107*		*60-140*	%	*2024-10-30*	
Calculated Parameters						
Hardness, Dissolved (as CaCO3)	**10.6**	N/A	0.500	mg/L	N/A	
Dissolved Metals						
Aluminum, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-10-29	
Antimony, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-10-29	
Arsenic, dissolved	**0.00105**	N/A	0.00050	mg/L	2024-10-29	
Barium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-10-29	
Beryllium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-29	
Bismuth, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-29	
Boron, dissolved	**0.948**	N/A	0.0500	mg/L	2024-10-29	
Cadmium, dissolved	< 0.000010	N/A	0.000010	mg/L	2024-10-29	
Calcium, dissolved	**4.09**	N/A	0.20	mg/L	2024-10-29	
Chromium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-29	
Cobalt, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-29	
Copper, dissolved	**0.00591**	N/A	0.00040	mg/L	2024-10-29	
Iron, dissolved	< 0.010	N/A	0.010	mg/L	2024-10-29	
Lead, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-10-29	
Lithium, dissolved	**0.00088**	N/A	0.00010	mg/L	2024-10-29	
Magnesium, dissolved	**0.104**	N/A	0.010	mg/L	2024-10-29	
Manganese, dissolved	**0.00044**	N/A	0.00020	mg/L	2024-10-29	
Mercury, dissolved	< 0.000010	N/A	0.000010	mg/L	2024-10-28	

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J3248
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
KSTC-04 (24J3248-04) | Matrix: Water | Sampled: 2024-10-23, Continued						
Dissolved Metals, Continued						
Molybdenum, dissolved	**0.00727**	N/A	0.00010	mg/L	2024-10-29	
Nickel, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-10-29	
Phosphorus, dissolved	< 0.050	N/A	0.050	mg/L	2024-10-29	
Potassium, dissolved	< 0.10	N/A	0.10	mg/L	2024-10-29	
Selenium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-29	
Silicon, dissolved	**2.8**	N/A	1.0	mg/L	2024-10-29	
Silver, dissolved	< 0.000050	N/A	0.000050	mg/L	2024-10-29	
Sodium, dissolved	**22.5**	N/A	0.10	mg/L	2024-10-29	
Strontium, dissolved	**0.0124**	N/A	0.0010	mg/L	2024-10-29	
Sulfur, dissolved	< 3.0	N/A	3.0	mg/L	2024-10-29	
Tellurium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-29	
Thallium, dissolved	< 0.000020	N/A	0.000020	mg/L	2024-10-29	
Thorium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-29	
Tin, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-10-29	
Titanium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-10-29	
Tungsten, dissolved	< 0.0010	N/A	0.0010	mg/L	2024-10-29	
Uranium, dissolved	< 0.000020	N/A	0.000020	mg/L	2024-10-29	
Vanadium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-10-29	
Zinc, dissolved	< 0.0040	N/A	0.0040	mg/L	2024-10-29	
Zirconium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-29	
General Parameters						
Alkalinity, Total (as CaCO3)	**35.4**	N/A	1.0	mg/L	2024-10-28	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-28	
Alkalinity, Bicarbonate (as CaCO3)	**35.4**	N/A	1.0	mg/L	2024-10-28	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-28	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-28	
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2024-10-25	
Colour, True	< 5.0	AO ≤ 15	5.0	CU	2024-10-27	HT1
Conductivity (EC)	**108**	N/A	2.0	µS/cm	2024-10-28	
pH	**7.65**	7.0-10.5	0.10	pH units	2024-10-28	HT2
Phosphorus, Total (as P)	**0.0192**	N/A	0.0050	mg/L	2024-10-28	
Phosphorus, Dissolved Reactive	**0.0080**	N/A	0.0050	mg/L	2024-10-25	
Solids, Total Dissolved	**75**	AO ≤ 500	15	mg/L	2024-10-29	
Solids, Total Suspended	< 2.0	N/A	2.0	mg/L	2024-10-31	
Sulfide, Total	< 0.020	AO ≤ 0.05	0.020	mg/L	2024-10-30	
Turbidity	**0.23**	OG < 1	0.10	NTU	2024-10-26	
Microbiological Parameters						
Coliforms, Total (Q-Tray)	< 1	MAC = 0	1	MPN/100 mL	2024-10-24	HT4
Coliforms, Fecal (Q-Tray)	< 1	N/A	1	MPN/100 mL	2024-10-24	HT4
E. coli (Q-Tray)	< 1	MAC = 0	1	MPN/100 mL	2024-10-24	HT4
Miscellaneous Subcontracted Parameters						

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J3248
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
KSTC-04 (24J3248-04) | Matrix: Water | Sampled: 2024-10-23, Continued						
Miscellaneous Subcontracted Parameters, Continued						
Phenolics, Total	< 0.00200	N/A	0.00200	mg/L	2024-10-28	
Total Metals						
Aluminum, total	< 0.0050	OG < 0.1	0.0050	mg/L	2024-10-29	
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2024-10-29	
Arsenic, total	**0.00102**	MAC = 0.01	0.00050	mg/L	2024-10-29	
Barium, total	< 0.0050	MAC = 2	0.0050	mg/L	2024-10-29	
Beryllium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-29	
Bismuth, total	< 0.00010	N/A	0.00010	mg/L	2024-10-29	
Boron, total	**0.941**	MAC = 5	0.0500	mg/L	2024-10-29	
Cadmium, total	< 0.000010	MAC = 0.007	0.000010	mg/L	2024-10-29	
Calcium, total	**4.12**	None Required	0.20	mg/L	2024-10-29	
Chromium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2024-10-29	
Cobalt, total	< 0.00010	N/A	0.00010	mg/L	2024-10-29	
Copper, total	**0.00695**	MAC = 2	0.00040	mg/L	2024-10-29	
Iron, total	< 0.010	AO ≤ 0.3	0.010	mg/L	2024-10-29	
Lead, total	< 0.00020	MAC = 0.005	0.00020	mg/L	2024-10-29	
Lithium, total	**0.00079**	N/A	0.00010	mg/L	2024-10-29	
Magnesium, total	**0.099**	None Required	0.010	mg/L	2024-10-29	
Manganese, total	**0.00041**	MAC = 0.12	0.00020	mg/L	2024-10-29	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2024-10-28	
Molybdenum, total	**0.00883**	N/A	0.00010	mg/L	2024-10-29	
Nickel, total	< 0.00040	N/A	0.00040	mg/L	2024-10-29	
Phosphorus, total	< 0.050	N/A	0.050	mg/L	2024-10-29	
Potassium, total	< 0.10	N/A	0.10	mg/L	2024-10-29	
Selenium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2024-10-29	
Silicon, total	**2.7**	N/A	1.0	mg/L	2024-10-29	
Silver, total	< 0.000050	None Required	0.000050	mg/L	2024-10-29	
Sodium, total	**19.5**	AO ≤ 200	0.10	mg/L	2024-10-29	
Strontium, total	**0.0123**	MAC = 7	0.0010	mg/L	2024-10-29	
Sulfur, total	< 3.0	N/A	3.0	mg/L	2024-10-29	
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2024-10-29	
Thallium, total	< 0.000020	N/A	0.000020	mg/L	2024-10-29	
Thorium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-29	
Tin, total	< 0.00020	N/A	0.00020	mg/L	2024-10-29	
Titanium, total	< 0.0050	N/A	0.0050	mg/L	2024-10-29	
Tungsten, total	< 0.0010	N/A	0.0010	mg/L	2024-10-29	
Uranium, total	< 0.000020	MAC = 0.02	0.000020	mg/L	2024-10-29	
Vanadium, total	< 0.0050	N/A	0.0050	mg/L	2024-10-29	
Zinc, total	< 0.0040	AO ≤ 5	0.0040	mg/L	2024-10-29	
Zirconium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-29	
KSTC-05 (24J3248-05) | Matrix: Water | Sampled: 2024-10-23						

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J3248
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
KSTC-05 (24J3248-05) | Matrix: Water | Sampled: 2024-10-23, Continued						
Anions						
Chloride	**104**	AO ≤ 250	0.10	mg/L	2024-10-25	
Fluoride	**1.77**	MAC = 1.5	0.10	mg/L	2024-10-25	
Nitrate (as N)	< 0.010	MAC = 10	0.010	mg/L	2024-10-25	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-10-25	
Sulfate	**350**	AO ≤ 500	1.0	mg/L	2024-10-25	RE2
BCMOE Aggregate Hydrocarbons						
EPHw10-19	< 250	N/A	250	µg/L	2024-10-30	
EPHw19-32	< 250	N/A	250	µg/L	2024-10-30	
Surrogate: 2-Methylnonane (EPH/F2-4)	*109*		*60-140*	%	*2024-10-30*	
Calculated Parameters						
Hardness, Dissolved (as CaCO3)	**7.61**	N/A	0.500	mg/L	N/A	
Dissolved Metals						
Aluminum, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-10-29	
Antimony, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-10-29	
Arsenic, dissolved	**0.0142**	N/A	0.00050	mg/L	2024-10-29	
Barium, dissolved	**0.0457**	N/A	0.0050	mg/L	2024-10-29	
Beryllium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-29	
Bismuth, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-29	
Boron, dissolved	**0.987**	N/A	0.0500	mg/L	2024-10-29	
Cadmium, dissolved	< 0.000080	N/A	0.000010	mg/L	2024-10-29	RA1
Calcium, dissolved	**1.83**	N/A	0.20	mg/L	2024-10-29	
Chromium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-29	
Cobalt, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-29	
Copper, dissolved	**0.00047**	N/A	0.00040	mg/L	2024-10-29	
Iron, dissolved	**0.047**	N/A	0.010	mg/L	2024-10-29	
Lead, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-10-29	
Lithium, dissolved	**0.0205**	N/A	0.00010	mg/L	2024-10-29	
Magnesium, dissolved	**0.738**	N/A	0.010	mg/L	2024-10-29	
Manganese, dissolved	**0.00522**	N/A	0.00020	mg/L	2024-10-29	
Mercury, dissolved	< 0.000010	N/A	0.000010	mg/L	2024-10-28	
Molybdenum, dissolved	**0.670**	N/A	0.00010	mg/L	2024-10-29	
Nickel, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-10-29	
Phosphorus, dissolved	< 0.050	N/A	0.050	mg/L	2024-10-29	
Potassium, dissolved	**0.98**	N/A	0.10	mg/L	2024-10-29	
Selenium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-29	
Silicon, dissolved	**18.5**	N/A	1.0	mg/L	2024-10-29	
Silver, dissolved	< 0.000050	N/A	0.000050	mg/L	2024-10-29	
Sodium, dissolved	**611**	N/A	0.10	mg/L	2024-10-29	
Strontium, dissolved	**0.130**	N/A	0.0010	mg/L	2024-10-29	
Sulfur, dissolved	**115**	N/A	3.0	mg/L	2024-10-29	
Tellurium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-29	

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J3248
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
KSTC-05 (24J3248-05) | Matrix: Water | Sampled: 2024-10-23, Continued						
Dissolved Metals, Continued						
Thallium, dissolved	< 0.000020	N/A	0.000020	mg/L	2024-10-29	
Thorium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-29	
Tin, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-10-29	
Titanium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-10-29	
Tungsten, dissolved	0.0018	N/A	0.0010	mg/L	2024-10-29	
Uranium, dissolved	< 0.000020	N/A	0.000020	mg/L	2024-10-29	
Vanadium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-10-29	
Zinc, dissolved	< 0.0040	N/A	0.0040	mg/L	2024-10-29	
Zirconium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-29	
General Parameters						
Alkalinity, Total (as CaCO3)	509	N/A	1.0	mg/L	2024-10-28	
Alkalinity, Phenolphthalein (as CaCO3)	32.8	N/A	1.0	mg/L	2024-10-28	
Alkalinity, Bicarbonate (as CaCO3)	444	N/A	1.0	mg/L	2024-10-28	
Alkalinity, Carbonate (as CaCO3)	65.7	N/A	1.0	mg/L	2024-10-28	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-28	
Ammonia, Total (as N)	0.084	None Required	0.050	mg/L	2024-10-25	
Colour, True	11	AO ≤ 15	5.0	CU	2024-10-27	HT1
Conductivity (EC)	2010	N/A	2.0	µS/cm	2024-10-28	
pH	8.67	7.0-10.5	0.10	pH units	2024-10-28	HT2
Phosphorus, Total (as P)	0.0269	N/A	0.0050	mg/L	2024-10-28	
Phosphorus, Dissolved Reactive	0.0190	N/A	0.0050	mg/L	2024-10-25	
Solids, Total Dissolved	1310	AO ≤ 500	15	mg/L	2024-10-29	
Solids, Total Suspended	< 2.0	N/A	2.0	mg/L	2024-10-31	
Sulfide, Total	< 0.020	AO ≤ 0.05	0.020	mg/L	2024-10-30	
Turbidity	0.34	OG < 1	0.10	NTU	2024-10-26	
Microbiological Parameters						
Coliforms, Total (Q-Tray)	< 1	MAC = 0	1	MPN/100 mL	2024-10-24	HT4
Coliforms, Fecal (Q-Tray)	< 1	N/A	1	MPN/100 mL	2024-10-24	HT4
E. coli (Q-Tray)	< 1	MAC = 0	1	MPN/100 mL	2024-10-24	HT4
Miscellaneous Subcontracted Parameters						
Phenolics, Total	< 0.00200	N/A	0.00200	mg/L	2024-10-28	
Total Metals						
Aluminum, total	< 0.0050	OG < 0.1	0.0050	mg/L	2024-10-28	
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2024-10-28	
Arsenic, total	0.0131	MAC = 0.01	0.00050	mg/L	2024-10-28	
Barium, total	0.0456	MAC = 2	0.0050	mg/L	2024-10-28	
Beryllium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-28	
Bismuth, total	< 0.00010	N/A	0.00010	mg/L	2024-10-28	
Boron, total	0.956	MAC = 5	0.0500	mg/L	2024-10-28	
Cadmium, total	< 0.000090	MAC = 0.007	0.000010	mg/L	2024-10-28	RA1

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J3248
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
KSTC-05 (24J3248-05) | Matrix: Water | Sampled: 2024-10-23, Continued						
Total Metals, Continued						
Calcium, total	**1.87**	None Required	0.20	mg/L	2024-10-28	
Chromium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2024-10-28	
Cobalt, total	< 0.00010	N/A	0.00010	mg/L	2024-10-28	
Copper, total	**0.00090**	MAC = 2	0.00040	mg/L	2024-10-28	
Iron, total	**0.062**	AO ≤ 0.3	0.010	mg/L	2024-10-28	
Lead, total	< 0.00020	MAC = 0.005	0.00020	mg/L	2024-10-28	
Lithium, total	**0.0165**	N/A	0.00010	mg/L	2024-10-28	
Magnesium, total	**0.658**	None Required	0.010	mg/L	2024-10-28	
Manganese, total	**0.00532**	MAC = 0.12	0.00020	mg/L	2024-10-28	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2024-10-28	
Molybdenum, total	**0.766**	N/A	0.00010	mg/L	2024-10-28	
Nickel, total	< 0.00040	N/A	0.00040	mg/L	2024-10-28	
Phosphorus, total	< 0.050	N/A	0.050	mg/L	2024-10-28	
Potassium, total	**0.95**	N/A	0.10	mg/L	2024-10-28	
Selenium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2024-10-28	
Silicon, total	**17.1**	N/A	1.0	mg/L	2024-10-28	
Silver, total	< 0.000050	None Required	0.000050	mg/L	2024-10-28	
Sodium, total	**523**	AO ≤ 200	0.10	mg/L	2024-10-28	
Strontium, total	**0.127**	MAC = 7	0.0010	mg/L	2024-10-28	
Sulfur, total	**118**	N/A	3.0	mg/L	2024-10-28	
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2024-10-28	
Thallium, total	< 0.000020	N/A	0.000020	mg/L	2024-10-28	
Thorium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-28	
Tin, total	< 0.00020	N/A	0.00020	mg/L	2024-10-28	
Titanium, total	< 0.0050	N/A	0.0050	mg/L	2024-10-28	
Tungsten, total	**0.0022**	N/A	0.0010	mg/L	2024-10-28	
Uranium, total	< 0.000020	MAC = 0.02	0.000020	mg/L	2024-10-29	
Vanadium, total	< 0.0050	N/A	0.0050	mg/L	2024-10-28	
Zinc, total	< 0.0040	AO ≤ 5	0.0040	mg/L	2024-10-28	
Zirconium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-28	

Sample Qualifiers:

HT1	The sample was prepared and/or analyzed past the recommended holding time.
HT2	The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.
HT4	The collection date and/or time was not provided. Therefore holding time exceedances cannot be properly identified.
RA1	The Reporting Limit for this sample has been raised due to matrix interference.
RE2	Result was confirmed by re-analysis prior to reporting.

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J3248
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna
Ammonia, Total in Water	SM 4500-NH3 G* (2021)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2020)	Ion Chromatography	✓	Kelowna
Coliforms, Fecal in Water	SM 9223 (2016)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Coliforms, Total in Water	SM 9223 (2016)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Colour, True in Water	SM 2120 C (2021)	Spectrophotometry (456 nm)	✓	Kelowna
Conductivity in Water	SM 2510 B (2021)	Conductivity Meter	✓	Kelowna
Dissolved Metals in Water	EPA 200.8 / EPA 6020B	0.45 µm Filtration / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond
E. coli in Water	SM 9223 (2016)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
EPH in Water	EPA 3511* / BCMOE EPHw	Hexane MicroExtraction (Base/Neutral) / Gas Chromatography (GC-FID)	✓	Richmond
Hardness in Water	SM 2340 B (2021)	Calculation: 2.497 [diss Ca] + 4.118 [diss Mg]	✓	N/A
Hardness in Water	SM 2340 B* (2021)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Mercury, dissolved in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	✓	Richmond
Mercury, total in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	✓	Richmond
pH in Water	SM 4500-H+ B (2021)	Electrometry	✓	Kelowna
Phenolics in Water	EPA 9066	Auto-Distill-Colorimetric		Sublet
Phosphorus, Dissolved Reactive in Water	SM 4500-P F (2021)	Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2021)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Dissolved in Water	Solids in Water, Filtered / SM 2540 C* (2020)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2020)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna
Sulfide, Total in Water	SM 4500-S2 D* (2021)	Colorimetry (Methylene Blue)	✓	Edmonton
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond
Turbidity in Water	SM 2130 B (2020)	Nephelometry	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

CARO ANALYTICAL SERVICES

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J3248
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
AO	Aesthetic Objective
CU	Colour Units (referenced against a platinum cobalt standard)
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
MPN/100 mL	Most Probable Number per 100 millilitres
NTU	Nephelometric Turbidity Units
OG	Operational Guideline (treated water)
pH units	pH < 7 = acidic, ph > 7 = basic
µg/L	Micrograms per litre
µS/cm	Microsiemens per centimetre
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Health Canada, September 2022)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

General Comments:

The results in this report apply to the received samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Caro will dispose of all samples within 30 days of sample receipt, unless otherwise agreed.

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager:hhannaoui@caro.ca

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline(s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J3248
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup)**: An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- **Blank Spike (BS)**: A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS)**: A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- **Reference Material (SRM)**: A homogenous material of similar matrix to the samples, certified for the parameter(s) listed. Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B4J4362										
Blank (B4J4362-BLK2)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Chloride	< 0.10	0.10	mg/L							
Fluoride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
LCS (B4J4362-BS1)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Chloride	16.0	0.10	mg/L	16.0		100	90-110			
Fluoride	4.03	0.10	mg/L	4.00		101	88-108			
Nitrate (as N)	4.05	0.010	mg/L	4.00		101	90-110			
Nitrite (as N)	2.06	0.010	mg/L	2.00		103	85-115			
Sulfate	16.1	1.0	mg/L	16.0		100	90-110			
LCS (B4J4362-BS2)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Chloride	16.0	0.10	mg/L	16.0		100	90-110			
Fluoride	4.07	0.10	mg/L	4.00		102	88-108			
Nitrate (as N)	4.03	0.010	mg/L	4.00		101	90-110			
Nitrite (as N)	2.03	0.010	mg/L	2.00		101	85-115			
Sulfate	16.0	1.0	mg/L	16.0		100	90-110			
BCMOE Aggregate Hydrocarbons, Batch B4J4754										
Blank (B4J4754-BLK1)				Prepared: 2024-10-29, Analyzed: 2024-10-30						
EPHw10-19	< 250	250	µg/L							
EPHw19-32	< 250	250	µg/L							
Surrogate: 2-Methylnonane (EPH/F2-4)	*2460*		*µg/L*	2490		*99*	*60-140*			
LCS (B4J4754-BS2)				Prepared: 2024-10-29, Analyzed: 2024-10-30						
EPHw10-19	18500	250	µg/L	17400		107	70-130			
EPHw19-32	27100	250	µg/L	24800		109	70-130			
Surrogate: 2-Methylnonane (EPH/F2-4)	*1820*		*µg/L*	2490		*73*	*60-140*			
LCS Dup (B4J4754-BSD2)				Prepared: 2024-10-29, Analyzed: 2024-10-30						
EPHw10-19	19100	250	µg/L	17400		110	70-130	3	20	
EPHw19-32	27900	250	µg/L	24800		112	70-130	3	20	
Surrogate: 2-Methylnonane (EPH/F2-4)	*2070*		*µg/L*	2490		*83*	*60-140*			

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	WORK ORDER	24J3248
PROJECT	KSTC Water System Analysis	REPORTED	2024-11-01 15:21

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B4J4595										
Blank (B4J4595-BLK1)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Aluminum, dissolved	< 0.0050	0.0050	mg/L							
Antimony, dissolved	< 0.00020	0.00020	mg/L							
Arsenic, dissolved	< 0.00050	0.00050	mg/L							
Barium, dissolved	< 0.0050	0.0050	mg/L							
Beryllium, dissolved	< 0.00010	0.00010	mg/L							
Bismuth, dissolved	< 0.00010	0.00010	mg/L							
Boron, dissolved	< 0.0500	0.0500	mg/L							
Cadmium, dissolved	< 0.000010	0.000010	mg/L							
Calcium, dissolved	< 0.20	0.20	mg/L							
Chromium, dissolved	< 0.00050	0.00050	mg/L							
Cobalt, dissolved	< 0.00010	0.00010	mg/L							
Copper, dissolved	< 0.00040	0.00040	mg/L							
Iron, dissolved	< 0.010	0.010	mg/L							
Lead, dissolved	< 0.00020	0.00020	mg/L							
Lithium, dissolved	< 0.00010	0.00010	mg/L							
Magnesium, dissolved	< 0.010	0.010	mg/L							
Manganese, dissolved	< 0.00020	0.00020	mg/L							
Molybdenum, dissolved	< 0.00010	0.00010	mg/L							
Nickel, dissolved	< 0.00040	0.00040	mg/L							
Phosphorus, dissolved	< 0.050	0.050	mg/L							
Potassium, dissolved	< 0.10	0.10	mg/L							
Selenium, dissolved	< 0.00050	0.00050	mg/L							
Silicon, dissolved	< 1.0	1.0	mg/L							
Silver, dissolved	< 0.000050	0.000050	mg/L							
Sodium, dissolved	< 0.10	0.10	mg/L							
Strontium, dissolved	< 0.0010	0.0010	mg/L							
Sulfur, dissolved	< 3.0	3.0	mg/L							
Tellurium, dissolved	< 0.00050	0.00050	mg/L							
Thallium, dissolved	< 0.000020	0.000020	mg/L							
Thorium, dissolved	< 0.00010	0.00010	mg/L							
Tin, dissolved	< 0.00020	0.00020	mg/L							
Titanium, dissolved	< 0.0050	0.0050	mg/L							
Tungsten, dissolved	< 0.0010	0.0010	mg/L							
Uranium, dissolved	< 0.000020	0.000020	mg/L							
Vanadium, dissolved	< 0.0050	0.0050	mg/L							
Zinc, dissolved	< 0.0040	0.0040	mg/L							
Zirconium, dissolved	< 0.00010	0.00010	mg/L							
LCS (B4J4595-BS1)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Aluminum, dissolved	4.09	0.0050	mg/L	4.00		102	80-120			
Antimony, dissolved	0.0413	0.00020	mg/L	0.0400		103	80-120			
Arsenic, dissolved	0.405	0.00050	mg/L	0.400		101	80-120			
Barium, dissolved	0.0419	0.0050	mg/L	0.0400		105	80-120			
Beryllium, dissolved	0.0413	0.00010	mg/L	0.0400		103	80-120			
Bismuth, dissolved	0.0413	0.00010	mg/L	0.0400		103	80-120			
Boron, dissolved	0.414	0.0500	mg/L	0.400		104	80-120			
Cadmium, dissolved	0.0416	0.000010	mg/L	0.0400		104	80-120			
Calcium, dissolved	4.16	0.20	mg/L	4.00		104	80-120			
Chromium, dissolved	0.0409	0.00050	mg/L	0.0400		102	80-120			
Cobalt, dissolved	0.0403	0.00010	mg/L	0.0400		101	80-120			
Copper, dissolved	0.0408	0.00040	mg/L	0.0400		102	80-120			
Iron, dissolved	4.02	0.010	mg/L	4.00		100	80-120			
Lead, dissolved	0.0404	0.00020	mg/L	0.0400		101	80-120			
Lithium, dissolved	0.0428	0.00010	mg/L	0.0400		107	80-120			
Magnesium, dissolved	4.13	0.010	mg/L	4.00		103	80-120			
Manganese, dissolved	0.0411	0.00020	mg/L	0.0400		103	80-120			

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J3248
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B4J4595, Continued										
LCS (B4J4595-BS1), Continued				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Molybdenum, dissolved	0.0418	0.00010	mg/L	0.0400		104	80-120			
Nickel, dissolved	0.0410	0.00040	mg/L	0.0400		103	80-120			
Phosphorus, dissolved	4.08	0.050	mg/L	4.00		102	80-120			
Potassium, dissolved	3.99	0.10	mg/L	4.00		100	80-120			
Selenium, dissolved	0.405	0.00050	mg/L	0.400		101	80-120			
Silicon, dissolved	4.2	1.0	mg/L	4.00		105	80-120			
Silver, dissolved	0.0409	0.000050	mg/L	0.0400		102	80-120			
Sodium, dissolved	4.16	0.10	mg/L	4.00		104	80-120			
Strontium, dissolved	0.0402	0.0010	mg/L	0.0400		101	80-120			
Sulfur, dissolved	40.0	3.0	mg/L	40.0		100	80-120			
Tellurium, dissolved	0.0404	0.00050	mg/L	0.0400		101	80-120			
Thallium, dissolved	0.0408	0.000020	mg/L	0.0400		102	80-120			
Thorium, dissolved	0.0398	0.00010	mg/L	0.0400		100	80-120			
Tin, dissolved	0.0409	0.00020	mg/L	0.0400		102	80-120			
Titanium, dissolved	0.0421	0.0050	mg/L	0.0400		105	80-120			
Tungsten, dissolved	0.0403	0.0010	mg/L	0.0400		101	80-120			
Uranium, dissolved	0.0405	0.000020	mg/L	0.0400		101	80-120			
Vanadium, dissolved	0.0401	0.0050	mg/L	0.0400		100	80-120			
Zinc, dissolved	0.407	0.0040	mg/L	0.400		102	80-120			
Zirconium, dissolved	0.0419	0.00010	mg/L	0.0400		105	80-120			
Duplicate (B4J4595-DUP1)		**Source: 24J3248-01**		Prepared: 2024-10-29, Analyzed: 2024-10-29						
Aluminum, dissolved	0.0477	0.0050	mg/L		0.0473			< 1	20	
Antimony, dissolved	0.00034	0.00020	mg/L		0.00036				20	
Arsenic, dissolved	< 0.00050	0.00050	mg/L		< 0.00050				20	
Barium, dissolved	0.0097	0.0050	mg/L		0.0095				20	
Beryllium, dissolved	< 0.00010	0.00010	mg/L		< 0.00010				20	
Bismuth, dissolved	0.00038	0.00010	mg/L		0.00038				20	
Boron, dissolved	0.143	0.0500	mg/L		0.144				20	
Cadmium, dissolved	0.000238	0.000010	mg/L		0.000254			6	20	
Calcium, dissolved	17.0	0.20	mg/L		17.1			< 1	20	
Chromium, dissolved	0.00463	0.00050	mg/L		0.00461			< 1	20	
Cobalt, dissolved	0.00038	0.00010	mg/L		0.00037				20	
Copper, dissolved	0.0284	0.00040	mg/L		0.0284			< 1	20	
Iron, dissolved	0.182	0.010	mg/L		0.181			< 1	20	
Lead, dissolved	0.00059	0.00020	mg/L		0.00056				20	
Lithium, dissolved	0.00413	0.00010	mg/L		0.00378			9	20	
Magnesium, dissolved	5.79	0.010	mg/L		5.76			< 1	20	
Manganese, dissolved	0.0188	0.00020	mg/L		0.0187			< 1	20	
Molybdenum, dissolved	0.00139	0.00010	mg/L		0.00141			1	20	
Nickel, dissolved	0.00169	0.00040	mg/L		0.00176				20	
Phosphorus, dissolved	5.37	0.050	mg/L		5.42			< 1	20	
Potassium, dissolved	14.9	0.10	mg/L		15.0			< 1	20	
Selenium, dissolved	< 0.00050	0.00050	mg/L		< 0.00050				20	
Silicon, dissolved	3.3	1.0	mg/L		3.3				20	
Silver, dissolved	0.000074	0.000050	mg/L		0.000066				20	
Sodium, dissolved	48.4	0.10	mg/L		46.5			4	20	
Strontium, dissolved	0.108	0.0010	mg/L		0.107			< 1	20	
Sulfur, dissolved	12.5	3.0	mg/L		11.9				20	
Tellurium, dissolved	< 0.00050	0.00050	mg/L		< 0.00050				20	
Thallium, dissolved	< 0.000020	0.000020	mg/L		< 0.000020				20	
Thorium, dissolved	< 0.00010	0.00010	mg/L		< 0.00010				20	
Tin, dissolved	0.00126	0.00020	mg/L		0.00136			7	20	
Titanium, dissolved	< 0.0050	0.0050	mg/L		< 0.0050				20	
Tungsten, dissolved	< 0.0010	0.0010	mg/L		< 0.0010				20	
Uranium, dissolved	0.000691	0.000020	mg/L		0.000696			< 1	20	

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	WORK ORDER	24J3248
PROJECT	KSTC Water System Analysis	REPORTED	2024-11-01 15:21

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B4J4595, Continued										
Duplicate (B4J4595-DUP1), Continued		**Source: 24J3248-01**		Prepared: 2024-10-29, Analyzed: 2024-10-29						
Vanadium, dissolved	< 0.0050	0.0050	mg/L		< 0.0050				20	
Zinc, dissolved	0.0398	0.0040	mg/L		0.0402			1	20	
Zirconium, dissolved	0.00129	0.00010	mg/L		0.00124			4	20	
Dissolved Metals, Batch B4J4597										
Blank (B4J4597-BLK1)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Mercury, dissolved	< 0.000010	0.000010	mg/L							
Blank (B4J4597-BLK2)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Mercury, dissolved	< 0.000010	0.000010	mg/L							
Blank (B4J4597-BLK3)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Mercury, dissolved	< 0.000010	0.000010	mg/L							
LCS (B4J4597-BS1)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Mercury, dissolved	0.00238	0.000010	mg/L	0.00250		95	80-120			
LCS (B4J4597-BS2)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Mercury, dissolved	0.00282	0.000010	mg/L	0.00250		113	80-120			
LCS (B4J4597-BS3)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Mercury, dissolved	0.00237	0.000010	mg/L	0.00250		95	80-120			
General Parameters, Batch B4J4323										
Blank (B4J4323-BLK1)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Ammonia, Total (as N)	0.028	0.010	mg/L							
Blank (B4J4323-BLK2)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Ammonia, Total (as N)	< 0.010	0.010	mg/L							
Blank (B4J4323-BLK3)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Ammonia, Total (as N)	0.027	0.010	mg/L							
Blank (B4J4323-BLK4)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Ammonia, Total (as N)	0.018	0.010	mg/L							
Blank (B4J4323-BLK5)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Ammonia, Total (as N)	0.019	0.010	mg/L							
Blank (B4J4323-BLK6)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Ammonia, Total (as N)	0.016	0.010	mg/L							
LCS (B4J4323-BS1)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Ammonia, Total (as N)	1.00	0.010	mg/L	1.00		100	85-115			
LCS (B4J4323-BS2)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Ammonia, Total (as N)	0.963	0.010	mg/L	1.00		96	85-115			
LCS (B4J4323-BS3)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Ammonia, Total (as N)	0.960	0.010	mg/L	1.00		96	85-115			
LCS (B4J4323-BS4)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Ammonia, Total (as N)	0.921	0.010	mg/L	1.00		92	85-115			

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J3248
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4J4323, Continued										
LCS (B4J4323-BS5)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Ammonia, Total (as N)	0.898	0.010	mg/L	1.00		90	85-115			
LCS (B4J4323-BS6)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Ammonia, Total (as N)	0.939	0.010	mg/L	1.00		94	85-115			
General Parameters, Batch B4J4384										
Blank (B4J4384-BLK1)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Phosphorus, Dissolved Reactive	< 0.0050	0.0050	mg/L							
LCS (B4J4384-BS1)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Phosphorus, Dissolved Reactive	0.101	0.0050	mg/L	0.100		101	84-115			
General Parameters, Batch B4J4429										
Blank (B4J4429-BLK1)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Conductivity (EC)	< 2.0	2.0	µS/cm							
Blank (B4J4429-BLK2)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Conductivity (EC)	< 2.0	2.0	µS/cm							
Blank (B4J4429-BLK3)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Conductivity (EC)	< 2.0	2.0	µS/cm							
LCS (B4J4429-BS1)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Alkalinity, Total (as CaCO3)	93.5	1.0	mg/L	100		93	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	42.0	1.0	mg/L	50.0		84	0-200			
LCS (B4J4429-BS2)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Conductivity (EC)	1410	2.0	µS/cm	1410		100	95-105			
LCS (B4J4429-BS3)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Alkalinity, Total (as CaCO3)	93.6	1.0	mg/L	100		94	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	44.3	1.0	mg/L	50.0		89	0-200			
LCS (B4J4429-BS4)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Conductivity (EC)	1410	2.0	µS/cm	1410		100	95-105			
LCS (B4J4429-BS5)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Alkalinity, Total (as CaCO3)	94.7	1.0	mg/L	100		95	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	46.0	1.0	mg/L	50.0		92	0-200			

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	WORK ORDER	24J3248
PROJECT	KSTC Water System Analysis	REPORTED	2024-11-01 15:21

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4J4429, Continued										
LCS (B4J4429-BS6)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
Conductivity (EC)	1410	2.0	µS/cm	1410		100	95-105			
Reference (B4J4429-SRM1)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
pH	6.99	0.10	pH units	7.01		100	98-102			
Reference (B4J4429-SRM2)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
pH	7.00	0.10	pH units	7.01		100	98-102			
Reference (B4J4429-SRM3)				Prepared: 2024-10-25, Analyzed: 2024-10-25						
pH	7.00	0.10	pH units	7.01		100	98-102			
General Parameters, Batch B4J4471										
Blank (B4J4471-BLK1)				Prepared: 2024-10-26, Analyzed: 2024-10-26						
Turbidity	< 0.10	0.10	NTU							
LCS (B4J4471-BS1)				Prepared: 2024-10-26, Analyzed: 2024-10-26						
Turbidity	146	0.10	NTU	140		104	90-110			
General Parameters, Batch B4J4514										
Blank (B4J4514-BLK1)				Prepared: 2024-10-27, Analyzed: 2024-10-27						
Colour, True	< 5.0	5.0	CU							
LCS (B4J4514-BS1)				Prepared: 2024-10-27, Analyzed: 2024-10-27						
Colour, True	18	5.0	CU	20.0		92	85-115			
General Parameters, Batch B4J4529										
Blank (B4J4529-BLK1)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Phosphorus, Total (as P)	< 0.0050	0.0050	mg/L							
Blank (B4J4529-BLK2)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Phosphorus, Total (as P)	< 0.0050	0.0050	mg/L							
Blank (B4J4529-BLK3)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Phosphorus, Total (as P)	< 0.0050	0.0050	mg/L							
Blank (B4J4529-BLK4)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Phosphorus, Total (as P)	< 0.0050	0.0050	mg/L							
LCS (B4J4529-BS1)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Phosphorus, Total (as P)	0.104	0.0050	mg/L	0.100		104	85-115			
LCS (B4J4529-BS2)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Phosphorus, Total (as P)	0.105	0.0050	mg/L	0.100		105	85-115			
LCS (B4J4529-BS3)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Phosphorus, Total (as P)	0.102	0.0050	mg/L	0.100		102	85-115			
LCS (B4J4529-BS4)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Phosphorus, Total (as P)	0.103	0.0050	mg/L	0.100		103	85-115			
General Parameters, Batch B4J4559										

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J3248
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4J4559, Continued										
Blank (B4J4559-BLK1)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Conductivity (EC)	< 2.0	2.0	µS/cm							
Blank (B4J4559-BLK2)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Conductivity (EC)	< 2.0	2.0	µS/cm							
LCS (B4J4559-BS1)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Alkalinity, Total (as CaCO3)	91.4	1.0	mg/L	100		91	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	37.1	1.0	mg/L	50.0		74	0-200			
LCS (B4J4559-BS2)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Conductivity (EC)	1410	2.0	µS/cm	1410		100	95-105			
LCS (B4J4559-BS3)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Alkalinity, Total (as CaCO3)	91.7	1.0	mg/L	100		92	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	40.7	1.0	mg/L	50.0		81	0-200			
LCS (B4J4559-BS4)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Conductivity (EC)	1410	2.0	µS/cm	1410		100	95-105			
Duplicate (B4J4559-DUP1)		Source: 24J3248-03		Prepared: 2024-10-28, Analyzed: 2024-10-28						
Alkalinity, Total (as CaCO3)	58.1	1.0	mg/L		58.0			< 1	10	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L		< 1.0				10	
Alkalinity, Bicarbonate (as CaCO3)	58.1	1.0	mg/L		58.0			< 1	10	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L		< 1.0				10	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L		< 1.0				10	
Conductivity (EC)	445	2.0	µS/cm		445			< 1	5	
pH	7.45	0.10	pH units		7.51			< 1	4	HT2
Reference (B4J4559-SRM1)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
pH	7.02	0.10	pH units	7.01		100	98-102			
Reference (B4J4559-SRM2)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
pH	7.01	0.10	pH units	7.01		100	98-102			
General Parameters, Batch B4J4658										
Blank (B4J4658-BLK1)				Prepared: 2024-10-29, Analyzed: 2024-10-31						
Solids, Total Suspended	< 2.0	2.0	mg/L							
LCS (B4J4658-BS1)				Prepared: 2024-10-29, Analyzed: 2024-10-31						
Solids, Total Suspended	92.0	5.0	mg/L	100		92	85-115			
Reference (B4J4658-SRM1)				Prepared: 2024-10-29, Analyzed: 2024-10-31						
Solids, Total Suspended	356	20.0	mg/L	362		98	80-120			
General Parameters, Batch B4J4691										

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	WORK ORDER	24J3248
PROJECT	KSTC Water System Analysis	REPORTED	2024-11-01 15:21

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4J4691, Continued										
Blank (B4J4691-BLK1)				Prepared: 2024-10-29, Analyzed: 2024-10-29						
Solids, Total Dissolved	< 15	15	mg/L							
LCS (B4J4691-BS1)				Prepared: 2024-10-29, Analyzed: 2024-10-29						
Solids, Total Dissolved	229	15	mg/L	240		95	85-115			
General Parameters, Batch B4J4727										
Blank (B4J4727-BLK1)				Prepared: 2024-10-30, Analyzed: 2024-10-30						
Solids, Total Suspended	< 2.0	2.0	mg/L							
LCS (B4J4727-BS1)				Prepared: 2024-10-30, Analyzed: 2024-10-30						
Solids, Total Suspended	98.0	5.0	mg/L	100		98	85-115			
General Parameters, Batch B4J4864										
Blank (B4J4864-BLK1)				Prepared: 2024-10-30, Analyzed: 2024-10-30						
Sulfide, Total	< 0.020	0.020	mg/L							
LCS (B4J4864-BS1)				Prepared: 2024-10-30, Analyzed: 2024-10-30						
Sulfide, Total	0.544	0.020	mg/L	0.530		103	80-120			
Microbiological Parameters, Batch B4J4213										
Blank (B4J4213-BLK1)				Prepared: 2024-10-24, Analyzed: 2024-10-24						
Coliforms, Total (Q-Tray)	< 1	1	MPN/100 mL							
E. coli (Q-Tray)	< 1	1	MPN/100 mL							
Blank (B4J4213-BLK2)				Prepared: 2024-10-24, Analyzed: 2024-10-24						
Coliforms, Fecal (Q-Tray)	< 1	1	MPN/100 mL							
Blank (B4J4213-BLK3)				Prepared: 2024-10-24, Analyzed: 2024-10-24						
Coliforms, Fecal (Q-Tray)	< 1	1	MPN/100 mL							
E. coli (Q-Tray)	< 1	1	MPN/100 mL							
Blank (B4J4213-BLK4)				Prepared: 2024-10-24, Analyzed: 2024-10-24						
Coliforms, Total (Q-Tray)	< 1	1	MPN/100 mL							
E. coli (Q-Tray)	< 1	1	MPN/100 mL							
Duplicate (B4J4213-DUP4)				Source: 24J3248-02		Prepared: 2024-10-24, Analyzed: 2024-10-24				
Coliforms, Total (Q-Tray)	34	1	MPN/100 mL		20			53	80	
E. coli (Q-Tray)	3	1	MPN/100 mL		1				80	MIC29
Total Metals, Batch B4J4577										
Blank (B4J4577-BLK1)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Aluminum, total	< 0.0050	0.0050	mg/L							
Antimony, total	< 0.00020	0.00020	mg/L							
Arsenic, total	< 0.00050	0.00050	mg/L							
Barium, total	< 0.0050	0.0050	mg/L							
Beryllium, total	< 0.00010	0.00010	mg/L							
Bismuth, total	< 0.00010	0.00010	mg/L							
Boron, total	< 0.0500	0.0500	mg/L							
Cadmium, total	< 0.000010	0.000010	mg/L							
Calcium, total	< 0.20	0.20	mg/L							
Chromium, total	< 0.00050	0.00050	mg/L							

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J3248
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B4J4577, Continued										
Blank (B4J4577-BLK1), Continued				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Cobalt, total	< 0.00010	0.00010	mg/L							
Copper, total	< 0.00040	0.00040	mg/L							
Iron, total	< 0.010	0.010	mg/L							
Lead, total	< 0.00020	0.00020	mg/L							
Lithium, total	< 0.00010	0.00010	mg/L							
Magnesium, total	< 0.010	0.010	mg/L							
Manganese, total	< 0.00020	0.00020	mg/L							
Molybdenum, total	< 0.00010	0.00010	mg/L							
Nickel, total	< 0.00040	0.00040	mg/L							
Phosphorus, total	< 0.050	0.050	mg/L							
Potassium, total	< 0.10	0.10	mg/L							
Selenium, total	< 0.00050	0.00050	mg/L							
Silicon, total	< 1.0	1.0	mg/L							
Silver, total	< 0.000050	0.000050	mg/L							
Sodium, total	< 0.10	0.10	mg/L							
Strontium, total	< 0.0010	0.0010	mg/L							
Sulfur, total	< 3.0	3.0	mg/L							
Tellurium, total	< 0.00050	0.00050	mg/L							
Thallium, total	< 0.000020	0.000020	mg/L							
Thorium, total	< 0.00010	0.00010	mg/L							
Tin, total	< 0.00020	0.00020	mg/L							
Titanium, total	< 0.0050	0.0050	mg/L							
Tungsten, total	< 0.0010	0.0010	mg/L							
Uranium, total	< 0.000020	0.000020	mg/L							
Vanadium, total	< 0.0050	0.0050	mg/L							
Zinc, total	< 0.0040	0.0040	mg/L							
Zirconium, total	< 0.00010	0.00010	mg/L							
LCS (B4J4577-BS1)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Aluminum, total	4.07	0.0050	mg/L	4.00		102	80-120			
Antimony, total	0.0403	0.00020	mg/L	0.0400		101	80-120			
Arsenic, total	0.398	0.00050	mg/L	0.400		99	80-120			
Barium, total	0.0407	0.0050	mg/L	0.0400		102	80-120			
Beryllium, total	0.0388	0.00010	mg/L	0.0400		97	80-120			
Bismuth, total	0.0402	0.00010	mg/L	0.0400		101	80-120			
Boron, total	0.403	0.0500	mg/L	0.400		101	80-120			
Cadmium, total	0.0397	0.000010	mg/L	0.0400		99	80-120			
Calcium, total	4.13	0.20	mg/L	4.00		103	80-120			
Chromium, total	0.0400	0.00050	mg/L	0.0400		100	80-120			
Cobalt, total	0.0399	0.00010	mg/L	0.0400		100	80-120			
Copper, total	0.0398	0.00040	mg/L	0.0400		100	80-120			
Iron, total	3.95	0.010	mg/L	4.00		99	80-120			
Lead, total	0.0394	0.00020	mg/L	0.0400		99	80-120			
Lithium, total	0.0391	0.00010	mg/L	0.0400		98	80-120			
Magnesium, total	4.00	0.010	mg/L	4.00		100	80-120			
Manganese, total	0.0402	0.00020	mg/L	0.0400		101	80-120			
Molybdenum, total	0.0408	0.00010	mg/L	0.0400		102	80-120			
Nickel, total	0.0400	0.00040	mg/L	0.0400		100	80-120			
Phosphorus, total	4.01	0.050	mg/L	4.00		100	80-120			
Potassium, total	4.02	0.10	mg/L	4.00		101	80-120			
Selenium, total	0.404	0.00050	mg/L	0.400		101	80-120			
Silicon, total	4.2	1.0	mg/L	4.00		105	80-120			
Silver, total	0.0402	0.000050	mg/L	0.0400		101	80-120			
Sodium, total	4.04	0.10	mg/L	4.00		101	80-120			
Strontium, total	0.0399	0.0010	mg/L	0.0400		100	80-120			
Sulfur, total	40.4	3.0	mg/L	40.0		101	80-120			

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	WORK ORDER	24J3248
PROJECT	KSTC Water System Analysis	REPORTED	2024-11-01 15:21

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B4J4577, Continued										
LCS (B4J4577-BS1), Continued				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Tellurium, total	0.0381	0.00050	mg/L	0.0400		95	80-120			
Thallium, total	0.0398	0.000020	mg/L	0.0400		100	80-120			
Thorium, total	0.0414	0.00010	mg/L	0.0400		103	80-120			
Tin, total	0.0403	0.00020	mg/L	0.0400		101	80-120			
Titanium, total	0.0417	0.0050	mg/L	0.0400		104	80-120			
Tungsten, total	0.0411	0.0010	mg/L	0.0400		103	80-120			
Uranium, total	0.0407	0.000020	mg/L	0.0400		102	80-120			
Vanadium, total	0.0396	0.0050	mg/L	0.0400		99	80-120			
Zinc, total	0.397	0.0040	mg/L	0.400		99	80-120			
Zirconium, total	0.0406	0.00010	mg/L	0.0400		102	80-120			
Total Metals, Batch B4J4597										
Blank (B4J4597-BLK1)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Mercury, total	< 0.000010	0.000010	mg/L							
Blank (B4J4597-BLK2)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Mercury, total	< 0.000010	0.000010	mg/L							
Blank (B4J4597-BLK3)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Mercury, total	< 0.000010	0.000010	mg/L							
LCS (B4J4597-BS1)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Mercury, total	0.00238	0.000010	mg/L	0.00250		95	80-120			
LCS (B4J4597-BS2)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Mercury, total	0.00282	0.000010	mg/L	0.00250		113	80-120			
LCS (B4J4597-BS3)				Prepared: 2024-10-28, Analyzed: 2024-10-28						
Mercury, total	0.00237	0.000010	mg/L	0.00250		95	80-120			
Total Metals, Batch B4J4783										
Blank (B4J4783-BLK1)				Prepared: 2024-10-29, Analyzed: 2024-10-29						
Aluminum, total	< 0.0050	0.0050	mg/L							
Antimony, total	< 0.00020	0.00020	mg/L							
Arsenic, total	< 0.00050	0.00050	mg/L							
Barium, total	< 0.0050	0.0050	mg/L							
Beryllium, total	< 0.00010	0.00010	mg/L							
Bismuth, total	< 0.00010	0.00010	mg/L							
Boron, total	< 0.0500	0.0500	mg/L							
Cadmium, total	< 0.000010	0.000010	mg/L							
Calcium, total	< 0.20	0.20	mg/L							
Chromium, total	< 0.00050	0.00050	mg/L							
Cobalt, total	< 0.00010	0.00010	mg/L							
Copper, total	< 0.00040	0.00040	mg/L							
Iron, total	< 0.010	0.010	mg/L							
Lead, total	< 0.00020	0.00020	mg/L							
Lithium, total	< 0.00010	0.00010	mg/L							
Magnesium, total	< 0.010	0.010	mg/L							
Manganese, total	< 0.00020	0.00020	mg/L							
Molybdenum, total	< 0.00010	0.00010	mg/L							
Nickel, total	< 0.00040	0.00040	mg/L							
Phosphorus, total	< 0.050	0.050	mg/L							
Potassium, total	< 0.10	0.10	mg/L							
Selenium, total	< 0.00050	0.00050	mg/L							

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J3248
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B4J4783, Continued										
Blank (B4J4783-BLK1), Continued				Prepared: 2024-10-29, Analyzed: 2024-10-29						
Silicon, total	< 1.0	1.0	mg/L							
Silver, total	< 0.000050	0.000050	mg/L							
Sodium, total	< 0.10	0.10	mg/L							
Strontium, total	< 0.0010	0.0010	mg/L							
Sulfur, total	< 3.0	3.0	mg/L							
Tellurium, total	< 0.00050	0.00050	mg/L							
Thallium, total	< 0.000020	0.000020	mg/L							
Thorium, total	< 0.00010	0.00010	mg/L							
Tin, total	< 0.00020	0.00020	mg/L							
Titanium, total	< 0.0050	0.0050	mg/L							
Tungsten, total	< 0.0010	0.0010	mg/L							
Uranium, total	< 0.000020	0.000020	mg/L							
Vanadium, total	< 0.0050	0.0050	mg/L							
Zinc, total	< 0.0040	0.0040	mg/L							
Zirconium, total	< 0.00010	0.00010	mg/L							
LCS (B4J4783-BS1)				Prepared: 2024-10-29, Analyzed: 2024-10-29						
Aluminum, total	4.02	0.0050	mg/L	4.00		101	80-120			
Antimony, total	0.0395	0.00020	mg/L	0.0400		99	80-120			
Arsenic, total	0.403	0.00050	mg/L	0.400		101	80-120			
Barium, total	0.0401	0.0050	mg/L	0.0400		100	80-120			
Beryllium, total	0.0399	0.00010	mg/L	0.0400		100	80-120			
Bismuth, total	0.0402	0.00010	mg/L	0.0400		101	80-120			
Boron, total	0.403	0.0500	mg/L	0.400		101	80-120			
Cadmium, total	0.0394	0.000010	mg/L	0.0400		98	80-120			
Calcium, total	4.08	0.20	mg/L	4.00		102	80-120			
Chromium, total	0.0401	0.00050	mg/L	0.0400		100	80-120			
Cobalt, total	0.0409	0.00010	mg/L	0.0400		102	80-120			
Copper, total	0.0408	0.00040	mg/L	0.0400		102	80-120			
Iron, total	4.03	0.010	mg/L	4.00		101	80-120			
Lead, total	0.0411	0.00020	mg/L	0.0400		103	80-120			
Lithium, total	0.0397	0.00010	mg/L	0.0400		99	80-120			
Magnesium, total	4.03	0.010	mg/L	4.00		101	80-120			
Manganese, total	0.0410	0.00020	mg/L	0.0400		102	80-120			
Molybdenum, total	0.0407	0.00010	mg/L	0.0400		102	80-120			
Nickel, total	0.0401	0.00040	mg/L	0.0400		100	80-120			
Phosphorus, total	3.98	0.050	mg/L	4.00		100	80-120			
Potassium, total	4.07	0.10	mg/L	4.00		102	80-120			
Selenium, total	0.411	0.00050	mg/L	0.400		103	80-120			
Silicon, total	4.2	1.0	mg/L	4.00		104	80-120			
Silver, total	0.0400	0.000050	mg/L	0.0400		100	80-120			
Sodium, total	4.03	0.10	mg/L	4.00		101	80-120			
Strontium, total	0.0407	0.0010	mg/L	0.0400		102	80-120			
Sulfur, total	41.7	3.0	mg/L	40.0		104	80-120			
Tellurium, total	0.0380	0.00050	mg/L	0.0400		95	80-120			
Thallium, total	0.0408	0.000020	mg/L	0.0400		102	80-120			
Thorium, total	0.0414	0.00010	mg/L	0.0400		103	80-120			
Tin, total	0.0399	0.00020	mg/L	0.0400		100	80-120			
Titanium, total	0.0400	0.0050	mg/L	0.0400		100	80-120			
Tungsten, total	0.0419	0.0010	mg/L	0.0400		105	80-120			
Uranium, total	0.0401	0.000020	mg/L	0.0400		100	80-120			
Vanadium, total	0.0406	0.0050	mg/L	0.0400		102	80-120			
Zinc, total	0.400	0.0040	mg/L	0.400		100	80-120			
Zirconium, total	0.0403	0.00010	mg/L	0.0400		101	80-120			

CARO ANALYTICAL SERVICES

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Kamloops, City of - Sewage Treatment Centre	**WORK ORDER**	24J3248
PROJECT	KSTC Water System Analysis	**REPORTED**	2024-11-01 15:21

QC Qualifiers:

HT2	The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.
MIC29	The difference in logs is less than the R value.

Appendix J: CREDS Groundwater Sampling Raw Data

ALS Canada Ltd.

CERTIFICATE OF ANALYSIS

Work Order	: **KS2404449**		
Client	: City of Kamloops	Laboratory	: ALS Environmental - Calgary
Contact	: Beth Lucier	Account Manager	: Caitlin Fountain
Address	: 955 Concordia Way Kamloops British Columbia Canada V2C 6V3	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: —	Telephone	: 250 372 3588
Project	: Cinnamon Ridge Groundwater	Date Samples Received	: 23-Oct-2024 13:52
PO	: —	Date Analysis Commenced	: 24-Oct-2024
C-O-C number	: —	Issue Date	: 04-Nov-2024 14:47
Sampler	: —		
Site	: —		
Quote number	: Cinnamon Ridge		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	Position	Laboratory Department
Ellie Milner	Account Manager	Microbiology, Kamloops, British Columbia
Ghazaleh Khanmirzaei	Analyst	Metals, Burnaby, British Columbia
Gurvinder Kour	Lab Assistant	Metals, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Inorganics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Shirley Li	Team Leader - Inorganics	Metals, Calgary, Alberta

Work Order : KS2404449
Client : City of Kamloops
Project : Cinnamon Ridge Groundwater

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
LOR: Limit of Reporting (detection limit).

Unit	Description
mg/L	milligrams per litre
pH units	pH units
CU	colour units (1 cu = 1 mg/l pt)
CFU/100mL	colony forming units per hundred millilitres
MPN/100mL	most probable number per hundred millilitres
-	no units

<: less than.
>: greater than.
Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Work Order : KS2404449
Client : City of Kamloops
Project : Cinnamon Ridge Groundwater

Qualifiers

Qualifier	Description
DLA	Detection Limit adjusted for required dilution.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
RRV	Reported result verified by repeat analysis.

Work Order : KS2404449
Client : City of Kamloops
Project : Cinnamon Ridge Groundwater

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	A+A Well	MW03-01	MW03-02	Duplicate	Field Blank
Client sample ID									
Client sampling date / time					23-Oct-2024 10:55	23-Oct-2024 12:15	23-Oct-2024 13:15	23-Oct-2024 12:15	23-Oct-2024 13:15
					K2404448-001	K2404448-002	K2404448-003	K2404448-004	K2404448-005
					Result	Result	Result	Result	Result
Physical Tests									
Alkalinity, bicarbonate (as CaCO3)	—	E290/VA	1.0	mg/L	651	300	290	302	<1.0
Alkalinity, carbonate (as CaCO3)	—	E290/VA	1.0	mg/L	6.5	<1.0	<1.0	<1.0	<1.0
Alkalinity, hydroxide (as CaCO3)	—	E290/VA	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, phenolphthalein (as CaCO3)	—	E290/VA	1.0	mg/L	3.2	<1.0	<1.0	<1.0	<1.0
Alkalinity, total (as CaCO3)	—	E290/VA	1.0	mg/L	658	300	290	302	<1.0
Colour, true	—	E329/VA	5.0	CU	22.3	406	332	448	<5.0
Hardness (as CaCO3), dissolved	—	EC100/CG	0.60	mg/L	96.5	238	234	232	<0.60
pH	—	E108/VA	0.10	pH units	8.32	6.58	6.60	6.57	5.51
Anions and Nutrients									
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L	19.2	39.4	41.9	34.0	<0.50
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L	0.118	<0.0010	<0.0010	<0.0010	<0.0010
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L	33.3	<0.30	<0.30	<1.50 DLDR	<0.30
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L	7.88	4.62	1.60	4.59	<0.0050
Nitrite (as N)	14797-65-0	E235.NO2-U/VA	0.0010	mg/L	0.0093	<0.0010	<0.0010	<0.0050 DLDR	<0.0010
Nitrate (as N)	14797-55-8	E235.NO3-U/VA	0.0050	mg/L	<0.0250 DLDR	<0.0050	<0.0050	<0.0250 DLDR	<0.0050
Kjeldahl nitrogen, total [TKN]	—	E318/VA	0.050	mg/L	8.79	4.77	1.59	4.56	<0.050
Nitrogen, total	7727-37-9	E366/VA	0.030	mg/L	7.33	4.74	1.68	4.70	<0.030
Microbiological Tests									
Coliforms, thermotolerant [fecal]	—	E012.FC/KS	1	CFU/100 mL	5	<1	<1	<1	<1
Coliforms, total	—	E010/KS	1	MPN/100 mL	>2420	<10 DLA	<10 DLA	<10 DLA	<1
Coliforms, Escherichia coli [E. coli]	—	E010/KS	1	MPN/100 mL	6	<10 DLA	<10 DLA	<10 DLA	<1

Work Order : KS2404449
Client : City of Kamloops
Project : Cinnamon Ridge Groundwater

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	Client sample ID	A+A Well	MW03-01	MW03-02	Duplicate	Field Blank
					Client sampling date / time	23-Oct-2024 10:55	23-Oct-2024 12:15	23-Oct-2024 13:15	23-Oct-2024 12:15	23-Oct-2024 13:15
						KS2404448-001	KS2404448-002	KS2404448-003	KS2404448-004	KS2404448-006
						Result	Result	Result	Result	Result
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/CG	0.0010	mg/L		0.0048	0.0058	0.0066	0.0057	<0.0010
Antimony, dissolved	7440-36-0	E421/CG	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic, dissolved	7440-38-2	E421/CG	0.00010	mg/L		0.00042	0.00031	0.00314	0.00033	<0.00010
Barium, dissolved	7440-39-3	E421/CG	0.00010	mg/L		0.0182	0.102	0.128	0.0940	<0.00010
Beryllium, dissolved	7440-41-7	E421/CG	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth, dissolved	7440-69-9	E421/CG	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron, dissolved	7440-42-8	E421/CG	0.010	mg/L		0.340	0.020	0.048	0.016	<0.010
Cadmium, dissolved	7440-43-9	E421/CG	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium, dissolved	7440-70-2	E421/CG	0.050	mg/L		21.0	52.9	46.7	51.6	<0.050
Cesium, dissolved	7440-46-2	E421/CG	0.000010	mg/L		0.000033	0.000030	0.000028	0.000034	<0.000010
Chromium, dissolved	7440-47-3	E421/CG	0.00050	mg/L		<0.00050	0.00056	<0.00050	0.00054	<0.00050
Cobalt, dissolved	7440-48-4	E421/CG	0.00010	mg/L		<0.00010	0.00029	0.00011	0.00030	<0.00010
Copper, dissolved	7440-50-8	E421/CG	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Iron, dissolved	7439-89-6	E421/CG	0.010	mg/L		1.14	69.7	91.9	68.1	0.047 RRV
Lead, dissolved	7439-92-1	E421/CG	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium, dissolved	7439-93-2	E421/CG	0.0010	mg/L		0.0016	0.0058	0.0056	0.0058	<0.0010
Magnesium, dissolved	7439-95-4	E421/CG	0.0050	mg/L		10.7	25.6	28.4	25.1	0.0162 RRV
Manganese, dissolved	7439-96-5	E421/CG	0.00010	mg/L		0.199	1.03	2.15	1.03	0.00124 RRV
Mercury, dissolved	7439-97-6	E509/VA	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum, dissolved	7439-98-7	E421/CG	0.000050	mg/L		0.00926	0.000216	0.000359	0.000203	<0.000050
Nickel, dissolved	7440-02-0	E421/CG	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

Work Order : KS2404449
Client : City of Kamloops
Project : Cinnamon Ridge Groundwater

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	A+A Well	MW03-01	MW03-02	Duplicate	Field Blank
Client sample ID					A+A Well	MW03-01	MW03-02	Duplicate	Field Blank
Client sampling date / time					23-Oct-2024 10:55	23-Oct-2024 12:15	23-Oct-2024 13:15	23-Oct-2024 12:15	23-Oct-2024 13:15
					KS2404448-001	KS2404448-002	KS2404448-003	KS2404448-004	KS2404448-005
					Result	Result	Result	Result	Result
Dissolved Metals									
Phosphorus, dissolved	7723-14-0	E421/CG	0.050	mg/L	0.559	0.347	0.509	0.273	<0.050
Potassium, dissolved	7440-09-7	E421/CG	0.050	mg/L	9.30	7.59	7.01	7.80	<0.050
Rubidium, dissolved	7440-17-7	E421/CG	0.00020	mg/L	0.00603	0.00553	0.00373	0.00551	<0.00020
Selenium, dissolved	7782-49-2	E421/CG	0.000050	mg/L	<0.000050	0.000128	0.000067	0.000110	<0.000050
Silicon, dissolved	7440-21-3	E421/CG	0.050	mg/L	15.1	27.0	24.2	26.2	<0.050
Silver, dissolved	7440-22-4	E421/CG	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium, dissolved	7440-23-5	E421/CG	0.050	mg/L	275	27.5	29.1	27.5	<0.050
Strontium, dissolved	7440-24-6	E421/CG	0.00020	mg/L	0.375	0.387	0.363	0.405	0.00020 ***
Sulfur, dissolved	7704-34-9	E421/CG	0.50	mg/L	12.5	<0.50	<0.50	<0.50	<0.50
Tellurium, dissolved	13494-80-9	E421/CG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium, dissolved	7440-28-0	E421/CG	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium, dissolved	7440-29-1	E421/CG	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin, dissolved	7440-31-5	E421/CG	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium, dissolved	7440-32-6	E421/CG	0.00030	mg/L	<0.00030	0.00070	0.00068	0.00057	<0.00030
Tungsten, dissolved	7440-33-7	E421/CG	0.00010	mg/L	0.00063	<0.00010	<0.00010	<0.00010	<0.00010
Uranium, dissolved	7440-61-1	E421/CG	0.000010	mg/L	0.000654	<0.000010	0.000075	<0.000010	<0.000010
Vanadium, dissolved	7440-62-2	E421/CG	0.00050	mg/L	<0.00050	0.00097	0.00079	0.00094	<0.00050
Zinc, dissolved	7440-66-6	E421/CG	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zirconium, dissolved	7440-67-7	E421/CG	0.00020	mg/L	<0.00020	0.00022	0.00026	0.00022	<0.00020
Dissolved mercury filtration location	—	EP509/VA	-	-	Field	Field	Field	Field	Field
Dissolved metals filtration location	—	EP421/CG	-	-	Field	Field	Field	Field	Field

Page: 6 of 7

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Work Order : KS2404449
Client : City of Kamloops
Project : Cinnamon Ridge Groundwater

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	A+A Well	MW03-01	MW03-02	Duplicate	Field Blank
					Client sampling date / time	23-Oct-2024 10:55	23-Oct-2024 12:15	23-Oct-2024 13:15	23-Oct-2024 12:15	23-Oct-2024 13:15
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit		KS2404448-001	KS2404448-002	KS2404448-003	KS2404448-004	KS2404448-005
						Result	Result	Result	Result	Result
Aggregate Organics										
Chemical oxygen demand [COD]	—	E559-L/VA	10	mg/L		50	49	34	48	<10

Please refer to the General Comments section for an explanation of any result qualifiers detected.
Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	:KS2404449	Page	: 1 of 17
Client	:City of Kamloops	Laboratory	: ALS Environmental - Kamloops
Contact	:Beth Lucier	Account Manager	: Caitlin Fountain
Address	:955 Concordia Way Kamloops BC Canada V2C 6V3	Address	: 1445 McGill Road, Unit 2B Kamloops, British Columbia Canada V2C 6K7
Telephone	:---	Telephone	: 250 372 3588
Project	:Cinnamon Ridge Groundwater	Date Samples Received	: 23-Oct-2024 13:52
PO	:---	Issue Date	: 04-Nov-2024 13:17
C-O-C number	:---		
Sampler	:---		
Site	:---		
Quote number	:Cinnamon Ridge		
No. of samples received	:5		
No. of samples analysed	:5		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid)										
A+A Well	E559-L	23-Oct-2024	—	—	—		25-Oct-2024	28 days	2 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid)										
Duplicate	E559-L	23-Oct-2024	—	—	—		25-Oct-2024	28 days	2 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid)										
Field Blank	E559-L	23-Oct-2024	—	—	—		25-Oct-2024	28 days	2 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid)										
MW03-01	E559-L	23-Oct-2024	—	—	—		25-Oct-2024	28 days	2 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid)										
MW03-02	E559-L	23-Oct-2024	—	—	—		25-Oct-2024	28 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Duplicate	E298	23-Oct-2024	29-Oct-2024	28 days	6 days	✓	29-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Field Blank	E298	23-Oct-2024	29-Oct-2024	28 days	6 days	✓	30-Oct-2024	28 days	6 days	✓

Matrix: Water

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW03-01	E298	23-Oct-2024	29-Oct-2024	28 days	6 days	✓	29-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW03-02	E298	23-Oct-2024	29-Oct-2024	28 days	6 days	✓	29-Oct-2024	28 days	6 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) A+A Well	E298	23-Oct-2024	29-Oct-2024	28 days	6 days	✓	29-Oct-2024	28 days	7 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE A+A Well	E235.Cl	23-Oct-2024	26-Oct-2024	28 days	3 days	✓	26-Oct-2024	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE Duplicate	E235.Cl	23-Oct-2024	26-Oct-2024	28 days	3 days	✓	26-Oct-2024	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE Field Blank	E235.Cl	23-Oct-2024	26-Oct-2024	28 days	3 days	✓	26-Oct-2024	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE MW03-01	E235.Cl	23-Oct-2024	26-Oct-2024	28 days	3 days	✓	26-Oct-2024	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE MW03-02	E235.Cl	23-Oct-2024	26-Oct-2024	28 days	3 days	✓	26-Oct-2024	28 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE A+A Well	E378-U	23-Oct-2024	26-Oct-2024	3 days	3 days	✓	26-Oct-2024	3 days	3 days	✓

Matrix: Water

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE Duplicate	E378-U	23-Oct-2024	26-Oct-2024	3 days	3 days	✓	26-Oct-2024	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE Field Blank	E378-U	23-Oct-2024	26-Oct-2024	3 days	3 days	✓	26-Oct-2024	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE MW03-01	E378-U	23-Oct-2024	26-Oct-2024	3 days	3 days	✓	26-Oct-2024	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE MW03-02	E378-U	23-Oct-2024	26-Oct-2024	3 days	3 days	✓	26-Oct-2024	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE A+A Well	E235.NO3-L	23-Oct-2024	26-Oct-2024	3 days	3 days	✓	26-Oct-2024	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Duplicate	E235.NO3-L	23-Oct-2024	26-Oct-2024	3 days	3 days	✓	26-Oct-2024	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Field Blank	E235.NO3-L	23-Oct-2024	26-Oct-2024	3 days	3 days	✓	26-Oct-2024	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW03-01	E235.NO3-L	23-Oct-2024	26-Oct-2024	3 days	3 days	✓	26-Oct-2024	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW03-02	E235.NO3-L	23-Oct-2024	26-Oct-2024	3 days	3 days	✓	26-Oct-2024	3 days	3 days	✓

Matrix: Water

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
A+A Well	E235.NO2-L	23-Oct-2024	26-Oct-2024	3 days	3 days	✓	26-Oct-2024	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
Duplicate	E235.NO2-L	23-Oct-2024	26-Oct-2024	3 days	3 days	✓	26-Oct-2024	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
Field Blank	E235.NO2-L	23-Oct-2024	26-Oct-2024	3 days	3 days	✓	26-Oct-2024	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
MW03-01	E235.NO2-L	23-Oct-2024	26-Oct-2024	3 days	3 days	✓	26-Oct-2024	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
MW03-02	E235.NO2-L	23-Oct-2024	26-Oct-2024	3 days	3 days	✓	26-Oct-2024	3 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
A+A Well	E235.SO4	23-Oct-2024	26-Oct-2024	28 days	3 days	✓	26-Oct-2024	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
Duplicate	E235.SO4	23-Oct-2024	26-Oct-2024	28 days	3 days	✓	26-Oct-2024	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
Field Blank	E235.SO4	23-Oct-2024	26-Oct-2024	28 days	3 days	✓	26-Oct-2024	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MW03-01	E235.SO4	23-Oct-2024	26-Oct-2024	28 days	3 days	✓	26-Oct-2024	28 days	3 days	✓

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Project : Cinnamon Ridge Groundwater

Matrix: Water

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MW03-02	E235.SO4	23-Oct-2024	26-Oct-2024	28 days	3 days	✓	26-Oct-2024	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
A+A Well	E318	23-Oct-2024	29-Oct-2024	28 days	6 days	✓	31-Oct-2024	28 days	8 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
Duplicate	E318	23-Oct-2024	29-Oct-2024	28 days	6 days	✓	31-Oct-2024	28 days	8 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
Field Blank	E318	23-Oct-2024	29-Oct-2024	28 days	6 days	✓	31-Oct-2024	28 days	8 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW03-01	E318	23-Oct-2024	29-Oct-2024	28 days	6 days	✓	31-Oct-2024	28 days	8 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW03-02	E318	23-Oct-2024	29-Oct-2024	28 days	6 days	✓	31-Oct-2024	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
A+A Well	E366	23-Oct-2024	29-Oct-2024	28 days	6 days	✓	30-Oct-2024	28 days	7 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
Duplicate	E366	23-Oct-2024	29-Oct-2024	28 days	6 days	✓	30-Oct-2024	28 days	7 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
Field Blank	E366	23-Oct-2024	29-Oct-2024	28 days	6 days	✓	30-Oct-2024	28 days	7 days	✓

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Matrix: Water — Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
MW03-01	E366	23-Oct-2024	29-Oct-2024	28 days	6 days	✓	30-Oct-2024	28 days	7 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
MW03-02	E366	23-Oct-2024	29-Oct-2024	28 days	6 days	✓	30-Oct-2024	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
A+A Well	E509	23-Oct-2024	01-Nov-2024	28 days	9 days	✓	01-Nov-2024	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
Duplicate	E509	23-Oct-2024	01-Nov-2024	28 days	9 days	✓	01-Nov-2024	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
Field Blank	E509	23-Oct-2024	01-Nov-2024	28 days	9 days	✓	01-Nov-2024	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
MW03-01	E509	23-Oct-2024	01-Nov-2024	28 days	9 days	✓	01-Nov-2024	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
MW03-02	E509	23-Oct-2024	01-Nov-2024	28 days	9 days	✓	01-Nov-2024	28 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
A+A Well	E421	23-Oct-2024	01-Nov-2024	180 days	9 days	✓	01-Nov-2024	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
Duplicate	E421	23-Oct-2024	01-Nov-2024	180 days	9 days	✓	01-Nov-2024	180 days	9 days	✓

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Matrix: Water — Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
Field Blank	E421	23-Oct-2024	01-Nov-2024	180 days	9 days	✓	01-Nov-2024	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
MW03-01	E421	23-Oct-2024	01-Nov-2024	180 days	9 days	✓	01-Nov-2024	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
MW03-02	E421	23-Oct-2024	01-Nov-2024	180 days	9 days	✓	01-Nov-2024	180 days	9 days	✓
Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)										
Sterile HDPE (Sodium thiosulphate)										
Field Blank	E012.FC	23-Oct-2024	—	—	—		24-Oct-2024	30 hrs	22 hrs	✓
Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)										
Sterile HDPE (Sodium thiosulphate)										
MW03-02	E012.FC	23-Oct-2024	—	—	—		24-Oct-2024	30 hrs	22 hrs	✓
Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)										
Sterile HDPE (Sodium thiosulphate)										
Duplicate	E012.FC	23-Oct-2024	—	—	—		24-Oct-2024	30 hrs	23 hrs	✓
Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)										
Sterile HDPE (Sodium thiosulphate)										
MW03-01	E012.FC	23-Oct-2024	—	—	—		24-Oct-2024	30 hrs	23 hrs	✓
Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)										
Sterile HDPE (Sodium thiosulphate)										
A+A Well	E012.FC	23-Oct-2024	—	—	—		24-Oct-2024	30 hrs	24 hrs	✓
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate)										
Field Blank	E010	23-Oct-2024	—	—	—		24-Oct-2024	30 hrs	23 hrs	✓

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Matrix: Water — Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate)										
MW03-02	E010	23-Oct-2024	—	—	—		24-Oct-2024	30 hrs	23 hrs	✓
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate)										
Duplicate	E010	23-Oct-2024	—	—	—		24-Oct-2024	30 hrs	24 hrs	✓
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate)										
MW03-01	E010	23-Oct-2024	—	—	—		24-Oct-2024	30 hrs	24 hrs	✓
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate)										
A+A Well	E010	23-Oct-2024	—	—	—		24-Oct-2024	30 hrs	25 hrs	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
A+A Well	E290	23-Oct-2024	26-Oct-2024	14 days	3 days	✓	26-Oct-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
Duplicate	E290	23-Oct-2024	26-Oct-2024	14 days	3 days	✓	26-Oct-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
Field Blank	E290	23-Oct-2024	26-Oct-2024	14 days	3 days	✓	26-Oct-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
MW03-01	E290	23-Oct-2024	26-Oct-2024	14 days	3 days	✓	26-Oct-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
MW03-02	E290	23-Oct-2024	26-Oct-2024	14 days	3 days	✓	26-Oct-2024	14 days	3 days	✓

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Matrix: Water

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Colour (True) by Spectrometer (5 CU)										
HDPE A+A Well	E329	23-Oct-2024	26-Oct-2024	3 days	3 days	✓	26-Oct-2024	3 days	3 days	✓
Physical Tests : Colour (True) by Spectrometer (5 CU)										
HDPE Duplicate	E329	23-Oct-2024	26-Oct-2024	3 days	3 days	✓	26-Oct-2024	3 days	3 days	✓
Physical Tests : Colour (True) by Spectrometer (5 CU)										
HDPE Field Blank	E329	23-Oct-2024	26-Oct-2024	3 days	3 days	✓	26-Oct-2024	3 days	3 days	✓
Physical Tests : Colour (True) by Spectrometer (5 CU)										
HDPE MW03-01	E329	23-Oct-2024	26-Oct-2024	3 days	3 days	✓	26-Oct-2024	3 days	3 days	✓
Physical Tests : Colour (True) by Spectrometer (5 CU)										
HDPE MW03-02	E329	23-Oct-2024	26-Oct-2024	3 days	3 days	✓	26-Oct-2024	3 days	3 days	✓
Physical Tests : pH by Meter										
HDPE Field Blank	E108	23-Oct-2024	26-Oct-2024	0.25 hrs	65 hrs	× EHTR-FM	26-Oct-2024	0.25 hrs	68 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW03-02	E108	23-Oct-2024	26-Oct-2024	0.25 hrs	65 hrs	× EHTR-FM	26-Oct-2024	0.25 hrs	68 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Duplicate	E108	23-Oct-2024	26-Oct-2024	0.25 hrs	66 hrs	× EHTR-FM	26-Oct-2024	0.25 hrs	69 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW03-01	E108	23-Oct-2024	26-Oct-2024	0.25 hrs	66 hrs	× EHTR-FM	26-Oct-2024	0.25 hrs	69 hrs	× EHTR-FM

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Matrix: Water

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE										
A+A Well	E108	23-Oct-2024	26-Oct-2024	0.25 hrs	68 hrs	× EHTR-FM	26-Oct-2024	0.25 hrs	70 hrs	× EHTR-FM

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended
Rec. HT: ALS recommended hold time (see units).

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Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: x = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	1733020	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	1737936	1	19	5.2	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1732027	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	1733013	1	13	7.6	5.0	✓
Colour (True) by Spectrometer (5 CU)	E329	1733022	1	17	5.8	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1744437	1	9	11.1	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1742173	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1733023	1	12	8.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1733015	1	18	5.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1733016	1	19	5.2	5.0	✓
pH by Meter	E108	1733019	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	1733017	1	13	7.6	5.0	✓
Thermotolerant (Fecal) Coliform (MF-mFC)	E012.FC	1731055	1	10	10.0	10.0	✓
Total Coliforms and E. coli (Enzyme Substrate)	E010	1731127	2	17	11.7	10.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1737939	1	15	6.6	5.0	✓
Total Nitrogen by Colourimetry	E366	1737935	1	9	11.1	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1733020	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	1737936	1	19	5.2	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1732027	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	1733013	1	13	7.6	5.0	✓
Colour (True) by Spectrometer (5 CU)	E329	1733022	1	17	5.8	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1744437	1	9	11.1	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1742173	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1733023	1	12	8.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1733015	1	18	5.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1733016	1	19	5.2	5.0	✓
pH by Meter	E108	1733019	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	1733017	1	13	7.6	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1737939	1	15	6.6	5.0	✓
Total Nitrogen by Colourimetry	E366	1737935	1	9	11.1	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1733020	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	1737936	1	19	5.2	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1732027	1	20	5.0	5.0	✓

Matrix: Water

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Method Blanks (MB) - Continued							
Chloride in Water by IC	E235.Cl	1733013	1	13	7.6	5.0	✓
Colour (True) by Spectrometer (5 CU)	E329	1733022	1	17	5.8	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1744437	1	9	11.1	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1742173	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1733023	1	12	8.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1733015	1	18	5.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1733016	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1733017	1	13	7.6	5.0	✓
Thermotolerant (Fecal) Coliform (MF-mFC)	E012.FC	1731055	1	10	10.0	10.0	✓
Total Coliforms and E. coli (Enzyme Substrate)	E010	1731127	1	17	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1737939	1	15	6.6	5.0	✓
Total Nitrogen by Colourimetry	E366	1737935	1	9	11.1	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1737936	1	19	5.2	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1732027	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	1733013	1	13	7.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1744437	1	9	11.1	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1742173	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1733023	1	12	8.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1733015	1	18	5.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1733016	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	1733017	1	13	7.6	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1737939	1	15	6.6	5.0	✓
Total Nitrogen by Colourimetry	E366	1737935	1	9	11.1	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Coliforms and E. coli (Enzyme Substrate)	E010 ALS Environmental - Kamloops	Water	APHA 9223 (mod)	The enzyme substrate test simultaneously detects Total Coliforms and E. coli in a 100 mL sample after incubation at 35.0 ±0.5°C for either 18 or 24 hours (dependent on reagent used).
Thermotolerant (Fecal) Coliform (MF-mFC)	E012.FC ALS Environmental - Kamloops	Water	APHA 9222 D (mod)	Following filtration (0.45 µm), and incubation at 44.5 ±0.2°C for 22-26 hours, colonies exhibiting characteristic morphology of the target organism are enumerated and confirmed.
pH by Meter	E108 ALS Environmental - Vancouver	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Chloride in Water by IC	E235.Cl ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 ALS Environmental - Vancouver	Water	Method Flalab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 ALS Environmental - Vancouver	Water	Method Flalab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Colour (True) by Spectrometer (5 CU)	E329 ALS Environmental - Vancouver	Water	APHA 2120 C (mod)	Colour (True Colour) is determined by filtering a sample through a 0.45 micron membrane filter followed by analysis of the filtrate using the platinum-cobalt colourimetric method. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment.
Total Nitrogen by Colourimetry	E366 ALS Environmental - Vancouver	Water	Chinchilla Scientific Nitrate Method, 2011	Following digestion, total nitrogen is is determined colourimetrically using a discrete analyzer utilizing the vanadium chloride reduction method. This method of analysis is approved under US EPA 40 CFR Part 136 (May 2021).
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Vancouver	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Dissolved Metals in Water by CRC ICPMS	E421 ALS Environmental - Calgary	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Mercury in Water by CVAAS	E509 ALS Environmental - Vancouver	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L ALS Environmental - Vancouver	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Calgary	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 ALS Environmental - Vancouver	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 ALS Environmental - Vancouver	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for Total Nitrogen in water	EP366 ALS Environmental - Vancouver	Water	APHA 4500-P J (mod)	Samples for total nitrogen analysis are digested using a heated persulfate digestion. Nitrogen compounds are converted to nitrate in this digestion.
Dissolved Metals Water Filtration	EP421 ALS Environmental - Calgary	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	:KS2404449	Page	: 1 of 13
Client	:City of Kamloops	Laboratory	:ALS Environmental - Kamloops
Contact	:Beth Lucier	Account Manager	:Caitlin Fountain
Address	:955 Concordia Way Kamloops BC Canada V2C 6V3	Address	:1445 McGill Road, Unit 2B Kamloops, British Columbia Canada V2C 6K7
Telephone	:—	Telephone	:250 372 3588
Project	:Cinnamon Ridge Groundwater	Date Samples Received	:23-Oct-2024 13:52
PO	:—	Date Analysis Commenced	:24-Oct-2024
C-O-C number	:—	Issue Date	:04-Nov-2024 15:16
Sampler	:—		
Site	:—		
Quote number	:Cinnamon Ridge		
No. of samples received	:5		
No. of samples analysed	:5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	Position	Laboratory Department
Ellie Milner	Account Manager	Kamloops Microbiology, Kamloops, British Columbia
Ghazaleh Khanmirzaei	Analyst	Vancouver Metals, Burnaby, British Columbia
Gurvinder Kour	Lab Assistant	Calgary Metals, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Vancouver Inorganics, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Shirley Li	Team Leader - Inorganics	Calgary Metals, Calgary, Alberta

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Work Order	:	KB2404449
Client	:	City of Kamloops
Project	:	Cinnamon Ridge Groundwater

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include 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 predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "—" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

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Work Order : KS2404449
Client : City of Kamloops
Project : Cinnamon Ridge Groundwater

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1733019)											
FJ2403261-001	Anonymous	pH	—	E108	0.10	pH units	7.78	7.78	0.00%	4%	—
Physical Tests (QC Lot: 1733020)											
FJ2403261-001	Anonymous	Alkalinity, bicarbonate (as CaCO3)	—	E290	1.0	mg/L	280	280	0.216%	20%	—
		Alkalinity, carbonate (as CaCO3)	—	E290	1.0	mg/L	<1.0	<1.0	0.00%	20%	—
		Alkalinity, hydroxide (as CaCO3)	—	E290	1.0	mg/L	<1.0	<1.0	0.00%	20%	—
		Alkalinity, phenolphthalein (as CaCO3)	—	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	—
		Alkalinity, total (as CaCO3)	—	E290	1.0	mg/L	280	280	0.216%	20%	—
Physical Tests (QC Lot: 1733022)											
FJ2403261-001	Anonymous	Colour, true	—	E329	5.0	CU	<5.0	<5.0	0	Diff <2x LOR	—
Anions and Nutrients (QC Lot: 1733013)											
FJ2403261-001	Anonymous	Chloride	16887-00-6	E235.Cl	5.00	mg/L	<5.00	<5.00	0	Diff <2x LOR	—
Anions and Nutrients (QC Lot: 1733015)											
FJ2403261-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0500	mg/L	39.4	44.5	12.1%	20%	—
Anions and Nutrients (QC Lot: 1733016)											
FJ2403261-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0100	mg/L	0.0564	0.0598	0.0035	Diff <2x LOR	—
Anions and Nutrients (QC Lot: 1733017)											
FJ2403261-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	3.00	mg/L	812	917	12.2%	20%	—
Anions and Nutrients (QC Lot: 1733023)											
FJ2403261-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0022	0.0034	0.0011	Diff <2x LOR	—
Anions and Nutrients (QC Lot: 1737935)											
KS2404449-001	A+A Well	Nitrogen, total	7727-37-9	E366	1.50	mg/L	7.33	6.99	0.340	Diff <2x LOR	—
Anions and Nutrients (QC Lot: 1737936)											
KS2404449-001	A+A Well	Ammonia, total (as N)	7664-41-7	E298	0.100	mg/L	7.88	8.01	1.74%	20%	—
Anions and Nutrients (QC Lot: 1737939)											
KS2404449-001	A+A Well	Kjeldahl nitrogen, total [TKN]	—	E318	0.250	mg/L	8.79	8.88	1.06%	20%	—
Microbiological Tests (QC Lot: 1731055)											
KS2404436-001	Anonymous	Coliforms, thermotolerant [fecal]	—	E012.FC	1	CFU/100mL	10	<1	9	Diff <2x LOR	DUP-H
Microbiological Tests (QC Lot: 1731127)											
KS2404458-004	Anonymous	Coliforms, Escherichia coli [E. coli]	—	E010	1	MPN/100mL	1	1	0	Diff <2x LOR	—

Sub-Matrix: Water

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Microbiological Tests (QC Lot: 1731127) - continued											
KS2404458-004	Anonymous	Coliforms, total	—	E010	1	MPN/100mL	99	74	29.2%	85%	—
KS2404467-003	Anonymous	Coliforms, Escherichia coli [E. coli]	—	E010	1	MPN/100mL	<1	<1	0	Diff <2x LOR	—
		Coliforms, total	—	E010	1	MPN/100mL	<1	<1	0	Diff <2x LOR	—
Dissolved Metals (QC Lot: 1742173)											
CG2416119-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0015	0.0012	0.0003	Diff <2x LOR	—
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	—
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00012	0.00011	0.000009	Diff <2x LOR	—
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0833	0.0842	1.03%	20%	—
		Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	—
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	—
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	0.010	0.010	0.0004	Diff <2x LOR	—
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0101 µg/L	0.0000102	0.0000001	Diff <2x LOR	—
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	56.0	57.3	2.28%	20%	—
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	—
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	—
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	—
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00155	0.00133	0.00022	Diff <2x LOR	—
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	—
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	—
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0045	0.0047	0.0002	Diff <2x LOR	—
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	16.4	16.2	0.931%	20%	—
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	—
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00121	0.00114	5.54%	20%	—
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	—
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	—
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.504	0.501	0.600%	20%	—
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00026	0.00024	0.00001	Diff <2x LOR	—
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	6.78 µg/L	0.00678	0.0512%	20%	—
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.23	2.18	2.37%	20%	—
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	—
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	2.19	2.11	3.49%	20%	—
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.159	0.152	4.60%	20%	—
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	25.8	25.4	1.67%	20%	—
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	—

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Work Order : KS2404449
Client : City of Kamloops
Project : Cinnamon Ridge Groundwater

Sub-Matrix: Water

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 1742173) - continued											
CG2418119-001	Anonymous	Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	—
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	—
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	—
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	—
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	—
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00101	0.000995	1.20%	20%	—
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	—
		Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0014	0.0012	0.0001	Diff <2x LOR	—
		Zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	—
Dissolved Metals (QC Lot: 1744437)											
KS2404449-001	A+A Well	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	—
Aggregate Organics (QC Lot: 1732027)											
KS2404448-001	Anonymous	Chemical oxygen demand [COD]	—	E559-L	10	mg/L	<10	<10	0	Diff <2x LOR	—

Qualifiers

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

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Work Order : KS2404449
Client : City of Kamloops
Project : Cinnamon Ridge Groundwater

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1733020)						
Alkalinity, bicarbonate (as CaCO3)	—	E290	1	mg/L	<1.0	—
Alkalinity, carbonate (as CaCO3)	—	E290	1	mg/L	<1.0	—
Alkalinity, hydroxide (as CaCO3)	—	E290	1	mg/L	<1.0	—
Alkalinity, phenolphthalein (as CaCO3)	—	E290	1	mg/L	<1.0	—
Alkalinity, total (as CaCO3)	—	E290	1	mg/L	<1.0	—
Physical Tests (QCLot: 1733022)						
Colour, true	—	E329	5	CU	<5.0	—
Anions and Nutrients (QCLot: 1733013)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	—
Anions and Nutrients (QCLot: 1733015)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	—
Anions and Nutrients (QCLot: 1733016)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	—
Anions and Nutrients (QCLot: 1733017)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	—
Anions and Nutrients (QCLot: 1733023)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	—
Anions and Nutrients (QCLot: 1737935)						
Nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	—
Anions and Nutrients (QCLot: 1737936)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	—
Anions and Nutrients (QCLot: 1737939)						
Kjeldahl nitrogen, total [TKN]	—	E318	0.05	mg/L	<0.050	—
Microbiological Tests (QCLot: 1731055)						
Coliforms, thermotolerant [fecal]	—	E012.FC	1	CFU/100mL	<1	—
Microbiological Tests (QCLot: 1731127)						
Coliforms, Escherichia coli [E. coli]	—	E010	1	MPN/100mL	<1	—
Coliforms, total	—	E010	1	MPN/100mL	<1	—
Dissolved Metals (QCLot: 1742173)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	—
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	—
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	—

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Project : Cinnamon Ridge Groundwater

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1742173) - continued						
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	—
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	—
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	—
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	—
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	—
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	—
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	—
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	—
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	—
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	—
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	—
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	—
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	—
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	—
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	—
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	—
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	—
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	—
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	—
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	—
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	—
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	—
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	—
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	—
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	—
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	—
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	—
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	—
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	—
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	—
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	—
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	—
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	—
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	—
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	—

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Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1742173) - continued						
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	—
Dissolved Metals (QCLot: 1744437)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	—
Aggregate Organics (QCLot: 1732027)						
Chemical oxygen demand [COD]	—	E559-L	10	mg/L	<10	—

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Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1733019)									
pH	—	E108	—	pH units	7 pH units	100	98.0	102	—
Physical Tests (QCLot: 1733020)									
Alkalinity, phenolphthalein (as CaCO3)	—	E290	1	mg/L	229 mg/L	104	75.0	125	—
Alkalinity, total (as CaCO3)	—	E290	1	mg/L	500 mg/L	103	85.0	115	—
Physical Tests (QCLot: 1733022)									
Colour, true	—	E329	5	CU	100 CU	101	85.0	115	—
Anions and Nutrients (QCLot: 1733013)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	97.3	90.0	110	—
Anions and Nutrients (QCLot: 1733015)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	97.9	90.0	110	—
Anions and Nutrients (QCLot: 1733016)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	94.5	90.0	110	—
Anions and Nutrients (QCLot: 1733017)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	98.5	90.0	110	—
Anions and Nutrients (QCLot: 1733023)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	99.9	80.0	120	—
Anions and Nutrients (QCLot: 1737935)									
Nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	92.0	75.0	125	—
Anions and Nutrients (QCLot: 1737936)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	104	85.0	115	—
Anions and Nutrients (QCLot: 1737939)									
Kjeldahl nitrogen, total [TKN]	—	E318	0.05	mg/L	4 mg/L	110	75.0	125	—
Dissolved Metals (QCLot: 1742173)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	96.2	80.0	120	—
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	94.2	80.0	120	—
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	96.0	80.0	120	—
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	100	80.0	120	—
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	101	80.0	120	—
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	99.9	80.0	120	—
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	104	80.0	120	—

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Client : City of Kamloops
Project : Cinnamon Ridge Groundwater

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike: Target Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Dissolved Metals (QCLot: 1742173) - continued									
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	96.4	80.0	120	—
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	102	80.0	120	—
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	94.5	80.0	120	—
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	95.2	80.0	120	—
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	93.8	80.0	120	—
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	93.2	80.0	120	—
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	98.2	80.0	120	—
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	96.2	80.0	120	—
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	87.2	80.0	120	—
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	94.8	80.0	120	—
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	94.3	80.0	120	—
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	97.5	80.0	120	—
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	89.5	80.0	120	—
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	96.3	70.0	130	—
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	94.8	80.0	120	—
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	94.7	80.0	120	—
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	95.4	80.0	120	—
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	98.5	80.0	140	—
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	89.9	80.0	120	—
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	98.0	80.0	120	—
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	104	80.0	120	—
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	101	80.0	120	—
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	96.8	80.0	120	—
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	94.2	80.0	120	—
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	99.2	80.0	120	—
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	98.1	80.0	120	—
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	98.1	80.0	120	—
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	99.7	80.0	120	—
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	99.2	80.0	120	—
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	96.8	80.0	120	—
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	94.0	80.0	120	—
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	100	80.0	120	—
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0 mg/L	97.3	80.0	120	—
Aggregate Organics (QCLot: 1732027)									
Chemical oxygen demand (COD)	—	E559-L	10	mg/L	100 mg/L	101	85.0	115	—

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Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier

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Project : Cinnamon Ridge Groundwater

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: Water

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 1733013)										
FJ2403261-002	Anonymous	Chloride	16887-00-6	E235.Cl	514 mg/L	500 mg/L	103	75.0	125	—
Anions and Nutrients (QCLot: 1733015)										
FJ2403261-002	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	13.0 mg/L	12.5 mg/L	104	75.0	125	—
Anions and Nutrients (QCLot: 1733016)										
FJ2403261-002	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	2.48 mg/L	2.5 mg/L	99.3	75.0	125	—
Anions and Nutrients (QCLot: 1733017)										
FJ2403261-002	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	512 mg/L	500 mg/L	102	75.0	125	—
Anions and Nutrients (QCLot: 1733023)										
FJ2403261-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0347 mg/L	0.03 mg/L	116	70.0	130	—
Anions and Nutrients (QCLot: 1737935)										
KS2404449-002	MW03-01	Nitrogen, total	7727-37-9	E366	ND mg/L	—	ND	70.0	130	—
Anions and Nutrients (QCLot: 1737936)										
KS2404449-002	MW03-01	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	—	ND	75.0	125	—
Anions and Nutrients (QCLot: 1737939)										
KS2404449-002	MW03-01	Kjeldahl nitrogen, total [TKN]	—	E318	10.5 mg/L	12.5 mg/L	84.3	70.0	130	—
Dissolved Metals (QCLot: 1742173)										
CG2416119-002	Anonymous	Aluminum, dissolved	7429-90-5	E421	1.90 mg/L	2 mg/L	95.0	70.0	130	—
		Antimony, dissolved	7440-36-0	E421	0.197 mg/L	0.2 mg/L	98.3	70.0	130	—
		Arsenic, dissolved	7440-38-2	E421	0.197 mg/L	0.2 mg/L	98.8	70.0	130	—
		Barium, dissolved	7440-39-3	E421	0.195 mg/L	0.2 mg/L	97.8	70.0	130	—
		Beryllium, dissolved	7440-41-7	E421	0.395 mg/L	0.4 mg/L	98.7	70.0	130	—
		Bismuth, dissolved	7440-69-9	E421	0.102 mg/L	0.1 mg/L	102	70.0	130	—
		Boron, dissolved	7440-42-8	E421	0.998 mg/L	1 mg/L	99.8	70.0	130	—
		Cadmium, dissolved	7440-43-9	E421	0.0401 mg/L	0.04 mg/L	100	70.0	130	—
		Calcium, dissolved	7440-70-2	E421	ND mg/L	—	ND	70.0	130	—
		Cesium, dissolved	7440-46-2	E421	0.101 mg/L	0.1 mg/L	101	70.0	130	—
		Chromium, dissolved	7440-47-3	E421	0.393 mg/L	0.4 mg/L	98.4	70.0	130	—
		Cobalt, dissolved	7440-48-4	E421	0.197 mg/L	0.2 mg/L	98.8	70.0	130	—
		Copper, dissolved	7440-50-8	E421	0.199 mg/L	0.2 mg/L	99.3	70.0	130	—
		Iron, dissolved	7439-89-6	E421	19.7 mg/L	20 mg/L	98.5	70.0	130	—
		Lead, dissolved	7439-92-1	E421	0.202 mg/L	0.2 mg/L	101	70.0	130	—
		Lithium, dissolved	7439-93-2	E421	0.827 mg/L	1 mg/L	82.7	70.0	130	—
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	—	ND	70.0	130	—
		Manganese, dissolved	7439-96-5	E421	0.193 mg/L	0.2 mg/L	96.7	70.0	130	—
		Molybdenum, dissolved	7439-98-7	E421	0.196 mg/L	0.2 mg/L	98.2	70.0	130	—

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Project : Cinnamon Ridge Groundwater

Sub-Matrix: Water

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 1742173) - continued										
CG24161119-002	Anonymous	Nickel, dissolved	7440-02-0	E421	0.389 mg/L	0.4 mg/L	97.4	70.0	130	—
		Phosphorus, dissolved	7723-14-0	E421	92.8 mg/L	100 mg/L	92.8	70.0	130	—
		Potassium, dissolved	7440-09-7	E421	37.3 mg/L	40 mg/L	93.4	70.0	130	—
		Rubidium, dissolved	7440-17-7	E421	0.192 mg/L	0.2 mg/L	96.3	70.0	130	—
		Selenium, dissolved	7782-49-2	E421	0.388 mg/L	0.4 mg/L	97.0	70.0	130	—
		Silicon, dissolved	7440-21-3	E421	88.5 mg/L	100 mg/L	88.5	70.0	130	—
		Silver, dissolved	7440-22-4	E421	0.0399 mg/L	0.04 mg/L	99.8	70.0	130	—
		Sodium, dissolved	7440-23-5	E421	19.8 mg/L	20 mg/L	98.8	70.0	130	—
		Strontium, dissolved	7440-24-6	E421	ND mg/L	—	ND	70.0	130	—
		Sulfur, dissolved	7704-34-9	E421	188 mg/L	200 mg/L	94.2	70.0	130	—
		Tellurium, dissolved	13494-80-9	E421	0.396 mg/L	0.4 mg/L	99.0	70.0	130	—
		Thallium, dissolved	7440-28-0	E421	0.0387 mg/L	0.04 mg/L	96.7	70.0	130	—
		Thorium, dissolved	7440-29-1	E421	0.215 mg/L	0.2 mg/L	107	70.0	130	—
		Tin, dissolved	7440-31-5	E421	0.195 mg/L	0.2 mg/L	97.4	70.0	130	—
		Titanium, dissolved	7440-32-6	E421	0.390 mg/L	0.4 mg/L	97.6	70.0	130	—
		Tungsten, dissolved	7440-33-7	E421	0.204 mg/L	0.2 mg/L	102	70.0	130	—
		Uranium, dissolved	7440-61-1	E421	0.0409 mg/L	0.04 mg/L	102	70.0	130	—
		Vanadium, dissolved	7440-62-2	E421	0.981 mg/L	1 mg/L	98.1	70.0	130	—
		Zinc, dissolved	7440-66-6	E421	3.99 mg/L	4 mg/L	99.8	70.0	130	—
		Zirconium, dissolved	7440-67-7	E421	0.404 mg/L	0.4 mg/L	101	70.0	130	—
Dissolved Metals (QCLot: 1744437)										
KS2404449-002	MW03-01	Mercury, dissolved	7439-97-6	E509	0.0000954 mg/L	0 mg/L	95.4	70.0	130	—
Aggregate Organics (QCLot: 1732027)										
KS2404449-001	A+A Well	Chemical oxygen demand [COD]	—	E559-L	94 mg/L	100 mg/L	94.5	75.0	125	—

ALS Canada Ltd.

CERTIFICATE OF ANALYSIS

Work Order	: KS2404471		
Client	: City of Kamloops	Laboratory	: ALS Environmental - Vancouver
Contact	: Beth Lucier	Account Manager	: Caitlin Fountain
Address	: 955 Concordia Way Kamloops British Columbia Canada V2C 6V3	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: —	Telephone	: 250 372 3588
Project	: Cinnamon Ridge Groundwater	Date Samples Received	: 24-Oct-2024 12:12
PO	: —	Date Analysis Commenced	: 24-Oct-2024
C-O-C number	: —	Issue Date	: 05-Nov-2024 16:57
Sampler	: —		
Site	: —		
Quote number	: Cinnamon Ridge		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	Position	Laboratory Department
Daniel Shabestani	Lab Assistant	Metals, Burnaby, British Columbia
Ellie Milner	Account Manager	Microbiology, Kamloops, British Columbia
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Work Order : KS2404471
Client : City of Kamloops
Project : Cinnamon Ridge Groundwater

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
LOR: Limit of Reporting (detection limit).

Unit	Description
mg/L	milligrams per litre
pH units	pH units
CU	colour units (1 cu = 1 mg/l pt)
CFU/100mL	colony forming units per hundred millilitres
MPN/100mL	most probable number per hundred millilitres
-	no units

<: less than.
>: greater than.
Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Work Order : KS2404471
Client : City of Kamloops
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Qualifiers

Qualifier	Description
DLA	Detection Limit adjusted for required dilution.
HTDC	Hold time exceeded for dilution or re-analysis. Reported results are consistent with initial results (tested within hold time), and are valid and defensible.
RRV	Reported result verified by repeat analysis.

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Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	Client sample ID	MW03-03W	MW03-04	CR15	—	—
					Client sampling date / time	24-Oct-2024 09:15	24-Oct-2024 10:15	24-Oct-2024 11:15	—	—
						KS2404471-001	KS2404471-002	KS2404471-003	—	—
						Result	Result	Result	—	—
Physical Tests										
Alkalinity, bicarbonate (as CaCO3)	—	E290/VA	1.0	mg/L		218	310	212	—	—
Alkalinity, carbonate (as CaCO3)	—	E290/VA	1.0	mg/L		<1.0	<1.0	<1.0	—	—
Alkalinity, hydroxide (as CaCO3)	—	E290/VA	1.0	mg/L		<1.0	<1.0	<1.0	—	—
Alkalinity, phenolphthalein (as CaCO3)	—	E290/VA	1.0	mg/L		<1.0	<1.0	<1.0	—	—
Alkalinity, total (as CaCO3)	—	E290/VA	1.0	mg/L		218	310	212	—	—
Colour, true	—	E329/VA	5.0	CU		238	61.2	204	—	—
Hardness (as CaCO3), dissolved	—	EC100/VA	0.60	mg/L		140	190	211	—	—
pH	—	E108/VA	0.10	pH units		6.96	7.28	7.13	—	—
Anions and Nutrients										
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L		33.2	16.1	71.5	—	—
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L		0.0012	<0.0010	<0.0010	—	—
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		<0.30	4.13 RRR	3.89	—	—
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L		1.48	0.548	0.229	—	—
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	0.0010	mg/L		<0.0010	<0.0010 HTDC	<0.0010	—	—
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	0.0050	mg/L		<0.0050	0.0050 HTDC	<0.0050	—	—
Kjeldahl nitrogen, total [TKN]	—	E318/VA	0.050	mg/L		2.05	0.909	0.479	—	—
Nitrogen, total	7727-37-9	E366/VA	0.030	mg/L		1.76	0.882	0.432	—	—
Microbiological Tests										
Coliforms, thermotolerant [fecal]	—	E012.FC/KS	1	CFU/100 mL		<10 DLA	<10 DLA	<10 DLA	—	—
Coliforms, total	—	E010/KS	1	MPN/100 mL		225	3	8	—	—
Coliforms, Escherichia coli [E. coli]	—	E010/KS	1	MPN/100 mL		<1	<1	<1	—	—

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Client : City of Kamloops
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Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	Client sample ID	MW03-03W	MW03-04	CR15	—	—
					Client sampling date / time	24-Oct-2024 09:15	24-Oct-2024 10:15	24-Oct-2024 11:15	—	—
						KS2404471-001	KS2404471-002	KS2404471-003	—	—
						Result	Result	Result	—	—
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	0.0010	mg/L		0.0034	0.0025	0.0010	—	—
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L		<0.00010	<0.00010	<0.00010	—	—
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L		0.00014	0.00062	0.00031	—	—
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L		0.120	0.0623	0.0762	—	—
Beryllium, dissolved	7440-41-7	E421/VA	0.000100	mg/L		<0.000100	<0.000100	<0.000100	—	—
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L		<0.000050	<0.000050	<0.000050	—	—
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L		0.070	0.058	0.067	—	—
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L		<0.0000050	0.0000147	<0.0000050	—	—
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L		30.0	28.2	37.5	—	—
Cesium, dissolved	7440-46-2	E421/VA	0.000010	mg/L		0.000050	0.000024	0.000011	—	—
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L		<0.00050	<0.00050	<0.00050	—	—
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L		0.00018	0.00015	<0.00010	—	—
Copper, dissolved	7440-50-8	E421/VA	0.00020	mg/L		0.00021	<0.00020	<0.00020	—	—
Iron, dissolved	7439-89-6	E421/VA	0.010	mg/L		42.2	28.1	25.9	—	—
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L		<0.000050	<0.000050	<0.000050	—	—
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L		0.0050	0.0036	0.0042	—	—
Magnesium, dissolved	7439-95-4	E421/VA	0.0050	mg/L		15.8	29.0	28.5	—	—
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L		0.966	1.70	1.23	—	—
Mercury, dissolved	7439-97-6	E509/VA	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	—	—
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L		0.000120	0.000407	0.000262	—	—
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L		0.00077	<0.00050	<0.00050	—	—

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Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	Client sample ID	MW03-03W	MW03-04	CR15	—	—
					Client sampling date / time	24-Oct-2024 09:15	24-Oct-2024 10:15	24-Oct-2024 11:15	—	—
						KS2404471-001	KS2404471-002	KS2404471-003	—	—
						Result	Result	Result	—	—
Dissolved Metals										
Phosphorus, dissolved	7723-14-0	E421/VA	0.050	mg/L		0.236	0.616	<0.050	—	—
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L		7.18	4.35	6.00	—	—
Rubidium, dissolved	7440-17-7	E421/VA	0.00020	mg/L		0.00584	0.00338	0.00284	—	—
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L		0.000051	0.000118	<0.000050	—	—
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L		21.2	24.0	16.8	—	—
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L		<0.000010	<0.000010	<0.000010	—	—
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L		44.4	21.2	33.5	—	—
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L		0.227	0.187	0.253	—	—
Sulfur, dissolved	7704-34-9	E421/VA	0.50	mg/L		<0.50	<0.50	1.35	—	—
Tellurium, dissolved	13494-80-9	E421/VA	0.00020	mg/L		<0.00020	<0.00020	<0.00020	—	—
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L		<0.000010	<0.000010	<0.000010	—	—
Thorium, dissolved	7440-29-1	E421/VA	0.00010	mg/L		<0.00010	<0.00010	<0.00010	—	—
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L		<0.00010	<0.00010	<0.00010	—	—
Titanium, dissolved	7440-32-6	E421/VA	0.00030	mg/L		0.00036	0.00055	<0.00030	—	—
Tungsten, dissolved	7440-33-7	E421/VA	0.00010	mg/L		<0.00010	<0.00010	<0.00010	—	—
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L		0.000022	0.000990	<0.000010	—	—
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L		<0.00050	0.00068	<0.00050	—	—
Zinc, dissolved	7440-66-6	E421/VA	0.0010	mg/L		<0.0010	<0.0010	<0.0010	—	—
Zirconium, dissolved	7440-67-7	E421/VA	0.00020	mg/L		<0.00020	<0.00020	<0.00020	—	—
Dissolved mercury filtration location	—	EP509/VA	-	-		Field	Field	Field	—	—
Dissolved metals filtration location	—	EP421/VA	-	-		Field	Field	Field	—	—

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Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	MW03-03W	MW03-04	CR15	—	—
					Client sampling date / time	24-Oct-2024 09:15	24-Oct-2024 10:15	24-Oct-2024 11:15	—	—
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit		KS2404471-001	KS2404471-002	KS2404471-003	—	—
						Result	Result	Result	—	—
Aggregate Organics										
Chemical oxygen demand [COD]	—	E559-L/VA	10	mg/L		47	20	21	—	—

Please refer to the General Comments section for an explanation of any result qualifiers detected.
Please refer to the Accreditation section for an explanation of analyte accreditations.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	:KS2404471	Page	: 1 of 13
Client	:City of Kamloops	Laboratory	: ALS Environmental - Kamloops
Contact	:Beth Lucier	Account Manager	: Caitlin Fountain
Address	:955 Concordia Way Kamloops BC Canada V2C 6V3	Address	: 1445 McGill Road, Unit 2B Kamloops, British Columbia Canada V2C 6K7
Telephone	:—	Telephone	: 250 372 3588
Project	:Cinnamon Ridge Groundwater	Date Samples Received	: 24-Oct-2024 12:12
PO	:—	Issue Date	: 05-Nov-2024 16:57
C-O-C number	:—		
Sampler	:—		
Site	:—		
Quote number	:Cinnamon Ridge		
No. of samples received	:3		
No. of samples analysed	:3		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "—" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

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Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: Water

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid)										
CR15	E559-L	24-Oct-2024	—	—	—		29-Oct-2024	28 days	5 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid)										
MW03-03W	E559-L	24-Oct-2024	—	—	—		29-Oct-2024	28 days	5 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid)										
MW03-04	E559-L	24-Oct-2024	—	—	—		29-Oct-2024	28 days	5 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
CR15	E298	24-Oct-2024	31-Oct-2024	28 days	7 days	✓	31-Oct-2024	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
MW03-04	E298	24-Oct-2024	31-Oct-2024	28 days	7 days	✓	31-Oct-2024	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
MW03-03W	E298	24-Oct-2024	31-Oct-2024	28 days	7 days	✓	31-Oct-2024	28 days	8 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
CR15	E235.Cl	24-Oct-2024	26-Oct-2024	28 days	2 days	✓	27-Oct-2024	28 days	3 days	✓

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Matrix: Water

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE										
MW03-03W	E235.Cl	24-Oct-2024	26-Oct-2024	28 days	2 days	✓	27-Oct-2024	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
MW03-04	E235.Cl	24-Oct-2024	26-Oct-2024	28 days	2 days	✓	27-Oct-2024	28 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE										
CR15	E378-U	24-Oct-2024	26-Oct-2024	3 days	2 days	✓	27-Oct-2024	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE										
MW03-03W	E378-U	24-Oct-2024	26-Oct-2024	3 days	2 days	✓	27-Oct-2024	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE										
MW03-04	E378-U	24-Oct-2024	26-Oct-2024	3 days	2 days	✓	27-Oct-2024	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
CR15	E235.NO3-L	24-Oct-2024	26-Oct-2024	3 days	2 days	✓	27-Oct-2024	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
MW03-03W	E235.NO3-L	24-Oct-2024	26-Oct-2024	3 days	2 days	✓	27-Oct-2024	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
MW03-04	E235.NO3-L	24-Oct-2024	26-Oct-2024	3 days	2 days	✓	27-Oct-2024	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
CR15	E235.NO2-L	24-Oct-2024	26-Oct-2024	3 days	2 days	✓	27-Oct-2024	3 days	3 days	✓

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Matrix: Water

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
MW03-03W	E235.NO2-L	24-Oct-2024	26-Oct-2024	3 days	2 days	✓	27-Oct-2024	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
MW03-04	E235.NO2-L	24-Oct-2024	26-Oct-2024	3 days	2 days	✓	27-Oct-2024	3 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
CR15	E235.SO4	24-Oct-2024	26-Oct-2024	28 days	2 days	✓	27-Oct-2024	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MW03-03W	E235.SO4	24-Oct-2024	26-Oct-2024	28 days	2 days	✓	27-Oct-2024	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MW03-04	E235.SO4	24-Oct-2024	26-Oct-2024	28 days	2 days	✓	27-Oct-2024	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
CR15	E318	24-Oct-2024	31-Oct-2024	28 days	7 days	✓	04-Nov-2024	28 days	11 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW03-03W	E318	24-Oct-2024	31-Oct-2024	28 days	7 days	✓	04-Nov-2024	28 days	11 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW03-04	E318	24-Oct-2024	31-Oct-2024	28 days	7 days	✓	04-Nov-2024	28 days	11 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
CR15	E366	24-Oct-2024	31-Oct-2024	28 days	7 days	✓	01-Nov-2024	28 days	8 days	✓

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Matrix: Water

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
MW03-03W	E366	24-Oct-2024	31-Oct-2024	28 days	7 days	✓	01-Nov-2024	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
MW03-04	E366	24-Oct-2024	31-Oct-2024	28 days	7 days	✓	01-Nov-2024	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
CR15	E509	24-Oct-2024	02-Nov-2024	28 days	9 days	✓	02-Nov-2024	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
MW03-03W	E509	24-Oct-2024	02-Nov-2024	28 days	9 days	✓	02-Nov-2024	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
MW03-04	E509	24-Oct-2024	02-Nov-2024	28 days	9 days	✓	02-Nov-2024	28 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
Glass vial - dissolved (lab preserved)										
CR15	E421	24-Oct-2024	04-Nov-2024	180 days	11 days	✓	04-Nov-2024	180 days	11 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
Glass vial - dissolved (lab preserved)										
MW03-03W	E421	24-Oct-2024	04-Nov-2024	180 days	11 days	✓	04-Nov-2024	180 days	11 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
Glass vial - dissolved (lab preserved)										
MW03-04	E421	24-Oct-2024	04-Nov-2024	180 days	11 days	✓	04-Nov-2024	180 days	11 days	✓
Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)										
Sterile HDPE (Sodium thiosulphate)										
CR15	E012.FC	24-Oct-2024	—	—	—		24-Oct-2024	30 hrs	2 hrs	✓

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Project : Cinnamon Ridge Groundwater

Matrix: Water — Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)										
Sterile HDPE (Sodium thiosulphate) MW03-04	E012.FC	24-Oct-2024	—	—	—		24-Oct-2024	30 hrs	3 hrs	✓
Microbiological Tests : Thermotolerant (Fecal) Coliform (MF-mFC)										
Sterile HDPE (Sodium thiosulphate) MW03-03W	E012.FC	24-Oct-2024	—	—	—		24-Oct-2024	30 hrs	4 hrs	✓
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate) CR15	E010	24-Oct-2024	—	—	—		24-Oct-2024	30 hrs	3 hrs	✓
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate) MW03-04	E010	24-Oct-2024	—	—	—		24-Oct-2024	30 hrs	4 hrs	✓
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate) MW03-03W	E010	24-Oct-2024	—	—	—		24-Oct-2024	30 hrs	5 hrs	✓
Physical Tests : Alkalinity Species by Titration										
HDPE CR15	E290	24-Oct-2024	26-Oct-2024	14 days	2 days	✓	27-Oct-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW03-03W	E290	24-Oct-2024	26-Oct-2024	14 days	2 days	✓	27-Oct-2024	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW03-04	E290	24-Oct-2024	26-Oct-2024	14 days	2 days	✓	27-Oct-2024	14 days	3 days	✓
Physical Tests : Colour (True) by Spectrometer (5 CU)										
HDPE CR15	E329	24-Oct-2024	26-Oct-2024	3 days	2 days	✓	27-Oct-2024	3 days	3 days	✓

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Work Order : KB2404471
Client : City of Kamloops
Project : Cinnamon Ridge Groundwater

Matrix: Water

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Colour (True) by Spectrometer (5 CU)										
HDPE										
MW03-03W	E329	24-Oct-2024	26-Oct-2024	3 days	2 days	✓	27-Oct-2024	3 days	3 days	✓
Physical Tests : Colour (True) by Spectrometer (5 CU)										
HDPE										
MW03-04	E329	24-Oct-2024	26-Oct-2024	3 days	2 days	✓	27-Oct-2024	3 days	3 days	✓
Physical Tests : pH by Meter										
HDPE										
CR15	E108	24-Oct-2024	26-Oct-2024	0.25 hrs	52 hrs	× EHTR-FM	27-Oct-2024	0.25 hrs	69 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE										
MW03-04	E108	24-Oct-2024	26-Oct-2024	0.25 hrs	53 hrs	× EHTR-FM	27-Oct-2024	0.25 hrs	70 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE										
MW03-03W	E108	24-Oct-2024	26-Oct-2024	0.25 hrs	54 hrs	× EHTR-FM	27-Oct-2024	0.25 hrs	71 hrs	× EHTR-FM

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

Rec. HT: ALS recommended hold time (see units).

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Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: Water

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	1733823	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	1742744	1	16	6.2	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1738332	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	1733816	1	18	5.5	5.0	✓
Colour (True) by Spectrometer (5 CU)	E329	1733825	1	12	8.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1746406	1	13	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1749032	1	5	20.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1733826	1	14	7.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1733818	1	18	5.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1733819	1	20	5.0	5.0	✓
pH by Meter	E108	1733822	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1733820	1	18	5.5	5.0	✓
Thermotolerant (Fecal) Coliform (MF-mFC)	E012.FC	1731071	1	7	14.2	10.0	✓
Total Coliforms and E. coli (Enzyme Substrate)	E010	1731194	2	13	15.3	10.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1742746	1	10	10.0	5.0	✓
Total Nitrogen by Colourimetry	E366	1742747	1	10	10.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1733823	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	1742744	1	16	6.2	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1738332	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	1733816	1	18	5.5	5.0	✓
Colour (True) by Spectrometer (5 CU)	E329	1733825	1	12	8.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1746406	1	13	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1749032	1	5	20.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1733826	1	14	7.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1733818	1	18	5.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1733819	1	20	5.0	5.0	✓
pH by Meter	E108	1733822	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1733820	1	18	5.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1742746	1	10	10.0	5.0	✓
Total Nitrogen by Colourimetry	E366	1742747	1	10	10.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1733823	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	1742744	1	16	6.2	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1738332	1	20	5.0	5.0	✓

Matrix: Water

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Method Blanks (MB) - Continued							
Chloride in Water by IC	E235.Cl	1733816	1	18	5.5	5.0	✓
Colour (True) by Spectrometer (5 CU)	E329	1733825	1	12	8.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1746406	1	13	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1749032	1	5	20.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1733826	1	14	7.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1733818	1	18	5.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1733819	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1733820	1	18	5.5	5.0	✓
Thermotolerant (Fecal) Coliform (MF-mFC)	E012.FC	1731071	1	7	14.2	10.0	✓
Total Coliforms and E. coli (Enzyme Substrate)	E010	1731194	1	13	7.6	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1742746	1	10	10.0	5.0	✓
Total Nitrogen by Colourimetry	E366	1742747	1	10	10.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1742744	1	16	6.2	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1738332	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	1733816	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	1746406	1	13	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1749032	1	5	20.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1733826	1	14	7.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1733818	1	18	5.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1733819	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1733820	1	18	5.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1742746	1	10	10.0	5.0	✓
Total Nitrogen by Colourimetry	E366	1742747	1	10	10.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Coliforms and E. coli (Enzyme Substrate)	E010 ALS Environmental - Kamloops	Water	APHA 9223 (mod)	The enzyme substrate test simultaneously detects Total Coliforms and E. coli in a 100 mL sample after incubation at 35.0 ±0.5°C for either 18 or 24 hours (dependent on reagent used).
Thermotolerant (Fecal) Coliform (MF-mFC)	E012.FC ALS Environmental - Kamloops	Water	APHA 9222 D (mod)	Following filtration (0.45 µm), and incubation at 44.5 ±0.2°C for 22-26 hours, colonies exhibiting characteristic morphology of the target organism are enumerated and confirmed.
pH by Meter	E108 ALS Environmental - Vancouver	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Chloride in Water by IC	E235.Cl ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 ALS Environmental - Vancouver	Water	Method Flalab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 ALS Environmental - Vancouver	Water	Method Flalab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Colour (True) by Spectrometer (5 CU)	E329 ALS Environmental - Vancouver	Water	APHA 2120 C (mod)	Colour (True Colour) is determined by filtering a sample through a 0.45 micron membrane filter followed by analysis of the filtrate using the platinum-cobalt colourimetric method. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment.
Total Nitrogen by Colourimetry	E366 ALS Environmental - Vancouver	Water	Chinchilla Scientific Nitrate Method, 2011	Following digestion, total nitrogen is is determined colourimetrically using a discrete analyzer utilizing the vanadium chloride reduction method. This method of analysis is approved under US EPA 40 CFR Part 136 (May 2021).
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Vancouver	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Dissolved Metals in Water by CRC ICPMS	E421 ALS Environmental - Vancouver	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Mercury in Water by CVAAS	E509 ALS Environmental - Vancouver	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L ALS Environmental - Vancouver	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 ALS Environmental - Vancouver	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 ALS Environmental - Vancouver	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for Total Nitrogen in water	EP366 ALS Environmental - Vancouver	Water	APHA 4500-P J (mod)	Samples for total nitrogen analysis are digested using a heated persulfate digestion. Nitrogen compounds are converted to nitrate in this digestion.
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

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QUALITY CONTROL REPORT

Work Order	:KS2404471	Page	: 1 of 13
Client	:City of Kamloops	Laboratory	:ALS Environmental - Kamloops
Contact	:Beth Lucier	Account Manager	:Caitlin Fountain
Address	:955 Concordia Way Kamloops BC Canada V2C 6V3	Address	:1445 McGill Road, Unit 2B Kamloops, British Columbia Canada V2C 6K7
Telephone	:—	Telephone	:250 372 3588
Project	:Cinnamon Ridge Groundwater	Date Samples Received	:24-Oct-2024 12:12
PO	:—	Date Analysis Commenced	:24-Oct-2024
C-O-C number	:—	Issue Date	:05-Nov-2024 16:57
Sampler	:—		
Site	:—		
Quote number	:Cinnamon Ridge		
No. of samples received	:3		
No. of samples analysed	:3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Daniel Shabestani	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Ellie Milner	Account Manager	Kamloops Microbiology, Kamloops, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Inorganics, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Russell Zhang	Analyst	Vancouver Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Vancouver Inorganics, Burnaby, British Columbia

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Work Order	:	KB2404471
Client	:	City of Kamloops
Project	:	Cinnamon Ridge Groundwater

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include 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 predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "—" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

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Work Order : KS2404471
Client : City of Kamloops
Project : Cinnamon Ridge Groundwater

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1733822)											
FJ2403272-003	Anonymous	pH	—	E108	0.10	pH units	7.43	7.45	0.269%	4%	—
Physical Tests (QC Lot: 1733823)											
FJ2403272-003	Anonymous	Alkalinity, bicarbonate (as CaCO3)	—	E290	1.0	mg/L	97.1	95.9	1.24%	20%	—
		Alkalinity, carbonate (as CaCO3)	—	E290	1.0	mg/L	<1.0	<1.0	0.00%	20%	—
		Alkalinity, hydroxide (as CaCO3)	—	E290	1.0	mg/L	<1.0	<1.0	0.00%	20%	—
		Alkalinity, phenolphthalein (as CaCO3)	—	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	—
		Alkalinity, total (as CaCO3)	—	E290	1.0	mg/L	97.1	95.9	1.24%	20%	—
Physical Tests (QC Lot: 1733825)											
KS2404471-001	MW03-03W	Colour, true	—	E329	5.0	CU	238	230	3.62%	20%	—
Anions and Nutrients (QC Lot: 1733816)											
FJ2403272-001	Anonymous	Chloride	16887-00-6	E235.Cl	2.50	mg/L	84.7	87.5	3.27%	20%	—
Anions and Nutrients (QC Lot: 1733818)											
FJ2403272-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	0.238	0.248	0.0099	Diff <2x LOR	—
Anions and Nutrients (QC Lot: 1733819)											
FJ2403272-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	0.0172	0.0199	0.0026	Diff <2x LOR	—
Anions and Nutrients (QC Lot: 1733820)											
FJ2403272-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	125	130	3.69%	20%	—
Anions and Nutrients (QC Lot: 1733826)											
FJ2403272-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0010	0.0010	0.00004	Diff <2x LOR	—
Anions and Nutrients (QC Lot: 1742744)											
FJ2403273-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0250	mg/L	0.191	0.196	0.0052	Diff <2x LOR	—
Anions and Nutrients (QC Lot: 1742746)											
KS2404469-001	Anonymous	Kjeldahl nitrogen, total [TKN]	—	E318	0.250	mg/L	2.07	2.02	0.049	Diff <2x LOR	—
Anions and Nutrients (QC Lot: 1742747)											
KS2404469-001	Anonymous	Nitrogen, total	7727-37-9	E366	0.600	mg/L	27.8	27.8	0.0210%	20%	—
Microbiological Tests (QC Lot: 1731071)											
KS2404474-004	Anonymous	Coliforms, thermotolerant [fecal]	—	E012.FC	1	CFU/100mL	<1	<1	0	Diff <2x LOR	—
Microbiological Tests (QC Lot: 1731194)											
KS2404476-001	Anonymous	Coliforms, Escherichia coli [E. coli]	—	E010	1	MPN/100mL	<1	<1	0	Diff <2x LOR	—

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Sub-Matrix: Water

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Microbiological Tests (QC Lot: 1731194) - continued											
KS2404476-001	Anonymous	Coliforms, total	---	E010	1	MPN/100mL	<1	<1	0	Diff <2x LOR	---
KS2404479-004	Anonymous	Coliforms, Escherichia coli [E. coli]	---	E010	1	MPN/100mL	<1	<1	0	Diff <2x LOR	---
		Coliforms, total	---	E010	1	MPN/100mL	<1	<1	0	Diff <2x LOR	---
Dissolved Metals (QC Lot: 1746406)											
KS2404471-001	MW03-03W	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	---
Dissolved Metals (QC Lot: 1749032)											
FJ2403357-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0095	0.0098	0.0003	Diff <2x LOR	---
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00029	0.00029	0.000002	Diff <2x LOR	---
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00123	0.00123	0.197%	20%	---
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0235	0.0240	1.88%	20%	---
		Beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	---
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	---
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	0.110	0.112	2.00%	20%	---
		Cadmium, dissolved	7440-43-9	E421	0.0000150	mg/L	<0.0000150	<0.0000150	0	Diff <2x LOR	---
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	83.1	83.0	0.0914%	20%	---
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	---
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	---
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00011	0.00011	0.0000006	Diff <2x LOR	---
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00097	0.00097	0.000008	Diff <2x LOR	---
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	0.022	0.022	0.00006	Diff <2x LOR	---
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	---
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0278	0.0280	0.511%	20%	---
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	43.9	42.8	2.44%	20%	---
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00612	0.00615	0.473%	20%	---
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.0130	0.0128	0.970%	20%	---
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00211	0.00212	0.000009	Diff <2x LOR	---
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	---
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	6.31	6.17	2.17%	20%	---
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00116	0.00105	0.00010	Diff <2x LOR	---
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000438	0.000430	0.000009	Diff <2x LOR	---
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	0.150	0.148	0.002	Diff <2x LOR	---
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	---
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	74.6	74.2	0.578%	20%	---
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.615	0.610	0.799%	20%	---

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Work Order : KS2404471
Client : City of Kamloops
Project : Cinnamon Ridge Groundwater

Sub-Matrix: Water

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 1745032) - continued											
FJ2403357-001	Anonymous	Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	139	140	0.760%	20%	—
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	—
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	—
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	—
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	—
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	—
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	—
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00220	0.00219	0.450%	20%	—
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	—
		Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0012	0.0011	0.0001	Diff <2x LOR	—
		Zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	—
Aggregate Organics (QC Lot: 1738332)											
KS2404471-001	MW03-03W	Chemical oxygen demand [COD]	—	E559-L	10	mg/L	47	42	5	Diff <2x LOR	—

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Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1733823)						
Alkalinity, bicarbonate (as CaCO3)	—	E290	1	mg/L	<1.0	—
Alkalinity, carbonate (as CaCO3)	—	E290	1	mg/L	<1.0	—
Alkalinity, hydroxide (as CaCO3)	—	E290	1	mg/L	<1.0	—
Alkalinity, phenolphthalein (as CaCO3)	—	E290	1	mg/L	<1.0	—
Alkalinity, total (as CaCO3)	—	E290	1	mg/L	<1.0	—
Physical Tests (QCLot: 1733825)						
Colour, true	—	E329	5	CU	<5.0	—
Anions and Nutrients (QCLot: 1733816)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	—
Anions and Nutrients (QCLot: 1733818)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	—
Anions and Nutrients (QCLot: 1733819)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	—
Anions and Nutrients (QCLot: 1733820)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	—
Anions and Nutrients (QCLot: 1733826)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	—
Anions and Nutrients (QCLot: 1742744)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	—
Anions and Nutrients (QCLot: 1742745)						
Kjeldahl nitrogen, total [TKN]	—	E318	0.05	mg/L	<0.050	—
Anions and Nutrients (QCLot: 1742747)						
Nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	—
Microbiological Tests (QCLot: 1731071)						
Coliforms, thermotolerant [fecal]	—	E012.FC	1	CFU/100mL	<1	—
Microbiological Tests (QCLot: 1731154)						
Coliforms, Escherichia coli [E. coli]	—	E010	1	MPN/100mL	<1	—
Coliforms, total	—	E010	1	MPN/100mL	<1	—
Dissolved Metals (QCLot: 1746406)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	—
Dissolved Metals (QCLot: 1749032)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	—

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Work Order : KS2404471
Client : City of Kamloops
Project : Cinnamon Ridge Groundwater

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1749032) - continued						
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	—
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	—
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	—
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	—
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	—
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	—
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	—
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	—
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	—
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	—
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	—
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	—
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	—
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	—
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	—
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	—
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	—
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	—
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	—
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	—
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	—
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	—
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	—
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	—
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	—
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	—
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	—
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	—
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	—
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	—
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	—
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	—
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	—
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	—
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	—

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Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1749032) - continued						
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	—
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	—
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	—
Aggregate Organics (QCLot: 1738332)						
Chemical oxygen demand [COD]	—	E559-L	10	mg/L	<10	—

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Work Order : KS2404471
Client : City of Kamloops
Project : Cinnamon Ridge Groundwater

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1733822)									
pH	—	E108	—	pH units	7 pH units	100	98.0	102	—
Physical Tests (QCLot: 1733823)									
Alkalinity, phenolphthalein (as CaCO3)	—	E290	1	mg/L	229 mg/L	97.8	75.0	125	—
Alkalinity, total (as CaCO3)	—	E290	1	mg/L	500 mg/L	104	85.0	115	—
Physical Tests (QCLot: 1733825)									
Colour, true	—	E329	5	CU	100 CU	103	85.0	115	—
Anions and Nutrients (QCLot: 1733816)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	—
Anions and Nutrients (QCLot: 1733818)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	99.9	90.0	110	—
Anions and Nutrients (QCLot: 1733819)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	105	90.0	110	—
Anions and Nutrients (QCLot: 1733820)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	—
Anions and Nutrients (QCLot: 1733826)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	104	80.0	120	—
Anions and Nutrients (QCLot: 1742744)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	99.1	85.0	115	—
Anions and Nutrients (QCLot: 1742746)									
Kjeldahl nitrogen, total [TKN]	—	E318	0.05	mg/L	4 mg/L	103	75.0	125	—
Anions and Nutrients (QCLot: 1742747)									
Nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	98.8	75.0	125	—
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0 mg/L	99.2	80.0	120	—
Dissolved Metals (QCLot: 1749032)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	97.0	80.0	120	—
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	101	80.0	120	—
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	101	80.0	120	—
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	100	80.0	120	—
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	95.8	80.0	120	—
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	97.1	80.0	120	—

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Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike: Target Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Dissolved Metals (QCLot: 1749032) - continued									
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	96.6	80.0	120	—
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	97.0	80.0	120	—
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	94.4	80.0	120	—
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	99.0	80.0	120	—
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	99.9	80.0	120	—
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	96.2	80.0	120	—
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	96.4	80.0	120	—
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	99.1	80.0	120	—
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	98.6	80.0	120	—
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	97.7	80.0	120	—
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	96.7	80.0	120	—
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	97.1	80.0	120	—
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	105	80.0	120	—
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	95.8	80.0	120	—
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	104	80.0	120	—
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	102	80.0	120	—
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	96.7	80.0	120	—
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	94.1	80.0	120	—
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	104	80.0	120	—
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	96.7	80.0	120	—
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	98.2	80.0	120	—
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	102	80.0	120	—
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	91.7	80.0	120	—
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	98.2	80.0	120	—
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	98.8	80.0	120	—
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	94.3	80.0	120	—
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	101	80.0	120	—
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	100	80.0	120	—
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	98.9	80.0	120	—
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	99.0	80.0	120	—
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	98.3	80.0	120	—
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	99.6	80.0	120	—
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	97.5	80.0	120	—
Aggregate Organics (QCLot: 1738332)									
Chemical oxygen demand [COD]	—	E559-L	10	mg/L	100 mg/L	98.7	85.0	115	—

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Work Order	:	KS2404471
Client	:	City of Kamloops
Project	:	Cinnamon Ridge Groundwater

Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier

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Work Order	:	KS2404471
Client	:	City of Kamloops
Project	:	Cinnamon Ridge Groundwater

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND = Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 1733816)										
FJ2403272-002	Anonymous	Chloride	16887-00-6	E235.Cl	515 mg/L	500 mg/L	103	75.0	125	—
Anions and Nutrients (QCLot: 1733818)										
FJ2403272-002	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	12.8 mg/L	12.5 mg/L	102	75.0	125	—
Anions and Nutrients (QCLot: 1733819)										
FJ2403272-002	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	2.66 mg/L	2.5 mg/L	106	75.0	125	—
Anions and Nutrients (QCLot: 1733820)										
FJ2403272-002	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	520 mg/L	500 mg/L	104	75.0	125	—
Anions and Nutrients (QCLot: 1733826)										
FJ2403272-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0304 mg/L	0.03 mg/L	101	70.0	130	—
Anions and Nutrients (QCLot: 1742744)										
FJ2403304-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0975 mg/L	0.1 mg/L	97.5	75.0	125	—
Anions and Nutrients (QCLot: 1742746)										
KS2404460-002	Anonymous	Kjeldahl nitrogen, total [TKN]	—	E318	2.64 mg/L	2.5 mg/L	106	70.0	130	—
Anions and Nutrients (QCLot: 1742747)										
KS2404460-002	Anonymous	Nitrogen, total	7727-37-9	E366	ND mg/L	—	ND	70.0	130	—
Dissolved Metals (QCLot: 1746406)										
KS2404471-002	MW03-04	Mercury, dissolved	7439-97-6	E509	0.0000968 mg/L	0 mg/L	96.8	70.0	130	—
Dissolved Metals (QCLot: 1749032)										
KS2404471-001	MW03-03W	Aluminum, dissolved	7429-90-5	E421	0.194 mg/L	0.2 mg/L	97.0	70.0	130	—
		Antimony, dissolved	7440-36-0	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	—
		Arsenic, dissolved	7440-38-2	E421	0.0210 mg/L	0.02 mg/L	105	70.0	130	—
		Barium, dissolved	7440-39-3	E421	ND mg/L	—	ND	70.0	130	—
		Beryllium, dissolved	7440-41-7	E421	0.0380 mg/L	0.04 mg/L	95.1	70.0	130	—
		Bismuth, dissolved	7440-69-9	E421	0.00908 mg/L	0.01 mg/L	90.8	70.0	130	—
		Boron, dissolved	7440-42-8	E421	0.099 mg/L	0.1 mg/L	98.8	70.0	130	—
		Cadmium, dissolved	7440-43-9	E421	0.00390 mg/L	0.004 mg/L	97.6	70.0	130	—
		Calcium, dissolved	7440-70-2	E421	ND mg/L	—	ND	70.0	130	—
		Cesium, dissolved	7440-46-2	E421	0.0100 mg/L	0.01 mg/L	100	70.0	130	—
		Chromium, dissolved	7440-47-3	E421	0.0389 mg/L	0.04 mg/L	97.3	70.0	130	—
		Cobalt, dissolved	7440-48-4	E421	0.0167 mg/L	0.02 mg/L	83.4	70.0	130	—
		Copper, dissolved	7440-50-8	E421	0.0161 mg/L	0.02 mg/L	80.5	70.0	130	—
		Iron, dissolved	7439-89-6	E421	ND mg/L	—	ND	70.0	130	—
		Lead, dissolved	7439-92-1	E421	0.0161 mg/L	0.02 mg/L	80.6	70.0	130	—
		Lithium, dissolved	7439-93-2	E421	0.0936 mg/L	0.1 mg/L	93.6	70.0	130	—

Page : 13 of 13
Work Order : KS2404471
Client : City of Kamloops
Project : Cinnamon Ridge Groundwater

Sub-Matrix: Water

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 1749032) - continued										
KS2404471-001	MW03-09W	Magnesium, dissolved	7439-95-4	E421	ND mg/L	—	ND	70.0	130	—
		Manganese, dissolved	7439-96-5	E421	ND mg/L	—	ND	70.0	130	—
		Molybdenum, dissolved	7439-98-7	E421	0.0214 mg/L	0.02 mg/L	107	70.0	130	—
		Nickel, dissolved	7440-02-0	E421	0.0367 mg/L	0.04 mg/L	91.7	70.0	130	—
		Phosphorus, dissolved	7723-14-0	E421	10.6 mg/L	10 mg/L	106	70.0	130	—
		Potassium, dissolved	7440-09-7	E421	ND mg/L	—	ND	70.0	130	—
		Rubidium, dissolved	7440-17-7	E421	0.0192 mg/L	0.02 mg/L	96.0	70.0	130	—
		Selenium, dissolved	7782-49-2	E421	0.0408 mg/L	0.04 mg/L	102	70.0	130	—
		Silicon, dissolved	7440-21-3	E421	ND mg/L	—	ND	70.0	130	—
		Silver, dissolved	7440-22-4	E421	0.00401 mg/L	0.004 mg/L	100	70.0	130	—
		Sodium, dissolved	7440-23-5	E421	ND mg/L	—	ND	70.0	130	—
		Strontium, dissolved	7440-24-6	E421	ND mg/L	—	ND	70.0	130	—
		Sulfur, dissolved	7704-34-9	E421	20.2 mg/L	20 mg/L	101	70.0	130	—
		Tellurium, dissolved	13494-80-9	E421	0.0426 mg/L	0.04 mg/L	106	70.0	130	—
		Thallium, dissolved	7440-28-0	E421	0.00364 mg/L	0.004 mg/L	91.0	70.0	130	—
		Thorium, dissolved	7440-29-1	E421	0.0192 mg/L	0.02 mg/L	96.1	70.0	130	—
		Tin, dissolved	7440-31-5	E421	0.0203 mg/L	0.02 mg/L	101	70.0	130	—
		Titanium, dissolved	7440-32-6	E421	0.0416 mg/L	0.04 mg/L	104	70.0	130	—
		Tungsten, dissolved	7440-33-7	E421	0.0194 mg/L	0.02 mg/L	97.0	70.0	130	—
		Uranium, dissolved	7440-61-1	E421	0.00383 mg/L	0.004 mg/L	95.8	70.0	130	—
		Vanadium, dissolved	7440-62-2	E421	0.0992 mg/L	0.1 mg/L	99.2	70.0	130	—
		Zinc, dissolved	7440-66-6	E421	0.380 mg/L	0.4 mg/L	95.0	70.0	130	—
		Zirconium, dissolved	7440-67-7	E421	0.0410 mg/L	0.04 mg/L	102	70.0	130	—
Aggregate Organics (QCLot: 1736332)										
KS2404471-002	MW03-04	Chemical oxygen demand [COD]	—	E559-L	109 mg/L	100 mg/L	109	75.0	125	—

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Appendix K: CREDS Soils Sampling Raw Data

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Farm Soil Analysis

Bill To: City of Kamloops - Environmental
7 Victoria Street West
Kamloops, BC, Canada
V2C 1A2
Attn: Accounts Payable
Sampled By: MD
Company: City of Kamloops

Project ID: CREDS Soil
Project Name: Cinnamon Ridge
Project Location: Cinnamon Ridge
LSD:
P.O.: 503286
Proj. Acct. code:

Lot ID: **1770442**
Control Number:
Date Received: Oct 23, 2024
Date Reported: Nov 1, 2024
Report Number: 3065208
Report Type: Final Report

			Reference Number	1770442-1	1770442-2	1770442-3	1770442-4
			Field Name				
			Legal Location				
			Site ID	CR18	CR1	CR5	CR7
			Acres				
			Depth				
			Matrix	Soil	Soil	Soil	Soil
Analyte		**Units**		**Results**	**Results**	**Results**	**Results**
Farm Soil Nutrients							
Calcium	FS Macro-nutrients	ppm		721	754	1110	1040
Magnesium	FS Macro-nutrients	ppm		114	133	175	211
Sodium	FS Macro-nutrients	ppm		256	306	213	413
Iron	FS Micro-nutrients	ppm		38.0	33.1	36.6	40.2
Copper	FS Micro-nutrients	ppm		1.1	1.1	1.2	1.1
Zinc	FS Micro-nutrients	ppm		<0.5	<0.5	<0.5	<0.5
Boron	FS Micro-nutrients	ppm		0.6	0.7	<0.1	0.9
Manganese	FS Micro-nutrients	ppm		0.9	1.1	1.5	1.3
Farm Soil Quality							
pH	1:2 Soil:Water			7.6	7.5	7.8	7.3
Electrical Conductivity	Sat. Paste equiv based on 1:2	dS/m		0.49	0.38	0.25	0.50
Organic Matter	LOI	%		1.8	1.3	2.5	2.0
Farm Soil Base Saturation							
Calcium	FS Base Saturation	%		62.6	59.9	68.9	58.4
Magnesium	FS Base Saturation	%		16.3	17.4	17.9	19.5
Potassium	FS Base Saturation	%		1.7	1.5	1.7	2.0
Sodium	FS Base Saturation	%		19.4	21.2	11.5	20.2
TEC	FS Base Saturation	meq/100 g		5.7	6.3	8.1	8.9
Base saturation	FS Base Saturation	%		100	100	100	100
CEC	FS Base Saturation	meq/100 g		5.7	6.3	8.1	8.9
Farm Soil Macro-nutrients							
Nitrate - N	Farmsoil	ppm		<2	<2	3	<2
Phosphorus	Farmsoil	ppm		<5	<5	<5	<5
Potassium	Farmsoil	ppm		38	37	54	68
Sulfate-S	Farmsoil	ppm		19	26	13	31
Lime Requirement							
pH	Sikora	pH		Not Required	Not Required	Not Required	Not Required
Lime		T/ac		0	0	0	0
Farm Soil Salinity							
pH	1:2 Soil:Water			7.6	7.5	7.8	7.3
Electrical Conductivity	Sat. Paste equiv based on 1:2	dS/m		0.49	0.38	0.25	0.50
Available Nutrients							
Phosphorus	Available	µg/g		<5	<5	<5	<5
Sulfate-S	Farmsoil	ppm		19	26	13	31
Ammonium - N	Available-dry basis	mg/kg		<0.4	10.8	0.5	<0.4
Nitrate - N	Farmsoil	ppm		<2	<2	3	<2
Phosphorus	Farmsoil	ppm		<5	<5	<5	<5

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Farm Soil Analysis

Bill To: City of Kamloops - Environmental
7 Victoria Street West
Kamloops, BC, Canada
V2C 1A2
Attn: Accounts Payable
Sampled By: MD
Company: City of Kamloops

Project ID: CREDS Soil
Project Name: Cinnamon Ridge
Project Location: Cinnamon Ridge
LSD:
P.O.: 503286
Proj. Acct. code:

Lot ID: **1770442**
Control Number:
Date Received: Oct 23, 2024
Date Reported: Nov 1, 2024
Report Number: 3065208
Report Type: Final Report

		Reference Number	1770442-1	1770442-2	1770442-3	1770442-4
		Field Name				
		Legal Location				
		Site ID	CR18	CR1	CR5	CR7
		Acres				
		Depth				
		Matrix	Soil	Soil	Soil	Soil
Analyte		**Units**	**Results**	**Results**	**Results**	**Results**
Available Nutrients - Continued						
Potassium	Farmsoil	ppm	38	37	54	68

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7 Victoria Street West
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V2C 1A2
Attn: Accounts Payable
Sampled By: MD
Company: City of Kamloops

Project ID: CREDS Soil
Project Name: Cinnamon Ridge
Project Location: Cinnamon Ridge
LSD:
P.O.: 503286
Proj. Acct. code:

Lot ID: **1770442**
Control Number:
Date Received: Oct 23, 2024
Date Reported: Nov 1, 2024
Report Number: 3065208
Report Type: Final Report

		Reference Number	1770442-5	1770442-6	1770442-7	1770442-8
		Field Name				
		Legal Location				
		Site ID	CR19	CR4	CR20	Duplicate - CR1
		Acres				
		Depth				
		Matrix	Soil	Soil	Soil	Soil
Analyte		**Units**	**Results**	**Results**	**Results**	**Results**
Farm Soil Nutrients						
Calcium	FS Macro-nutrients	ppm	1750	2450	940	809
Magnesium	FS Macro-nutrients	ppm	315	294	131	132
Sodium	FS Macro-nutrients	ppm	490	343	196	315
Iron	FS Micro-nutrients	ppm	61.6	59.8	16.1	45.5
Copper	FS Micro-nutrients	ppm	3.8	1.1	0.9	1.1
Zinc	FS Micro-nutrients	ppm	<0.5	1	<0.5	<0.5
Boron	FS Micro-nutrients	ppm	1.8	2.1	0.8	0.8
Manganese	FS Micro-nutrients	ppm	0.7	1.4	1.6	1.0
Farm Soil Quality						
pH	1:2 Soil:Water		7.0	7.6	7.7	7.8
Electrical Conductivity	Sat. Paste equiv based on 1:2	dS/m	3.38	0.91	0.38	0.32
Organic Matter	LOI	%	7.2	8.8	1.6	2.2
Farm Soil Base Saturation						
Calcium	FS Base Saturation	%	64.5	75.1	69.4	61.3
Magnesium	FS Base Saturation	%	19.1	14.8	15.9	16.4
Potassium	FS Base Saturation	%	0.6	1.0	2.0	1.4
Sodium	FS Base Saturation	%	15.8	9.1	12.6	20.8
TEC	FS Base Saturation	meq/100 g	13.5	16.3	6.8	6.6
Base saturation	FS Base Saturation	%	100.0	100	100	100
CEC	FS Base Saturation	meq/100 g	13.5	16.3	6.8	6.6
Farm Soil Macro-nutrients						
Nitrate - N	Farmsoil	ppm	5	3	2	<2
Phosphorus	Farmsoil	ppm	>80	10	<5	<5
Potassium	Farmsoil	ppm	33	61	54	37
Sulfate-S	Farmsoil	ppm	524	66	29	16
Lime Requirement						
pH	Sikora	pH	Not Required	Not Required	Not Required	Not Required
Lime		T/ac	0	0	0	0
Farm Soil Salinity						
pH	1:2 Soil:Water		7.0	7.6	7.7	7.8
Electrical Conductivity	Sat. Paste equiv based on 1:2	dS/m	3.38	0.91	0.38	0.32
Available Nutrients						
Phosphorus	Available	µg/g	760	13	<5	<5
Sulfate-S	Farmsoil	ppm	524	66	29	16
Ammonium - N	Available-dry basis	mg/kg	<0.4	0.4	<0.4	<0.4
Nitrate - N	Farmsoil	ppm	5	3	2	<2
Phosphorus	Farmsoil	ppm	>80	10	<5	<5

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Farm Soil Analysis

Bill To: City of Kamloops - Environmental
7 Victoria Street West
Kamloops, BC, Canada
V2C 1A2
Attn: Accounts Payable
Sampled By: MD
Company: City of Kamloops

Project ID: CREDS Soil
Project Name: Cinnamon Ridge
Project Location: Cinnamon Ridge
LSD:
P.O.: 503286
Proj. Acct. code:

Lot ID: **1770442**
Control Number:
Date Received: Oct 23, 2024
Date Reported: Nov 1, 2024
Report Number: 3065208
Report Type: Final Report

		Reference Number	1770442-5	1770442-6	1770442-7	1770442-8
		Field Name				
		Legal Location				
		Site ID	CR19	CR4	CR20	Duplicate - CR1
		Acres				
		Depth				
		Matrix	Soil	Soil	Soil	Soil
Analyte		**Units**	**Results**	**Results**	**Results**	**Results**
Available Nutrients - Continued						
Potassium	Farmsoil	ppm	33	61	54	37

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Farm Soil Analysis

Bill To: City of Kamloops - Environmental
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Kamloops, BC, Canada
V2C 1A2
Attn: Accounts Payable
Sampled By: MD
Company: City of Kamloops

Project ID: CREDS Soil
Project Name: Cinnamon Ridge
Project Location: Cinnamon Ridge
LSD:
P.O.: 503286
Proj. Acct. code:

Lot ID: **1770442**
Control Number:
Date Received: Oct 23, 2024
Date Reported: Nov 1, 2024
Report Number: 3065208
Report Type: Final Report

Reference Number	1770442-9
Field Name	
Legal Location	
Site ID	Blank
Acres	
Depth	
Matrix	Soil

Analyte		Units	Results	Results	Results	Results
Farm Soil Nutrients						
Calcium	FS Macro-nutrients	ppm	911			
Magnesium	FS Macro-nutrients	ppm	131			
Sodium	FS Macro-nutrients	ppm	75			
Iron	FS Micro-nutrients	ppm	12.2			
Copper	FS Micro-nutrients	ppm	0.6			
Zinc	FS Micro-nutrients	ppm	<0.5			
Boron	FS Micro-nutrients	ppm	0.5			
Manganese	FS Micro-nutrients	ppm	2.3			
Farm Soil Quality						
pH	1:2 Soil:Water		7.9			
Electrical Conductivity	Sat. Paste equiv based on 1:2	dS/m	0.53			
Organic Matter	LOI	%	0.7			
Farm Soil Base Saturation						
Calcium	FS Base Saturation	%	70.2			
Magnesium	FS Base Saturation	%	16.6			
Potassium	FS Base Saturation	%	8.2			
Sodium	FS Base Saturation	%	5.0			
TEC	FS Base Saturation	meq/100 g	6.5			
Base saturation	FS Base Saturation	%	100			
CEC	FS Base Saturation	meq/100 g	6.5			
Farm Soil Macro-nutrients						
Nitrate - N	Farmsoil	ppm	3			
Phosphorus	Farmsoil	ppm	32			
Potassium	Farmsoil	ppm	206			
Sulfate-S	Farmsoil	ppm	19			
Lime Requirement						
pH	Sikora	pH	Not Required			
Lime		T/ac	0			
Farm Soil Salinity						
pH	1:2 Soil:Water		7.9			
Electrical Conductivity	Sat. Paste equiv based on 1:2	dS/m	0.53			
Available Nutrients						
Phosphorus	Available	µg/g	27			
Sulfate-S	Farmsoil	ppm	19			
Ammonium - N	Available-dry basis	mg/kg	0.3			
Nitrate - N	Farmsoil	ppm	3			
Phosphorus	Farmsoil	ppm	32			

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Farm Soil Analysis

Bill To: City of Kamloops - Environmental
7 Victoria Street West
Kamloops, BC, Canada
V2C 1A2
Attn: Accounts Payable
Sampled By: MD
Company: City of Kamloops

Project ID: CREDS Soil
Project Name: Cinnamon Ridge
Project Location: Cinnamon Ridge
LSD:
P.O.: 503286
Proj. Acct. code:

Lot ID: **1770442**
Control Number:
Date Received: Oct 23, 2024
Date Reported: Nov 1, 2024
Report Number: 3065208
Report Type: Final Report

Reference Number	1770442-9
Field Name	
Legal Location	
Site ID	Blank
Acres	
Depth	
Matrix	Soil

Analyte		Units	Results	Results	Results	Results
Available Nutrients - Continued						
Potassium	Farmsoil	ppm	206			

Comments:

- Reduction of analytical volume was necessary for iron and aluminum to bring results within the analytical range for lot 1770442. Detection limits are adjusted accordingly.
- Reduction of analytical volume was necessary for metals due to matrix effects in sample 1770442. Detection limits are adjusted accordingly.

Approved by:

Benjamin Morris, B.Sc
Operations Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).
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Report Transmission Cover Page

Bill To:	City of Kamloops - Environmental 7 Victoria Street West Kamloops, BC, Canada V2C 1A2	Project ID:	CREDS Soil	Lot ID:	**1770442**
		Project Name:	Cinnamon Ridge	Control Number:	
		Project Location:	Cinnamon Ridge	Date Received:	Oct 23, 2024
		LSD:		Date Reported:	Nov 1, 2024
Attn:	Accounts Payable	P.O.:	503286	Report Number:	3065592
Sampled By:	MD	Proj. Acct. code:		Report Type:	Final Report
Company:	City of Kamloops				

Contact	Company	Address
Accounts Payable	**City of Kamloops - Environmental Services**	7 Victoria Street West Kamloops, BC V2C 1A2 Phone: (250) 828-3311 Fax: (250) 828-0845 Email: ap@kamloops.ca

Delivery	Format	Deliverables
Email	PDF	Invoice

Contact	Company	Address
Beth Lucier	**City of Kamloops - Environmental Services**	955 Concordia Way Kamloops, BC V2C 6V3 Phone: (250) 828-3585 Fax: (250) 828-3790 Email: blucier@kamloops.ca

Delivery	Format	Deliverables
Email - Merge	PDF	COC / Test Report

Contact	Company	Address
D Steinke	**City of Kamloops - Environmental Services**	955 Concordia Way Kamloops, BC V2C 6V3 Phone: (250) 828-3757 Fax: (250) 828-3790 Email: dsteinke@kamloops.ca

Delivery	Format	Deliverables
Email	PDF	COC / Test Report

Notes To Clients:

- Reduction of analytical volume was necessary for iron and aluminum to bring results within the analytical range for lot 1770442. Detection limits are adjusted accordingly.
- Reduction of analytical volume was necessary for metals due to matrix effects in sample 1770442. Detection limits are adjusted accordingly.
- All wet soil samples received in a soil bag will be disposed 30 days after receipt on 2024-11-22.

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Analytical Report

Bill To: City of Kamloops - Environmental
7 Victoria Street West
Kamloops, BC, Canada
V2C 1A2
Attn: Accounts Payable
Sampled By: MD
Company: City of Kamloops

Project ID: CREDS Soil
Project Name: Cinnamon Ridge
Project Location: Cinnamon Ridge
LSD:
P.O.: 503286
Proj. Acct. code:

Lot ID: **1770442**
Control Number:
Date Received: Oct 23, 2024
Date Reported: Nov 1, 2024
Report Number: 3065592
Report Type: Final Report

	Reference Number	1770442-1	1770442-2	1770442-3	
	Sample Date	Oct 22, 2024	Oct 22, 2024	Oct 22, 2024	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	CR18 / Soil Sample / 30 / cm / 10.0 °C	CR1 / Soil Sample / 30 / cm / 10.0 °C	CR5 / Soil Sample / 30 / cm / 10.0 °C	
	Matrix	Soil	Soil	Soil	
Analyte		**Units**	**Results**	**Results**	**Results**	**Nominal Detection Limit**
Aggregate Organic Constituents						
Organic Matter	LOI	%	1.8	1.3	2.5	0.1
Available Nutrients						
Phosphorus	Available	µg/g	<5	<5	<5	5
Sulfate-S	Farmsoil	ppm	19	26	13	1
Ammonium - N	Available-dry basis	mg/kg	<0.4	10.8	0.5	0.3
Nitrate - N	Farmsoil	ppm	<2	<2	3	2
Phosphorus	Farmsoil	ppm	<5	<5	<5	5
Potassium	Farmsoil	ppm	38	37	54	25
Classification						
Nitrogen	Total	%	0.10	0.11	0.13	0.02
Hot Water Soluble						
Boron	Water Soluble	µg/g	0.76	0.89	0.68	0.02
Metals Strong Acid Digestion						
Aluminum	Strong Acid Extractable	µg/g	18500	20500	19300	0.5
Antimony	Strong Acid Extractable	µg/g	0.10	0.14	0.14	0.025
Arsenic	Strong Acid Extractable	µg/g	2.4	3.4	3.5	0.05
Barium	Strong Acid Extractable	µg/g	113	130	124	0.05
Beryllium	Strong Acid Extractable	µg/g	0.5	0.5	0.5	0.05
Cadmium	Strong Acid Extractable	µg/g	0.14	0.19	0.20	0.005
Chromium	Strong Acid Extractable	µg/g	38.8	42.3	39.7	0.05
Cobalt	Strong Acid Extractable	µg/g	12.7	13.6	13.1	0.05
Copper	Strong Acid Extractable	µg/g	26.1	31.5	29.8	0.1
Iron	Strong Acid Extractable	µg/g	31800	35300	35000	0.02
Lead	Strong Acid Extractable	µg/g	5.96	7.40	8.02	0.01
Lithium	Strong Acid Extractable	µg/g	26.4	27.6	26.6	0.25
Manganese	Strong Acid Extractable	µg/g	340	420	429	0.05
Mercury	Strong Acid Extractable	µg/g	0.023	0.011	0.012	0.003
Molybdenum	Strong Acid Extractable	µg/g	0.9	1.2	1.0	0.05
Nickel	Strong Acid Extractable	µg/g	31.7	34.8	33.6	0.1
Selenium	Strong Acid Extractable	µg/g	0.5	0.7	0.6	0.1
Silver	Strong Acid Extractable	µg/g	0.06	0.09	0.10	0.025
Strontium	Strong Acid Extractable	µg/g	33.4	38.1	40.1	0.05
Tellurium	Strong Acid Extractable	µg/g	<0.05	<0.05	<0.05	0.025
Thallium	Strong Acid Extractable	µg/g	0.12	0.11	0.12	0.01
Thorium	Strong Acid Extractable	µg/g	6.1	6.9	6.9	0.05
Tin	Strong Acid Extractable	µg/g	0.7	0.8	0.7	0.05
Tungsten	Strong Acid Extractable	µg/g	0.3	<0.2	0.2	0.1
Uranium	Strong Acid Extractable	µg/g	2.27	2.32	2.04	0.01

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Analytical Report

Bill To: City of Kamloops - Environmental
7 Victoria Street West
Kamloops, BC, Canada
V2C 1A2
Attn: Accounts Payable
Sampled By: MD
Company: City of Kamloops

Project ID: CREDS Soil
Project Name: Cinnamon Ridge
Project Location: Cinnamon Ridge
LSD:
P.O.: 503286
Proj. Acct. code:

Lot ID: **1770442**
Control Number:
Date Received: Oct 23, 2024
Date Reported: Nov 1, 2024
Report Number: 3065592
Report Type: Final Report

		Reference Number	1770442-1	1770442-2	1770442-3	
		Sample Date	Oct 22, 2024	Oct 22, 2024	Oct 22, 2024	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	CR18 / Soil Sample / 30 / cm / 10.0 °C	CR1 / Soil Sample / 30 / cm / 10.0 °C	CR5 / Soil Sample / 30 / cm / 10.0 °C	
		Matrix	Soil	Soil	Soil	
Analyte		**Units**	**Results**	**Results**	**Results**	**Nominal Detection Limit**
Metals Strong Acid Digestion - Continued						
Vanadium	Strong Acid Extractable	µg/g	38.5	42.7	39.4	0.05
Zinc	Strong Acid Extractable	µg/g	66.1	71.3	73.5	0.25
Microbiological Analysis						
Thermotolerant (Fecal) Coliforms	MPN - Dry Weight	MPN/g	<3.9	12	<3.8	
Salinity						
pH	Saturated Paste	pH	6.0	6.5	7.0	
Electrical Conductivity	Saturated Paste	dS/m	0.28	0.64	0.43	0.01
SAR	Saturated Paste		7.9	15.6	8.5	
% Saturation		%	149	87	67	
Calcium	Saturated Paste	mg/kg	<29.8	<17.4	<13.4	
Chloride	Saturated Paste	mg/kg	356	<26	<20	
Magnesium	Saturated Paste	mg/kg	4.5	2.7	2.6	
Potassium	Saturated Paste	mg/kg	<15	<9	<7	
Sodium	Saturated Paste	mg/kg	95	112	53	
Sulfate (SO4)	Saturated Paste	mg/kg	<89.5	130	47.0	
Sulfate-S	Saturated Paste	mg/kg	<29.8	43.3	15.7	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:Water	pH	6.9	7.0	7.1	0.5
pH	1:2 Soil:Water		7.6	7.5	7.8	
Electrical Conductivity	Sat. Paste equiv based on 1:2	dS/m	0.49	0.38	0.25	0.02
Water Soluble Parameters						
Chemical Oxygen Demand	Soluble	µg/g	9600	5500	9200	25
Nitrate - N	Water Soluble	µg/g	4	2	4	0.5
Nitrite - N	Water Soluble	µg/g	<0.5	<0.5	<0.5	0.5
Lime Requirement						
pH	Sikora	pH	Not Required	Not Required	Not Required	
Lime		T/ac	0	0	0	
Soil % Moisture						
Moisture	Soil % Moisture	%	22.50	22.40	21.30	
Subcontracted Analysis						
Total Kjeldahl Nitrogen	TKN	mg/kg	1400	596	1070	300
Plant Tissue Results						
Nitrate - N	Water Soluble	µg/g	4	2	4	0.5
Nitrite - N	Water Soluble	µg/g	<0.5	<0.5	<0.5	0.5
Farm Soil Nutrients						
Calcium	FS Macro-nutrients	ppm	721	754	1110	30

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Sampled By: MD
Company: City of Kamloops

Project ID: CREDS Soil
Project Name: Cinnamon Ridge
Project Location: Cinnamon Ridge
LSD:
P.O.: 503286
Proj. Acct. code:

Lot ID: **1770442**
Control Number:
Date Received: Oct 23, 2024
Date Reported: Nov 1, 2024
Report Number: 3065592
Report Type: Final Report

Reference Number		1770442-1	1770442-2	1770442-3
Sample Date		Oct 22, 2024	Oct 22, 2024	Oct 22, 2024
Sample Time		NA	NA	NA
Sample Location				
Sample Description		CR18 / Soil Sample / 30 / cm / 10.0 °C	CR1 / Soil Sample / 30 / cm / 10.0 °C	CR5 / Soil Sample / 30 / cm / 10.0 °C
Matrix		Soil	Soil	Soil
Analyte		**Units**	**Results**	**Results**	**Results**	**Nominal Detection Limit**
Farm Soil Nutrients - Continued						
Magnesium	FS Macro-nutrients	ppm	114	133	175	5
Sodium	FS Macro-nutrients	ppm	256	306	213	30
Iron	FS Micro-nutrients	ppm	38.0	33.1	36.6	2
Copper	FS Micro-nutrients	ppm	1.1	1.1	1.2	0.1
Zinc	FS Micro-nutrients	ppm	<0.5	<0.5	<0.5	0.5
Boron	FS Micro-nutrients	ppm	0.6	0.7	<0.1	0.1
Manganese	FS Micro-nutrients	ppm	0.9	1.1	1.5	0.1

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Project Name: Cinnamon Ridge
Project Location: Cinnamon Ridge
LSD:
P.O.: 503286
Proj. Acct. code:

Lot ID: **1770442**
Control Number:
Date Received: Oct 23, 2024
Date Reported: Nov 1, 2024
Report Number: 3065592
Report Type: Final Report

	Reference Number	1770442-4	1770442-5	1770442-6	
	Sample Date	Oct 22, 2024	Oct 22, 2024	Oct 22, 2024	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	CR7 / Soil Sample / 30 / cm / 10.0 °C	CR19 / Soil Sample / 30 / cm / 10.0 °C	CR4 / Soil Sample / 30 / cm / 10.0 °C	
	Matrix	Soil	Soil	Soil	
Analyte		**Units**	**Results**	**Results**	**Results**	**Nominal Detection Limit**
Aggregate Organic Constituents						
Organic Matter	LOI	%	2.0	7.2	8.8	0.1
Available Nutrients						
Phosphorus	Available	µg/g	<5	760	13	5
Sulfate-S	Farmsoil	ppm	31	524	66	1
Ammonium - N	Available-dry basis	mg/kg	<0.4	<0.4	0.4	0.3
Nitrate - N	Farmsoil	ppm	<2	5	3	2
Phosphorus	Farmsoil	ppm	<5	>80	10	5
Potassium	Farmsoil	ppm	68	33	61	25
Classification						
Nitrogen	Total	%	0.17	0.25	0.37	0.02
Hot Water Soluble						
Boron	Water Soluble	µg/g	1.1	2.4	2.2	0.02
Metals Strong Acid Digestion						
Aluminum	Strong Acid Extractable	µg/g	23100	24200	21800	0.5
Antimony	Strong Acid Extractable	µg/g	0.16	0.16	0.14	0.025
Arsenic	Strong Acid Extractable	µg/g	3.4	2.6	2.6	0.05
Barium	Strong Acid Extractable	µg/g	139	130	143	0.05
Beryllium	Strong Acid Extractable	µg/g	0.6	0.5	0.5	0.05
Cadmium	Strong Acid Extractable	µg/g	0.21	0.29	0.39	0.005
Chromium	Strong Acid Extractable	µg/g	47.4	45.9	42.8	0.05
Cobalt	Strong Acid Extractable	µg/g	14.9	12.5	12.8	0.05
Copper	Strong Acid Extractable	µg/g	29.9	47.9	32.9	0.1
Iron	Strong Acid Extractable	µg/g	38400	33600	35000	0.02
Lead	Strong Acid Extractable	µg/g	9.01	9.63	8.62	0.01
Lithium	Strong Acid Extractable	µg/g	30.1	27.1	27.6	0.25
Manganese	Strong Acid Extractable	µg/g	380	290	327	0.05
Mercury	Strong Acid Extractable	µg/g	0.011	0.015	0.0661	0.003
Molybdenum	Strong Acid Extractable	µg/g	1.4	1.3	1.3	0.05
Nickel	Strong Acid Extractable	µg/g	39.3	32.5	33.5	0.1
Selenium	Strong Acid Extractable	µg/g	0.6	0.8	1.1	0.1
Silver	Strong Acid Extractable	µg/g	0.09	1.22	0.10	0.025
Strontium	Strong Acid Extractable	µg/g	40.6	49.7	57.9	0.05
Tellurium	Strong Acid Extractable	µg/g	<0.05	0.13	<0.05	0.025
Thallium	Strong Acid Extractable	µg/g	0.13	0.16	0.18	0.01
Thorium	Strong Acid Extractable	µg/g	6.8	5.2	5.5	0.05
Tin	Strong Acid Extractable	µg/g	0.9	2.8	0.9	0.05
Tungsten	Strong Acid Extractable	µg/g	0.3	0.2	0.2	0.1
Uranium	Strong Acid Extractable	µg/g	2.96	2.72	2.10	0.01

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7 Victoria Street West
Kamloops, BC, Canada
V2C 1A2
Attn: Accounts Payable
Sampled By: MD
Company: City of Kamloops

Project ID: CREDS Soil
Project Name: Cinnamon Ridge
Project Location: Cinnamon Ridge
LSD:
P.O.: 503286
Proj. Acct. code:

Lot ID: **1770442**
Control Number:
Date Received: Oct 23, 2024
Date Reported: Nov 1, 2024
Report Number: 3065592
Report Type: Final Report

	Reference Number	1770442-4	1770442-5	1770442-6	
	Sample Date	Oct 22, 2024	Oct 22, 2024	Oct 22, 2024	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	CR7 / Soil Sample / 30 / cm / 10.0 °C	CR19 / Soil Sample / 30 / cm / 10.0 °C	CR4 / Soil Sample / 30 / cm / 10.0 °C	
	Matrix	Soil	Soil	Soil	
Analyte		**Units**	**Results**	**Results**	**Results**	**Nominal Detection Limit**
Metals Strong Acid Digestion - Continued						
Vanadium	Strong Acid Extractable	µg/g	47.5	44.4	42.9	0.05
Zinc	Strong Acid Extractable	µg/g	80.4	80.2	92.0	0.25
Microbiological Analysis						
Thermotolerant (Fecal) Coliforms	MPN - Dry Weight	MPN/g	4.6	<4.0	4.4	
Salinity						
pH	Saturated Paste	pH	6.6	6.2	7.2	
Electrical Conductivity	Saturated Paste	dS/m	0.96	4.15	1.34	0.01
SAR	Saturated Paste		8.3	5.1	4.0	
% Saturation		%	85	102	112	
Calcium	Saturated Paste	mg/kg	19.6	471	113	
Chloride	Saturated Paste	mg/kg	54	38	145	
Magnesium	Saturated Paste	mg/kg	7.6	145	26.7	
Potassium	Saturated Paste	mg/kg	<9	<10	<11	
Sodium	Saturated Paste	mg/kg	159	496	193	
Sulfate (SO4)	Saturated Paste	mg/kg	205	2560	427	
Sulfate-S	Saturated Paste	mg/kg	68.2	855	142	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:Water	pH	6.4	6.1	7.0	0.5
pH	1:2 Soil:Water		7.3	7.0	7.6	
Electrical Conductivity	Sat. Paste equiv based on 1:2	dS/m	0.50	3.38	0.91	0.02
Water Soluble Parameters						
Chemical Oxygen Demand	Soluble	µg/g	3700	9400	29900	25
Nitrate - N	Water Soluble	µg/g	3	5	7.2	0.5
Nitrite - N	Water Soluble	µg/g	<0.5	<0.5	<0.5	0.5
Lime Requirement						
pH	Sikora	pH	Not Required	Not Required	Not Required	
Lime		T/ac	0	0	0	
Soil % Moisture						
Moisture	Soil % Moisture	%	22.60	24.10	17.30	
Subcontracted Analysis						
Total Kjeldahl Nitrogen	TKN	mg/kg	1330	3150	3450	300
Plant Tissue Results						
Nitrate - N	Water Soluble	µg/g	3	5	7.2	0.5
Nitrite - N	Water Soluble	µg/g	<0.5	<0.5	<0.5	0.5
Farm Soil Nutrients						
Calcium	FS Macro-nutrients	ppm	1040	1750	2450	30

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Sampled By: MD
Company: City of Kamloops

Project ID: CREDS Soil
Project Name: Cinnamon Ridge
Project Location: Cinnamon Ridge
LSD:
P.O.: 503286
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Lot ID: **1770442**
Control Number:
Date Received: Oct 23, 2024
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		Reference Number	1770442-4	1770442-5	1770442-6	
		Sample Date	Oct 22, 2024	Oct 22, 2024	Oct 22, 2024	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	CR7 / Soil Sample / 30 / cm / 10.0 °C	CR19 / Soil Sample / 30 / cm / 10.0 °C	CR4 / Soil Sample / 30 / cm / 10.0 °C	
		Matrix	Soil	Soil	Soil	
Analyte		**Units**	**Results**	**Results**	**Results**	**Nominal Detection Limit**
Farm Soil Nutrients - Continued						
Magnesium	FS Macro-nutrients	ppm	211	315	294	5
Sodium	FS Macro-nutrients	ppm	413	490	343	30
Iron	FS Micro-nutrients	ppm	40.2	61.6	59.8	2
Copper	FS Micro-nutrients	ppm	1.1	3.8	1.1	0.1
Zinc	FS Micro-nutrients	ppm	<0.5	<0.5	1	0.5
Boron	FS Micro-nutrients	ppm	0.9	1.8	2.1	0.1
Manganese	FS Micro-nutrients	ppm	1.3	0.7	1.4	0.1

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Project ID: CREDS Soil
Project Name: Cinnamon Ridge
Project Location: Cinnamon Ridge
LSD:
P.O.: 503286
Proj. Acct. code:

Lot ID: **1770442**
Control Number:
Date Received: Oct 23, 2024
Date Reported: Nov 1, 2024
Report Number: 3065592
Report Type: Final Report

	Reference Number	1770442-7	1770442-8	1770442-9	
	Sample Date	Oct 22, 2024	Oct 22, 2024	Oct 22, 2024	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	CR20 / Soil Sample / 30 / cm / 10.0 °C	Duplicate - CR1 / Soil Sample / 30 / cm / 10.0 °C	Blank / Soil Sample / 30 / cm / 10.0 °C	
	Matrix	Soil	Soil	Soil	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Organic Matter LOI	%	1.6	2.2	0.7	0.1
Available Nutrients					
Phosphorus Available	µg/g	<5	<5	27	5
Sulfate-S Farmsoil	ppm	29	16	19	1
Ammonium - N Available-dry basis	mg/kg	<0.4	<0.4	0.3	0.3
Nitrate - N Farmsoil	ppm	2	<2	3	2
Phosphorus Farmsoil	ppm	<5	<5	32	5
Potassium Farmsoil	ppm	54	37	206	25
Classification					
Nitrogen Total	%	0.09	<0.02	0.03	0.02
Hot Water Soluble					
Boron Water Soluble	µg/g	1.0	0.75	0.33	0.02
Metals Strong Acid Digestion					
Aluminum Strong Acid Extractable	µg/g	20600	20400	11100	0.5
Antimony Strong Acid Extractable	µg/g	0.14	0.14	0.06	0.025
Arsenic Strong Acid Extractable	µg/g	3.4	3.3	1.9	0.05
Barium Strong Acid Extractable	µg/g	136	124	76.3	0.05
Beryllium Strong Acid Extractable	µg/g	0.5	0.5	0.3	0.05
Cadmium Strong Acid Extractable	µg/g	0.13	0.17	0.08	0.005
Chromium Strong Acid Extractable	µg/g	42.8	41.5	24.1	0.05
Cobalt Strong Acid Extractable	µg/g	14.1	13.2	8.6	0.05
Copper Strong Acid Extractable	µg/g	33.2	30.8	14.0	0.1
Iron Strong Acid Extractable	µg/g	37400	34900	22700	0.02
Lead Strong Acid Extractable	µg/g	7.31	7.39	3.09	0.01
Lithium Strong Acid Extractable	µg/g	28.1	26.7	15.3	0.25
Manganese Strong Acid Extractable	µg/g	409	363	242	0.05
Mercury Strong Acid Extractable	µg/g	0.021	0.012	0.004	0.003
Molybdenum Strong Acid Extractable	µg/g	1.0	1.1	0.4	0.05
Nickel Strong Acid Extractable	µg/g	35.8	33.7	22.9	0.1
Selenium Strong Acid Extractable	µg/g	0.8	0.6	0.3	0.1
Silver Strong Acid Extractable	µg/g	0.10	0.09	<0.05	0.025
Strontium Strong Acid Extractable	µg/g	43.9	36.1	32.1	0.05
Tellurium Strong Acid Extractable	µg/g	<0.05	<0.05	<0.05	0.025
Thallium Strong Acid Extractable	µg/g	0.13	0.11	0.04	0.01
Thorium Strong Acid Extractable	µg/g	6.9	7.0	5.2	0.05
Tin Strong Acid Extractable	µg/g	0.8	0.8	0.5	0.05
Tungsten Strong Acid Extractable	µg/g	0.2	0.2	<0.2	0.1

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Project ID: CREDS Soil
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Project Location: Cinnamon Ridge
LSD:
P.O.: 503286
Proj. Acct. code:

Lot ID: **1770442**
Control Number:
Date Received: Oct 23, 2024
Date Reported: Nov 1, 2024
Report Number: 3065592
Report Type: Final Report

	Reference Number	1770442-7	1770442-8	1770442-9	
	Sample Date	Oct 22, 2024	Oct 22, 2024	Oct 22, 2024	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	CR20 / Soil Sample / 30 / cm / 10.0 °C	Duplicate - CR1 / Soil Sample / 30 / cm / 10.0 °C	Blank / Soil Sample / 30 / cm / 10.0 °C	
	Matrix	Soil	Soil	Soil	
Analyte		**Units**	**Results**	**Results**	**Results**	**Nominal Detection Limit**
Metals Strong Acid Digestion - Continued						
Uranium	Strong Acid Extractable	µg/g	1.87	2.21	1.21	0.01
Vanadium	Strong Acid Extractable	µg/g	42.6	41.8	24.6	0.05
Zinc	Strong Acid Extractable	µg/g	73.4	68.2	38.0	0.25
Microbiological Analysis						
Thermotolerant (Fecal) Coliforms	MPN - Dry Weight	MPN/g	58	4.5	<3.1	
Salinity						
pH	Saturated Paste	pH	7.0	6.8	7.4	
Electrical Conductivity	Saturated Paste	dS/m	0.60	0.45	1.08	0.01
SAR	Saturated Paste		4.6	10.9	3.3	
% Saturation		%	74	67	65	
Calcium	Saturated Paste	mg/kg	17.0	<13.4	51.3	
Chloride	Saturated Paste	mg/kg	92	92	24	
Magnesium	Saturated Paste	mg/kg	4.7	2.1	14.1	
Potassium	Saturated Paste	mg/kg	<7	<7	23	
Sodium	Saturated Paste	mg/kg	71	61	83	
Sulfate (SO4)	Saturated Paste	mg/kg	85.1	65.1	51.8	
Sulfate-S	Saturated Paste	mg/kg	28.4	21.7	17.3	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:Water	pH	7.5	7.0	7.6	0.5
pH	1:2 Soil:Water		7.7	7.8	7.9	
Electrical Conductivity	Sat. Paste equiv based on 1:2	dS/m	0.38	0.32	0.53	0.02
Water Soluble Parameters						
Chemical Oxygen Demand	Soluble	µg/g	9400	17700	14600	25
Nitrate - N	Water Soluble	µg/g	6.4	2	3	0.5
Nitrite - N	Water Soluble	µg/g	<0.5	<0.5	<0.5	0.5
Lime Requirement						
pH	Sikora	pH	Not Required	Not Required	Not Required	
Lime		T/ac	0	0	0	
Soil % Moisture						
Moisture	Soil % Moisture	%	25.30	19.80	4.06	
Subcontracted Analysis						
Total Kjeldahl Nitrogen	TKN	mg/kg	1820	1730	1230	300
Plant Tissue Results						
Nitrate - N	Water Soluble	µg/g	6.4	2	3	0.5
Nitrite - N	Water Soluble	µg/g	<0.5	<0.5	<0.5	0.5

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Analytical Report

Bill To: City of Kamloops - Environmental
7 Victoria Street West
Kamloops, BC, Canada
V2C 1A2
Attn: Accounts Payable
Sampled By: MD
Company: City of Kamloops

Project ID: CREDS Soil
Project Name: Cinnamon Ridge
Project Location: Cinnamon Ridge
LSD:
P.O.: 503286
Proj. Acct. code:

Lot ID: **1770442**
Control Number:
Date Received: Oct 23, 2024
Date Reported: Nov 1, 2024
Report Number: 3065592
Report Type: Final Report

		Reference Number	1770442-7	1770442-8	1770442-9	
		Sample Date	Oct 22, 2024	Oct 22, 2024	Oct 22, 2024	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	CR20 / Soil Sample / 30 / cm / 10.0 °C	Duplicate - CR1 / Soil Sample / 30 / cm / 10.0 °C	Blank / Soil Sample / 30 / cm / 10.0 °C	
		Matrix	Soil	Soil	Soil	
Analyte		**Units**	**Results**	**Results**	**Results**	**Nominal Detection Limit**
Farm Soil Nutrients						
Calcium	FS Macro-nutrients	ppm	940	809	911	30
Magnesium	FS Macro-nutrients	ppm	131	132	131	5
Sodium	FS Macro-nutrients	ppm	196	315	75	30
Iron	FS Micro-nutrients	ppm	16.1	45.5	12.2	2
Copper	FS Micro-nutrients	ppm	0.9	1.1	0.6	0.1
Zinc	FS Micro-nutrients	ppm	<0.5	<0.5	<0.5	0.5
Boron	FS Micro-nutrients	ppm	0.8	0.8	0.5	0.1
Manganese	FS Micro-nutrients	ppm	1.6	1.0	2.3	0.1

Approved by:

Benjamin Morris, B.Sc
Operations Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).
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Methodology and Notes

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Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Ammonium-N (Extractable) in Soil	Carter	*	Extraction of NO3-N and NH4-N with 2.0 M KCl, 6.2	Oct 29, 2024	Element Edmonton - Roper Road
Anions in solids (VAN)	APHA	*	Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Oct 24, 2024	Element Vancouver
Boron - Hot Water Soluble (VAN)	BCELM	*	Hot Water Soluble Boron, HWS-Boron	Oct 24, 2024	Element Vancouver
Boron in farm soil	BCELM	*	Hot Water Soluble Boron, HWS-Boron	Oct 24, 2024	Element Edmonton - Roper Road
Chemical Oxygen Demand (Soluble) in soil	APHA	*	Closed Reflux, Colorimetric Method, 5220 D	Oct 27, 2024	Element Edmonton - Roper Road
Chemical Oxygen Demand (Soluble) in soil	Element-in house		1:100 soil to water extraction, analysis by APHA 5220 D, COD soil	Oct 27, 2024	Element Edmonton - Roper Road
Coliforms- MPN (Enviro)	APHA	*	Fecal Coliform Procedure, 9221 E	Oct 24, 2024	Element Calgary
Macronutrients in Farm Soils	McKeague	*	Ammonium Acetate Extractable Cations, 4.51	Oct 24, 2024	Element Edmonton - Roper Road
Metals (Strong Acid Leachable) in soils (VAN)	B.C.M.O.E	*	Strong Acid Leachable Metals (SALM) in Soil (2023), SALM	Oct 24, 2024	Element Vancouver
Metals (Strong Acid Leachable) in soils (VAN)	US EPA	*	Mercury in Solid and Semi-Solid Wastes (Cold Vapour), 7471B	Oct 24, 2024	Element Vancouver
Micronutrients in Farm Soil	APHA	*	Inductively Coupled Plasma (ICP) Method, 3120 B	Oct 24, 2024	Element Edmonton - Roper Road
Micronutrients in Farm Soil	McKeague	*	DTPA-TEA Extractable Elements, 4.65	Oct 24, 2024	Element Edmonton - Roper Road
Nutrients in Farm Soil	Comm. Soil Sci. Pl. Anal.	*	Modified Kelowna Soil Test, Vol 26, 1995	Oct 24, 2024	Element Edmonton - Roper Road
Nutrients in General Soil	Comm. Soil Sci. Pl. Anal.	*	Modified Kelowna Soil Test, Vol 26, 1995	Oct 25, 2024	Element Edmonton - Roper Road
Organic Matter by Ignition	McKeague	*	Loss on Ignition (LOI), 3.8	Oct 24, 2024	Element Edmonton - Roper Road
pH and Conductivity in farm soil	McKeague	*	1:2 Soil:Water Ratio, 4.12	Oct 24, 2024	Element Edmonton - Roper Road
pH and Conductivity in farm soil	McKeague	*	1:2 Soil:Water Ratio, 4.12	Oct 24, 2024	Element Edmonton - Roper Road
pH and EC - 1:2 (VAN)	Carter	*	Soil pH (1:2 Water), 16.2	Oct 24, 2024	Element Vancouver
Saturated Paste in General Soil (VAN)	Carter	*	Electrical Conductivity and Soluble Ions, Chapter 15	Oct 25, 2024	Element Vancouver
Sikora Lime Requirements	SSSA	*	A buffer that mimics the SMP buffer for determining lime requirement of soil, Vol. 70	Oct 25, 2024	Element Edmonton - Roper Road
Sulfate in Farm Soil	McKeague	*	Sulfate Extractable by 0.1M CaCl2, 4.47	Oct 24, 2024	Element Edmonton - Roper Road
Sulfate in Farm Soil	McKeague	*	Sulfate Extractable by 0.1M CaCl2, 4.47	Oct 24, 2024	Element Edmonton - Roper Road
TKN in Soil	APHA		Nitrogen (Organic). Macro-Kjeldahl Method, 4500-NOrg B	Nov 01, 2024	Eurofins EnvironeX - Pointe Claire
Total Carbon, Nitrogen in Soil by Leco Combustion (VAN)	SSSA Book Series 5	*	Nitrogen-Total, Ch 37	Oct 28, 2024	Element Vancouver

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Methodology and Notes

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Attn:	Accounts Payable	P.O.:	503286	Report Number:	3065592
Sampled By:	MD	Proj. Acct. code:		Report Type:	Final Report
Company:	City of Kamloops				

Method Name	Reference		Method	Date Analysis Started	Location
Trace Metals ICP-MS (BCMOE SALM) in soil (VAN)	B.C.M.O.E	*	Strong Acid Leachable Metals (SALM) in Soil (2023), SALM	Oct 24, 2024	Element Vancouver

*Reference Method Modified

References

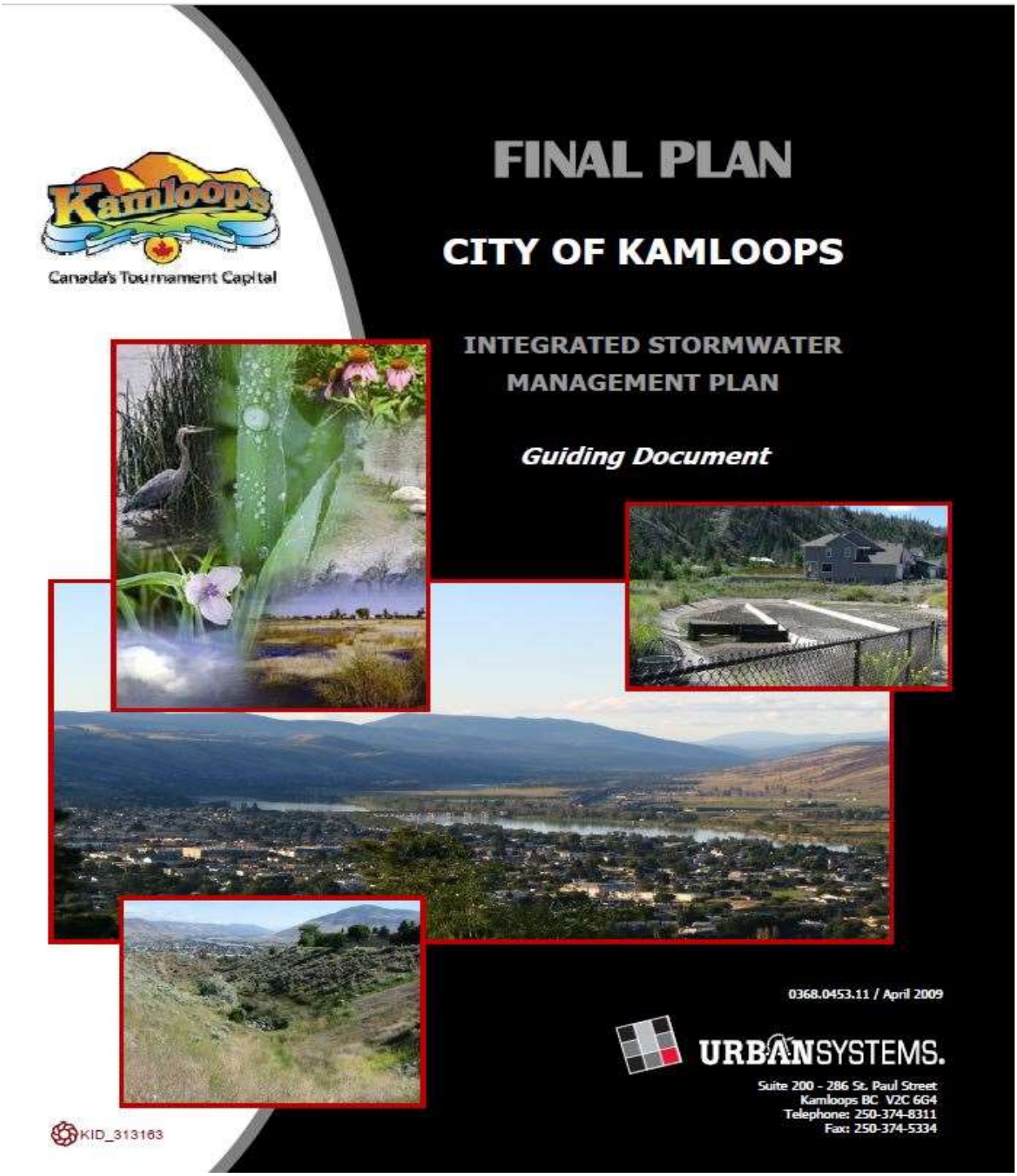
APHA	Standard Methods for the Examination of Water and Wastewater
B.C.M.O.E	B.C. Ministry of Environment
BCELM	B.C. Environmental Laboratory Manual
Carter	Soil Sampling and Methods of Analysis.
Comm. Soil Sci. Pl.	Communications in Soil Science and Plant Analysis
Element-In house	In house method
McKeague	Manual on Soil Sampling and Methods of Analysis
SSSA	Soil Science Society of America Journal
SSSA Book Series 5	Methods of Soil Analysis, Part 3
US EPA	US Environmental Protection Agency Test Methods

Comments:

- Reduction of analytical volume was necessary for iron and aluminum to bring results within the analytical range for lot 1770442. Detection limits are adjusted accordingly.
- Reduction of analytical volume was necessary for metals due to matrix effects in sample 1770442. Detection limits are adjusted accordingly.

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Appendix L: Kamloops Stormwater Management Plan



City of Kamloops
Integrated Stormwater Management Plan
Guiding Document

Final Plan

Client: City of Kamloops
105 Seymour Street
Kamloops, BC V2C 2C6

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Date Issued: 2009/04/06

Project No.: 0368.0453.11

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APPENDIX B FINANCING OPTIONS WORKING PAPER
APPENDIX C TECHNICAL BACKGROUND DATA WORKING PAPER
APPENDIX D HYDROLOGIC / HYDRAULIC MODELING SOFTWARE WORKING PAPER
APPENDIX E ENGINEERING ISSUES WORKING PAPER
APPENDIX F PUBLIC EDUCATION (KAMLOOPS HOME SHOWS)
APPENDIX G STAKEHOLDERS WORKING GROUP
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LIST OF ACRONMYNS

BMP	Best Management Practice
ESC	Erosion and Sediment Control
GIS	Geographical Information System
GVRD	Greater Vancouver Regional District
IDF	Intensity-Duration-Frequency
ISMP	Integrated Stormwater Management Plan
LID	Low Impact Development
LWMP	Liquid Waste Management Plan
MDP	Master Drainage Plan
MWP	Master Watershed Plan
OCP	Official Community Plan

1.0 INTRODUCTION

1.1 Why is Stormwater Management important?

Stormwater management, for many years, has not been a "top-of-mind" issue in Kamloops. While there is some support for increased attention to stormwater management in the City's Official Community Plan (OCP) – KAMPLAN '04 - and various other plans, policies, and bylaws, there has not been a comprehensive study of stormwater management in Kamloops for quite some time. The topic has not received the attention it deserves due in large part perhaps to the fact that Kamloops is located in a semi-arid climatic zone and thus does not receive significant amounts of precipitation. Despite this, Kamloops does in fact experience high intensity rainfalls as well as snowmelt conditions which can make stormwater management more challenging and more complex. There are several other reasons why stormwater management should receive more attention; these include:

Storms are becoming more intense – Based on historical data collected from weather stations in Kamloops, storms are becoming even more intense. While the area is not necessarily receiving more annual precipitation, the same amount is falling in shorter periods of time. This creates challenges for the limited stormwater management tools that are in place in Kamloops.

Lands outside of Kamloops are losing absorptive capacity – The Mountain Pine Beetle epidemic has caused the death of many trees in the surrounding areas which used to absorb significant amounts of water. This water now must be absorbed directly into the soils or flow overland to creeks and other waterways. Compounding the issue is that, due to the loss of tree cover, soils have become sun-baked and compacted, causing them to lose their absorptive capacity. Thus more water is diverted to creeks, carrying other sediments, and eventually draining through Kamloops to the Thompson Rivers. This also increases the risk of flooding.

Stormwater is surface water resulting from rain events and/or snow melt. Other terms include runoff, drainage, and rain water.

Stormwater management is a way to avoid or mitigate the otherwise negative impacts of development on Kamloops' surface and ground waters.



An example of severe creek erosion

Improper stormwater management can lead to erosion – Kamloops has significant development in the hillsides. Much of this development has taken place on soils that are of dubious quality and thus there has been much effort to ensure slope subsidence does not occur. If the trend for more intense storms increases, it could challenge the systems that have been put in place to manage stormwater and prevent erosion in these areas.

Further, many streams in Kamloops start from the surrounding hillsides and flow downhill towards the Thompson Rivers and thus are more sensitive to improper stormwater management.

Managing stormwater is an important environmental issue – Proper stormwater management is required to protect environmental values; without it, there is risk to water quality and to aquatic habitats. The current system in Kamloops allows stormwater to enter into creeks and other water bodies without first being treated. As a result a wide variety of pollutants are washed into local surface waters. Since Kamloops may go for longer periods without rain, there will be more opportunity for contaminants to accumulate which will result in poorer stormwater runoff quality if proper interventions are not put in place.



The Thompson River is directly affected by the quality of water in local creeks.

The most significant impacts of stormwater runoff occur due to conversion of natural open space, especially forests, to "hard" impervious surfaces, such as roads and buildings.

Residents of Kamloops desire better stormwater management – At the City's Sustainability Forum, held in November 2008, many respondents to a survey pertaining to water issues in Kamloops indicated that improved stormwater management was either an important issue or a very important issue. Similarly, many Fall 2008 Home Show attendees who visited the City's stormwater display also expressed concern for water quality and drainage issues (see Appendix F).

1.2 Background to Integrated Stormwater Management Plan (ISMP) Process

The Integrated Stormwater Management Plan process began in 2006 with an initial scoping report which led to the development of this guiding document. One outcome will be updated Master Drainage Plans, to be called Master Watershed Plans, which will be developed in the coming years for each of the City's watersheds. **Figure 1.1** illustrates the Integrated Stormwater Management Plan process.

Figure 1.1: Integrated Stormwater Management Plan Process



1.3 Audience

There are a number of potential audiences for the outcomes of integrated stormwater management planning, including:

Council – Council will be the ultimate implementers of this plan. It is important that they understand the purpose and importance of the planning process and that they provide support to Staff for the implementation of the Plan.

Staff – Many on City staff will have important roles in the implementation of this Plan. These include the City drainage engineer who acts as the point person for this process; other engineers in the Development and Engineering Servicing Department; current and long-range planners who must integrate stormwater management issues into various plans and bylaws; Environmental Services and Public Works staff who must address current issues and provide education to the general public; and reviewers and inspectors in the Building Department who will approve specific plans for on-site stormwater controls. It is important that the breadth of City staff acknowledge the importance of stormwater management and understand their role in implementing the plan.

Developers – The development community has a significant role to play in that they will be required to construct and, in many cases, pay for stormwater management tools. Effectively engaging the development community in the stormwater management process will alleviate any contentiousness associated with requiring a higher degree of attention to stormwater management in new development and redevelopment.

Other stakeholders – Other stakeholders such as the Ministry of Environment, various environmental groups, Kamloops Indian Band, and others all have a role to play in the development and implementation of this plan. These include addressing regulatory issues, leveraging potential partnerships and raising public awareness.

General public – The general public, through Council, must ultimately approve this plan. Further, it will be important that the general public become more knowledgeable about the importance of stormwater management as they will be required to fund implementation. Perhaps as importantly, there are many opportunities for the general public to become active as part of the solution to stormwater problems through the use of sustainable stormwater practices such as rain barrels, rain gardens, and "good housekeeping" (for example, by keeping deleterious materials like engine oil out of storm drains).

Ultimately, **Council** and **Staff** have been identified as the primary audiences for this **Guiding Document.** Thus, this plan is presented in a manner that allows a broad range of Council and staff, with different levels of knowledge, to become better aware of the importance of stormwater management in Kamloops and to learn some of the best practices that will work in the Kamloops environment. It will be the responsibility of Council and Staff to communicate this knowledge to the other audiences listed.

1.4 Objectives

The objectives of this **Guiding Document** are:

1) Provide education to Council and staff about the importance of stormwater management planning in Kamloops;

2) Outline opportunities for the City to better manage stormwater, both in existing and future development, taking into account the local environment and current thinking among stormwater practitioners in North America;

3) Provide guidance on implementation of the Plan including guidance for the Phase 3 Master Watershed Plans; and

4) Identify ways that stormwater management can be better integrated into ongoing planning efforts, particularly the ongoing sustainability planning exercise.

1.5 Scope of Work

The work for Phase 2 of the Integrated Stormwater Management Plan entailed the following:

1. Develop technical working papers – Topics covered in the Working Papers included financing, engineering issues, policies and regulations, and a range of background issues such as climate, hydrology, environmental conditions, land use and stormwater infrastructure. The working papers are briefly described in Section 2 of this Plan while the full papers are included in the **Phase 2 Support Document.**

2. Establish and meet with working groups – Three groups were convened, a City staff team, a stakeholders group and a technical group. Minutes and other materials from these meetings can be found in the **Phase 2 Support Document.**
3. Inform the public and solicit their input at the fall Kamloops Home Show - The Integrated Stormwater Management Plan process was featured prominently at the Spring 2009 Home Show at the City of Kamloops booth, and attendees were invited to provide their feedback on stormwater management issues. The **Phase 2 Support Document** provides details.
4. Prepare this guiding document – This **Guiding Document** summarizes work completed to date and, more importantly, provides recommendations and an implementation plan for strengthening the City's stormwater management responsibilities and authorities.

1.6 Plan Outline

The remainder of this Guiding Document focuses on four critical topics for consideration by Council and Staff:

- What are the current stormwater issues facing the City? (Section 2)
- What guiding principles can be adopted to address these issues? (Section 3)
- What actions can the City take to implement a more comprehensive and integrated approach to stormwater management? (Section 4)
- Is there an orderly plan to undertake these actions? (Section 5)

A proposed Scope of Work for the Master Watershed Plans is provided in Table 4.1.

2.0 CURRENT STORMWATER MANAGEMENT ISSUES IN KAMLOOPS

A major component of the ISMP Phase 2 was to gather and collate current and historical background data and studies relating to stormwater management within the City. From this collated background data, several Working Papers were prepared. Each Working Paper focused on one or more technical subjects important to the planning process and provides the City and stakeholders with important information necessary to understand conditions, issues, challenges and opportunities for stormwater management within the City. The following sections summarize key aspects of the working papers that support this Guiding Document and future phases of the Kamloops ISMP.

2.1 Summary of Working Papers

Five Working Papers were prepared during Phase 2, focusing on the following general topics:

- Policies and Regulations
- Financing Options
- Engineering Issues
- Technical Background Data
- Hydrologic/Hydraulic Modeling Software

Each of these is discussed in the paragraphs that follow. Detailed information related to these topics can be found in the **Phase 2 Support Document**, under separate cover.

Land use planning is a critical part of stormwater management because it directly affects the extent of impervious are in the City.

2.1.1 Policies and Regulations

Many municipalities, including the City of Kamloops, implement regulations that directly affect stormwater management (e.g., Official Community Plans and Zoning Bylaws). However, few municipalities *explicitly* consider how land use and development practices relate to stormwater management when developing their bylaws and regulations. The purpose of this Working Paper was to collect and review City Plans, bylaws and policies and to identify policy gaps, as well as provisions that support, integrated stormwater management.

Four policy documents most influential to stormwater management were reviewed in detail in the working paper and a fifth one (the LWMP) is added here.

KAMPLAN (2004) – Official Community Plan – KAMPLAN '04 indirectly supports stormwater management by encouraging environmental sustainability, establishing Development Permit Areas to protect Environmentally Sensitive Areas, and supporting infill development. KAMPLAN '04 objectives that pertain directly to stormwater management include: ensure post-development flows meet pre-development levels; protect life and property; use existing natural drainage courses as primary drainage systems; and work with

senior governments to implement surface runoff/water quality management practices.



Urbanization of Peterson Creek – Peterson Creek can be seen between the two homes, where the vegetation is present.

Opportunities/Constraints – KAMPLAN '04 fails to include measurable targets for preserving open space or limiting impervious area, two particularly cogent means for limiting negative impacts to watersheds from urban development. This plan also does not identify an urban containment boundary to limit sprawl. A review and substantial update of KAMPLAN '04 is underway and should be complete by 2010, thus it is a good time to raise and address these issues.

Neighbourhood Plans – The City has completed several neighbourhood plans for various areas of the City. The neighbourhood specific policies in these plans relate to land use, environmental protection and servicing. Many of these plans include more detailed stormwater management policies, than those contained in KAMPLAN '04 or the City's other regulatory bylaws, which could be used as examples to be applied on a larger City wide basis.

Opportunities/Constraints - Like many of the KAMPLAN '04 policies related to stormwater management, neighbourhood plan policies are not often designed to be regulatory. To implement many of the neighbourhood plan objectives, the City would have to amend its regulatory bylaws.

Zoning Bylaw – The Zoning Bylaw includes provisions to establish maximum lot coverage and impose usable open space requirements both of which limit impervious area.

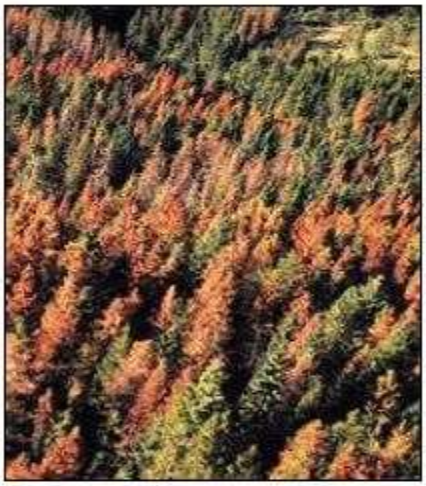
Opportunities/Constraints – The Bylaw could be improved by imposing more specific requirements to limit impervious area and protect open space. For example, the City could impose parking standards to limit the amount of impervious area from parking and / or also specify density averaging options to promote cluster development for the protection of the natural environment.

Subdivision Control Bylaw – This Bylaw establishes service levels and servicing standards for new development. The Subdivision Control Bylaw has perhaps the most potential to directly and significantly influence stormwater management by requiring the use of specific control methods or imposing specific control performance targets.

Opportunities/Constraints – Currently the Subdivision Control Bylaw does not include on-site stormwater source controls as acceptable Best Management Practices (BMPs). The Bylaw could be amended to require developers to install on-site stormwater source control BMP's such as porous pavements, constructed

vegetated swales, infiltration trenches and absorbent landscaping. Site adaptive planning policies that reduce impervious areas can also be added to the bylaw. (See Section 2.1.5 for discussion of BMPs.)

Tree Protection Bylaw – Tree protection is a highly effective component of stormwater management. The current Bylaw includes some counter productive tree removal exemptions that hinder the ISMP objectives.



Effects of Pine Beetle infestation.

Opportunities/Constraints - The Bylaw does not apply to trees on properties less than 2 ha, trees less than 5m in height or 10cm in diameter, or trees on property undergoing development in accordance with a subdivision plan. The City could significantly improve tree protection by reducing these exemptions.

Kamloops Liquid Waste Management Plan (LWMP) – provides direction for the safe and environmentally sustainable treatment, disposal and reuse of the City of Kamloops' sewage. The LWMP provides a strategy for managing current and future sewage demands. With a large part of the plan focusing on water quality issues such as the required levels of treatment, methods of treatment and other mitigation options.

Opportunities/Constraints – The Kamloops LWMP requires that a comprehensive Stormwater Management Plan be prepared to manage the disposal of stormwater into the Thompson Rivers. The LWMP does not, however, provide specific levels of stormwater treatment or management methods. As a result, there is a great deal of latitude available to implement stormwater strategies such as this Integrated Stormwater Management Plan.

Successful stormwater management requires effective implementation tools such as regulatory bylaws.

Currently, there are a number of regulatory gaps that make it difficult to fully implement the stormwater-related policies outlined in KAMPLAN '04 and in neighbourhood plans. Consequently, to achieve effective, integrated stormwater management, the City's broad policies must be augmented with effective implementation tools (i.e., regulatory bylaws that require compliance). To do this, existing policies and bylaws will have to be amended and new ones will have to be incorporated. Section 4 provides descriptions of

recommended revised and new policies and bylaws.

2.1.2 Financing Options

As with many initiatives, implementation of the ISMP will require funding. This Working Paper provided a broad overview of financing options available for stormwater management funding. Specifically, the Working Paper identified and evaluated financing options, reviewed the City's current stormwater management funding approach and discussed the applicability of a stormwater user fee to finance City activities.

Financing Options - Under the Community Charter and Local Government Act, municipalities can make use of the following cost-recovery tools for stormwater management:

- General revenues – General property taxes levied based on assessed value;
- Local service taxes – Taxes levied in a specific area(s) of the City for specific services provided to that area;
- Works and services – Infrastructure improvements constructed by developers as part of the subdivision or building permit process;
- Stormwater fees – Fees similar to water or sewer utility user fees that are levied to provide dedicated funding for stormwater management initiatives;
- Development cost charges – Fees levied on new development to assist with financing engineering infrastructure, parkland acquisitions, and parkland improvements needed to support growth;
- Grants – Provincial and Federal Grants.

The City currently finances stormwater management costs through general revenues, development cost charges, and works and services agreements. It does not, however, have a dedicated source of funding for stormwater management nor does the City use grants or local service taxes for stormwater initiatives. On-going operation and maintenance costs for stormwater must compete with other City initiatives funded through general revenues.

Rating the Financing Alternatives – To choose among potential funding sources, a set of criteria was established to evaluate each option. Ideally, preferred or chosen funding sources should:

- Minimize exposure to financial risk (to the City and its taxpayers) – The City assumes financial risk when long-term borrowing (by the City) is employed as a means to finance capital projects that are required prior to having collected the necessary funds to pay for these projects.
- Promote fairness (the "user pay" principle) – Those who use the service should also pay for the service. Costs should be allocated to reflect demands or impacts on systems.
- Provide certainty and sufficiency – Financial tools should provide sufficient revenues to fund required initiatives in a given timeframe.

- Minimize administrative cost – Funding strategies should be cost effective to administer.
- Reflect established practices – It may be more challenging to gain support for funding approaches that are new to the City.

An evaluation matrix was prepared to compare how each financing option performs against the criteria (see Table 2.1). As shown, stormwater fees are expected to be the City's best option for funding stormwater management initiatives.

Table 2.1: Evaluation of Potential Financing Options

	GENERAL REVENUE	LOCAL SERVICE TAXES	WORKS AND SERVICES	DEVELOPMENT COST CHARGES	STORMWATER FEES	GRANTS
Minimize Financial Risk	●	●	●	◐ - ●	●	○
Promote Fairness ("user pay")	○	◐	◐	◐	●	○
Provide Certainty and Sufficiency	○	○	○	○	●	○
Minimize Administrative Cost	●	◐	●	●	◐	○
Reflect Established Practices	●	○	●	●	◐	●

● Ability to satisfy the evaluation criterion is **above average.**

◐ Ability to satisfy the evaluation criterion is **average.**

○ Ability to satisfy the evaluation criterion is **below average.**

Stormwater Fees – A stormwater fee is simply a fee levied by local governments for the provision of stormwater management services. Just as water and sanitary user charges provide the City with dedicated, stable sources of revenue for water and sanitary services, a stormwater fee would provide the City with a dedicated, stable source of revenue for stormwater management services. Furthermore, like water and sanitary user charges, stormwater fees can be designed to reflect the user pay principle – that is, the greater the demand on the stormwater management system (i.e., the greater proportion of a parcel that is covered by impervious surfaces), the greater the user fee should be for that parcel.

Stormwater fees are becoming the tool of choice for generating stormwater management revenue.

Revenues collected through stormwater fees can be used to pay for any component of the City's stormwater management service, including:

- Planning and engineering analyses,
- Capital improvements (both growth and non-growth related),
- Capital reinvestment (i.e., long-term infrastructure replacement),
- Operations and maintenance,
- Administration and financial services related to providing the services,
- Public safety and hazard mitigation (e.g., disaster preparedness), and
- Public education.

Stormwater fees have gained widespread acceptance among North American communities (especially in the U.S.) and are being used as an alternative to general revenues because they are considered to be the most equitable way of securing stable funding for stormwater management services. At this time, the City of White Rock is the only BC municipality to have implemented a true stormwater fee (i.e., a fee that is designed to reflect use of the stormwater system). Other BC municipalities (e.g., Surrey, Abbotsford, Langley Township, and Campbell River) levy fees specifically for stormwater, but these fees do not necessarily reflect the extent of use of the stormwater system. In any case, regardless of the fee system design, these municipalities have secured a dedicated and stable source of funding for their stormwater management initiatives.



2.1.3 Technical Background Data

This working paper focused on gathering general background data for use in updating individual Master Watershed Plans during Phase 3 of the ISMP. The data included the following topics:

- Topography,
- Climate,
- Hydrology,
- Soils and Hydrogeology,
- Environment,
- Land use,
- Stormwater infrastructure, and
- Stormwater quality.

The purpose of the working paper was to understand the overall context of stormwater management in the City and identify what additional data will be required for updating individual Master Watershed Plans in Phase 3. The following paragraphs summarize the working paper's discussion of the listed topics.

Topography

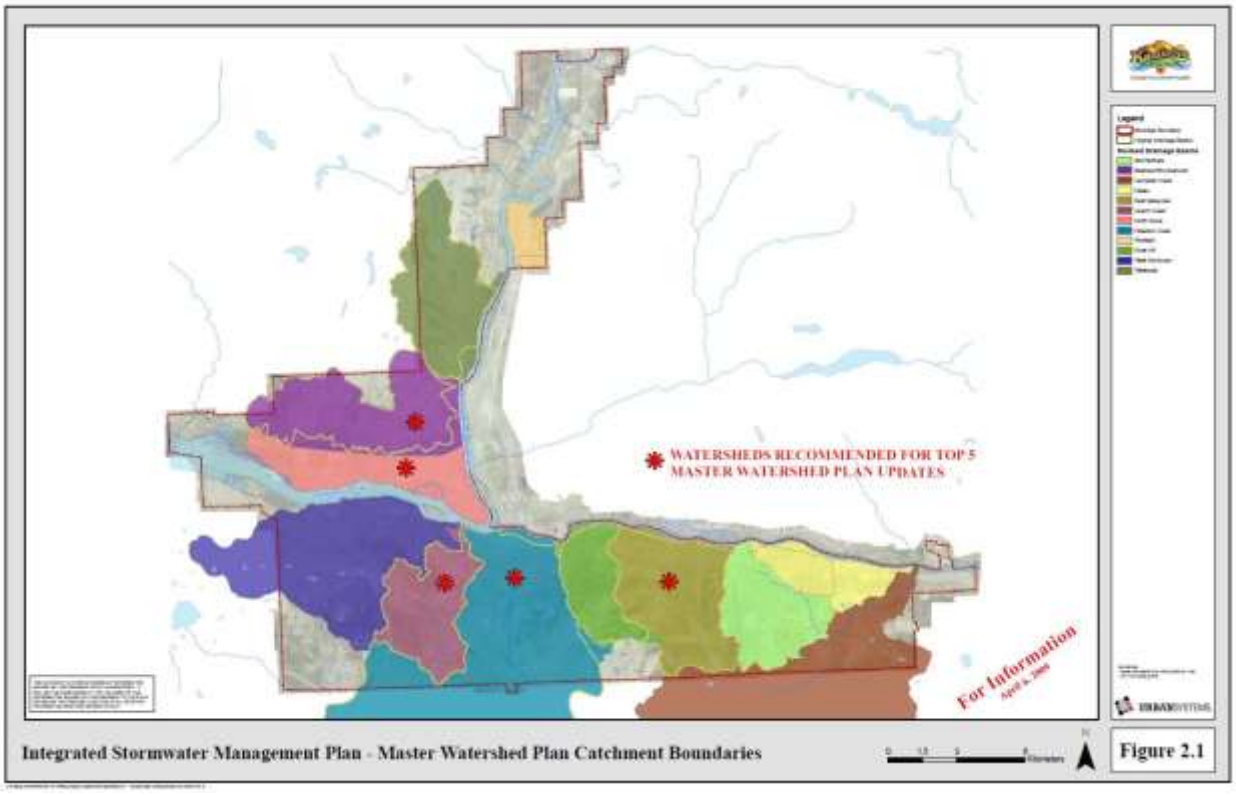
The City of Kamloops' topography consists of diverse and challenging formations due to its location amongst the Thompson Rivers' valleys. The City collects and maintains very good topographic data which was used to define the various watershed boundaries within City limits. These watersheds can be seen on Figure 2.1 (Integrated Stormwater Management Plan – Master Watershed Plan Catchment Boundaries). The Master Watershed Plan Updates will reflect these watersheds.



Climate

Climatic data is essential to understanding hydrologic processes at work in Kamloops' watersheds. Currently, Environment Canada collects raw temperature, precipitation, wind speed, humidity and air pressure data at the airport. The City also has been collecting climatic data at several stations through out the City. Data from these various stations can be used in the Master Watershed Plan updates to compare and contrast the varying climatic and hydrologic conditions that are present throughout the Kamloops areas.

Climate change will have a significant impact on stormwater generation in Kamloops.


WATERSHEDS RECOMMENDED FOR TOP 5
MASTER WATERSHED PLAN UPDATES
For Information
Integrated Stormwater Management Plan - Master Watershed Plan Catchment Boundaries
Figure 2.1

As signs of climatic changes become more prevalent it will be imperative that climatic data continues to be collected and maintained over time to help monitor the effects of the changing climatic conditions (i.e., peak storm intensities, precipitation patterns, temperature changes, etc.) and the associated effects on the local hydrologic cycles.

Hydrology

Hydrologic (stream flow) data is essential to stormwater planning and adaptive management. Along with climatic data, stream flow data is critical to the understanding of the complex natural and urbanized hydrologic processes present throughout the City. At this time, there is no stream flow data available for any of the streams within or near City limits. Therefore, it is recommended that the City purchase and install at least two (2) permanent, continuously recording stream gauges on City streams.

Soils and Hydrogeology

A watershed's subsurface conditions are key to the water balance of the area, significantly affecting the amount of surface runoff is generated. Thus it is essential to have an understanding of local soils and subsurface conditions. Therefore, basic soils, surficial geology and groundwater data were collected during Phase 2, though analysis was not a part of the current scope of work. In overview, the soils around Kamloops are locally quite variable. For example, north shore areas generally consist of free draining coarse-grained materials, while many areas on the south shore are characterized by fine-grained soils that exhibit significant slope instability. During the update of Master Watershed Plans in Phase 3 of the ISMP, a fuller analysis of the soils and hydrogeologic conditions will be completed.



Steep slopes present a challenge for erosion control

Environmental

A preliminary review of available data was performed to gather environmental data relating to the ISMP. The City has a significant collection of environmental data that was used for this investigation. Kamloops contains diverse environmental conditions that must be accounted for during development. These include rivers, streams, riparian areas, floodplains, grasslands, forested slopes, rocky outcrops and talus slopes.

Protection of Kamloops' environmentally sensitive areas is an essential component of stormwater management.

These areas provide unique ecological functions or habitat, act as natural stormwater regulating features and are highly susceptible to negative development impacts. Therefore, protection of local environmentally sensitive areas is an essential component of the ISMP.

Despite the City's significant environmental inventory, there are a gaps in the data that will need confirmation through field work when the Master Watershed Plans are updated. Some of the environmental data gaps include confirmation of extent and quality of riparian areas; specific locations of rocky outcrops, talus slopes and springs; and confirmation of forest and grassland covers. Refer to Appendix C in the **Phase 2 Support Document** for more detail on available environmental data.

Land Use

The City of Kamloops and the BC Assessment Authority maintain high-quality land use data bases that can be used to help identify watershed characteristics of urbanized areas.



More specifically, impervious areas and associated hydrologic (runoff) characteristics can be determined from this land use data.

Stormwater Infrastructure

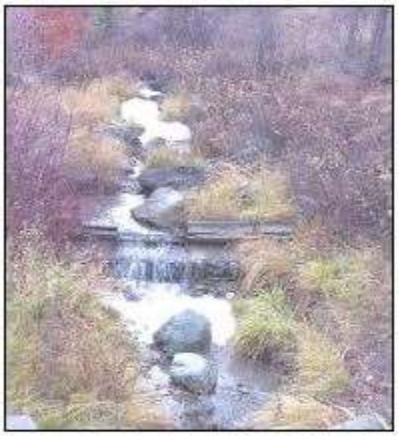
The City's GIS database contains extensive stormwater infrastructure data including: storm sewer locations, sizes, lengths, inverts and material types; catch basins; outlet structures; detention pond locations; rock (infiltration) pits; and open channels. This data will be used to prepare the hydrology models for each Master Watershed Plan. Any gaps in this data will be verified and updated during individual MWP updates.



Stormwater Quality

Urban development not only affects stormwater runoff peaks and volumes but also the quality of that runoff. Typical runoff pollutants include suspended sediments, nutrients (nitrogen and phosphorous), trace metals (copper, nickel and zinc), bacteria and hydrocarbons.

In the late 1990's, a short lived stormwater quality monitoring program was initiated by the City. The program was well-documented and planned, however the results proved not very helpful to fully understanding the extent and nature of stormwater pollution in the City.



A preliminary screening-level stormwater quality analysis was performed during Phase 2 of the ISMP. This analysis provided a general planning estimate of likely storm pollutant export from the different watersheds in Kamloops. More sophisticated modeling will have to be done during MWP updates to analyze the complex physical, chemical and biological factors associated with stormwater quality.

2.1.4 Hydrologic / Hydraulic Modeling Software

A review of available modeling software that would be suitable for the needs of future ISMP initiatives was completed and a recommendation was made for purchase of software by the City Engineering Department.

2.1.5 Engineering Issues

This working paper focused on engineering control aspects of the ISMP. Topics presented in this working paper included:

- Key technical issues to be addressed in the ISMP.
- Best management practices in the local environment.
- Master Drainage Plan updates, including system simulation (i.e., modeling).

These topics are summarized in the following sections.

Key technical issues – A number of issues were identified during both Phase 1 and Phase 2 (the current phase) of the ISMP. These issues include:

- Adequacy of collection and conveyance systems.
- Lack of adequate erosion and sediment control during construction.



Street flooding can be a nuisance and a source of pollution

- Applicability of low impact development (LID) stormwater control methods in Kamloops.
- Need to develop Design Standards for use of best management practices, including progressive LID measures.

- Importance of groundwater conditions to stormwater management.
- Lack of overland flow routes, putting property owners at risk to flooding.
- Importance of protecting natural drainage courses.
- Significance of runoff quality and its role in causing significant environmental impacts to local aquatic life and habitats.
- Long term viability of detention ponds as a stormwater control method.



Guerin Creek – noticeable trash & debris present

Best Management Practices – For centuries, stormwater management, if undertaken at all, consisted primarily of ditches and pipes to convey surface runoff away from properties and communities as quickly as possible. In the last 50 years, communities and regions around North America have increasingly applied other stormwater control methods, often called "best management practices" or BMPs, to mitigate the negative effects of urbanization on watersheds. During that time, in British Columbia, BMPs have been applied primarily to reduce downstream flooding, generally at the end of storm drain pipes (or storm sewers). More recently, stormwater practitioners have come to realize that effective stormwater management must address not only peak runoff rates (i.e., flooding), but also total runoff volumes and the water quality of the runoff.

BMP's are subdivided into four categories:

- ***Site adaptive planning***
- ***Source controls***
- ***Structural controls***
- ***Non-structural controls***

Best Management Practices are the "on the ground" methods for avoiding and mitigating the negative impacts of urban development on stormwater. **Table 2.2** provides an overview of BMPs. Through *site adaptive planning* the total amount of impervious surface area on development sites can be reduced, impervious area being a key factor in determining the impacts of urbanization on stormwater.

To supplement these impervious area reductions, *source controls*, fitted to each specific development site, can be used to replicate natural water cycle processes – infiltration, evaporation and transpiration – before runoff becomes excessive. In some cases, very large development sites, neighbourhoods or regions must use *structural controls*, generally located downstream of the affected area, to manage stormwater in a more centralized way.

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Table 2.2: BEST MANAGEMENT PRACTICES (including Low Impact Development Methods)

Best Management Practice	Scale or Scope				Primary Stormwater Issue(s) Addressed				Overall Evaluation					
	Site	Neighbor-hood	Water-shed	Regional	Volume Control	WQ Control	Peak Control	Erosion Control	Effective-ness	Sustain-ability	Cost	Ownership	Accepted by Sr. Envl Agencies?	Experi-ence
Site Adaptive Planning														
Disconnect Impervious Areas	X	X			X				1	1	2	na	Y	1
Green Street		X			X		X		1	1	2	C/P	Y	2
Limit building footprint size	X				X		X		1	1	0	C/P	Y	1
Narrow Pavement Street		X			X				2	1	1	C/P	Y	2
Reduce parking requirements	X				X	X	X		1	1	0	C/P	Y	1
Source Controls														
Amended Soils/Absorbent Landscaping	X				X				1	1	1	P	Y	2
Disconnected Downspouts & Splashpads	X				X				1	1	1	P	Y	1
Green Roof	X				X				1	2	2	P	Y	2
Infiltration (Engineered System)	X	X			X	X			1	2	3	C/P	Y?	1
Infiltration Basin	X	X			X	X			1	1	2	C/P	Y	1
Infiltration Swale		X			X	X			1	1	1	C/P	Y	1
Infiltration Trench	X	X			X	X			1	1	2/3	C/P	Y	1
Planter Boxes	X								2	1	1	P	Y	1
Porous Pavement (asphalt)	X	X			X	X	X		1	1?	2	C/P	Y	2
Porous Pavement (concrete)	X	X			X	X	X		1	1?	2	C/P	Y	3
Porous Pavement (permeable pavers)	X	X			X	X	X		1	1?	2	C/P	Y	1
Rain Barrel	X				X				1	1	1	P	Y	1
Rain Garden (Bioretention)	X	(X)			X				1	1	1/2	P	Y	1
Rock / Soakaway Pit	X				X				1	1	2	P	Y	1
Structural Controls														
Biofiltration Swale (Bioswale)		X				X			1	1	1/2	C/P	Y	1
Constructed Wetlands		X	X	X	X	X			1	2	2/3	C	Y	1
Dry Detention Pond		X	(X)	X			X		2	2	2	C	N	1
Grass (Vegetated) Swale		X			X				1	1	1/2	C/P	Y	1
Subsurface Gravel Wetland	X	X				X	(X)		1	1	2	C/P	Y?	3
Oil / Grit Separator	X	X		X		X			2	2	2	P	N	1
Perforated Storm Sewer		X		X	X		X		2	2	2	C/P	Y	2
Sand Filters	X	X		X		X			1	2	2/3	C	Y	1
Underground Vault (for sediment)	X	X		X		X			2	2	2/3	C/P	N	1
Underground Vault (media filters)	X	X		(X)		X			1	2	3	C/P	N	1
Vegetated Filter Strips	X	X				X		X	1	1	1	C	Y	1
Wet Detention Pond		X	X	X		X	X		1	2	2/3	C/P	Y	1
Non-Structural Practices														
Early Revegetation of Cleared Sites	X							X	1	1	1	P	Y	1
Maintenance of Riparian Corridors			X	X		X	X	X	1	1	2	C/P	Y	1
Minimize Soil Compaction	X				X			X	1	1	1	P	Y	1
Preserve Natural Drainage Features	X	X	X		X				1	1	2	C/P	Y	1
Protect / Retain Wetlands		X	X		X	X	X		1	1	2	C/P	Y	1
Public Education Programs			X	X	X	X	X	X	2	1	2	C/P	Y	1
Catch Basin Cleaning Program	X	X	X	X		X			1	2	2	C	Y?	1
Retain / Plant Trees at Building Sites	X				X				1	1	1	P	Y	1
Street Cleaning Program			X	X		X			1	2	3	C	U	2

Ranking Values:

Effectiveness 1 to 3, w/re: to primary issues addressed (1=best)
Sustainability 1 to 3 w/re: long term usage & risk of failure (1=best)
Cost 0 to 3 (0=very low or none)
Ownership (Responsibility) C(ity); P(rivate)
Acceptance by Senior Env'l Agencies Y(es, likely); N(ot top choice); U(nknown)
Experience in North America 1 to 3, w/re: to common usage & availability of design standards (1=high)

Cost rankings partially based on information presented in "Stormwater Best Management Practices in an Ultra-Urban Setting," U.S. Federal Highway Administration, ca. 2005.

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1 of 1

Finally, *non-structural practices* are used to ensure the long-term viability of both source and structural controls and to minimize the potential for urban activities to cause stormwater problems in the first place.

Site adaptive planning and source control BMPs together are sometimes denoted *low impact development* (LID) or sustainable urban drainage methods. Although the methods have been known for quite some time, LID in general has received increasing emphasis in the last few years, particularly in British Columbia where the methods are encouraged for use in the Province's "Stormwater Planning" guidelines manual published in 2002.



Kamloops' watersheds can benefit from the use of low impact development

Source controls, typically decentralized and applied to individual properties, are often installed and maintained by private property owners, although a municipality may also use LID within public rights of way or other public lands. On the other hand, structural controls are considered "end of pipe" solutions, often best applied in remedial situations or when a municipality desires to exercise more direct control of the BMPs. Determining which type of BMP is best suited for each site, development, neighborhood or region requires careful analysis and evaluation. Further, the overall mix of *publicly-owned and maintained* versus *privately-owned and maintained* best management practices is best established by watershed, taking into account land use, topography, climate, soils, hydrogeology and other watershed-based conditions. Of course, the City's general assessment of such issues as risk, staffing, resource availability, cost and potential to meet stormwater objectives will also be a major determinant of this mix.

Will LID work in Kamloops?

Some concerns have been raised about the cost-effectiveness and feasibility of LID in the context of the Kamloops area. The fact is, conventional drainage infrastructure (consisting primarily of ditches and storm drain pipes) does not and can not meet environmental objectives, and it merely passes problems downstream. Even with the addition of commonly used structural BMPs such as detention ponds (which are used in Kamloops), conventional drainage infrastructure can only meet some, but not all, environmental and flood-control objectives. It does poorly at runoff quality control and often is unable to control erosion, at times actually worsening stream erosion. If the City wishes to meet broad stormwater management / environmental objectives, the Kamloops ISMP should incorporate LID that focuses on site adaptive planning and source control measures. A successful LID program should be flexible, allowing consideration of site-specific conditions focusing on factors such as local climate, topography, soils and hydrogeologic conditions.



LID methods can provide stormwater management as well as aesthetic value to communities

Concern has also been expressed about using LID in the cold weather and dry climate conditions of Kamloops. To ease these concerns, it should be noted that there are several examples of North American communities (and regions) that currently use low impact development in similar or even harsher climates. The primary keys to successful low impact development are (1) to use LID in conjunction with the full palate of BMPs and (2) to adapt the LID designs to local, site conditions.

2.2 Master Watershed Plans

In the late 1980's and early 1990's, eight of the City's watersheds were studied and Master Drainage Plans (MDPs) were prepared for each. During Phase 2, several more watersheds were identified for which the City should prepare plans. (See **Figure 2.1.**)

In recognition of the wider scope of the ISMP, as compared to the earlier studies, the updated MDPs should really be called Master Watershed Plans (MWPs). During Phase 3 of the Kamloops ISMP, Master Watershed Plans will recommend specific stormwater improvements to existing and proposed future development areas within each watershed and provide a roadmap for implementing the various recommendations set forth in this Guiding Document. The MWPs will not be inexpensive (perhaps $75,000 each), thus the intent is to schedule the plans for the coming decade. A recommended Scope of Work for the MWPs can be found in Table 4.1.

Stormwater management planning has come to rely on sophisticated hydrologic and hydraulic modeling to simulate watershed conditions, assess infrastructure performance and assist with infrastructure design. During Phase 3 of the ISMP, modeling should focus on developing a systematic understanding of the hydrology of each watershed, using models that can adequately simulate the complex hydrologic conditions that are present, or are projected to be in the future, including the use of BMPs. The hydrologic modeling efforts should:

- Use continuous (extended period) simulations
- Have the ability to simulate soils conditions and their impact on runoff
- Make full use of the City's GIS database with respect to topography, ground cover, infrastructure, etc.
- Use the flow and weather data the City is now or will be collecting for model calibration and verification
- Link with less complex hydraulic models for design of facilities in the future.

Currently, complex modeling software capable of modeling these scenarios is available.

Once the initial watershed hydrologic models are prepared, they should be maintained over time to reflect changing land use and development conditions throughout the watersheds. This could be done during the regular cycle of MWP updates or at other intervals as needed. In addition, the hydraulic models which will be used for infrastructure design should be maintained as well, to reflect installation of improvements and other changes to the stormwater system.

3.0 GUIDING PRINCIPLES FOR STORMWATER MANAGEMENT

A series of guiding principles for stormwater management has been established for Kamloops. Moving forward, these provide Council and Staff a list of principles to reference as additional work relating directly and indirectly to stormwater management occurs in the future, particularly as the City progresses with Master Watershed Plans.

They also provide a basis for the recommendations made in Section 4 of this report. The guiding principles are intended to act as a catalyst for elevating the importance of and attention paid to stormwater management in Kamloops. By educating Council and Staff on these principles, it will enable the City, as an organization, to deal more efficiently and effectively with stormwater management issues.

The guiding principles are:

Long-term thinking will guide decision making – Stormwater management issues cannot be addressed quickly in Kamloops. It took a long-time for the City's stormwater management practices to evolve to the point they are at now in Kamloops and it is recognized that it will take time for the philosophy and implementation of stormwater management to evolve to practices that are more sustainable. Thus a long-term approach is required to understand and address the breadth and depth of issues in Kamloops in order to be successful.

The City will provide leadership to the community – By having Council's continued support and a knowledgeable staff, the City will be able to provide leadership to the community. This will mean applying best practices to its own operations and capital projects, to the extent feasible. This will also mean providing education to developers, stakeholders, and the general public, as well as ensuring best management practices are followed in Kamloops.

Implementation will be context sensitive – It is critical that appropriate stormwater management solutions are sought. A "one-size fits all" philosophy will not work for Kamloops. It is important that guidance for stormwater management solutions be developed at the watershed level, where possible, and that detailed design of stormwater management solutions be applied at the site level.



This will recognize that there are critical differences between the various watersheds and that even within individual watersheds there is enough variation in site conditions that any interventions must be context sensitive. For example, the MWPs will need to address, in a context sensitive manner, the need to limit stormwater infiltration in Aberdeen. A similar approach is needed for silt bluff areas.

However, it is also recognized that there are low impact development techniques that can respond to a variety of unique situations, such as those mentioned, and that these will be employed in combination with a full spectrum of BMPs.

The goals and objectives of stormwater management will permeate the City's regulatory framework – The City recognizes that in order for stormwater management to be treated with the importance it requires, that goals and objectives regarding stormwater must permeate throughout the City's regulatory framework. As such, existing policies must be modified and new policies potentially developed to address stormwater management. In this way, the stormwater management process becomes an ongoing exercise rather than a static, one-time planning initiative. The complexity of stormwater management practices in Kamloops should evolve as capacity develops.

Preserving and enhancing important environmental values will be a top priority – The City will work with developers to ensure environmental impacts of run-off from new development are minimized. At the same time, the City will seek to address situations where current stormwater management practices are harmful to the environment. Measurable performance targets will be established and monitored to ensure compliance.

Stormwater management will take into account the capacity of the City – While it is important that stormwater management processes are fair, it is also important that they fit within the capacity of the City to undertake. Neither the planning and engineering, nor the financing of stormwater management, can be of such a complexity that Staff cannot effectively implement stormwater management.

Stormwater management will be integrated with other initiatives – It will be important that stormwater management be integrated with other planning, engineering and financing initiatives. Most pointedly, the ISMP must integrate with the guidance that will evolve from the development of the City's Environmental Plan, as well as the City's Sustainability Plan/Official Community Plan.

Stormwater management will have dedicated annual funding – Stormwater management will have dedicated annual funding allotments and should be based on a "user pay" principle. It is critical that stable funding that is appropriate to the scale of stormwater management implementation is developed. This will ingrain the idea that stormwater management is an important consideration for the City of Kamloops.



The City will require that the full spectrum of storm events be addressed appropriately – Identifying how different storm events will be addressed will help the City ensure that appropriate infrastructure is implemented and that stormwater management is addressed in an efficient manner that respects environmental values, and mimics nature to the fullest extent possible.

The City will facilitate innovation – The City will facilitate innovation by first recognizing that a "one-size fits all" solution will not work in Kamloops and by secondly establishing performance based targets in order to account for the need to be context sensitive in terms of stormwater management. The City will work with developers to utilize best management practices (including low impact development) to add value to development.



An example of innovative stormwater control with a rain garden

Preventative approaches should be explored – One of the major issues with stormwater runoff is the amount of pollution it disperses to waterways which in turn has adverse impacts on water quality and the watershed in general. To promote better runoff quality, the City will explore preventative measures to reduce accumulation of surface pollutants before they become an issue of stormwater quality. Or put differently, in the long run, it is always better to prevent pollution than have to clean it up!

4.0 RECOMMENDATIONS

This section summarizes recommendations for future implementation of the ISMP.

4.1 Council Acceptance of the Integrated Stormwater Management Plan Guiding Document

City Council should accept, in principle, the recommendations and implementation plan of the ISMP Guiding Document. The rationale for accepting the recommendations include:

- It provides staff the ability to begin implementing the ISMP and continue with related processes;
- It sends a message to the public that stormwater management is important in Kamloops; and
- It sends a message to developers that stormwater management will be an important consideration in new development.

4.2 Integration with the Official Community Plan and Environmental Plan

The City is currently developing a Sustainability Plan, which in turn will be integrated with the City's Official Community Plan (OCP). It is critical that the guidance provided in the ISMP be reflected in these plans. This will ensure that stormwater management will be addressed appropriately in the full hierarchy of City plans.

One specific item to consider is the establishment of an urban containment boundary. This boundary, which is not in KAMPLAN (2004) currently, should be added to KAMPLAN to prohibit urban development outside core development areas and to encourage densification through infill development. This will also serve to maintain open space and natural areas in the upper portions of watersheds.

The City has begun the process of updating KAMPLAN with much of 2009 and 2010 dedicated towards this task. This will be a critical opportunity to incorporate a more sustainable stormwater management perspective into City-wide initiatives.

4.3 Internal Stormwater Management Committee

The City should develop an internal stormwater management committee consisting of staff, and potentially a member of Council, that can provide overall direction for the implementation of the ISMP. This committee should at least include the following:

- Drainage engineer
- Community planner
- Subdivision approval officer
- Environmental services staff
- Utility manager
- Parks

This group reflects the integrated nature of this plan and will help to ensure that projects

achieve the synergy required to make them economically feasible and more sustainable over the long-term.

4.4 Stormwater Control Performance Targets

The City should adopt targets for stormwater control that focus on runoff rate and volume and on runoff quality. We recommend the use of a "dual target" system which will allow different classes of development or land use to meet stormwater management goals in an efficient manner. For commercial, industrial, institutional and multi-family residential development (including redevelopment), we recommend the use of a performance standard which must be met:

- For small storms (less than 12 mm in 24 hours): Capture and retain on site all rainwater for reuse, infiltration, evaporation and/or transpiration.
- For medium storms (between 12 mm and 24 mm in 24 hours): Capture and detain for slow release the next increment of stormwater exceeding that specified for small storms.
- For large storms (greater than 24 mm in 24 hours): Provide safe conveyance of all stormwater, in agreement with the applicable Master Watershed Plan.
- On an average basis, remove 80% of Total Suspended Solids (TSS) down to 50 micron particle size.
- On an average basis, limit discharge of Oil & Grease to less than 10 mg/L.

Additional requirements may be necessary for specific properties, such as gas stations, industrial parks, and other locations at "high risk" for wash off of potentially toxic pollutants. In these cases, the emphasis will be on encouraging the use of "good housekeeping" and trapping methods to prevent release or wash off of contaminants in the first place and on providing protocols for atypical or rare circumstances, for example spills.

Both stormwater performance and prescriptive standards are proposed to account for various land uses.

For single family residential development (including redevelopment), we recommend the use of a prescriptive standard, by which specific low impact BMPs must be installed or used on residential lots and local streets:

- Place 150-200 mm of amended topsoil prior to seeding or sodding on lots and boulevards
- Meet minimum tree retention and planting requirement (see Section 4.7.5)
- Direct roof leaders to ground (not a storm sewer) or to a perforated pipe placed in the yard
- Install bioswales and/or rain gardens for street runoff, with overflows to the storm sewer

Installation of LID stormwater controls such as these that provide contact between runoff and soils should be accepted as meeting the goals for small storm volume control and for

treatment control, as described under performance standards.

The Master Watershed Plans should use these targets as a basis for analyzing and evaluating alternative stormwater management options, and for recommending a cost-effective mix of public and private stormwater controls. Further, the MWPs should identify any areas within the watersheds where the use of specific BMPs may be inadvisable or may require design accommodations to avoid unacceptable impacts. An example is requiring the use of perforated underdrain systems for porous pavements and bioswales in order to minimize potential negative impacts of infiltration in specific areas.

4.5 Operational Best Management Practices

The City should develop internal policies to ensure that Public Works' operations are consistent with the new outlook on stormwater management. This includes developing internal policies for such matters as street sweeping, spill containment, and stormwater infrastructure (outfalls, bioswales, catch basins, rain gardens, etc.) maintenance.

An effective education program is essential to the success of the ISMP implementation.

4.6 Education Program

In order to communicate the importance of stormwater management planning, the City needs to develop a multi-pronged education program that is adaptable to a variety of audiences. A goal of the education programs is to ensure buy-in from various stakeholders. Further, education should be focused both on how to address existing stormwater management deficiencies as well as how to proactively prepare for future development.

For City Staff, there are two key audiences that need to be informed of stormwater management issues. First, Public Works staff need to be educated about the impacts they can have on stormwater management quality through various operations such as street sweeping, spill containment, and stormwater infrastructure maintenance. Second, planning and engineering staff must be able to integrate stormwater management with other components of planning and design.

For developers, it is important to communicate why stormwater management is important, what they should do in their own developments, and the costs and benefits of undertaking this work. It is particularly important that developers have a better understanding of stormwater management as they will be, in many cases, called upon to implement and pay for applying mitigation techniques.

For the general public, there are a few needs for stormwater management education. These include:

- Helping them to understand how they can personally positively and negatively impact stormwater management;

- Helping them to understand how stormwater management relates to environmental protection; and
- Helping them to understand why it is important to pay stormwater management fees, if indeed that option is chosen as recommended in this **Guiding Document.**

Education for the general public can come through the City's ECOSmart program and Kamloops-specific materials (brochures, etc.) relating to stormwater should be distributed. Particular emphasis should be put on educating children as they can influence the decisions that their parents make. The use of more passive education should be encouraged as well. Passive education could include attractive and meaningful signage on catch basins, and development and description of demonstration projects such as rain gardens and bioswales, similar to the xeriscape demonstration garden at McArthur Island. The goals of the education program should be to continuously raise the profile of stormwater management and watershed protection and to distribute this knowledge to all age groups.

One specific initiative the City could undertake to broaden the community understanding of stormwater management would be to publish an annual report on stormwater management practices in Kamloops. This report could highlight physical interventions that the City and others have implemented that demonstrate best management practices; summarize and analyze key data that reflect on stormwater (i.e. flow rates, IDF curves); provide updates on Master Watershed Plans; and provide general education for initiatives residents could undertake to better manage stormwater on their own properties. This annual report would be an important communications piece, particularly in terms of promoting the need for a user pay stormwater charge and after a stormwater charge is implemented to provide accountability for the funding collected.

4.7 Policy Updates

Based on the research undertaken for the Policies and Regulations Working Paper, a number of policies and bylaws can be modified to better reflect stormwater management issues.

4.7.1 Erosion and Sediment Control Bylaw

An Erosion and Sediment and Control Bylaw would seek to limit the discharge of sediment from construction activities into the stormwater system. This bylaw would stipulate how erosion and sediment control plans for construction sites would be developed and acted upon. It would also provide guidelines for inspection and outline enforcement and penalties for non-compliance.

4.7.2 Watercourse Protection Bylaw

While the City currently has a Watercourses Regulation Bylaw, it is old and does not have regulations on prohibiting discharge of certain pollutants into watercourses. To help ensure water quality is not compromised a new watercourses protection bylaw should update the previous bylaw and include a more detailed list of substances that are prohibited from being

discharged as well as the type of controls and monitoring required.



4.7.3 Zoning Bylaw

The Zoning Bylaw should be modified to reduce impervious coverage and encourage alternative landscape design that is more sustainable for stormwater management. Impervious coverage could be reduced by setting a maximum for off-street parking stalls, and requiring the use of pervious materials for parking pads. Further, the City should consider maximum impervious area regulations for all zones. Within the landscaping requirements, the City could encourage the use of bioswales, wetlands, and rain gardens for stormwater management.

4.7.4 Subdivision Control Bylaw

The Subdivision Control Bylaw is currently under review. However, moving forward, a series of measures should be included that will better address stormwater management issues in Kamloops. Potential amendments include:

- Require all buildings to disconnect roof leaders, subject to suitable site conditions.
- Require the use of LID to manage stormwater on site, subject to suitable site conditions, specifically when stormwater infiltration may be used.
- Require the use of BMPs to supplement LID where needed.
- Develop alternate road standards to narrow pavement width.
- Allow the use of pervious pavement for parking areas, subject to suitable site conditions.
- Establish prescriptive and performance standards for stormwater runoff volume, rates, timing and quality (see Section 4.3, above).
- Allow flexibility in service levels (e.g., allow the use of open swales in urban areas).
- Encourage depressed boulevards for rain gardens or swales (currently, boulevards are typically required to drain to the curb).
- Require protection of existing trees as well as provision for new tree plantings as part of subdivision development.

4.7.5 Tree Protection Bylaw

The City should review exemptions to the Tree Protection Bylaw. Trees are an important part of stormwater management as they absorb stormwater and slow down its flow. Currently, the bylaw does not apply to trees that are less than 5 m in height or less than 10 cm in diameter and to trees located on property less

than 2 ha in size and zoned Residential, Commercial or Industrial. The City should consider reducing or rewording these exemptions to provide better tree protection.

4.8 Comprehensive Financing Strategy

The City should determine how it plans to finance stormwater management initiatives in the future. Currently, stormwater management is funded through general revenues, development cost charges, and works and services. To ensure long-term financial sustainability, the City should consider developing a comprehensive financing strategy for all elements of its stormwater management service. The financing strategy should include the continued use of development cost charges and works and services to help fund growth-related infrastructure needs. Most importantly, the financing strategy should also introduce the use of a stormwater fee to eliminate reliance on general revenues.

The use of a stormwater fee would:

- Provide a stable and dedicated source of funding for any component of the City's stormwater management service (e.g., engineering analysis, long term capital replacement, operations and maintenance, watershed planning, public education);
- Help ensure that stormwater management services are funded based on the user-pay principle;
- Raise the profile of stormwater management in the community; and
- Allow the City to be proactive about stormwater management.

The development of a stormwater fee, as with other fees, would require the City to address a number of policy questions related to the design and implementation of the fee. The three most important questions the City will have to address are:

- Which services will be funded through the stormwater fee?
- Which user pay approach (i.e., proportionate pay, beneficiary pay, ability to pay, or polluter pay) is most appropriate?
- How will the fee be designed to reflect the user pay approach?

These and other questions would have to be answered while keeping in mind the need to ensure the fee does not become overly complex for the City to administer.

4.9 Master Watershed Plans

A series of individual Master Watershed Plans will be required over the next 10 – 15 years. Upon consultation with various City staff members, MWP updates were prioritized in light of existing and projected population within the watershed; stream and environmental health conditions; flooding, erosion and water quality concerns; and public acceptance issues. With the understanding that each MWP will take approximately one year to complete, the following schedule is proposed for the first five MWPs:

- North Shore
- Peterson Creek
- Guerin Creek
- East Valleyview (Juniper)
- Batchelor Heights / Brocklehurst

The suggested schedule could be altered in the future to accommodate changing conditions such as new development growth patterns. If revisions are made, the scheduled updates should be done in concert with other regional community plans or development strategies to maximize the efficiencies of the multiple initiatives.

To help develop a framework for the future master watershed plan updates, a general scope of work was prepared and can be found in Table 4.1.

4.10 Design Manual for Best Management Practices

The City should develop a design manual outlining best management practices for stormwater management. The manual can provide a more localized approach to various stormwater management techniques and could address the issue of Kamloops' many micro-environments and how to adjust to these. For instance, best management practices for Aberdeen may be quite different than those for Brocklehurst. Further, the BMP's that are to be used in Kamloops should include those that have been successful in climates similar to Kamloops. A list of BMP's that could be used in Kamloops could include but not be limited to: rain gardens, bio-swales, pervious pavements for parking areas and other infiltration-based practices as referenced in the document "Stormwater Source Control Design Guidelines – 2005," published by the Greater Vancouver Regional District.

In addition, the Design Manual should include requirements for site development Stormwater Management Plans and Erosion and Sediment Control Plans. Requirements could include specific items such as: stormwater management approaches (e.g., allowing the use of source control / Low Impact Development measures), detention / retention requirements, design storm requirements, designated IDF (rainfall intensity) data, acceptable hydrology methods (models) for design and analysis, appropriate sediment control measures, etc.

Eventually, these should be incorporated into the Subdivision Control Bylaw where more detail can be specified in the corresponding Design Manual Bylaw schedule.

BMP industry standards are often changing. Therefore, to stay up-to-date, the City should review them every three to five years and revise the manual accordingly.

Table 4.1 –General Outline of Tasks for Master Watershed Plans (MWP) *

Item #	Task
1.	Establish and implement a public consultation process for the update, including convening technical and stakeholders working groups.
2.	Obtain, review and evaluate current and historical mapping, data, reports, etc.
3.	Collect hydrometric (stream flow) and climate data.
4.	Perform hydrometric monitoring for use in modeling effort.
5.	Develop a drainage system and stream inventory (site reconnaissance and survey as required).
6.	Perform hydrogeological and geotechnical assessments; develop a conceptual model of the groundwater regime for the watershed.
7.	Develop land use information, for both existing and potential future built-out (OCP) conditions, including determining impervious surface areas within sub-catchments.
8.	Prepare an inventory of aquatic species and habitat(s).
9.	Determine extent and quality of existing and potential riparian corridors.
10.	Prepare an inventory of terrestrial species and habitat(s).
11.	Establish baseline creek health, through combination of benthic community, water quality and sediment quality sampling.
12.	Prepare base mapping (GIS).
13.	Perform hydrologic analysis of watershed (existing and future conditions); includes development of an appropriate model as well as calibration and verification of the model and validation of model parameters.
14.	Perform hydraulic analysis of existing infrastructure (existing and future conditions), including flood and capacity assessments; includes development of an appropriate model as well as calibration and verification of the model and validation of model parameters.
15.	Assess current and future potential for channel erosion in creek(s).
16.	Assess current and future runoff pollutant loadings, including accounting for application of BMPs.
17.	Assess other natural hazard conditions that intersect with stormwater concerns (e.g., land slide areas).
18.	Identify opportunities for recreation and public access to creeks.
19.	Assess current and future ecological health of creek(s).
20.	Assess implications of climate change on modeling results and on application of BMPs or other mitigative measures.
21	Formulate alternatives to manage flooding, erosion and water quality.
22.	Formulate alternative land use options to minimize negative impacts to creek(s).
23.	Evaluate the alternative management options.
24.	Develop a Master Watershed Plan (MWP) for the watershed. The plan must identify a cost-effective mix of publicly and privately implemented stormwater controls for the watershed.
25.	Develop an implementation plan and timeline that will identify key items such as priority actions, capital improvements, cost estimates, and special financing mechanisms if applicable.
26.	Formulate an adaptive management plan for the watershed over time, including monitoring program(s).
27.	Make recommendations for consideration in other City comprehensive planning processes such as OCP, NCPs, Parks and Recreations plans, etc.
28.	Prepare appropriate documentation.

* **NOTE:** This list of tasks should be considered an overall guide to the work to be completed. The final scope of work will vary with the watershed, as well as perhaps with available funding, and should be prepared just prior to undertaking the work (or issuing a Request for Proposal).

4.11 Stormwater Management Monitoring Program

The City should continue its current practice of maintaining a network of weather stations around the City. We recommend that the Parks and Engineering Departments coordinate downloading and analyzing the data from these stations. Statistical analysis should be completed on the data annually.

The City should establish a stream flow monitoring program. Initially, we recommend establishing two permanent hydrometric stations within a single watershed, preferably on Peterson Creek, with one each on upper and lower sections of the creek. In addition to continuous flow measurements (5 or 15 minute intervals), the station could also collect basic water quality data such as turbidity, temperature and conductivity. Ideally, these stations would be established prior to the commencement of individual watershed plans as the information can be used in calibration of hydrologic models (see Section 2).

The City may wish to develop a broader monitoring program, specifically with respect to water quality though perhaps also with respect to stream flow, that can be used to establish baseline conditions and assess changes over time. Given the number of other critical ISMP initiatives that the City will be pursuing, it seems prudent to await the completion of one or more updated MWPs before embarking on additional expensive monitoring.

4.12 Demonstration Projects

The City should identify some pilot projects that can be undertaken to show leadership for the use of sustainable stormwater practices. A few ideas include:

- Initiate a "1000 Rain Gardens" program to promote the use of rain gardens in the community. The City could establish a goal of working with residents, businesses, and their own Parks department to have 1,000 rain gardens established in the City by 2014 (five years). A rain garden is a concave garden that captures stormwater and provides detention as well as treatment.



Example of a rain garden used for stormwater volume and quality control

- Pilot test permeable pavements on roads. City staff has indicated its concerns with respect to the use of permeable pavement (specifically, permeable asphalt) on City streets. In general in North America, permeable pavement has been used primarily for parking lots, sidewalks and other non-vehicular traffic areas. Although some communities are starting to use it for streets.



Water percolates through porous asphalt to recharge ground water

The City could test permeable pavements in several Kamloops streets to determine if some areas could benefit from its use. Candidate streets include a cul-de-sac and several other low volume residential streets at various elevations around the City. Some of the performance parameters that could be tested include the level of maintenance required, the impact on snow removal, and the deterioration rate of the pavement.



Green streets can increase property values in a community

- Continue to test the Green Streets program. The City should continue the Green Streets program it has started and look for other areas of the community where this program could be implemented. This could be coupled with the testing of permeable pavement.

5.0 IMPLEMENTATION PLAN

With the guiding principles and recommendations set in this Guiding Document an implementation plan was prepared to assist with the development of subsequent ISMP initiatives (see Table 5.1). The following considerations were included in the implementation plan.

5.1 Priority

All of the recommendations are valuable to the implementation of the ISMP. The recommendations were prioritized based on discussions with City staff and on how they best suit the ISMP process. Therefore the recommendations were not prioritized relative to each other. Instead, a priority rating of low (L), medium (M) and high (H) were used.

5.2 Timeline

The recommendation timeframes presented in this plan are approximate and set relative to the completion of the ISMP Guiding Document (Phase 2).

5.3 Task Responsibility

The tasks associated with the recommendations will all require at least some supervision by City staff. However, some tasks may be better suited for outside consultants (coordinating with City staff), for City staff alone or a combination of the two. Action items identified to be done by both City staff and consultants will likely require that City staff play a larger role on the initiative(s).

As recommended in Section 4.3, the ISMP will benefit greatly from oversight by an Internal Stormwater Management Committee dedicated to successful implementation.

5.4 Staffing Resources

Estimates of staffing were made to assist in identifying the City's investment in the ISMP process as it moves forward. Resources are listed in hours.

5.5 Costs

Preliminary cost estimates for each recommendation or task were made and are shown for budgeting purposes. These estimates should be updated under subsequent phases with the completion of more detailed terms of reference. Based on recommendations by City staff, the proposed cost estimates are based on the assumption that consultants will be performing the task(s).

Table 5.1: ISMP Implementation Plan

Task*		Priority (L = Low, M = Medium, H = High)	Timeline (Yrs - based on start date of 2009)	Task Done By: (CY = City, CT = Consultant)	City Staffing Resources Level of Effort (hrs)	Cost ($)
4.1	Council Acceptance in Principle of Integrated Stormwater Management Plan Guiding Document	H	0-1 Yr	CY/CT	80 hrs	5–10K
4.2	Integration with the Official Community Plan and Environmental Plan	H	0-2 Yrs	CY/CT	80 hrs	10–30K
4.3	Internal Stormwater Management Committee	H	0-10 Yrs (on-going)	CY	80 hrs/yr for each of 6 people	5-10k/yr
4.4	Stormwater Control Performance Targets	H	0-2 Yrs	CY/CT	-	-
4.5	Operational Best Management Practices	M	0-2 Yrs	CY	100 hrs	-
4.6	Education Program	H	0-2 Yrs	CY	300 hrs/yr	20 – 50K
4.7	Policy Updates	H	0-5 Yrs	CT	400 hrs	50 – 60K
4.7.1	Erosion and Sediment Control Bylaw	H	0-1 Yrs	CT	-	-
4.7.2	Watercourse Protection Bylaw	H	0-2 Yrs	CT	-	-
4.7.3	Zoning Bylaw	M	0-5 Yrs	CT	-	-
4.7.4	Subdivision Control Bylaw	H	0-2 Yrs	CT	-	-
4.7.5	Tree Protection Bylaw	L	0-5 Yrs	CT	-	-
4.8	Comprehensive Financing Strategy	M	0-5 Yrs	CY/CT	200 hrs	60-80K
4.9	Master Watershed Plans	H	0-12 Yrs	CT	120 hrs/ea	75K/ea
4.10	Design Manual for Best Management Practices	H	0-2 Yrs	CT	80 hrs	20-40K
4.11	Stormwater Management Monitoring Program	H	0-1 Yr	CT	200 hrs/yr	40-60K plus 10-15K/yr
4.12	Demonstration Projects	M	0-5 Yrs	CY/CT	200 hrs per project	40–60K per project

* Task Numbers reference Section 4 of this Guiding Document.

6.0 CONCLUSION



At first glance, the importance of stormwater management in semi-arid climates such as that found in Kamloops may not be clearly evident. However there are several reasons why managing stormwater in Kamloops is important. Without effective stormwater management, environmental values will continue to be at risk. As well, without a comprehensive plan, the City may not be prepared to manage erosion and flooding that can occur during rain events. Finally, without effective stormwater management, Kamloops may not be able to adequately address new risks associated with long-term climate change.

Conventional stormwater management can not adequately address these issues; however through the process of developing its **Integrated Stormwater Management Plan** (ISMP), Kamloops is stepping up and exploring more progressive and effective ways to address stormwater issues within its many watersheds. This **Guiding Document**, which is the primary output of Phase 2 of the ISMP, provides the framework for an overall stormwater management strategy for the City and for the development of individual **Master Watershed Plans** (MWP). A supplement to the Guiding Document, the **Phase 2 Support Document**, contains more detailed data and background assessments which can be used in the development of the MWPs.

Appendix M: Kamloops Sanitary Sewer Bylaw

CITY OF KAMLOOPS

SANITARY SEWER
BYLAW NO. 32-35
Effective Date - 1983 December 30

Consolidated for Convenience Only

This is a consolidation of "Sanitary Sewer Bylaw No. 32-35, 1983". The amendment bylaws listed below have been combined with the original bylaw for convenience only. This consolidation is not a legal document. The original bylaws should be consulted for all interpretations and applications on this subject.

Amendment Bylaw			Effective Date
Bylaw No. 32-37	-	amends Section 9	December 18, 1984
Bylaw No. 32-40	-	amends Schedule A	April 22, 1986
Bylaw No. 32-46	-	amends Section 9, due dates	February 12, 1991
Bylaw No. 32-48	-	due dates for 1992 and 1993	January 14, 1992
Bylaw No. 32-49	-	amends definitions and staff titles	June 16, 1992
Bylaw No. 32-51	-	amends Schedule B, connection fees	December 7, 1993
Bylaw No. 32-52	-	amends Schedule A, user rates	December 21, 1993
Bylaw No. 32-53	-	amends due dates	February 8, 1993
Bylaw No. 32-55	-	Schedule A, user rates	December 20, 1994
Bylaw No. 32-57	-	Schedule A, user rates	December 19, 1995
Bylaw No. 32-59	-	Schedule A, user rates and Schedule C, base rate	January 7, 1997
Bylaw No. 32-61	-	amends Schedules A and C, rates	February 9, 1999
Bylaw No. 32-62	-	amends Schedules A and C, rates	December 10, 2002
Bylaw No. 32-63	-	amends Section 9, due dates	December 16, 2003
Bylaw No. 32-64	-	sewage holding tanks - Schedules D and E	January 13, 2004
Bylaw No. 32-65	-	amends Schedules A and C, rates	December 7, 2004
Bylaw No. 32-66	-	amends Schedules A and C, rates	December 20, 2005
Bylaw No. 32-67	-	amends Schedule A, user rates - commercial tipping fees at Mission Flats	August 29, 2006
Bylaw No. 32-68	-	amends "Industrial Waste" in Definitions and adds permit requirement prior to discharging into sewer	February 9, 2010
Bylaw No. 32-69	-	adds rates for disposal, and disposal after hours, of commercial liquid waste at the Kamloops Sewage Treatment Centre.	November 2, 2010
Bylaw No. 32-70	-	adjusts rate structure and operational procedures in consideration of the universal water metering program	May 31, 2011
Bylaw No. 32-71	-	amends rate structure	December 13, 2011
Bylaw No. 32-72	-	amends rate structure	December 18, 2012
Bylaw No. 32-73	-	amends rate structure	December 17, 2013
Bylaw No. 32-74	-	amends rate structure	January 1, 2016
Bylaw No. 32-75	-	amends Schedules A and B, rates	January 1, 2017
Bylaw No. 32-76	-	amends Schedules A and B, rates	January 1, 2018
Bylaw No. 32-77	-	amends Schedules A, B, and C, rates	January 1, 2019
Bylaw No. 32-78	-	repeals and re-enacts Schedule C	September 30, 2019
Bylaw No. 32-79	-	repeals and re-enacts Schedule A, B, and C	December 10, 2019
Bylaw No. 32-80	-	add emergency situation clause	May 5, 2020
Bylaw No. 32-81	-	repeals and re-enacts Schedule A, B, and C	December 15, 2020

Bylaw No. 32-82	-	repeals and re-enacts Schedule A, B, and C	December 21, 2021
Bylaw No. 32-83	-	repeals and re-enacts Schedules "A", "B", and "C"	September 27, 2022
Bylaw No. 32-84	-	replacing Schedules "A", "B", and "C"	December 12, 2023

The bylaw numbers in the margins of this consolidation refer to the bylaws that amended the principal bylaw "Sanitary Sewer Bylaw No. 32-35, 1983".

This is a consolidated bylaw prepared by the City of Kamloops for information only. To verify the accuracy and currency of this information, please contact Legislative Services at 250-828-3483 or email legislate@kamloops.ca.

CITY OF KAMLOOPS
BYLAW NO. 32-35

(AS AMENDED)

A BYLAW RESPECTING THE SANITARY SEWAGE SYSTEM
OF THE CITY OF KAMLOOPS

WHEREAS under the provisions of the Municipal Act, R.S.B.C. 1979 Chapter 290, a municipality may establish, maintain and operate a sanitary sewage system;

AND WHEREAS the City of Kamloops has already established such a sanitary sewage system;

AND WHEREAS it is deemed expedient to establish additional controls respecting the use of such system and to impose certain charges against owners of properties benefiting from such system.

NOW THEREFORE, the Municipal Council of the City of Kamloops, in open meeting assembled, enacts as follows:

1. This bylaw may be cited for all purposes as the City of Kamloops "Sanitary Sewer Bylaw No. 32-35, 1983".

2. Bylaw No. 32-28 and all amendments thereto are hereby repealed.

3. Metric units are used for all measurements in this bylaw.

DEFINITIONS

4. In this bylaw, unless the context otherwise requires:

"Accessible" means having access thereto but which first requires removal of an access panel, door or similar obstruction.

"B.O.D.5" (denoting biochemical oxygen demand) means the quantity of oxygen utilized in the biochemical oxidation of organic matter under standard laboratory procedure in five (5) days at 20° Centigrade, expressed in milligrams per litre.

(32-49) "Building Inspection Manager" means the person appointed as such from time to time by the City of Kamloops and any person delegated to assist him in carrying out his duties under this bylaw.

(32-64) "Building sewer service" means that portion of the pipe from the property line up to and including all portions of the sanitary sewage collection system within any given building inclusive of any on site sanitary sewer holding tank.

"City" means the City of Kamloops.

"Commercial" means all buildings other than residential.

"Customer" means the registered owner or occupier of the property.

DEFINITIONS (CONTINUED)

"Family unit" means an individual or 2 or more persons closely related by blood, marriage or adoption sharing one dwelling, or 3 or less unrelated persons sharing the same dwelling.

"Farm animal" means a domesticated animal normally raised for food, milk, or as a beast of burden, and without limiting the generality of the foregoing, includes cattle, horses, swine, sheep, goats, mules, donkeys, asses and oxen.

"Garbage" means solid wastes from the preparation, cooking and dispensing of food or from the handling, storage and sale of produce.

(32-68) "Industrial Wastewater" means all wastewater and water carried waste from any industrial activity, but does not include domestic wastewater.

"Natural outlet" means any outlet into a watercourse, pond, ditch, lake or other body of surface or ground water.

"Person" means any individual, firm, company, association, society, corporation, group or municipality.

"pH" means the logarithm of the reciprocal of the weight of hydrogen ions in grams per litre of solution and denotes alkalinity or acidity.

"Properly shredded garbage" means garbage that has been shredded to such a degree that all particles will be carried freely under the flow conditions normally prevailing in the City sewer mains. In no case shall these particles be greater than 6 mm in any dimension.

(32-70) (32-73) (32-77) "Civic Operations Director" means the person appointed as such from time to time by the City of Kamloops and any person delegated to assist him in carrying out his/her duties under this bylaw.

"Readily accessible" means direct access without the necessity of removing or moving away any panel, door or similar obstruction.

"Residential" means all single family dwellings, duplexes, semi-detached or row housing.

"Sanitary sewer main" means any sewer which carries sewage and to which storm, surface or ground waters are not intentionally admitted.

(32-49) "Service connection" means a pipe connecting a sanitary sewer main to a building sewer service at the property line of a parcel of land.

(32-64) "Sewage holding tank" means a tank or series of tanks intended to store domestic sewage conveyed by a building sewer service until the sewage can be transported by tanker truck to an approved location.

"Sewage or wastewater" means a combination of the water carried wastes from residential and commercial buildings, together with such ground water, surface and storm waters as may be present.

"Sewage system" means all facilities for collecting, pumping, treating and disposing of sewage.

DEFINITIONS (CONTINUED)

(32-74) "Sewage Treatment Centre" means any arrangement of devices and structures used for treating sewage.

"Sewer" means a pipe or conduit for carrying sewage.

"Standard methods" means the methods and procedures set out in the latest edition of "Standard Methods for the Examination of Waste and Wastewater" published by the American Public Health Association, American Waterworks Association and the Water Pollution Control Federation.

"Suspended solids" means solids that either float on the surface of, or are in suspension in water, sewage or other liquids and which are removable by laboratory filtering.

5. The City shall continue to maintain, operate and extend its sanitary sewage system as required.

(32-49) (32-77) 6. The operation of the said sanitary sewage system shall be under the direction of the Civic Operations Director.

SEWER RATES

7. A charge shall be and is hereby imposed upon the owners of real property situate both inside and outside the corporate limits of the City of Kamloops for the use of the City sewage system.

(32-57) 8. All rates, rents and tolls to be paid by customers for the use of the City sewage system shall be those stated in Schedules "A" and "F" attached to and forming part of this bylaw.

(32-70) 9. (a) 'Metered Accounts' - The residential metered wastewater rate will only be valid until December 31, 2011. One-fourth of the annual rates set out in Schedule "A" attached to and forming part of this bylaw shall be due and payable quarterly on or before the due dates of March 31, June 30, September 30, and December 31, in each and every year, provided that if any of these days fall on a Saturday, Sunday, or statutory holiday, then the due date shall be the earliest day preceding March 31, June 30, September 30, and December 31, as the case may be, during which the City offices are open for business. Payments shall be applied to the oldest balance first.

Until December 31, 2011, quarterly rates paid in full on or before the applicable due dates shall qualify for a discount equal to ten per cent (10%) of the current quarterly amount due. Any balance remaining unpaid by the applicable due dates will result in the loss of the discount.

(b) 'Flat Rate Accounts' - One-fourth of the annual rates set out in Schedule "B" attached to and forming part of this bylaw shall be due and payable quarterly on or before the due dates of March 31, June 30, September 30, and December 31, in each and every year, provided that if any of these days fall on a Saturday, Sunday, or statutory holiday, then the due date shall be the earliest day preceding March 31, June 30, September 30, and December 31, as the case may be, during which the City offices are open for business. Payments shall be applied to the oldest balance first.

(32-80) In emergency situations, Council may, by resolution, offer interest relief on unpaid accounts.

SEWER RATES (CONTINUED)

Until December 31, 2011, quarterly rates paid in full on or before the applicable due dates shall qualify for a discount equal to ten per cent (10%) of the current quarterly amount due. Any balance remaining unpaid by the applicable due dates will result in the loss of the discount.

Effective January 1, 2012, all amounts not paid by the applicable due dates will be subject to twelve per cent (12%) interest per annum calculated annually. Payments must be received by the City on or before the applicable due dates in order for the customer to avoid interest charges. Payments made at a financial institution must be received by the City on or before the applicable due dates in order for the customer to avoid interest charges.

(32-70) 10. (a) Non-receipt of a utility bill will not exempt the customer from payment for the service received.

All sewer rate charges, sewer service connections and other fees or charges imposed under this bylaw on the premises in respect of which they are imposed and, if unpaid on December 31 of the year in which they are imposed and due and payable, on that date, shall be deemed to be taxes in arrears.

(32-37) (b) Any customer paying rent, rate or toll for use of the City sewage system shall be liable for same until they have given notice in writing to the City Utilities Department of their desire to discontinue the use thereof. Any service supplied for a portion of a month shall be charged as if it were a full month.

(c) No person shall knowingly withhold information about the use of his premises that could affect utility rates or charges. It is the responsibility of the owner to notify the Utilities Department in writing when any changes or modifications are made to his premises that may affect his utility rates. Failure to provide the said notification will constitute a violation of this bylaw. In addition, it shall be reasonable and lawful for the City to bill and collect from the owner the appropriate rates, tolls and charges from the time the changes or modifications to his premises were found to have first existed.

(32-49) (32-77) (d) The Civic Operations Director is responsible for interpretation of the sanitary sewer rates schedule, and any person who feels that he has been unjustly charged or incorrectly billed for the service may appeal directly to the Civic Operations Director in writing.

SEWER SERVICE CONNECTIONS

(32-49) 11. Application for service connection shall be made in writing on the form provided for that purpose, giving the legal description or municipal address of the property to be served and all other information that may be required in order that the correct rates, rents or tolls can be applied.

(32-70) 12. Upon receipt of such application, and provided the City's sanitary sewer mains are laid to within 20 m of the customer's property, the City will tap the main and lay a service pipe to the nearest boundary of the applicant's property and for such connection the City shall be entitled to demand and receive from the applicant, in advance, for a 100 mm diameter residential service, such fee as outlined in Schedule "D" attached to and forming part of this bylaw.

SEWER SERVICE CONNECTIONS (CONTINUED)

(32-49) 13. Where application for service connection has been made in accordance with this bylaw and it is found that no sanitary sewer mains are within 20 m, the applicant may have the option to:

(32-49) (32-77) (a) at the discretion of the Civic Operations Director, pay in advance for such extra service connection which is required, the sum according to the City's estimated cost;

(b) accept a full return of monies paid at time of service application.

(32-49) 14. Charges for service connection shall be made according to the City's estimated cost, when:

(a) the size of residential service is larger than 100 mm in diameter, or,

(b) regardless of size, the service is to be used for other than a single family residential purpose.

15. The City shall in every case determine the location and size of service pipe to be used, having first given due consideration to any specific requests.

(32-49) 16. Where a specific size of service connection is requested, and where the City's sewage system cannot readily handle such service, the applicant shall have the option of:

(a) accepting the size of service connection as determined by the City;

(b) paying in advance the appropriate cost of upgrading the City's sanitary sewer mains to meet the specific requests, according to the City's estimated cost;

(c) accepting a full return of monies paid at time of service application.

(32-49) (32-77) 17. No person except the duly authorized agents of the City shall uncover, make connection to, use, alter or disturb any sanitary sewer main without the permission of the Civic Operations Director.

(32-49) 18. All building sewer services shall be constructed and maintained by the customer at his or her expense, to the requirements of this bylaw and those of the British Columbia Plumbing Code. Permit applications for such construction must be made to the City Building Department on the appropriate form provided. Such application shall be supplemented by any plans, specifications or other information considered pertinent by the City Building Department.

(32-49) 19. Maintenance of the service connection shall be the responsibility of the City.

(32-77) 20. Any owner of property within the City on which there is located a residential or commercial building and which abuts on any City right-of-way or easement in which there is now or hereafter located a sanitary sewer main of the City, is hereby required to be connected directly to the City sanitary sewer at the owner's expense, in accordance with the British Columbia Plumbing Code and this bylaw within thirty (30) days after notice from the Civic Operations Director to do so.

SEWER SERVICE CONNECTIONS (CONTINUED)

(32-49) (32-77) Should the owner fail to connect his premises to the City's sewage system within the time specified, the Civic Operations Director may order the required connection to be made by City workmen or others in accordance with this bylaw. All costs resulting from the said connection shall become due and payable by the owner. If the costs are not paid within ninety (90) days, they shall be transferred to, and become part of the owner's utility charges.

21. When any sanitary sewer connection is abandoned, the customer or his authorized agent shall effectively block such connection at a location within 3 m of the property line. Failure to so do within a reasonable time after such abandonment shall be construed as authorization for the City to enter upon the property and so block such connection at the expense of the owner.

PRIVATE SEWAGE DISPOSAL

(32-64) (32-70) 22. No person shall construct or maintain any septic tank, cesspool, holding tank, or other facility used for disposal or sewage without approval, in writing, from the Building Inspection Manager and provincial authorities. Sewage holding tanks may be used only as an alternative to an in-ground disposal system where provision of a sanitary sewer collection system is anticipated in the near future. In-ground sewage disposal must be a feasible alternative and holding tanks must be installed and maintained in accordance with Schedules "E" and "F" attached to and forming part of this bylaw.

23. All customers using private sewage disposal systems shall operate and maintain such facilities in a sanitary manner at all times at their own expense.

(32-64) 24. At such time that the City's sewage system becomes available to the property serviced by a private sewage disposal system, the conditions of Section 20 of this bylaw shall apply. Any septic tank, cesspool, holding tank, or similar facility shall then be abandoned and removed or filled with sand or suitable material as approved by the Building Inspection Manager.

25. No provision contained in this bylaw shall be construed to interfere with any additional requirements that may be required by the Provincial authorities.

USE OF THE SEWAGE SYSTEM

(32-49) (32-77) 26. No person shall discharge into any natural outlet any sanitary sewage, industrial waste, or other polluted waters without first obtaining a permit to do so from the Civic Operations Director.

(32-49) (32-68) 27. (a) No person shall discharge or cause to be discharged any storm water, surface water, ground water or cooling water into the City sewage system provided that the City Engineer may upon application authorize such discharge where exceptional conditions may require so.

(b) No person may generate industrial wastewater, nor discharge industrial wastewater into the sanitary sewer, without first obtaining a sanitary sewer discharge permit under the provisions of this bylaw.

USE OF THE SEWAGE SYSTEM (CONTINUED)

28. No person shall block, either wholly or in part of any portion of the City sewage system by failure, omission or neglect to comply with the provisions of this bylaw, and where such blockage occurs, the customer concerned shall, in addition to any penalty for infraction of this bylaw, be liable to the City for all costs of clearing such blockage and for any other costs which the City may be held liable because of such blockage.

29. (a) Grease, oil and sand interceptors shall be provided by the customer on private property for all garages, gasoline service stations, and vehicle or equipment washing establishments.

(32-49) (32-77) (b) Interceptors shall also be required for any commercial development when in the opinion of the Civic Operations Director excessive amounts of grease, oil, flammable liquids, sand or other undesirable substances are being discharged into the City sewage works.

(32-49) (32-77) (c) All interceptors shall be of a type and capacity approved by the Civic Operations Director and shall be readily accessible for cleaning or inspection.

(d) The customer shall be responsible for continuous efficient operation at their expense of all interceptors.

EFFLUENT QUALITY

(32-49) (32-77) 30. Without changing the generality of the foregoing statements, no person shall discharge or cause or permit to be discharged any of the following into any portion of the City sewage system without obtaining a permit from the Civic Operations Director to do so:

(a) any sewage or industrial waste in a volume greater than 3,000 m^3 per month;

(b) any liquid or vapour having a temperature higher than 50° C;

(c) any flammable or explosive material;

(d) any garbage which is not properly shredded;

(e) any metal, plastic, wood or other solid or viscous substance capable of causing obstruction or interference with the proper operation of the City sewage collection system or treatment process;

(f) any excrement from farm animals;

(g) any waste material from the processing of any animal or portions thereof;

(h) any noxious or malodorous gas or substance capable of creating a public nuisance;

(i) any sewage or industrial waste having a pH limit less than 6.0 or greater than 9.5;

EFFLUENT QUALITY (CONTINUED)

(j) any sewage or industrial waste containing any of the following materials in excess of the indicated concentrations:

- B.O.D.5	300 mg/L
- suspended solids	400 mg/L
- total sulphide expressed as H2	5 mg/L
- phenolic compounds	2 mg/L
- oil and grease	50 mg/L
- total cyanide expressed as HCN	0.2 mg/L
- total copper, expressed as Cu	1.0 mg/L
- total chromium, expressed as Cr	1.0 mg/L
- total nickel, expressed as Ni	1.0 mg/L
- total lead, expressed as Pb	1.0 mg/L
- total zinc, expressed as Zn	1.0 mg/L
- total cadmium, expressed as Cd	1.0 mg/L
- total phosphorus, expressed as P	8.0 mg/L

PERMIT APPLICATION

(32-49) (32-77) 31. Any person who, under the provisions of this bylaw is required to obtain a permit, shall make a request in writing to the Civic Operations Director and shall not discharge any effluent into the City sewage system until written approval is received

(32-49) (32-77) 32. Each permit application shall contain the chemical and physical analysis information related to the quantity and rate of discharge and proposed pretreatment or any other detailed information the Civic Operations Director may require.

33. No person shall fail to obtain a permit, where required to do so under the provisions of this bylaw.

CONDITIONS OF PERMIT

(32-49) (32-77) 34. The Civic Operations Director has the authority to set or regulate at any time, any rates or conditions particular to each permit application.

(32-77) 35. When required by the Civic Operations Director, any person required to obtain a permit shall at his expense, install and maintain a control structure connected to allow observation, sampling and measurement of the sewage or wastewater, suitable to the Civic Operations Director Such structure shall at all times be safe and accessible to authorized City personnel.

36. Any measurements, tests or analyses of sewage or industrial waste which are required under provisions within this bylaw shall be determined in accordance with standard methods. All samples for testing shall be taken from the control structure provided for that purpose or where no structure exists the nearest downstream manhole in the City sewage works shall be deemed to be the control structure.

37. Any person making application for permit shall at his expense provide pretreatment facilities that may be necessary to make the sewage or industrial waste acceptable to the standards set out in this bylaw. Where pretreatment facilities are provided they shall be maintained continuously in a satisfactory and effective manner by the applicant at no expense to the City.

CONDITIONS OF PERMIT (CONTINUED)

(32-49) 38. In cases where no pretreatment can be provided and with the approval of the City Engineer, a special agreement can be made between the City and the person concerned whereby industrial waste of an unusual strength or nature may be accepted by the City for treatment subject to payment by the party concerned for such service.

AUTHORITIES

(32-49) (32-77) 39. Any person duly authorized by the Civic Operations Director shall be permitted to enter upon all property for the purpose of inspection, observation, measurement, sampling and testing in accordance with the provisions of this bylaw. If such inspection discloses any failure to comply with the provisions of this bylaw, the Civic Operations Director shall notify the customer to rectify the said failure and in case of non-compliance, the licence to operate or occupy the premises shall be cancelled until proper alterations have been made.

PENALTIES

40. (a) Every person who violates any of the provisions of this bylaw or who suffers or permits any act or thing to be done in contravention or in violation of any of the provisions of this bylaw, who neglects to do or refrains from doing anything required to be done by any of the provisions of this bylaw or who does any act which violates any of the provisions of this bylaw, is guilty of an offence against this bylaw and liable to the penalties hereby imposed. Each day that a violation continues to exist shall constitute a separate offence.

(b) Every person who commits an offence against this bylaw is liable to a fine and penalty of not more than Two Thousand Dollars ($2,000.00) and not less than Twenty-Five Dollars ($25.00) for each offence, and in default of payment thereof, forthwith or within such time as the presiding Provincial Court Judge or Justice of the Peace shall direct, the fine imposed shall be recoverable under the provisions of the *Offence Act* R.S.B.C. 1979, Chapter 305 and all amendments thereto.

(32-64) (c) Where security has been submitted for sanitary waste facilities constructed in accordance with this bylaw, violation of the bylaw shall permit the City to draw on the entirety of the security to remedy the offence. Remedy may mean the installation of an in-ground disposal system to accommodate the use on the property and shall not include landscape restoration.

(32-70) 41. Schedules

Schedule "A" - Commercial Wastewater Metered Rates

Schedule "B" - Residential and Commercial Wastewater Flat Rates

(32-84) Schedule "C" - Commercial Liquid Waste Disposal and Wastewater Disposal Rates

Schedule "D" - Connection Fees

Schedule "E" - Sewage Holding Tanks - General Requirements

Schedule "F" - Holding Tanks - Technical Requirements

ORIGINAL SIGNED BY R. M. LATTA
MAYOR

ORIGINAL SIGNED BY G. R. HAYWARD
CITY ADMINISTRATOR

SANITARY SEWER RATES

SCHEDULE "A" – COMMERCIAL WASTEWATER METERED RATES

The commercial wastewater metered rate consists of two components: the commercial fixed charge and the commercial variable consumption charge. The commercial fixed charge covers the cost of the infrastructure to provide wastewater collection and treatment and is determined based on the size of the water service to a property. The commercial variable consumption charge covers the cost of wastewater collection and treatment and is determined as a percentage of the water consumed at a property. These charges are outlined in Tables A-1 and A-2 below.

Table A-1 - Commercial Fixed Charges

Description	Annual Charge (Effective January 1, 2025)
For each property with a 20 mm or smaller water service	$383.21
For each property with a 26 mm water service	$766.42
For each property with a 32 mm water service	$1,341.13
For each property with a 38 mm water service	$1,915.88
For each property with a 51 mm water service	$4,598.13
For each property with a 64 mm water service	$6,626.45
For each property with a 76 mm water service	$9,579.68
For each property with a 102 mm water service	$17,243.16
For each property with a 152 mm water service	$32,570.60

Table A-2 - Commercial Variable Consumption Charges

Description	Cubic Metre Charge (Effective January 1, 2025)
For customers in the Campbell Creek Industrial Park	$14.84
For all other users of water meters (based on calculated flows)	$0.71

SANITARY SEWER RATES

SCHEDULE "B" – RESIDENTIAL AND COMMERCIAL WASTEWATER FLAT RATES

The residential and commercial wastewater flat rates consist of two components: the residential fixed charge and the residential and commercial user charge. The residential fixed charge covers the cost of the infrastructure to provide wastewater collection and treatment and is determined based on the size of the water service to a property. The residential and commercial user charge covers the cost of wastewater collection and treatment. These charges are outlined in Tables B-1 and B-2 below.

Table B-1 - Residential Fixed Charges

Description	Annual Charge (Effective January 1, 2025)
For each property with a 20 mm or smaller water service	$297.08
For each property with a 26 mm water service	$594.14
For each property with a 32 mm water service	$1,039.67
For each property with a 38 mm water service	$1,485.23
For each property with a 51 mm water service	$3,564.54
For each property with a 64 mm water service	$5,940.97
For each property with a 76 mm water service	$8,283.19
For each property with a 102 mm water service	$13,367.14
For each property with a 152 mm water service	$25,249.18

Table B-2 - Residential and Commercial User Charges

Description	User Charge (Effective January 1, 2025)
For each family unit	$220.97
For each rentable room in rooming or boarding homes	$124.25
For each commercial unit (using the same or less than a family)	$220.97

- The minimum charge for any non-metered (water) customer is equal to the family unit rate.
- Where two or more uses are made of a single property or building, multiples or combinations of the user rates will apply.
- If a property is served by more than one sewer service, multiples or combinations of the base rate may apply.

SANITARY SEWER RATES

SCHEDULE "C" - COMMERCIAL LIQUID WASTE DISPOSAL AND WASTEWATER DISPOSAL RATES

- For liquid waste disposal at the Mission Flats liquid waste disposal site (310 Mission Flats Road), a tipping fee of $56.53 per cubic metre will apply.
- For liquid waste disposal at the Kamloops Sewage Treatment Centre disposal site, a tipping fee of $57.95 per cubic metre to be billed based on the full capacity of the vehicle hauling the wastewater will apply.
- For access to the Kamloops Sewage Treatment Centre for disposal of commercial liquid waste outside of normal operating hours (as determined by the City of Kamloops from time to time), a fee of $231.80 per load in addition to the regular (per cubic metre) tipping fee will apply.

SANITARY SEWER RATES

(32-70)

SCHEDULE "D" - CONNECTION FEES

	Description	Annual Charge
	For each 101.6 mm residential single-family service installed between:	
(32-74) (32-77)	April 1 and October 31, inclusive	Will be set at the average previous year's cost for April 1 to October 31 as certified by the Corporate Services Director
(32-74) (32-77)	November 1 and March 31, inclusive	Will be set at the average previous year's cost for November 1 to March 31 as certified by the Corporate Services Director
	Restoration of:	
(32-74) (32-77)	• Curb	Will be set at the average previous year's cost for April 1 to March 31 as certified by the Corporate Services Director
(32-74) (32-77)	• Gutter	Will be set at the average previous year's cost for April 1 to March 31 as certified by the Corporate Services Director
(32-74) (32-77)	• Sidewalk	Will be set at the average previous year's cost for April 1 to March 31 as certified by the Corporate Services Director

PRIVATE SEWAGE DISPOSAL

(32-70) SCHEDULE "E"

SEWAGE HOLDING TANKS - GENERAL REQUIREMENTS

1. A sewage holding tank system shall be used for storage only and will receive all sewage generated by the dwelling located on the property. The owner shall be responsible for installing the holding tank and bearing all costs and expenses incidental to the installation and maintenance. The owner shall indemnify the City from any loss or damage that may be directly or indirectly occasioned by the installation, operation, and maintenance of the holding tank.

2. Every owner of land who intends to install a holding tank system shall submit a plan or plans of the proposed system to the City for approval prior to installation. The plans shall be in such detail as to be acceptable to the City. A permit shall be obtained from the Interior Health Region as required by the BC Sewage Disposal Regulations. This permit shall accompany the plans submission to the City.

3. No owner shall put into use, modify, expand, or otherwise alter a holding tank system without prior approval of the City as set out in clause "2" above.

4. The owner shall obtain a "Haulage Contract" with a contractor. The Haulage Contract shall provide for pumping and hauling of the contents of the holding tank system and such contract must be maintained at all times. The wording of the contract must be approved by the City.

(32-77) 5. The Haulage Contract shall:

   a) Guarantee continuous service of the holding tank installation, road accessibility, provision for backup tanker truck service, total contract workload, and other pertinent factors shall be taken into account when providing the guarantee.

   b) Ensure that the waste disposal vehicles are submitted for inspection at the request of the Civic Operations Director.

   c) Specify discharge of the sewage pumped out of the holding tanks to a location and in a manner specified by the Civic Operations Director.

   d) Specify that upon each visit to the approved discharge point, the contractor must deposit with the City a memo for each residence serviced including the date, the address of that residence, and the volume of sewage collected from the residence.

6. No owner shall enter into a new Haulage Contract or modify an old contract without prior approval as set out in clause "4" above.

7. The minimum capacity of the holding tank system shall be designed such that the full-time use of the building on the property will require a pump-out frequency of once every seven days (based on the BC Sewage Disposal Regulations pursuant to provincial legislation) or a volume of 10,445 L (2,300 imp. gal.), whichever is greater.

SCHEDULE "E" (CONTINUED)

8. The contractor may be required to visit the premises for the purposes of pumping out the holding tank at intervals of between one and four weeks if water conservation methods such as spring-loaded taps, reduced flush toilets, water conserving shower heads, etc., are utilized. However, holding tanks shall be pumped out more frequently as required to prevent the sewage from reaching the high level elevation of the holding tank.

9. For all holding tank system installations, a restrictive covenant shall be registered against the title of the land in accordance with Section 219 of the Land Title Act. The restrictive covenant shall require that the owner of the lot maintains a Haulage Contract at all times with a contractor and that a copy of the current Haulage Contract is always deposited with the City. The covenant will allow inspectors of the City the right to access at any reasonable time to inspect any part of the holding tank system. The covenant will describe that if the City is made aware that the system is overloaded, has leaked, or overflowed, and if the contractor is contacted and will not perform the work or the contractor cannot be contacted, then the City will attempt to contact the owner of the land. If the owner of the land cannot be contacted or if alternative arrangements cannot be agreed upon, the municipality will arrange to pump out and clean up at a cost which will be charged to the owner. If the charges remain unpaid as of December 31 in any year, they shall be added to and form part of the taxes payable on that land as taxes in arrears.

10. Security as a cash deposit or irrevocable Letter of Credit shall be submitted to the City for a value equivalent to the cost of developing an in-ground sewage disposal system. The security shall be held until the property is connected to the municipal sanitary sewer system or an approved in-ground disposal system is constructed. The security may be reduced to a minimum of $3,500 if the City adopts a bylaw authorizing a local improvement project to provide a sanitary sewer collection system to the property.

11. The Security may be used by the City to install an in-ground sewer disposal system if the owner fails to maintain the holding tank system or if local residents reject a bylaw authorizing extension of a sanitary sewer collection system to service the property.

SCHEDULE "F" (CONTINUED)

c) No provision for an overflow pipe is permitted. Should an overflow of the holding tank occur, it is to be designed so that an obvious and immediate problem is created on the surface of the ground at the tank area.

d) All tank installations shall require leakage testing. This will consist of filling the tank with water to within 3 cm of the rim of the access manhole. This will be left for a minimum of 24 hours. The water level will be brought to within 3 cm of the rim of the access manhole once again. An inspection will be carried out a minimum of 24 hours later, and no drop of the water level will be permitted. This inspection is to be completed by the engineer designing and supervising the installation of the system.

Appendix N: Qualified Professional Declaration of Competency and Conflict of Interest Disclosure

Ministry of Environment and Climate Change Strategy

Declaration of Competency

The Ministry of Environment and Climate Change Strategy relies on the work, advice, recommendations and in some cases decision making of qualified professionals[1], under government's professional reliance regime. With this comes an assumption that professionals who undertake work in relation to ministry legislation, regulations and codes of practice have the knowledge, experience and objectivity necessary to fulfill this role.

1. Name of Qualified Professional: Daniel Steinke

   Title: P. Chem

2. Are you a registered member of a professional association in B.C.? ☒ Yes ☐ No

   Name of Association: Association of the Chemical Profession of British Columbia Registration #: 2013355

3. Brief description of professional services:

   Perform data review and interpretation for the City of Kamloops and OC 111009

This declaration of competency is collected under section 26(c) of the *Freedom of Information and Protection of Privacy Act* for the purposes of increasing government transparency and ensuring professional ethics and accountability. By signing and submitting this statement you consent to its publication and its disclosure outside of Canada. This consent is valid from the date submitted and cannot be revoked. If you have any questions about the collection, use or disclosure of your personal information please contact the Ministry of Environment and Climate Change Strategy Headquarters Office at 1-800-663-7867.

Declaration

I am a qualified professional with the knowledge, skills and experience to provide expert information, advice and/or recommendations in relation to the specific work described above.

Signature: X D Steinke

Print Name: Daniel Steinke

Witnessed by: X JQuarmby

Print Name: Joanne Quarmby

Date signed: February 28, 2025

[1] *Qualified Professional, in relation to a duty or function under ministry legislation, means an individual who*

a) is registered in British Columbia with a professional association, is acting under that organization's code of ethics, and is subject to disciplinary action by that association, and

b) through suitable education, experience, accreditation and knowledge, may reasonably be relied on to provide advice within his or her area of expertise, which area of expertise is applicable to the duty or function.

July 2019

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

Conflict of Interest Disclosure Statement

A qualified professional [1] providing services to either the Ministry of Environment and Climate Change Strategy ("ministry"), or to a regulated person for the purpose of obtaining an authorization from the ministry, or pursuant to a requirement imposed under the *Environmental Management Act*, the *Integrated Pest Management Act* or the *Park Act* has a real or perceived conflict of interest when the qualified professional, or their relatives, close associates or personal friends have a financial or other interest in the outcome of the work being performed.

A real or perceived conflict of interest occurs when a qualified professional has

a) an ownership interest in the regulated person's business;

b) an opportunity to influence a decision that leads to financial benefits from the regulated person or their business other than a standard fee for service (e.g. bonuses, stock options, other profit sharing arrangements);

c) a personal or professional interest in a specific outcome;

d) the promise of a long term or ongoing business relationship with the regulated person, that is contingent upon a specific outcome of work;

e) a spouse or other family member who will benefit from a specific outcome; or

f) any other interest that could be perceived as a threat to the independence or objectivity of the qualified professional in performing a duty or function.

Qualified professionals who work under ministry legislation must take care in the conduct of their work that potential conflicts of interest within their control are avoided or mitigated. Precise rules in conflict of interest are not possible and professionals must rely on guidance of their professional associations, their common sense, conscience and sense of personal integrity.

Declaration

I Daniel Steinke, as a member of Association of the Chemical profession of British Columbia declare

Select one of the following:

☒ Absence from conflict of interest

Other than the standard fee I will receive for my professional services, I have no financial or other interest in the outcome of this Report. I further declare that should a conflict of interest arise in the future during the course of this work, I will fully disclose the circumstances in writing and without delay to the ENV Director, erring on the side of caution.

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

☐ Real or perceived conflict of interest

Description and nature of conflict(s):

I will maintain my objectivity, conducting my work in accordance with my Code of Ethics and standards of practice.

In addition, I will take the following steps to mitigate the real or perceived conflict(s) I have disclosed, to ensure the public interest remains paramount:

Further, I acknowledge that this disclosure may be interpreted as a threat to my independence and will be considered by the statutory decision maker accordingly.

This conflict of interest disclosure statement is collected under section 26(c) of the *Freedom of Information and Protection of Privacy Act* for the purposes of increasing government transparency and ensuring professional ethics and accountability. By signing and submitting this statement you consent to its publication and its disclosure outside of Canada. This consent is valid from the date submitted and cannot be revoked. If you have any questions about the collection, use or disclosure of your personal information please contact the Ministry of Environment and Climate Change Strategy Headquarters Office at 1-800-663-7867.

Signature: X _____

Witnessed by: X JQuarmby

Print name: Daniel Steinke

Print name: Joanne Quarmby

Date: February 28, 2025

[1]*Qualified Professional, in relation to a duty or function under ministry legislation, means an individual who*

a) *is registered in British Columbia with a professional association, is acting under that organization's code of ethics, and is subject to disciplinary action by that association, and*

b) *through suitable education, experience, accreditation and knowledge, may reasonably be relied on to provide advice within his or her area of expertise, which area of expertise is applicable to the duty or function.*

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