

2022 Annual Report

Advanced Waste Water Treatment Plant



MOE Permit # PE12212

Date: April 2022

City of Penticton
Engineering – Advanced Waste Water Treatment Plant
171 Main St., Penticton, B.C. V2A5A9

**CITY OF PENTICTON
2022 ADVANCED WASTEWATER TREATMENT SYSTEM ANNUAL REPORT**

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1.0 Executive Summary

1.1 Overview

The Advanced Wastewater Treatment System monitoring program was completed using data compiled from January 1st 2022 to December 31st 2022 in accordance with Operational Certificate (OC) 12212 issued by the BC Ministry of Environment (MOE). Additional monitoring and testing of the Wastewater Treatment system was carried out for operational purposes. Monthly permit results required by the OC were sent to the Ministry of Environment, as well as a yearly report for 2022. As stated in 12212 Section 5.2.3 “The first report is due on or before within 120 days of the end of a calendar year for that year’s monitoring.

1.2 Collection System

The Public Works Department of the City of Penticton maintains the gravity sanitary sewer system. The Wastewater Treatment Division looks after eleven lift stations that collect the wastewater from the gravity system and they then pump the wastewater to the Advanced Wastewater Treatment Plant (AWWTP) on Waterloo Ave.

In 2022, we continued with odor control chemicals on a long force main at the south end of town, utilizing a Nitrate based chemical. The chemical is safer to transport and handle than other acidic chemical options and the results have been positive.

1.3 Raw Wastewater

In 2022, the Advanced Wastewater Treatment Plant (AWWTP) received 4,471 Million Liters (ML) of influent from the sanitary sewer system, compared to 2021’s influent flow of 4,460ML. The 2022 average daily influent flow rate was 12.25 ML/day. The average influent flow rate per person was 336 liters/day based on the 2022 Penticton population estimate of 36,821 people.

<https://www2.gov.bc.ca/gov/content/data/statistics/people-population-community/population/population-estimates>

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Sanitary Influent Monitoring (EMS # 0500232) ¹ to Advanced Wastewater Treatment System						
Parameter ²	PE 12212 Sampling Frequency Requirement	WWTP Sampling Frequency	PE 12212 Parameter Values for 0500232	2022 Influent Quality Data		# of Tests
Yearly Averaged Flow	N/A	Daily	N/A	12.2	ML/day	365
Chemical Oxygen Demand (COD)	N/A	Once per Week	N/A	583	mg/l	51
Total Suspended Solids (TSS)	N/A	Weekly	N/A	298	mg/l	129
Total Phosphorus as P	Monthly	Monthly	N/A	8.2	mg/l	12
Ortho Phosphorus	Monthly	Weekly	N/A	3.6	mg/l	363
Total Nitrogen as N	Monthly	Monthly	N/A	53.8	mg/l	12
Ammonia Nitrogen	N/A	Weekly	N/A	29.1	mg/l	358
Nitrate Nitrogen	N/A	Weekly	N/A	1.1	mg/l	353
pH	Monthly	Weekly	N/A	7.8		68
¹ EMS is the "Environmental Monitoring System" numbers set up by the Ministry of						
² Unless otherwise stated, Parameter values are yearly averages.						

Table 1 – Sanitary Influent Monitoring (EMS #0500232)

Table 1 is compiled using the parameters set out by the Ministry of Environment and Climate Change Strategy. These parameters can be found in the Operational Certificate 12212, which regulates the AWWTP operational activities (issued March 20, 1995 and amended July 5, 2010).

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Advanced Wastewater Treatment System**



Figure 1 – Aerial View of AWWTP

In 2022 the Plant continued its historic high standard of Phosphorus and Nitrogen removal.

1.4 Treatment Plant Goals & Objectives completed for 2022 included:

- Centrifuge #1 rebuild
- Bioreactor Train 1 mixer upgrade
- Bioreactor Train 1 fine air diffuser maintenance
- Bioreactor Train 1 Nitrified Mixed Liquor Recycle Pump installation
- Purchase new Nitrified Mixed Liquor Recycle Pump
- Complete the National Benchmarking Initiative
- Asset management software implementation
- Asset management renewal projects
- Continued upgrades and modernization to the SCADA, PLC and power monitoring systems

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1.5 Treatment Plant Goals & Objectives planned for 2023

- Asset management software implementation
- Asset management renewal projects
- Continued Upgrades and modernization to the SCADA, PLC and power monitoring systems
- Secondary Clarifier #3 design and award and construction
- Grit vortex rebuild design and award
- Nitrified Mixed Liquor recycle pump design and award
- Liquid Waste Management Plan update
- Primary Clarifier drive chain replacement
- Bin Room Design and award
- Primary Clarifier safety railings purchase and install
- Replace LCP6 with modernized equipment
- Integrate second pillerator
- VFD upgrade for North Irrigation

The City of Penticton in 2005 amended the sewer use Bylaw, combining it with the Irrigation and Water Bylaws. The new bylaw 2005-02 is referred to as the Irrigation, Sewer and Water Bylaw. <https://www.penticton.ca/city-hall/bylaws-enforcement/bylaws-directory/irrigation-sewer-water-bylaw-no-2005-02>

1.6 Effluent discharge to Okanagan River Channel

In 2022 the AWWTP discharged 3,270 Million Liters of effluent to the Okanagan river channel. The AWWTP's average effluent discharge to the Okanagan river channel in 2022 was 8.98 ML/day, compared to an average effluent discharge to the Okanagan river channel of 8.23 ML/day in 2021.

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Discharge Effluent Monitoring (EMS #E105000) ¹ from Advanced Wastewater Treatment System					
Parameter ²	PE 12212 Sampling Frequency Requirements	WWTP Sampling Frequency	PE 12212 Parameter Values for E105000	2022 Effluent Quality Data	# of Tests
Maximum One-day Flow	Daily	Daily	< 30.9 ML/day	12.5 (July 4)	364
Annual Average Daily Flow	Daily	Daily	22.7 ML/day	9.0 ML/day	366
5 day Biochemical Oxygen Demand (BOD)	Monthly	Monthly	< 10 mg/l	3.5 mg/l	39
Chemical Oxygen Demand (COD)	Weekly	Weekly	N/A	45 mg/L	52
Total Suspended Solids (TSS) (composite sample)	Monthly	weekly	< 10 mg/l	6.4 mg/L	366
Total Phosphorus as P Not to exceed (weekly Composite)	365	Daily	< 2.0 mg/l	0.6 (May 13)	366
Total Phosphorus as P Annual Average (weekly composite)	Weekly	Daily	< 0.20 mg/l	0.14 mg/L	366
Total Phosphorus as P Level to Strive for	Weekly	Daily	<0.01 mg/l		
Ortho Phosphorus	Daily	Daily	N/A	0.06 mg/L	365
Total Nitrogen as N not to exceed (Weekly Composite)	Weekly	Daily	< 10.0 mg/l	7 mg/L	364
Annual Average Total Nitrogen as N (weekly composite)	Weekly	Daily	< 6.0 mg/l	4.5 mg/L	366
Ammonia Nitrogen	Weekly	Daily	N/A	0.29 mg/L	365
Nitrate Nitrogen	Weekly	Daily	N/A	3.0 mg/L	365
Fecal Coliforms	Weekly ⁵	Weekly	< 50 MPN	1.1 MPN	147
E. coli Coliforms	Weekly ⁶	Weekly	< 50 MPN	1.1 MPN	144
pH	Daily	Daily	N/A	7.0	365

Bold Items Indicate an exceeding of Permit Parameters

¹ EMS is the "Environmental Monitoring System" numbers set up by the Ministry of Environment for 12212

² Unless otherwise stated, Parameter values are yearly averages.

Table 2 –Discharge Effluent Monitoring (EMS #E105000), Advanced Wastewater Treatment Plant

Table 2 is compiled using the parameters set out by the Ministry of Environment and Climate Change Strategy. These parameters are found in Operational Certificate 12212, which regulates the AWWTP operational activities (issued March 20, 1995 & amended July 5, 2010).

1.7 Effluent Irrigation to Parks, Golf Course & School Fields

The volume of effluent used for irrigation in 2022 was 212.5 ML, compared to 454.4 ML used in 2021. Irrigation was online between April 1 and Oct. 27, 2022. The City operates and maintains two separate reclaimed water systems: one to the North, and one to the South. The North system irrigates two city parks; King's and SOEC, and the Penticton Golf & Country Club. The North system also provides reclaimed water to the Okanagan College for toilet and urinal flushing. The South system irrigates three City parks; Lions, Ellis Creek, and Skaha Park, as well as three school district fields; Parkway, Princess Margaret and Skaha Lake Middle School.

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Historic irrigation flows vary from year to year due to several factors including precipitation, increases in irrigation acreage, length of the growing season, etc.

1.8 Okanagan River Channel Monitoring

Receiving water impact monitoring is required under Operating Certificate #12212. The Upstream Monitoring location (EMS# 0500050) is located near Okanagan Lake on the river channel. The Downstream Monitoring location (EMS# E221464) is located at the Okanagan channel just upstream of Shingle creek.

The yearly average was 0.9 (MPN) for E.coli in the effluent. The effluent E.coli count was lower than the Upstream (15.5 MPN) and Downstream (133.3 MPN) count.

1.9 Operating Certificate 12212 Violations

Effluent

- 02-06-2022 - TSS Greater than 10 mg/L (10.7)
- 01-09-2022 – TSS greater than 10 mg/L (12.6)
- 29-09-2022 - TSS greater than 10 mg/L (11.2)
- 13-10-2022 - TSS greater than 10 mg/L (13.7)
- 17-11-2022 - TSS greater than 10 mg/L (15.8)
- 24-11-2022 - TSS greater than 10 mg/L (23.6)
- 12-08-2022 - TSS greater than 10 mg/L (11.4)
- 12-15-2022 - TSS greater than 10 mg/L (22.0)

2.0 Collection System

The City of Penticton's sanitary sewer collection and treatment system consists of 171 km of gravity and force main sanitary sewer pipes. This serves the entire city and the Penticton Regional Airport. There are two main Lift stations: Lee Ave Lift Station that serves the south end of the city and the South Okanagan Events Center (SOEC) Lift station that serves the north end of the city. In addition, there are nine smaller lift stations located throughout Penticton. The majority of the wastewater collected by the sanitary system flows by gravity to these Lift stations, and then pumped by force mains to the AWWTP located at 459 Waterloo Ave. (see Map A.1.). Some central parts of Penticton's wastewater flows directly by gravity to the AWWTP.

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2.1 Lift Station Report

The 11 Lift stations are inspected once per week by AWWTP staff. Nine of the eleven lift stations are monitored 24 hrs. /day by a remote telemetry system. In the case of an alarm, it will automatically call the on call operator. A computerized managed maintenance system monitors service intervals for the various equipment found at each lift station.

a. Lee Avenue Lift Station

The Lee Ave. Lift station is located at the corner of Lee Ave. and Parkview St. in Skaha Park. Sanitary wastewater flows by gravity from the south end of Penticton into this lift station. It also receives wastewater from the three lift stations along East Side Rd., Airport Lift station and Wilson St. Lift station. Lee Ave. Lift station was replaced in 2009. The Lift Station consists of a wet well area, flow meter chamber and a control building. The control building houses the MCC, stand by generator, PLC and an activated carbon odor control unit. The old wet well was expanded by cutting out the wall between the drywell and wet-well. In the wet well there are three 50 hp submersible Myers Pumps, each rated at 150 Litres/sec. The total flow through Lee Ave for 2022 was 813.16 ML. The average daily flow through Lee Ave for 2022 was 2.23 ML/day. In the event of a power outage there is a 150 kW standby generator to supply power to the lift station.



Figure 2 –Lee Ave. Lift Station

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b. SOEC Lift Station

The SOEC Lift Station is located at the SOEC behind the Penticton Trade and Convention Centre. It was replaced in 2008 due to the construction of the South Okanagan Events Centre. Part of that construction required the force main and some of the gravity sewer lines to be re-aligned. Sanitary wastewater flows by gravity from the north end of Penticton into this station. It also receives wastewater from the two lift stations along Marina Way Rd. The SOEC Lift Station consists of two sections. The first section consists of a fiberglass wet well that contains three flygt pumps rated at 65L/sec. The second section contains three kiosks; one housing the MCC, PLC and transfer switch; the second containing an 80 kw backup generator that will supply power to the station during a power failure; and lastly the third contains an activated carbon drum scrubber and flow meter. The total flow through SOEC for 2022 was 942 ML. The average daily flow through SOEC for 2022 was 2.58 ML/day.



Figure 3 – SOEC Lift Station

c. Lift Station Repairs & Modifications for 2022

- Annual pump inspections performed and various minor repairs and rebuilds performed by AWWTP maintenance staff
- Weekly Routine Preventative maintenance
- Liftstation screenings/dewatering bin design and purchase
- Spare Pump purchased for Lee ave, Wilson, and Fairview liftstations
- Marina Way emergency backup generator installation

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d. Planned Projects for 2023

- Weekly routine preventive maintenance
- Annual lift stations pump inspections and repairs
- Wilson Ave electrical upgrade from single phase to three phase
- Engineered design for Wilson lift station emergency backup generator
- Purchase new SOEC spare pump

3.0 Advanced Wastewater Treatment Plant



Figure 4 – AWWTP

The City of Penticton’s Advanced Wastewater Treatment Plant is located at 459 Waterloo Ave. (Appendix A Photo A.2). The plant staff includes; A Wastewater Treatment Plant Supervisor (IV), one (1) Wastewater Treatment Plant Foreman (IV), two (2) Wastewater Operator III’s, f (4) Wastewater Operator II’s, two (2) Millwrights, one (1) Electrician, one (1) Systems Integrator.

3.1 History

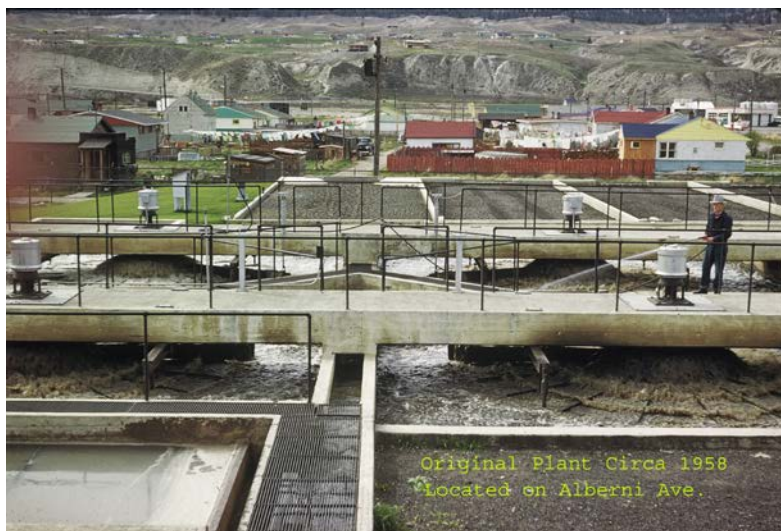


Figure 5 – Original Plant circa 1958 Located on Alberni Ave.

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Wastewater Treatment started in Penticton in 1948 with a Package Primary / Secondary plant at what is now the SOEC Lift Station. The existing plant location has had a Secondary Activated Sludge Treatment Plant since 1960, with a design capacity of 5.5 ML/d. In 1970, the plant capacity was increased to 8.2 ML/d with the construction of additional primary and secondary clarifiers, plus chemical coagulation facilities for phosphorus removal. Between 1970 –1985, a number of improvements and increases to the plant's treatment capacity were made to cope with increasing wastewater flows and loads. In 1985 the BC Waste Management Branch prepared a report which reviewed the requirements for discharge of municipal effluents to the Okanagan Lake system. It was determined that continued surface discharge of treated effluent to Okanagan Lake, Okanagan River and Skaha Lake would be possible, provided advanced tertiary treatment was implemented to ensure high quality effluent. The report recognized that land application proposals would also require advanced tertiary treatment.

Stanley & Associates Engineering Ltd. completed a Liquid Waste Management Plan (LWMP) for the City in 1987, and was subsequently commissioned by the City to provide design, construction management and plant commissioning services for a new Advanced Wastewater Treatment Plant (AWWTP). The new and expanded AWWTP, with biological nutrient removal, was constructed and commissioned in the fall of 1990. The plant is designed to treat 18.2 ML/d with a hydraulic capacity of 36.2 ML/d. After the plant was commissioned, an optimization study was conducted that showed a capacity up to 28.0 ML/day is available. The BC Ministry of Environment paid for 75 percent of the cost of the new facility through the Okanagan Water Quality Control Project.

In 2005 the LWMP was updated by Stantec and signed off by the Minister of Environment in 2008. Following the LWMP the City hired AECOM Canada to complete a functional pre-design, preliminary design, value engineering, and a detailed design which was completed in early 2009. Following the detail design, AECOM and City tendered the AWWTP upgrade. The award went to Maple Reinders Incorporated for a value of \$19,745,000. Construction started in the fall of 2009 and was completed in 2013.

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Figure 6 – Reclaimed Water Pumping System and UV Disinfection

3.2 Physical Works

The AWWTP system is made up of the following twelve sub-systems.

3.2.1 Headworks & Primary Treatment

Headwork's & Primary treatment consist of the following: three Archimedes screw pumps, two 6 mm perforated fine screens, one screenings washer / compactor, one Pista de-gritter, two rectangular primary clarifiers, three flow equalization basins and one sludge fermenter to supplement the phosphorous removal process.

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Figure 7 – Primary Clarifier Tanks

Sanitary Influent Comparison (EMS # 0500232) ¹ 2018 to 2022 Advanced Wastewater Treatment System													
Parameter ²	PE 12212 Sampling Frequency Requirement	WWTP Sampling Frequency	PE 12212 Parameter Values for 0500232	2022 Influent Quality Data		2021 Influent Quality Data		2020 Influent Quality Data		2019 Influent Quality Data		2018 Influent Quality Data	
Yearly Averaged Flow	N/A	Daily	N/A	12.2	ML/day	12.2	ML/day	12.7	ML/day	12.2	ML/day	11.8	ML/day
Chemical Oxygen Demand (COD)	N/A	Weekly	N/A	583	mg/l	568	mg/l	526	mg/l	623	mg/l	718	mg/l
Total Suspended Solids (TSS)	N/A	Monthly	N/A	298	mg/l	268	mg/l	267	mg/l	239	mg/l	302	mg/l
Total Phosphorus as P	Monthly	Monthly	N/A	8.2	mg/l	9.2	mg/l	6.8	mg/l	7.5	mg/l	5.4	mg/l
Ortho Phosphorus	Monthly	Weekly	N/A	3.6	mg/l	4.2	mg/l	3.3	mg/l	4.5	mg/l	2.7	mg/l
Total Nitrogen as N	Monthly	Monthly	N/A	53.8	mg/l	52.0	mg/l	45.9	mg/l	42.2	mg/l	45.5	mg/l
Ammonia Nitrogen	N/A	Weekly	N/A	29.1	mg/l	29.7	mg/l	27.1	mg/l	28.2	mg/l	27.6	mg/l
Nitrate Nitrogen	N/A	Weekly	N/A	1.10	mg/l	1.20	mg/l	1.41	mg/l	0.72	mg/l	0.64	mg/l
pH	Monthly	Weekly	N/A	7.8		7.7		7.7		7.7		7.8	

¹ EMS is the "Environmental Monitoring System" numbers set up by the Ministry of Environment for 12212

² Unless otherwise stated, Parameter values are yearly averages.

Table 3 - Sanitary Influent Comparison (EMS # 0500232), 2018 to 2022, Advanced Wastewater Treatment System

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Table 3 compares raw wastewater test results from 2022 to the previous four years. These parameters are set out by the Ministry of Environment and Climate Change Strategy for influent monitoring (EMS # 0500232) and are found in Operational Certificate 12212, which regulates the Advanced Wastewater Treatment Plant Operational Activities (issued March 20, 1995 and amended July 5, 2010)

Influent, Effluent and Irrigation Flow WWTP 2013-2022 Compared With Permitted Maximum Allowable Effluent Flow City of Penticton Advanced Wastewater Plant

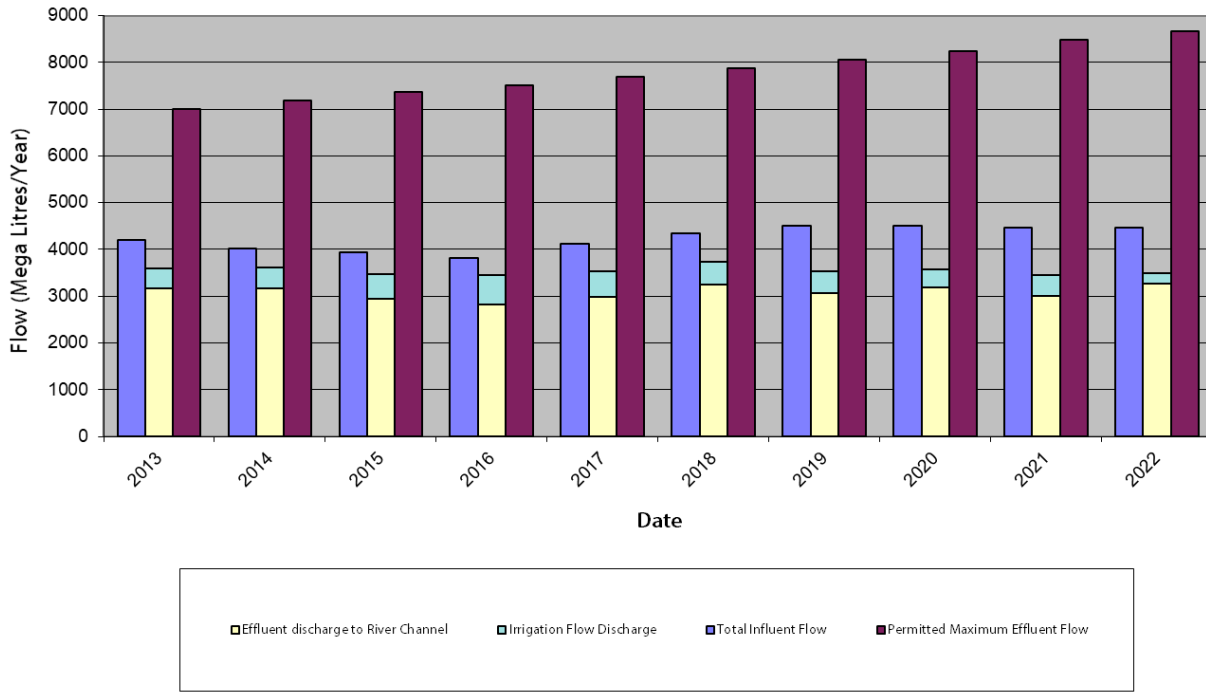


Chart 1 – Influent, Effluent & Irrigation Flow Compared to Permitted Maximum Effluent Flow; WWTP 2013 - 2022

Chart 1 compares the total influent flow to the combined irrigation & effluent flows, in addition to the permitted maximum effluent flow.

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Minimum Monthly, Maximum Monthly, and Average Monthly Influent Flows; 2013 - 2022

City of Penticton Advanced Wastewater Plant

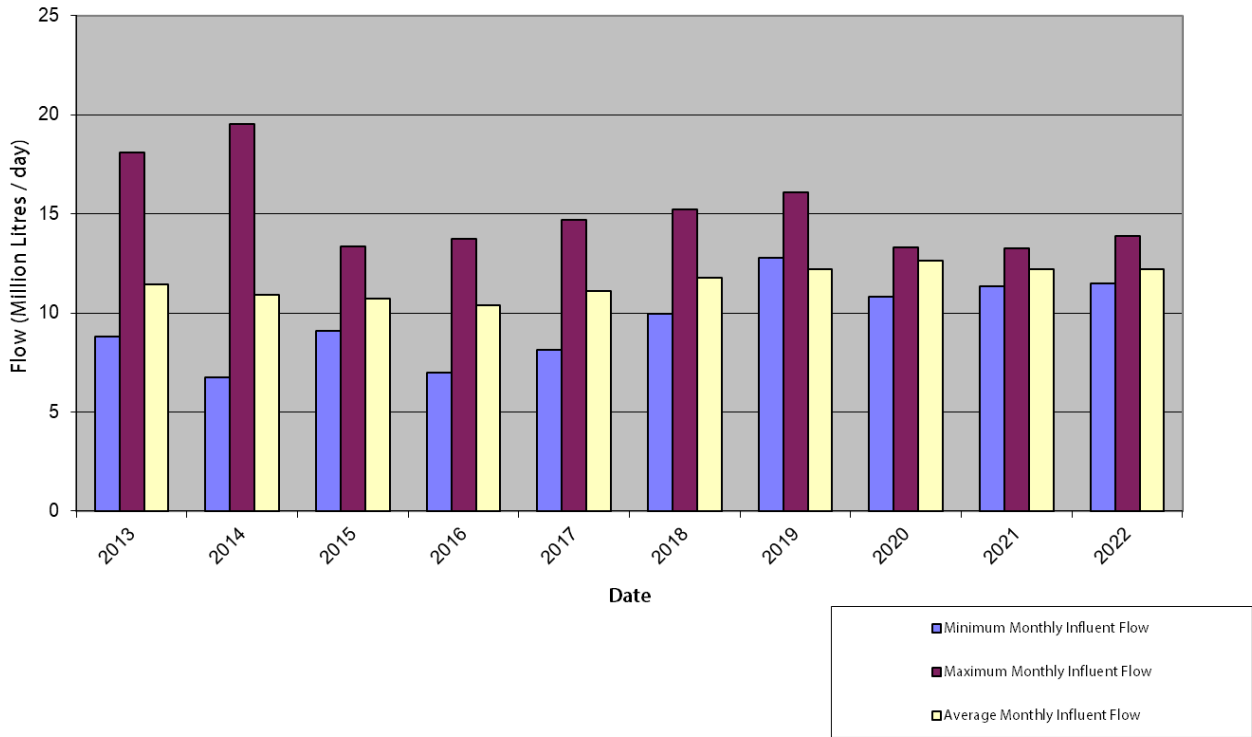


Chart 2 - Minimum, Maximum Influent & Monthly Average Flows WWTP 2013 – 2022

Chart 2 shows a larger difference between the maximum and the minimum monthly influent flow in some years which may indicate that the winter to summer population fluctuation was more pronounced. The difference between the maximum monthly and minimum monthly flows increased between 2021 and 2022 possibly due to an increase in tourism as a result of the COVID-19 pandemic restrictions easing.

3.2.2 Secondary & Tertiary Treatment

Secondary & Tertiary treatment consists of biological phosphorous and nitrogen removal using the Modified University of Capetown process with a step-feed configuration. The bioreactor consists of three zones – anaerobic, anoxic, and aerobic zones. Primary clarifier effluent enters the front of the anoxic zone. In the anaerobic zone biomass recycled from the secondary clarifiers, Return Activated Sludge (RAS) is mixed with the supernatant from the fermenters (RAS Fermentation). Phosphorus is released by the RAS as it uptakes the Volatile Fatty Acids (VFA) from the fermenter supernatant.

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The second part of the bioreactor, called the anoxic zone, is where recycled MLSS from the third zone of the bioreactor (Aerobic) is mixed back in with the Primary Effluent and RAS/VFA from the anaerobic zone. Typical recycle rates are around 3-4 times the influent rate. The biomass then strips oxygen from the nitrates in the recycled MLSS and begins consuming organic waste. This converts the ammonia to nitrate, and reabsorbs the phosphorus that was released in the anaerobic stage. In the process, the nitrogen gas left over after the oxygen has been stripped away from the nitrates escapes from the bioreactor as nitrogen gas. In the third or aerobic zone, fine air is bubbled through the MLSS to allow the MLSS to finish consuming the remaining organic material as well as removing almost all of the phosphorus. Ammonia is also converted to nitrates in this zone. At the end of the aerobic stage, 3-4 times the influent flow rate is sent back to the anoxic stage. The rest of the flow goes on to the secondary clarifiers, with some of it being sent to the Dissolved Air Flootation (DAF) & centrifuge for thickening and de-watering and then composting at the landfill. In the secondary clarifiers, MLSS is separated by gravity into a thicker biomass called "Return Activated Sludge" (RAS), and the clear supernatant becomes secondary effluent. The RAS is returned to the anaerobic stage of the bioreactor. The secondary effluent is then sent through 10 micron cloth disk filters as a final filtration/polishing step. The plant has the capability of chemical addition to augment the biological process system in times of a plant upset.



Figure 8 – Bioreactors

3.2.3 Disinfection Method

Disinfection consists of four banks of Ultra Violet Light (UV). Each bank consists of 14 modules with 8 lamps per module for a total of 448 lamps. This leaves an effluent that is free of pathogenic organisms and is safe for discharge to Okanagan River Channel, or for use as irrigation. The reclaimed water used off site for irrigation and on site for re-use is further disinfected by 15% sodium hypochlorite.

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3.2.4 Sludge Conditioning & Composting

Sludge Conditioning & Composting consists of the primary sludge being fermented (FPS), and the Mixed Liquor Suspended Solids (MLSS) from the Secondary treatment system being thickened by the Dissolved Air Flootation (DAF) to a solids content of approximately 3.5% to 4.0%, with solids referred to as Thickened Waste Activated Sludge (TWAS). The TWAS is then stored in two TWAS storage tanks that have a capacity of 196 m³ each for a total of approximately 4 days storage. The TWAS and the FPS is then pumped to one of two Centrifuges for de-watering to approximately 18% solids content, and then composted at the compost site located at Campbell Mtn. Landfill. Composting is by static pile aeration method. This conditioning / fertilizing product is recycled to City Parks, and provided to landscapers, the public and orchardists for agriculture use. In 2022, the Wastewater plant sent 709 truckloads of sludge to the compost facility, for a total volume of 8005 cubic meters.



Figure 9 – Centrifuges

3.2.5 Odour Control Systems

Three types of systems control plant foul air. Foul air is removed from the covered fermenter, covered primaries, covered equalization tanks, covered headworks channels, two centrifuges, grease pit and septage receiving facility by a centrifugal blower that moves the foul air through a Bio-Rem biological removal system. The total volume of foul air treated by this system is 15,000 m³/hr. The air in the headworks room is removed and treated by an activated carbon system; this system treats 7,500 m³/hr. The DAF building and bin room area foul air is treated via the centrifugal blowers that supply air to the bioreactor; this system treats 4,080 m³/hr. The total foul air treated is 26,580 m³/hr.

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3.2.6 Instrumentation & Control Systems

The Supervisory Control and Data Acquisition (SCADA) system consists of a Wonderware System Platform, controlled through Modicon and Quantum programmable logic controllers. The software was updated in 2011, to System Platform from Wonderware In-Touch. The plant and lift station alarms are connected by a wireless radio system. Alarms are monitored after hours by an auto-dialer. One operator is required to be on call every day of the year. PLC hardware is continually in the process of being upgraded.

3.2.7 Septage Receiving Facility

A regional septage receiving facility was constructed at the AWWTP in 2008. City of Penticton Wastewater Treatment Plant staff complete operation and maintenance of the facility and monthly bills are collected from the haulers. The current rate being charged for septage received is \$37.00/m³. Additional operating costs are split to 70% RDOS and 30% City of Penticton from user fees.

In 2022 the AWWTP processed 6906m³ of Septage, as compared with 5931m³ in 2021. The process consists of a truck unloading bay, inlet valve, rock trap, flow meter, septage receiving screen (Model #HLS500PSR Hycor Helisieve Plus Septage Receiving Unit) with a capacity of 38 l/s peak flow and a manual bypass vertical bar screen.

With the facility operating at the AWWTP the screened septage is treated by entering the WWTP process at headworks. The screenings are bagged and taken to the landfill for disposal.



Figure 10 – Septage Receiving Facility

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Figure 11 –Administration Building

3.2.8 Treated Effluent

Treated effluent from the AWWTP is discharged to the Okanagan River Channel. During the spring/summer/fall, it is also used to irrigate the Penticton Golf & Country Club, and numerous parks and schools. Effluent quality parameters discussed apply to both Okanagan River Channel discharge flow, and Irrigation flow. Effluent is discharged based on the Ministry of Environment's Municipal Wastewater Regulation (MWR).

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Minimum and Maximum Daily Effluent Flows; 2013-2022 Compared to Permitted Maximum Daily Allowable Effluent Flow City of Penticton Advanced Wastewater Plant

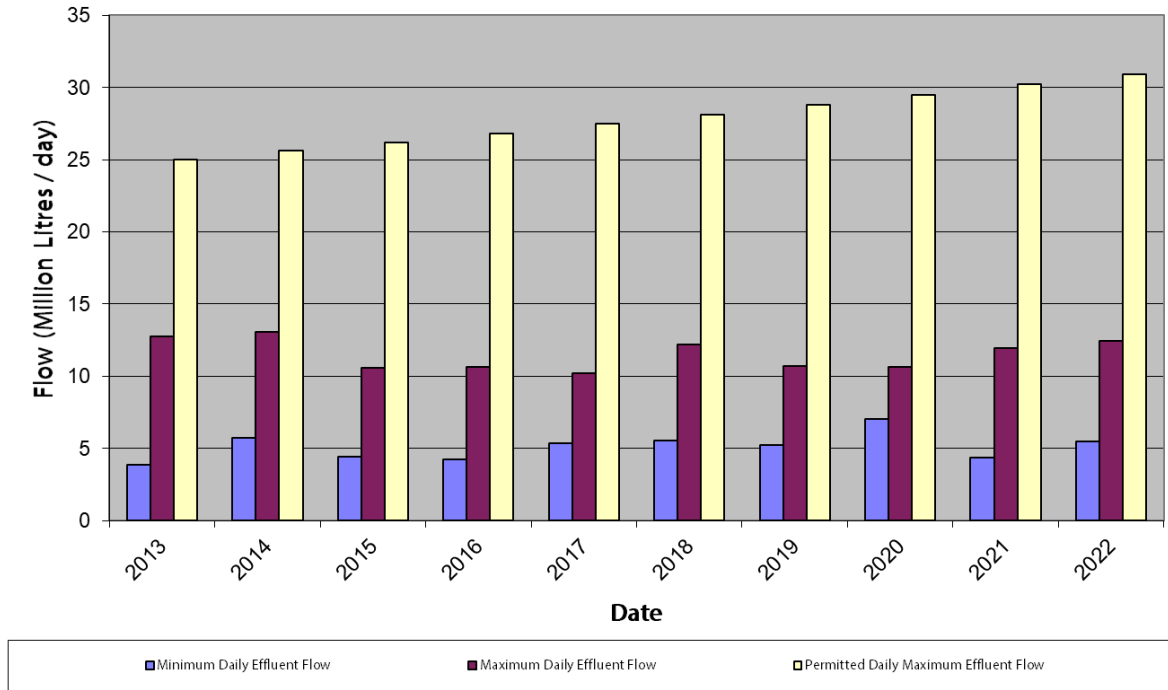


Chart 3-Minimum & Maximum Daily Effluent Flow Compared to Permitted Maximum Daily Effluent Flow Chart 2013 – 2022

Chart 3 is showing the minimum & maximum daily effluent flow to the Okanagan River Channel. The effluent meter is a magnetic flow meter installed in a 900mm line.

**CITY OF PENTICTON
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Discharge Effluent Comparison (EMS #E105000), 1 2018 to 2022, Advanced Wastewater Treatment System													
Parameter ²	PE 12212 Sampling Frequency Requirements	WWTP Sampling Frequency	PE 12212 Parameter Values for E105000	2022 Effluent Quality Data		2021 Effluent Quality Data		2020 Effluent Quality Data		2019 Effluent Quality Data		2018 Effluent Quality Data	
Maximum One-day Flow	Daily	Daily	< 30.2 ML/day	12.5	ML/day (July 4)	11.9	ML/day (Oct 20)	11.2	ML/day (June 16)	10.9	ML/day (Dec 20)	12.2	ML/day (March 20)
Yearly Averaged Flow	Daily	Daily	< 23.2 ML/day	9.0	ML/Day	8.2	ML/Day	8.7	ML/Day	8.4	ML/Day	8.9	ML/Day
Maximum Monthly Averaged Flow	Daily	Daily	< 1.9 ML/month	10.3	ML/day (Jan)	9.6	ML/day (Jan)	9.6	ML/day (Jan)	9.6	ML/day (Dec)	9.8	ML/day (Mar)
5 day Biochemical Oxygen Demand (BOD)	Monthly	Monthly	< 10 mg/l	<6	mg/l	2.3	mg/l	5.4	mg/l	<5	mg/l	<5	mg/l
Chemical Oxygen Demand (COD)	Daily	Daily	N/A	6	mg/l	39	mg/l	28	mg/l	28	mg/l	25	mg/l
Total Suspended Solids (TSS)	Monthly	Weekly	< 10 mg/l	0.6	mg/l	1.9	mg/l	2.0	mg/l	<1.0	mg/l	<1	mg/l
Total Phosphorus as P Not to exceed (Maximum one day total)	Weekly	Daily	< 2.0 mg/l	0.64	mg/l (May 12)	1.32	mg/l (Sept 22)	0.23	mg/l (Jan 24)	0.94	mg/l (March 28)	1.08	mg/l (Jan 24)
Total Phosphorus as P Annual Average	Weekly	Daily	< 0.2 mg/l	0.1	mg/l	0.2	mg/l	0.13	mg/l	0.27	mg/l	0.18	mg/l
Ortho Phosphorus	Daily	Daily	N/A	0.06	mg/l	0.12	mg/l	0.07	mg/l	0.20	mg/l	0.10	mg/l
Total Nitrogen as N (not to exceed maximum one day total)	Weekly	Daily	< 10 mg/l	7.30	mg/l	9.92	mg/l	9.40	mg/l	5.51	mg/l	6.95	mg/l
Total Nitrogen as N Annual Average	Weekly	Daily	< 6 mg/l	4.50	mg/l	5.43	mg/l	5.64	mg/l	5.10	mg/l	4.33	mg/l
Ammonia Nitrogen	Weekly	Daily	N/A	0.29	mg/l	0.70	mg/l	0.63	mg/l	1.44	mg/l	0.39	mg/l
Nitrate Nitrogen	Weekly	Daily	N/A	3.00	mg/l	3.55	mg/l	3.74	mg/l	3.20	mg/l	3.50	mg/l
Fecal Coliforms	Weekly ³	Weekly	< 50 MPN	1.1	MPN	1.3	MPN	1.2	MPN	1.1	MPN	<2.2	MPN
pH	Daily	Daily	N/A	7.0		7.1		7.0		7.4		7.2	
Bold Items Indicate an exceeding of Permit Parameters													
¹ EMS is the "Environmental Monitoring System" numbers set up by the Ministry of Environment for 12212													
² Unless otherwise stated, Parameter values are yearly averages.													
³ Increasing to daily if an analysis of over 50 MPN Fecal Coliform is recorded during the summer season.													

Table 4 - Discharge Effluent Comparison (EMS #E105000), 2018 to 2022, Advanced Wastewater Treatment System

Table 4 compares results from 2022 to the previous four years. The parameters are set out by the Ministry of Environment and Climate Change Strategy for effluent monitoring (EMS #E105000) in Operational Certificate 12212.

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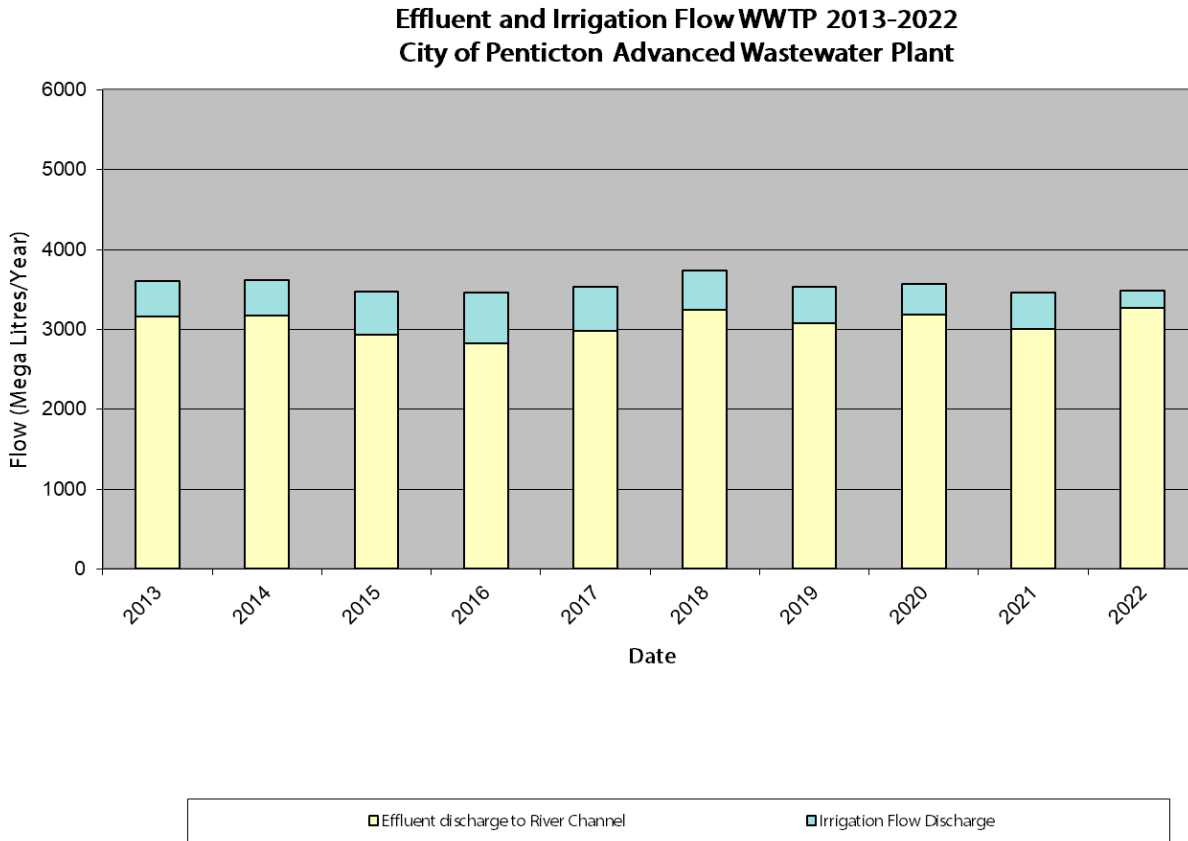


Chart 4 – Stacking Bar Chart of Effluent Flow to the Okanagan River Channel and Irrigation Flow 2013 to 2022

Chart 4 shows the combined flow levels of the Okanagan River Channel discharge, and the Irrigation flow levels. This shows the total irrigation flow compared to the total effluent flow.

3.2.9 Okanagan River Diffuser Outfall

Treated effluent is discharged via gravity through an under-water diffuser system into the Okanagan river channel adjacent to the plant site. In 2022, the treatment plant sent 3,270 ML total flow to the Okanagan River Channel as compared to 3,004 ML in 2021, or 8.6 ML./day for 2022 as compared to 8.2 ML/day in 2021.

CITY OF PENTICTON
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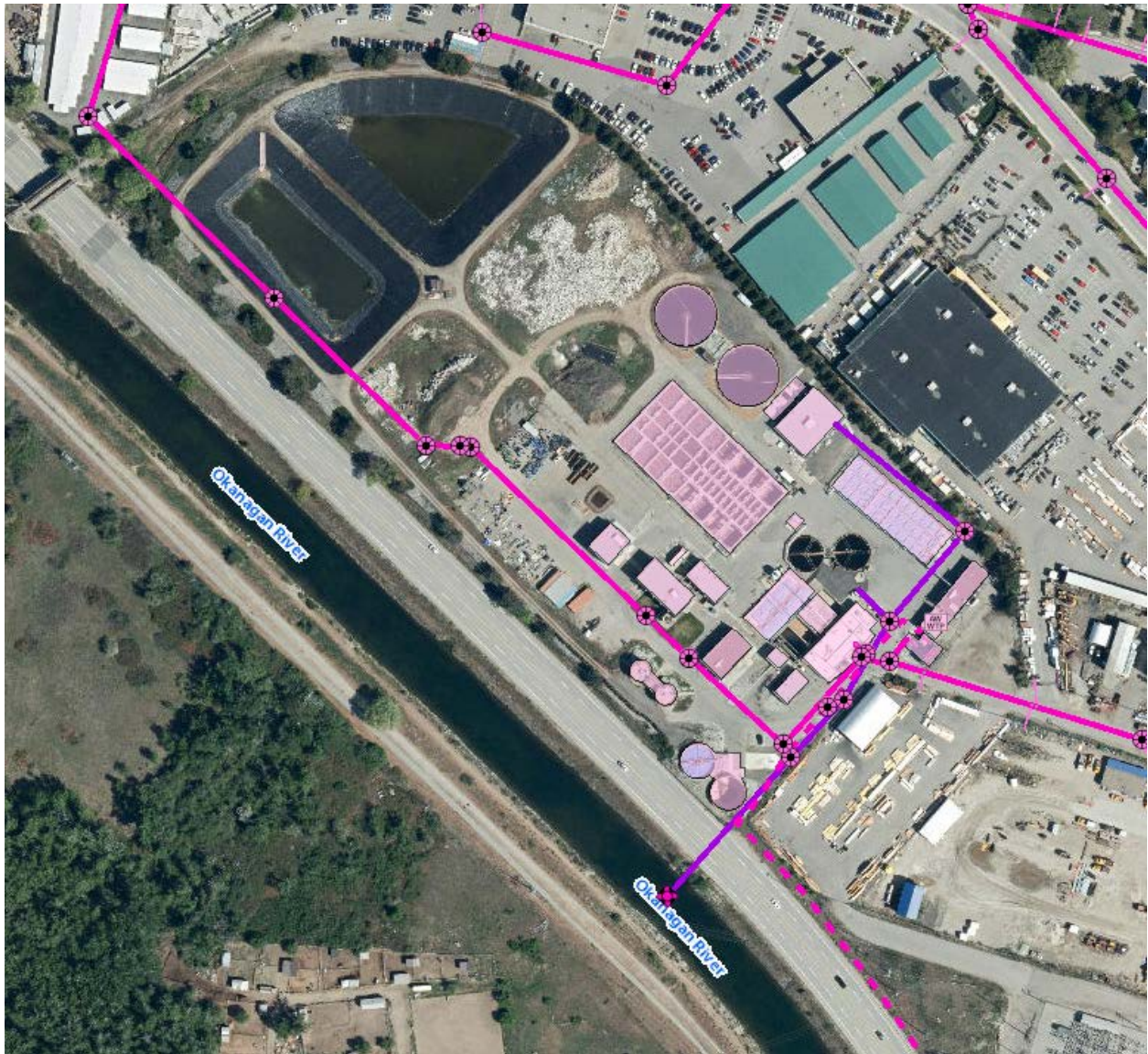


Figure 12 – Outfall Diffuser Location

CITY OF PENTICTON
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Monthly Average Effluent Flows Compared to Permit
City of Penticton Advanced Wastewater Treatment Plant 2022

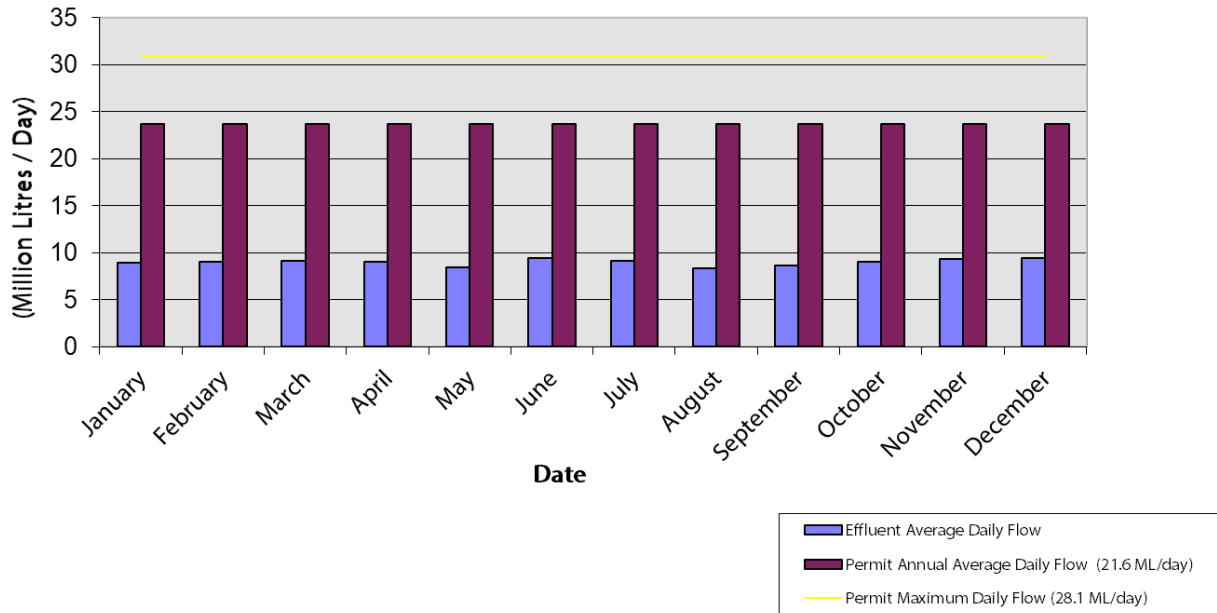


Chart 5 - Monthly Average Effluent Flows Compared to Permit

Chart 5 shows that the average monthly flow is well within the Annual Average Daily Flow permit level of 23.2 ML/day at all times of the year.

**CITY OF PENTICTON
2022 ADVANCED WASTEWATER TREATMENT SYSTEM ANNUAL REPORT**

**Monthly Maximum Effluent Flows Compared to Permit
City of Penticton Advanced Wastewater Treatment Plant 2022**

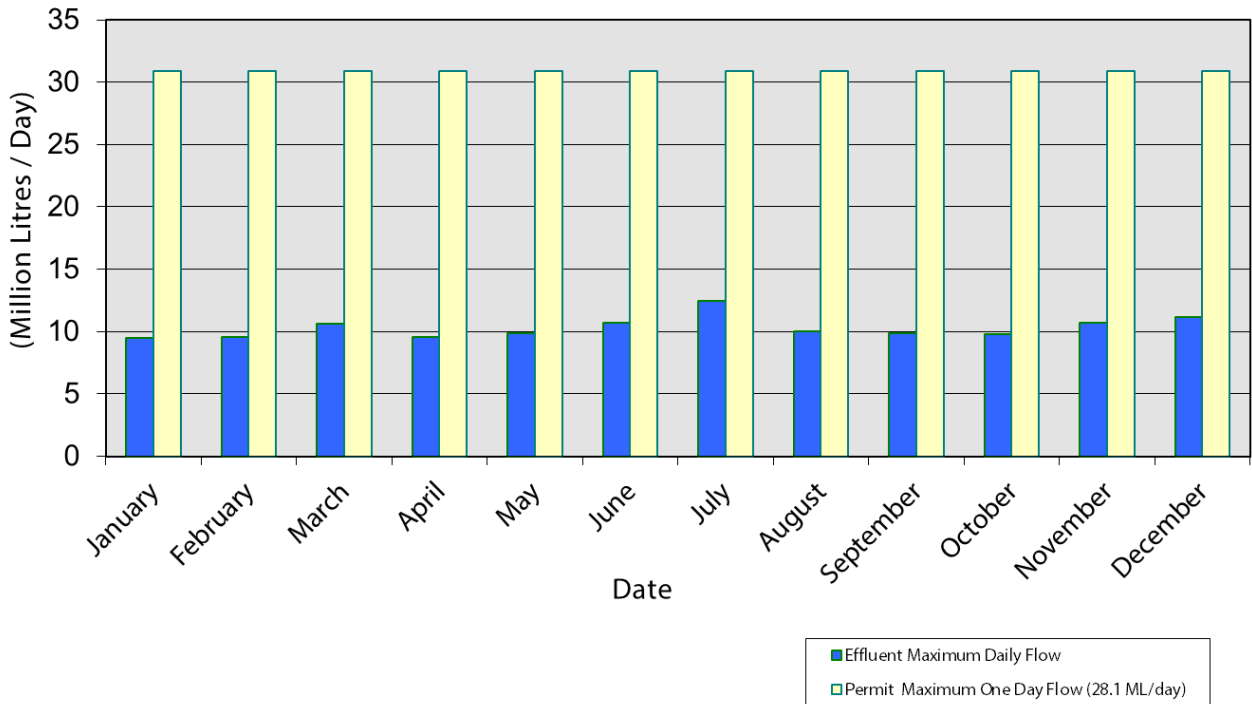


Chart 6 – Maximum Daily Effluent Flow Compared to Permitted Maximum Daily Effluent Flow

Chart 6 shows that the maximum daily flow for each month is well under permit level of 30.2 ML/day

3.2.10 Reclaimed Water System

The North Irrigation system has been in place since 1990 and supplied by three 60 hp 8 stage vertical turbine pumps. Three 40 hp 3 stage inline vertical turbine pumps supply the South Irrigation system. North system’s maximum pumping capacity is approximately 100 L/sec while the South systems maximum capacity is approximately 70 L/sec. In 2022, 212 ML went out for Irrigation, accounting for 5% of the total plant flow. The north system currently irrigates the Penticton Golf and Country Club (29.1 hectares) and Kings Park (5.1 hectares) for a total of 34.2 hectares. The south system currently irrigates Lions Park (2.1 Hectares), Ellis Creek Park (0.85 hectares), and Skaha Park (10.2 hectares) see Appendix A Map A.3. Three school district sports fields (Skaha Lake Middle School, Maggie Secondary and Parkway Elementary) were connected in 2017.

**CITY OF PENTICTON
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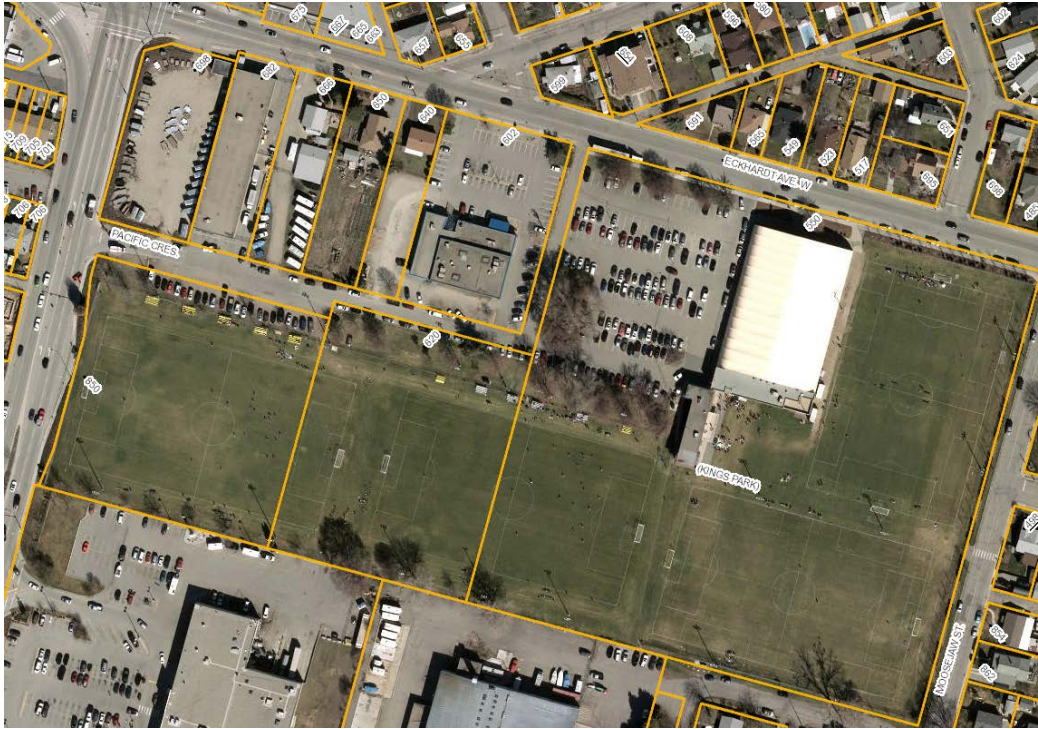


Figure 13 – Kings Park

Reclaimed Water Monitoring (EMS# E221689) ¹ from Advanced Wastewater Treatment System						
Parameter ²	PE 12212 Sampling Frequency Requirements	Irrigation Sampling Frequency	PE 12212 Parameter Values for E221689	2022 Reclaimed Water Quality Data		# of Tests
Total Yearly Flow	Continuously	Continuously	N/A	213	ML	420
Average Daily Flow ³	Continuously	Continuously	N/A	0.6	ML/day	365
Total Chlorine residual	Continuously	Daily	> 0.5 mg/l	0.7	mg/l	28
Fecal Coliforms	Weekly	Weekly	< 2.2 MPN	0.0	MPN	27
pH	Daily	Daily	N/A	7.0		365
Bold Items Indicate an exceeding of Permit Parameters						
¹ EMS is the "Environmental Monitoring System" numbers set up by the Ministry of Environment for 12212						
² Unless otherwise stated, Parameter values are yearly averages.						
³ Flow, total and averaged over irrigation period.						
For all other parameters about effluent irrigation, see "Discharge Effluent Quality from Advanced Wastewater Treatment System" Data table						

Table 5 –Reclaimed Water Monitoring (EMS #E221689), Advanced Wastewater Treatment System

**CITY OF PENTICTON
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Reclaimed Water Comparison (EMS# E221689), 2018 to 2022 Advanced Wastewater Treatment System													
Parameter ²	PE 12212 Sampling Frequency Requirements	Irrigation Sampling Frequency	PE 12212 Parameter Values for E221689	2022 Effluent Irrigation Quality Data		2021 Effluent Irrigation Quality Data		2020 Effluent Irrigation Quality Data		2019 Effluent Irrigation Quality Data		2018 Effluent Irrigation Quality Data	
Total Yearly Flow	Continuously	Continuously	N/A	213	ML	454	ML	393	ML	372	ML	408	ML
Average Daily Flow ³	Continuously	Continuously	N/A	0.6	ML/day	2.2	ML/day	1.8	ML/day	2.1	ML/day	2.0	ML/day
Total Chlorine residual	Continuously	Daily	> 1.0 mg/l	0.7	mg/l	0.6	mg/L	0.5	mg/l	0.7	mg/l	0.9	mg/l
Fecal Coliforms	Weekly	Weekly	< 2.2 MPN	0.0	MPN	36.8	MPN	<1	MPN	<2.2	MPN	<2.2	MPN
pH	Daily	Daily	N/A	7.0		7.1		7.0		7.4		7.4	
Bold Items indicate an exceeding of Permit Parameters													
¹ EMS is the "Environmental Monitoring System" numbers set up by the Ministry of Environment for 12212													
² Unless otherwise stated, Parameter values are yearly averages.													
³ Flow is averaged over whole year, not just irrigation period.													
For all other parameters about effluent irrigation, see "Discharge Effluent Quality from Advanced Wastewater Treatment System" Data table													

Table 6 – Reclaimed Water Comparison (EMS #E221689), 2018- 2022, Advanced Wastewater Treatment System

3.2.11 Effluent Storage Pond

In case of a plant upset, treated or untreated wastewater can be stored in two on-site 36 ML emergency storage basins. Stored wastewater can then be returned by gravity to the Headworks of the plant for treatment.

3.2.12 Okanagan River Channel

The Okanagan River Channel is eight kilometers long and connects Okanagan Lake to Skaha Lake. The Advanced Wastewater Treatment Plant effluent is discharged into Okanagan River Channel approximately 400 meters north of Green Mountain Rd. Effluent is diffused into the channel through a 600 mm Outfall pipe, which splits into 6 x 200 mm diffuser heads under the Okanagan River channel. Signs posted on both banks of the channel mark the pipe location.

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Figure 14 –Upstream Sampling Location

Figure 15 – Downstream Sampling Location

Upstream sampling occurs at the Coyote Cruises loading site on Riverside Rd. (EMS# 0500050) The Downstream Monitoring location (EMS# E221464) is located at the river off the landing upstream of Shingle Creek.

The annual average Downstream Okanagan River Channel Total Phosphorous of 0.01 mg/L is meeting the Skaha Lake spring total Phosphorous interim objective of 15 ug/L.

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Okanagan River Channel Upstream Surface Water Impact monitoring (EMS# 0500050) ¹						
Parameter ²	PE 12212 Sampling Frequency Requirements	Upstream Sampling Frequency	PE 12212 Parameter Values	2022 Upstream Quality Data Average		# of Tests
Total Suspended Solids (TSS)	Monthly	Monthly	N/A	1.1	mg/l	12
Total Phosphorus as P	Monthly	Monthly	N/A	0.01	mg/l	12
Ortho Phosphorus	Monthly	Monthly	N/A	0.00	mg/l	12
Total Nitrogen as N	Monthly	Monthly	N/A	0.41	mg/l	12
Ammonia Nitrogen	Monthly	Monthly	N/A	0.32	mg/l	12
Nitrate Nitrogen	Monthly	Monthly	N/A	0.03	mg/l	12
Total Coliforms	Monthly	Monthly	N/A	432.3	MPN	12
e coli Coliforms	Monthly	Monthly	N/A	15.5	MPN	12
pH	Monthly	Monthly	N/A	8.4		12
Chloride	Monthly	Monthly	N/A	5.3	mg/l	12

¹ EMS is the "Environmental Monitoring System" numbers set up by the Ministry of Environment for 12212

² Unless otherwise stated, Parameter values are yearly averages.

³ Below detection

Table 7 -Okanagan River Channel Upstream Surface Water Impact Monitoring (EMS #0500050)

Table 7's results are typical of water bodies in the Okanagan. Coliform counts come from a variety of non-point sources, like wildlife, storm water runoff, etc. Samples are collected once a month.

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Okanagan River Channel Downstream Surface Water Impact monitoring (EMS# E221464) ¹						
Parameter ²	PE 12212 Sampling Frequency Requirements	Downstream Sampling Frequency	PE 12212 Parameter Values for E221464	2022 Downstream Quality Data (Average)		# of Tests
Total Suspended Solids (TSS)	Monthly	Monthly	N/A	2.0	mg/l	12
Total Phosphorus as P	Monthly	Monthly	N/A	0.00	mg/l	12
Ortho Phosphorus	Monthly	Monthly	N/A	0.00	mg/l	12
Total Nitrogen as N	Monthly	Monthly	N/A	0.38	mg/l	12
Ammonia Nitrogen	Monthly	Monthly	N/A	0.21	mg/l	12
Nitrate Nitrogen	Monthly	Monthly	N/A	0.04	mg/l	12
Total Coliforms	Monthly	Monthly	N/A	926.3	MPN	12
e coli Coliforms	Monthly	Monthly	N/A	133.3	MPN	12
pH	Monthly	Monthly	N/A	8.6		12
Chloride	Monthly	Monthly	N/A	6.1	mg/l	12

¹ EMS is the "Environmental Monitoring System" numbers set up by the Ministry of Environment for 12212

² Unless otherwise stated, Parameter values are yearly averages.

Table 8 - Okanagan River Channel Downstream Surface Water Impact Monitoring (EMS #E221464)

Okanagan River Channel Upstream Surface Water Comparison (EMS# 0500050), 2018 to 2022													
Parameter ²	PE 12212 Sampling Frequency Requirements	Upstream Sampling Frequency	PE 12212 Parameter Values for 0500050	2022 Upstream Quality Data		2021 Upstream Quality Data		2020 Upstream Quality Data		2019 Upstream Quality Data		2018 Upstream Quality Data	
Total Suspended Solids (TSS)	Monthly	Monthly	N/A	1.07	mg/l	1.28	mg/L	1.93	mg/L	5.67	mg/L	0.98	mg/L
Total Phosphorus as P	Monthly	Monthly	N/A	0.01	mg/l	0.02	mg/L	0.01	mg/L	0.01	mg/L	0.01	mg/L
Ortho Phosphorus	Monthly	Monthly	N/A	0.00	mg/l	0.00	mg/L	0.00	mg/L	0.00	mg/L	0.03	mg/L
Total Nitrogen as N	Monthly	Monthly	N/A	0.41	mg/l	0.30	mg/L	0.28	mg/L	0.24	mg/L	0.24	mg/L
Ammonia Nitrogen	Monthly	Monthly	N/A	0.32	mg/l	0.04	mg/L	0.04	mg/L	0.00	mg/L	0.06	mg/L
Nitrate Nitrogen	Monthly	Monthly	N/A	0.03	mg/l	0.05	mg/L	0.03	mg/L	0.04	mg/L	0.41	mg/L
Total Coliforms	Monthly	Monthly	N/A	432.25	MPN	549.83	MPN	21.89	MPN	54.58	MPN	124.36	MPN
e coli Coliforms	Monthly	Monthly	N/A	15.50	MPN	33.54	MPN	15.09	MPN	6.18	MPN	8.10	MPN
pH	Monthly	Monthly	N/A	8.41		7.80		8.51		8.42		7.78	

¹ EMS is the "Environmental Monitoring System" numbers set up by the Ministry of Environment for 12212

² Unless otherwise stated, Parameter values are yearly averages.

Table 9 – Okanagan River Channel Upstream Surface Water Comparison (EMS #0500050), 2018 – 2022

**CITY OF PENTICTON
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Okanagan River Channel Downstream Surface Water comparison (EMS# E221464), 2018 to 2022													
Parameter ²	PE 12212 Sampling Frequency Requirements	Upstream Sampling Frequency	PE 12212 Parameter Values for E221464	2022 Downstream Quality Data		2021 Downstream Quality Data		2020 Downstream Quality Data		2019 Downstream Quality Data		2018 Downstream Quality Data	
Total Suspended Solids (TSS)	Monthly	Monthly	N/A	2.0	mg/l	1.2	mg/L	1.02	mg/L	1.10	mg/L	0.00	mg/L
Total Phosphorus as P	Monthly	Monthly	N/A	0.00	mg/l	0.02	mg/L	0.00	mg/L	0.01	mg/L	0.01	mg/L
Ortho Phosphorus	Monthly	Monthly	N/A	0.00	mg/l	0.003	mg/L	0.00	mg/L	0.02	mg/L	0.01	mg/L
Total Nitrogen as N	Monthly	Monthly	N/A	0.34	mg/l	0.29	mg/L	0.24	mg/L	0.26	mg/L	0.31	mg/L
Ammonia Nitrogen	Monthly	Monthly	N/A	0.21	mg/l	0.03	mg/L	0.01	mg/L	0.06	mg/L	0.03	mg/L
Nitrate Nitrogen	Monthly	Monthly	N/A	0.04	mg/l	0.04	mg/L	0.03	mg/L	0.47	mg/L	0.44	mg/L
Total Coliforms	Monthly	Monthly	N/A	926.3	MPN	630.8	MPN	357.83	MPN	132.50	MPN	83.00	MPN
e coli Coliforms	Monthly	Monthly	N/A	133.3	MPN	16.4	MPN	43.36	MPN	46.70	MPN	21.70	MPN
pH	Monthly	Monthly	N/A	8.6		8.2		8.4		7.9		8.0	
Monitoring System ¹ numbers set													
² Unless otherwise stated,													

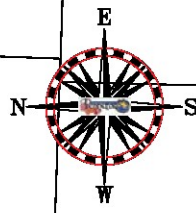
Table 10 – Okanagan River Channel Downstream Surface Water Comparison (EMS #E221464), 2018 - 2022

Appendix A

Maps of Lift Stations and Irrigation Areas; Aerial Photo of Advanced Wastewater Treatment Plant

Appendix A.1 .

Map of Lift Stations



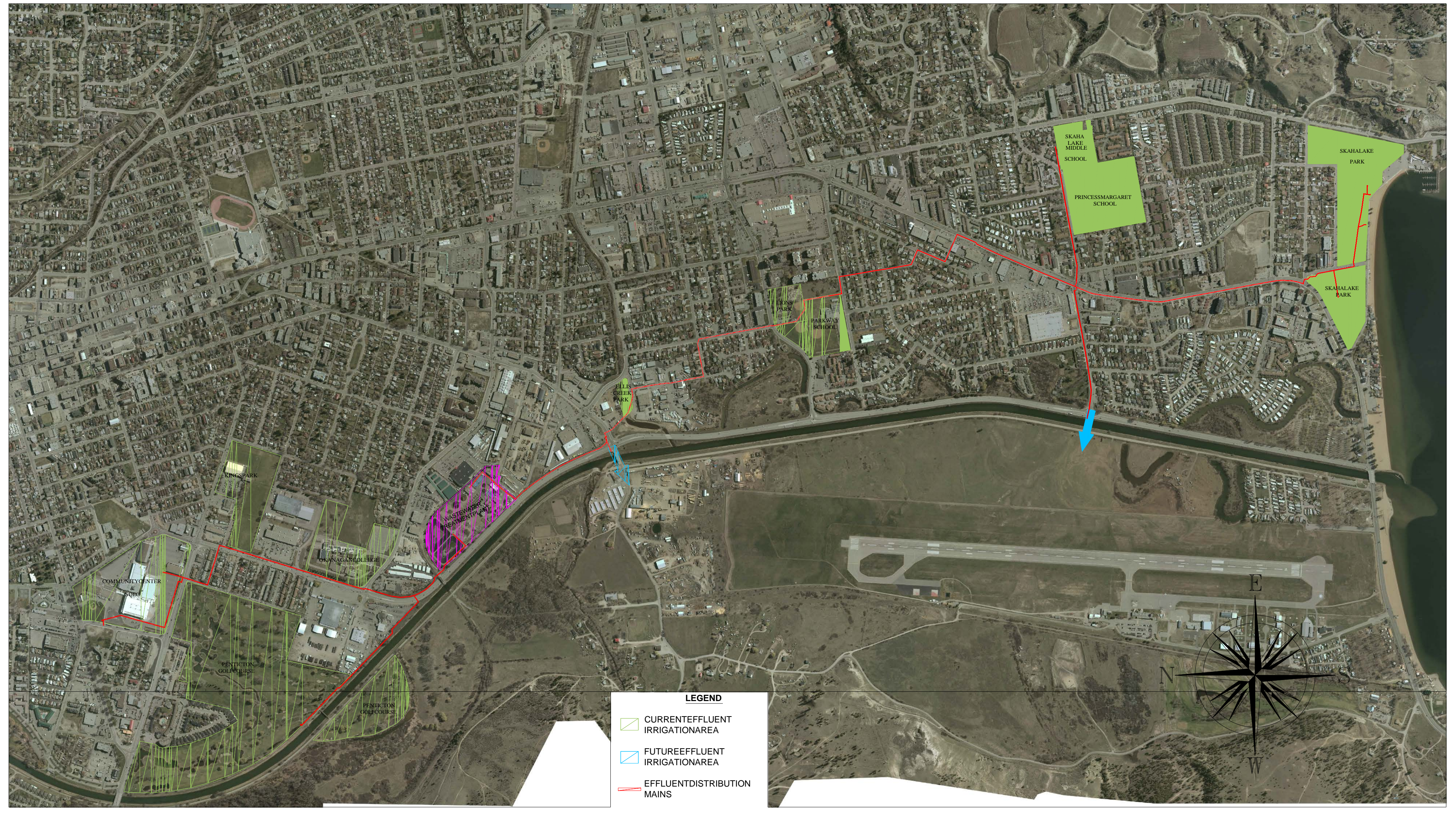
Appendix A.2.

Aerial Photo of Advanced Wastewater Treatment Plant






Appendix A.3.

Map of Irrigation Areas



LEGEND

-  CURRENT EFFLUENT IRRIGATION AREA
-  FUTURE EFFLUENT IRRIGATION AREA
-  EFFLUENT DISTRIBUTION MAINS

Appendix B.1.

Influent, Effluent, And Irrigation Flow Data

Monthly Average, Maximum, Minimum and Total Flows; Influent, Effluent and Irrigation																
City of Pentticton Advanced Wastewater Treatment Plant 2022																
Date	Average Daily Flow (ML/Day)			Maximum Daily Flow (ML/Day)			Permit Maximum Flow (Maximum One Day Flow)			Minimum Daily Flow (ML/Day)			Total Monthly Flow (ML/Month)			
	Influent	Effluent ¹	Irrigation	Permit Annual Average Daily Flow ²	Permit Maximum Daily Flow (ML/Day) ²	Influent	Effluent	Irrigation	Permit Maximum Flow (Maximum One Day Flow)	Influent	Effluent	Irrigation	Influent	Effluent	Irrigation	Permit Allowable Flow
January	9.0	8.9	0.0	23.7	30.9	10.1	9.5	0.0	30.9	8.5	8.3	0.0	280.2	275.6	0.0	734.70
February	11.2	9.1	0.0	23.7	30.9	11.5	9.6	0.0	30.9	10.9	8.4	0.0	313.8	244.7	0.0	663.60
March	11.6	9.2	0.0	23.7	30.9	14.1	10.6	0.0	30.9	11.0	6.8	0.0	360.8	284.0	0.0	734.70
April	11.5	9.0	0.0	23.7	30.9	11.8	9.6	1.6	30.9	11.2	7.0	0.0	344.8	269.8	6.9	711.00
May	12.3	8.5	1.0	23.7	30.9	13.0	9.9	2.9	30.9	11.5	5.5	0.0	382.4	262.6	30.5	734.70
June	13.5	9.4	0.7	23.7	30.9	18.8	10.7	1.7	30.9	12.7	7.5	0.0	404.5	282.4	21.8	711.00
July	14.0	9.1	1.6	23.7	30.9	16.5	12.5	2.9	30.9	13.4	7.4	0.0	433.3	282.8	48.7	734.70
August	14.0	8.3	2.0	23.7	30.9	14.8	10.0	3.3	30.9	13.2	6.9	0.3	433.1	258.1	61.6	734.70
September	12.8	8.7	1.0	23.7	30.9	13.6	9.8	2.9	30.9	12.3	6.2	0.0	384.6	260.2	30.9	711.00
October	12.5	9.0	0.4	23.7	30.9	13.0	9.8	1.4	30.9	10.1	7.9	0.0	387.7	280.2	12.1	734.70
November	12.5	9.3	0.0	23.7	30.9	15.2	10.7	0.0	30.9	11.8	8.8	0.0	373.9	279.0	0.0	711.00
December	12.0	9.4	0.0	23.7	30.9	14.1	11.2	0.0	30.9	11.1	8.7	0.0	372.3	290.9	0.0	734.70
Annual Average³	12.2	9.0	0.6	23.7	30.9	13.9	10.3	1.4	30.9	11.5	7.4	0.0	372.6	272.5	17.7	721
Annual Total	4471	3270	213	8651									4471	3270	213	8651

¹ Permit Values Originate From the BC Ministry of Water, Land and Air Protection's Operational Certificate for the Pentticton Advanced Wastewater Treatment Plant (12212) Section 1.1.1

² Averages involving the Irrigation flow are calculated over the whole year, not just the summer season.

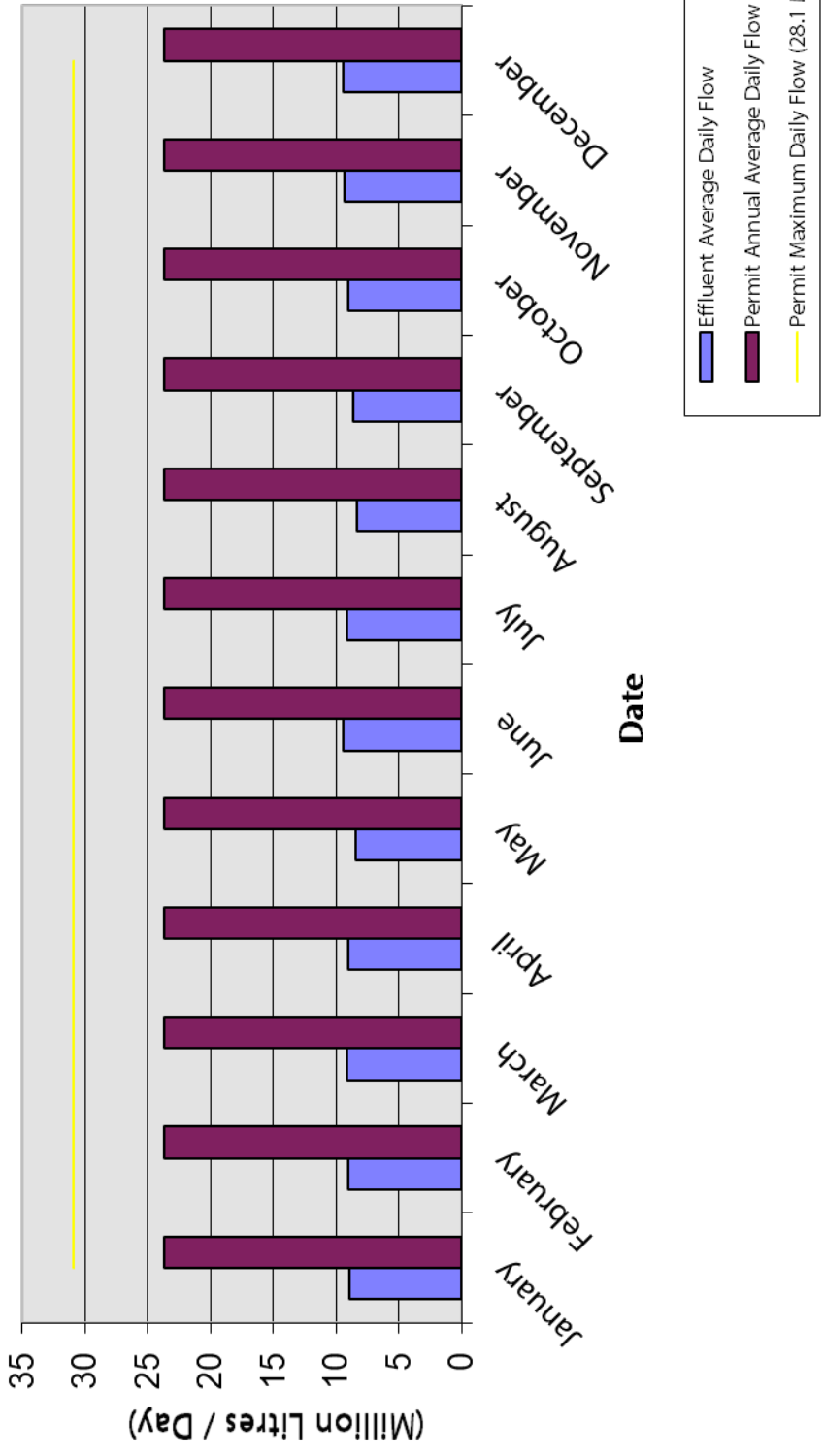
Data for this table was obtained from the Excel Workbook "Yearly 2022.XLS", spreadsheet

population - 36821

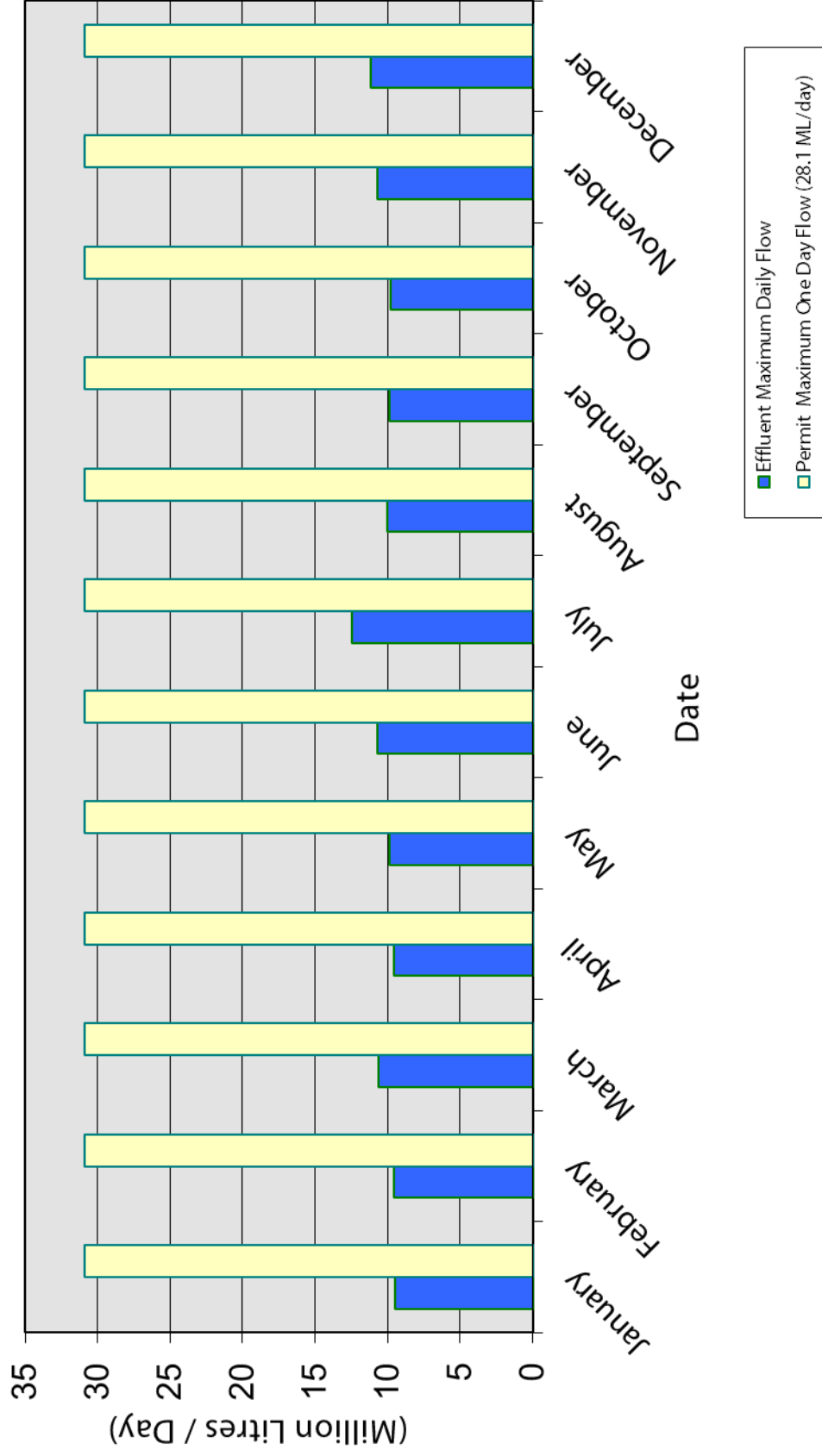
Average Flow per Capita 333 litres/day/person

Irrigation Flow Is 4.8% of the Influent Flow

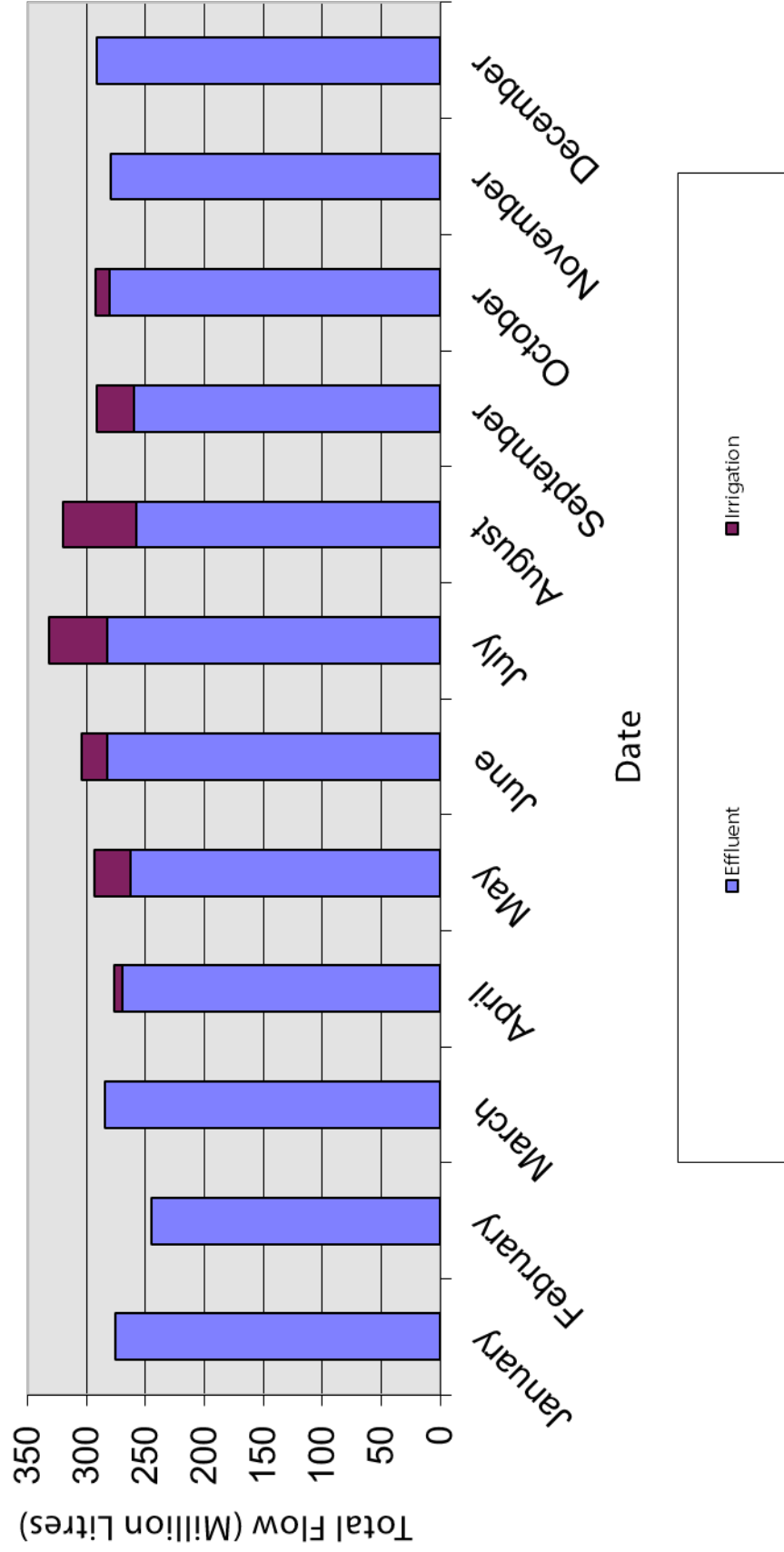
Monthly Average Effluent Flows Compared to Permit City of Penticton Advanced Wastewater Treatment Plant 2022



Monthly Maximum Effluent Flows Compared to Permit City of Penticton Advanced Wastewater Treatment Plant 2022



Total Flow Stacking Bar-Chart City of Penticton Advanced Wastewater Treatment Plant 2022



Daily Average, Daily Maximum, Daily Minimum and Total Flows; Influent, Effluent and Irrigation

City of Penticton Advanced Wastewater Treatment Plant 2013-2022

Date	Average Daily Flow (ML/Day)				Maximum Daily Flow (ML/Day)				Minimum Daily Flow (ML/Day)			Total Flow (Mega Litres)		
	Influent	Effluent	Irrigation ²	Annual Average Daily Flow (ML/day)	Influent	Effluent	Irrigation	Maximum Daily Flow (ML/day)	Influent	Effluent	Irrigation	Influent	Effluent	Irrigation
Jan-13	10.26	9.51	0.00	19.2	13.67	12.77	0.00	25.0	9.40	8.45	0.00	318.06	294.85	0.00
Feb-13	10.33	9.54	0.00	19.2	11.25	11.28	0.00	25.0	9.68	8.91	0.00	319.03	267.06	0.00
Mar-13	10.29	9.30	0.00	19.2	12.81	10.45	0.00	25.0	9.68	6.79	0.00	319.03	288.23	0.00
Apr-13	13.72	8.37	1.06	19.2	18.09	10.74	2.21	25.0	10.03	5.67	0.14	411.45	251.06	29.66
May-13	11.24	7.66	2.14	19.2	12.22	9.96	4.56	25.0	10.69	5.32	0.62	348.33	237.31	66.25
Jun-13	11.98	8.30	2.00	19.2	13.88	11.35	3.34	25.0	10.81	6.55	0.94	359.40	249.00	60.02
Jul-13	12.87	7.29	3.06	19.2	13.58	9.99	4.22	25.0	12.20	5.81	0.90	399.07	226.10	94.71
Aug-13	13.24	8.01	2.96	19.2	14.02	10.13	4.01	25.0	12.42	6.75	1.63	410.48	248.23	91.87
Sep-13	12.02	8.62	1.74	19.2	13.43	11.61	2.90	25.0	10.92	6.68	0.32	360.49	258.60	52.22
Oct-13	10.90	8.50	1.65	19.2	12.18	10.49	2.97	25.0	10.35	3.86	1.11	337.82	263.50	41.29
Nov-13	10.25	9.64	0.00	19.2	11.35	10.45	0.00	25.0	9.77	9.11	0.00	307.47	289.26	0.00
Dec-13	9.92	9.42	0.00	19.2	10.39	10.28	0.00	25.0	8.82	7.92	0.00	307.40	292.17	0.00
Jan-14	9.88	9.41	0.00	19.7	11.66	12.80	0.00	25.6	6.76	6.15	0.00	306.41	291.84	0.00
Feb-14	9.93	9.20	0.00	19.7	10.17	10.11	0.00	25.6	9.63	8.14	0.00	313.66	257.70	0.00
Mar-14	10.12	9.37	0.00	19.7	11.35	10.45	0.00	25.6	9.53	7.40	0.00	313.66	290.44	0.00
Apr-14	10.47	8.50	1.06	19.7	10.96	13.08	2.32	25.6	10.08	5.71	0.13	313.99	254.96	31.89
May-14	11.01	8.52	1.41	19.7	11.70	10.40	2.54	25.6	10.60	7.19	0.13	341.33	264.14	43.56
Jun-14	11.55	8.03	2.18	19.7	12.81	9.92	3.29	25.6	10.91	6.49	1.48	346.43	240.80	65.51
Jul-14	12.65	7.08	3.42	19.7	14.10	9.58	4.19	25.6	12.02	5.74	2.11	392.12	219.37	106.09
Aug-14	13.39	7.99	3.00	19.7	19.53	9.25	3.88	25.6	11.96	6.60	1.96	415.16	247.62	93.14
Sep-14	11.42	7.97	2.12	19.7	12.34	10.40	3.66	25.6	10.75	6.15	0.68	342.73	239.14	63.63
Oct-14	10.69	8.91	1.13	19.7	12.33	10.10	2.83	25.6	9.93	7.89	0.00	331.36	276.12	35.02
Nov-14	9.63	9.74	0.00	19.7	10.12	10.74	0.00	25.6	9.00	8.20	0.00	289.01	292.05	0.00
Dec-14	10.20	9.59	0.00	19.7	11.09	10.64	0.00	25.6	9.06	8.90	0.00	316.35	297.37	0.00
Jan-15	10.11	9.56	0.00	20.2	11.54	10.15	0.00	26.2	9.27	9.13	0.00	313.35	296.44	0.00
Feb-15	10.08	9.47	0.00	20.2	10.92	10.02	0.00	26.2	9.53	9.06	0.00	312.33	265.14	0.00
Mar-15	10.08	9.22	0.00	20.2	11.09	10.23	0.00	26.2	9.08	8.04	0.00	312.33	285.67	0.00
Apr-15	9.96	7.50	1.78	20.2	10.83	10.00	3.80	26.2	9.33	5.00	0.00	298.86	225.09	53.44
May-15	10.95	6.71	2.73	20.2	13.34	9.55	3.95	26.2	10.11	4.86	0.89	339.32	207.91	84.70
Jun-15	11.29	6.36	3.13	20.2	13.35	9.31	4.20	26.2	10.33	4.44	1.43	338.59	190.88	93.88
Jul-15	12.51	7.06	3.02	20.2	13.10	8.90	4.32	26.2	11.85	5.24	1.57	387.74	218.93	93.63
Aug-15	12.32	7.16	3.15	20.2	12.96	8.57	3.83	26.2	11.32	5.74	2.19	381.84	221.94	97.62
Sep-15	10.85	7.07	2.38	20.2	11.56	9.29	4.20	26.2	10.36	4.70	0.65	325.48	211.97	71.51
Oct-15	10.17	7.90	1.21	20.2	10.67	9.35	2.81	26.2	9.55	6.31	0.00	315.23	244.80	37.43
Nov-15	10.37	9.43	0.00	20.2	10.99	10.56	0.00	26.2	9.80	8.14	0.00	311.09	283.00	0.00
Dec-15	10.06	9.17	0.00	20.2	10.60	9.87	0.00	26.2	9.52	8.39	0.00	311.90	284.32	0.00
Jan-16	9.81	9.31	0.00	20.6	10.30	10.34	0.00	26.8	8.99	8.76	0.00	304.25	288.48	0.00
Feb-16	9.36	9.11	0.00	20.6	9.74	10.29	0.00	26.8	8.72	8.19	0.00	289.96	255.23	0.00
Mar-16	9.35	9.36	0.00	20.6	10.48	10.07	0.00	26.8	8.07	8.96	0.00	289.96	290.25	0.00
Apr-16	10.13	7.10	2.08	20.6	10.92	9.36	4.30	26.8	8.85	5.27	0.00	303.78	212.92	62.30
May-16	10.85	6.45	2.74	20.6	11.47	7.55	4.33	26.8	10.38	5.05	0.24	336.50	200.08	84.86
Jun-16	11.51	6.28	3.37	20.6	13.76	8.36	4.89	26.8	1083.00	4.27	1.22	345.27	188.41	101.17
Jul-16	12.16	6.13	3.68	20.6	12.75	8.91	4.75	26.8	11.71	4.57	1.87	377.07	190.07	114.17
Aug-16	12.21	5.52	4.18	20.6	12.93	7.70	4.99	26.8	11.67	4.22	2.02	378.49	171.03	129.48
Sep-16	11.16	6.69	2.73	20.6	11.71	8.53	3.84	26.8	10.66	4.53	3.20	334.92	200.82	82.04
Oct-16	10.58	8.36	2.15	20.6	11.45	10.66	5.14	26.8	9.77	6.07	1.57	328.00	259.12	58.04
Nov-16	9.51	9.42	0.00	20.6	10.15	9.96	0.00	26.8	8.52	8.68	0.00	285.38	282.66	0.00
Dec-16	8.08	9.34	0.00	20.6	8.86	9.85	0.00	26.8	7.01	8.42	0.00	250.57	289.52	0.00
Jan-17	9.06	9.25	0.00	21.1	9.97	10.09	0.00	27.5	8.14	8.55	0.00	280.77	286.78	0.00
Feb-17	9.31	9.04	0.00	21.1	10.21	9.87	0.00	27.5	8.40	8.52	0.00	309.78	253.17	0.00
Mar-17	9.99	9.35	0.00	21.1	10.71	10.15	0.00	27.5	9.15	8.10	0.00	309.78	289.90	0.00
Apr-17	11.12	8.27	1.57	21.1	12.80	10.19	2.45	27.5	10.41	6.80	0.33	333.63	247.98	44.02
May-17	11.86	8.10	1.96	21.1	13.22	9.62	3.93	27.5	10.86	5.67	0.28	367.53	251.04	60.71
Jun-17	12.63	7.65	3.06	21.1	14.26	10.08	4.08	27.5	10	6.02	0.81	378.89	229.45	91.91
Jul-17	12.81	6.57	3.93	21.1	13.24	8.25	4.82	27.5	12.47	5.50	1.31	397.06	203.53	121.81
Aug-17	12.92	7.21	3.49	21.1	14.71	9.13	4.19	27.5	10.26	6.44	2.62	400.54	223.66	108.17
Sep-17	11.69	6.85	2.81	21.1	12.59	8.52	3.83	27.5	11.26	5.38	1.52	350.62	205.45	84.35
Oct-17	11.09	7.64	1.65	21.1	11.46	10.18	2.95	27.5	10.34	5.47	0.01	343.64	236.69	44.55
Nov-17	10.75	9.29	0.00	21.1	11.19	9.77	0.00	27.5	10.37	8.77	0.00	322.39	278.57	0.00
Dec-17	10.24	8.86	0.00	21.1	10.82	9.34	0.00	27.5	9.55	7.77	0.00	317.48	274.65	0.00
Jan-18	11.40	9.26	0.00	21.6	12.91	10.02	0.00	28.1	10.00	8.49	0.00	353.35	286.98	0.00
Feb-18	11.97	9.17	0.00	21.6	13.02	9.92	0.00	28.1	11.28	7.78	0.00	366.76	256.77	0.00
Mar-18	11.83	9.56	0.00	21.6	15.21	12.19	0.00	28.1	11.23	8.38	0.00	366.76	296.29	0.00
Apr-18	11.58	9.16	0.65	21.6	12.67	10.68	5.14	28.1	11.04	7.28	0.00	347.31	274.88	19.51
May-18	12.39	8.82	1.63	21.6	14.04	10.45	2.66	28.1	11.28	7.29	0.81	384.04	273.30	50.62
Jun-18	11.29	9.10	3.07	21.6	12.06	10.68	4.07	28.1	10	6.91	0.91	338.83	273.08	92.02
Jul-18	10.66	7.88	3.49	21.6	11.15	9.79	4.86	28.1	10.19	6.73	1.48	330.49	244.26	108.32
Aug-18	12.90	7.92	3.39	21.6	14.59	9.31	4.76	28.1	10.26	6.79	1.87	399.95	245.38	105.10
Sep-18	12.00	7.82	2.56	21.6	12.99	9.09	4.40	28.1	9.97	5.55	1.35	359.97	234.49	76.87
Oct-18	12.18	8.86	1.45	21.6	13.31	10.45	1.86	28.1	11.56	8.03	0.99	377.59	274.71	39.03
Nov-18	11.80	9.80	0.00	21.6	12.55	10.80	0.00	28.1	11.48	8.36	0.00	354.00	293.85	0.00
Dec-18	11.47	9.31	0.00	21.6	11.76	9.90	0.00	28.1	10.56	8.52	0.00	355.72	288.47	0.00

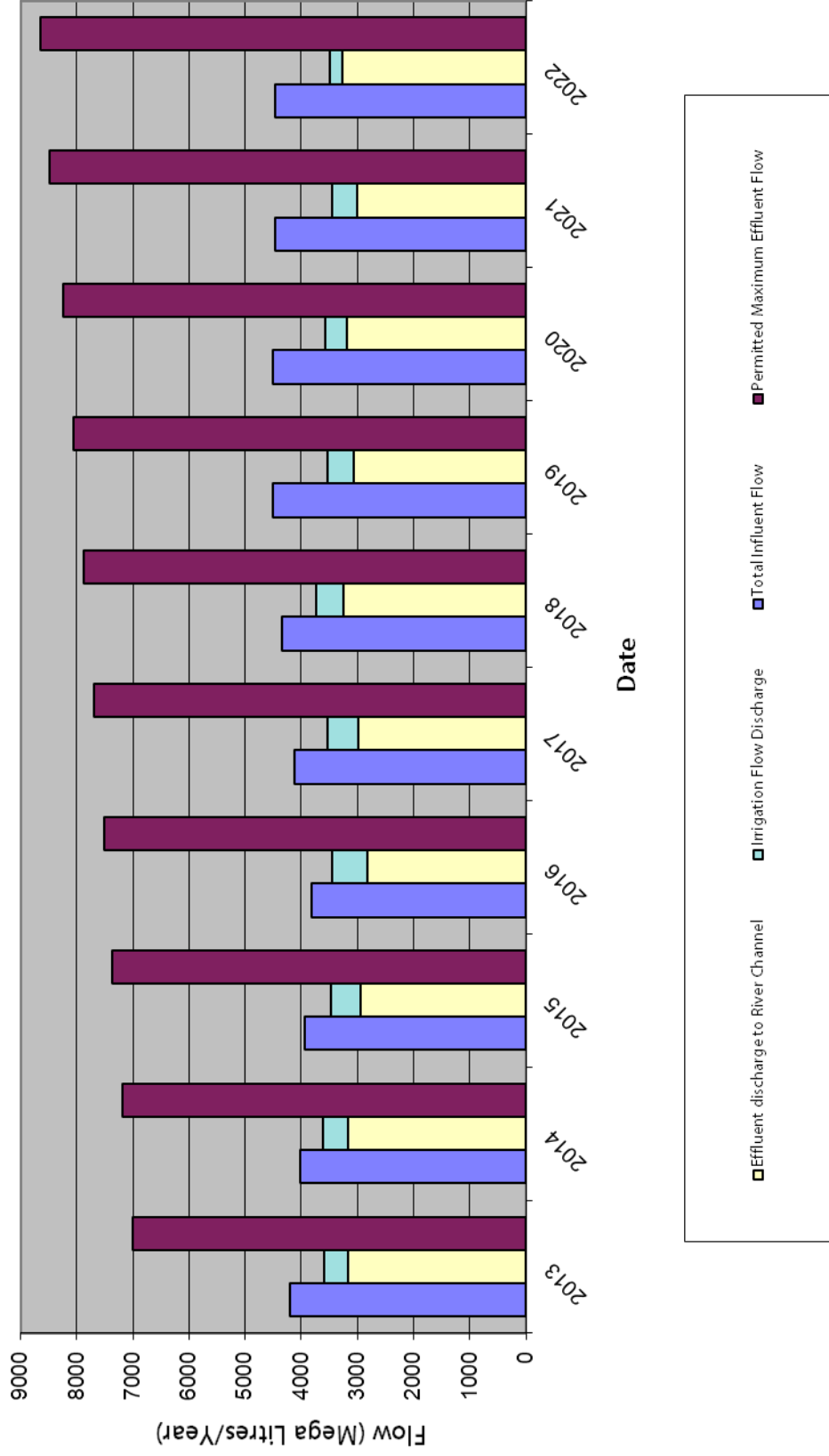
Daily Average, Daily Maximum, Daily Minimum and Total Flows; Influent, Effluent and Irrigation														
City of Penticton Advanced Wastewater Treatment Plant 2013-2022														
Date	Average Daily Flow (ML/Day)				Maximum Daily Flow (ML/Day)				Minimum Daily Flow (ML/Day)			Total Flow (Mega Litres)		
	Influent	Effluent	Irrigation ²	Annual Average Daily Flow (ML/day)	Influent	Effluent	Irrigation	Maximum Daily Flow (ML/day)	Influent	Effluent	Irrigation	Influent	Effluent	Irrigation
Jan-19	11.2	9.1	0.0	22.1	11.6	9.6	0.0	28.8	10.9	8.2	0.0	346.1	283.4	0.0
Feb-19	10.8	9.1	0.0	22.1	11.3	9.3	0.0	29.5	10.5	8.7	0.0	347.3	254.4	0.0
Mar-19	11.2	9.4	0.0	22.1	12.6	10.7	0.0	29.5	10.6	8.7	0.0	347.3	292.4	0.0
Apr-19	12.2	8.8	0.8	22.1	13.6	10.6	1.9	29.5	11.1	7.3	0.0	366.3	263.5	23.2
May-19	13.3	7.9	2.1	22.1	14.5	9.4	2.9	29.5	10.9	6.8	1.3	411.4	244.9	59.9
Jun-19	11.4	7.1	3.1	22.1	12.3	8.1	4.0	29.5	11.1	5.8	1.8	342.9	212.3	92.9
Jul-19	13.7	7.4	2.9	22.1	14.3	9.3	4.3	29.5	12.8	5.2	0.7	424.6	228.8	85.9
Aug-19	13.5	7.2	2.9	22.1	16.1	10.0	4.0	29.5	9.9	5.7	1.4	419.4	224.4	87.1
Sep-19	12.9	7.8	2.0	22.1	13.9	10.5	3.1	29.5	9.4	6.5	0.0	386.8	233.1	55.2
Oct-19	12.2	8.0	1.6	22.1	12.9	10.2	2.8	29.5	7.9	5.2	0.0	377.9	247.9	47.4
Nov-19	12.0	9.8	0.0	22.1	12.9	10.6	0.0	29.5	6.9	9.1	0.0	361.3	293.6	0.0
Dec-19	12.1	9.6	0.0	22.1	13.0	10.9	0.0	29.5	11.3	5.7	0.0	376.2	296.7	0.0
Jan-20	12.7	10.1	0.0	22.7	12.2	9.6	0.0	29.5	12.2	9.8	0.0	377.9	298.4	0.0
Feb-20	12.0	9.6	0.0	22.7	12.7	6.2	0.0	29.5	12.7	10.2	0.0	361.9	278.6	0.0
Mar-20	11.4	9.4	0.0	22.7	11.6	9.5	0.0	29.5	11.6	9.2	0.0	361.9	291.0	0.0
Apr-20	12.0	7.5	2.3	22.7	12.6	6.9	0.2	29.5	12.6	7.2	0.2	231.2	231.2	38.7
May-20	12.9	7.4	1.9	22.7	12.8	9.1	0.3	29.5	12.8	8.5	1.2	393.2	228.9	62.2
Jun-20	13.9	9.4	1.3	22.7	14.7	10.6	0.0	29.5	14.7	9.2	0.5	423.4	285.5	36.8
Jul-20	14.1	8.0	2.6	22.7	14.8	7.7	0.6	29.5	14.8	7.1	1.2	438.4	285.5	76.2
Aug-20	14.2	7.5	2.3	22.7	13.5	7.0	0.8	29.5	13.5	7.2	2.9	434.8	232.5	88.5
Sep-20	12.3	8.1	1.4	22.7	12.5	7.9	0.8	29.5	12.5	8.1	0.5	379.0	229.2	59.0
Oct-20	12.8	8.9	1.2	22.7	12.7	10.3	0.0	29.5	12.7	10.1	214.0	391.5	282.6	29.1
Nov-20	11.9	9.3	0.0	22.7	11.9	9.1	0.0	29.5	11.9	8.9	0.0	362.3	281.9	0.0
Dec-20	11.4	9.2	0.0	22.7	11.7	8.5	0.0	29.5	11.7	9.3	0.0	357.5	281.1	0.0
Jan-21	11.7	9.3	0.0	23.2	11.3	9.9	0.0	30.2	11.3	8.2	0.0	361.5	289.5	0.0
Feb-21	12.1	9.5	0.0	23.2	11.7	9.9	0.0	30.2	11.7	9.1	0.0	382.3	265.6	0.0
Mar-21	12.3	9.7	0.0	23.2	11.4	10.9	0.0	30.2	11.4	8.9	0.0	382.3	299.2	0.0
Apr-21	11.7	7.9	1.2	23.2	11.0	9.5	0.3	30.2	11.0	5.9	0.0	237.3	237.3	35.6
May-21	11.8	6.6	2.4	23.2	11.2	7.9	1.3	30.2	11.2	5.3	1.4	365.3	204.1	75.3
Jun-21	12.0	5.8	3.2	23.2	9.9	8.6	1.2	30.2	9.9	4.4	0.3	359.9	174.3	95.8
Jul-21	13.3	6.7	3.4	23.2	12.9	7.8	1.7	30.9	12.9	5.9	0.4	411.2	208.0	105.1
Aug-21	13.0	7.3	2.8	23.2	12.3	9.4	1.6	30.9	12.3	5.2	1.7	404.3	225.4	85.6
Sep-21	12.8	8.1	1.6	23.2	12.4	9.8	1.5	30.9	12.4	8.3	0.3	383.4	243.2	47.5
Oct-21	12.7	9.5	0.3	23.2	11.8	11.9	0.8	30.9	11.8	7.5	0.0	393.4	295.9	9.5
Nov-21	12.0	9.4	9.5	23.2	11.4	10.1	0.0	30.9	11.4	8.8	0.0	359.1	281.0	0.0
Dec-21	11.3	9.1	0.4	23.2	10.6	9.9	0.0	30.9	10.6	8.0	0.0	351.7	281.0	0.0
Jan-22	9.0	8.9	0.0	23.7	8.5	9.5	0.0	30.9	8.5	8.3	0.0	280.2	275.6	0.0
Feb-22	11.2	9.1	0.0	23.7	10.9	9.6	0.0	30.9	10.9	8.4	0.0	313.8	244.7	0.0
Mar-22	11.6	9.2	0.0	23.7	11.0	10.6	0.0	30.9	11.0	6.8	0.0	360.8	284.0	0.0
Apr-22	11.5	9.0	0.2	23.7	11.2	9.6	0.4	30.9	11.2	7.0	0.0	269.8	269.8	6.9
May-22	12.3	8.5	1.0	23.7	11.5	9.9	0.4	30.9	11.5	5.5	0.3	382.4	262.6	30.5
Jun-22	13.5	9.4	0.7	23.7	12.7	10.7	0.5	30.9	12.7	7.5	0.0	404.5	282.4	21.8
Jul-22	14.0	9.1	1.6	23.7	13.4	12.5	1.4	30.9	13.4	7.4	0.3	433.3	282.8	48.7
Aug-22	14.0	8.3	2.0	23.7	13.2	10.0	1.2	30.9	13.2	6.9	0.8	433.1	258.1	61.6
Sep-22	12.8	8.7	1.0	23.7	12.3	9.8	1.0	30.9	12.3	8.8	0.1	384.6	260.2	30.9
Oct-22	12.5	9.0	0.4	23.7	10.1	9.8	0.6	30.9	10.1	7.9	0.0	387.7	280.2	12.1
Nov-22	12.5	9.3	12.1	23.7	11.8	10.7	0.0	30.9	11.8	8.8	0.0	373.9	279.0	0.0
Dec-22	12.0	9.4	0.4	23.7	11.1	11.2	0.0	30.9	11.1	8.7	0.0	372.3	290.9	0.0
2013	11.42	8.68	1.22	19.2	18.09	12.77	4.56	25.0	8.82	3.86	0.00	4198.04	3165.37	436.01
2014	10.91	8.69	1.19	19.7	19.53	13.08	4.19	25.6	6.76	5.71	0.00	4022.20	3171.55	438.85
2015	10.73	8.05	1.45	20.2	13.35	10.56	4.32	26.2	9.08	4.44	0.00	3948.07	2936.09	532.20
2016	10.39	7.76	1.74	20.6	13.76	10.66	5.14	26.8	7.01	4.22	0.00	3824.15	2828.59	632.06
2017	11.12	8.17	1.54	21.1	14.71	10.19	4.82	27.5	8.14	5.38	0.00	4112.09	2980.87	555.53
2018	11.79	8.89	1.35	21.6	15.21	12.19	5.14	28.1	9.97	5.55	0.00	4334.77	3242.47	491.46
2019	12.15	8.41	1.27	22.1	16.10	10.68	4.30	28.8	14.80	5.23	0.00	4507.43	3075.41	451.54
2020	12.63	8.70	1.08	22.6	14.80	10.62	0.80	29.5	11.60	7.05	0.00	4513.05	3179.39	390.55
2021	12.20	8.23	2.07	23.2	12.90	11.93	1.72	30.2	9.90	4.35	0.00	4460.11	3004.43	454.41
2022	12.20	8.98	1.62	23.7	13.40	12.47	1.35	30.9	8.53	5.50	0.00	4471.36	3270.22	212.53

¹ Permit Values Originate From the BC Ministry of Environment Operational Certificate for the Penticton Advanced Wastewater Treatment Plant (12212) Section 1.1.1

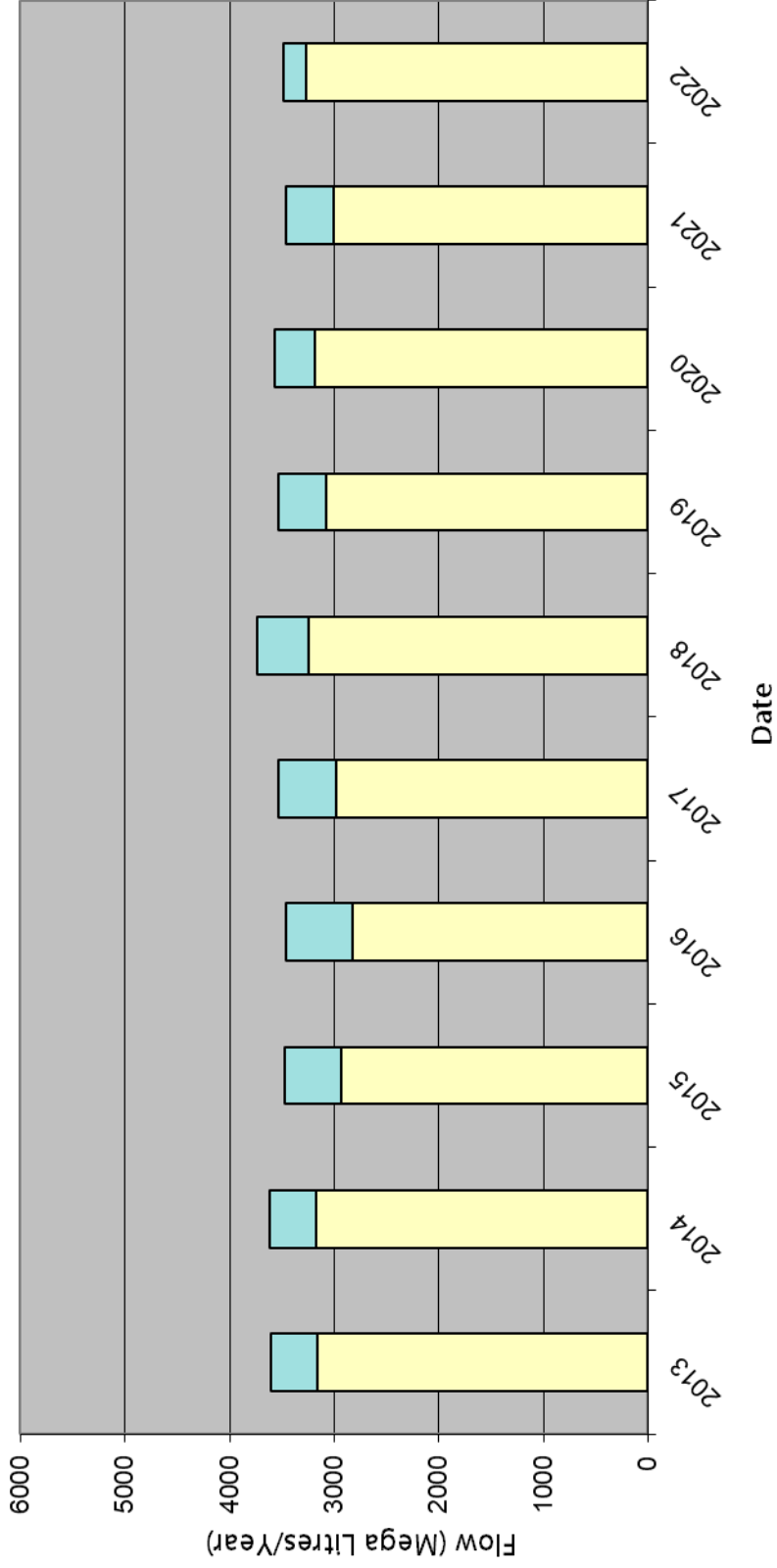
² Averages involving the Irrigation flow are calculated over the whole year, not just the summer season.

Influent, Effluent and Irrigation Flow WWTP 2013-2022 Compared With Permitted Maximum

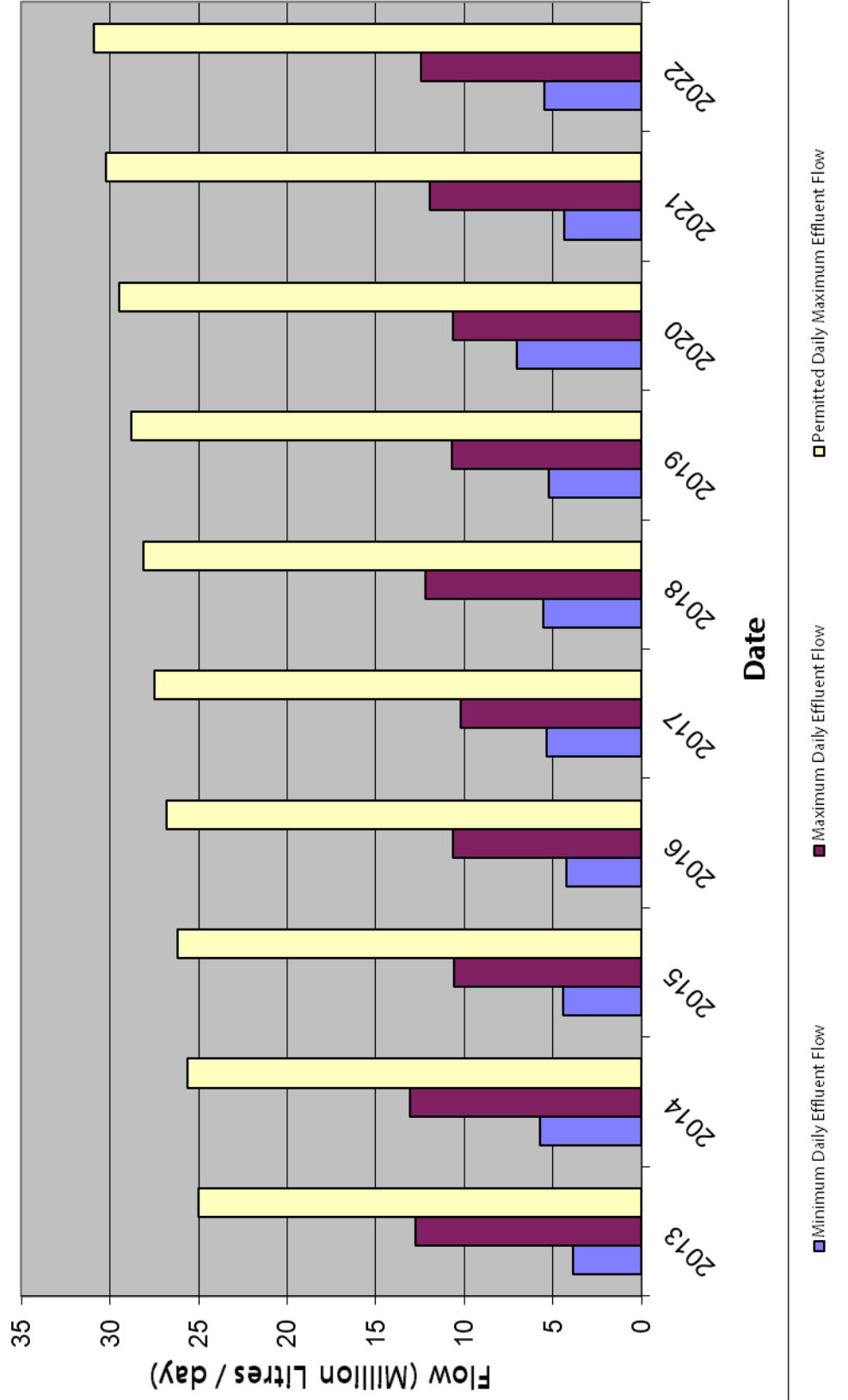
Allowable Effluent Flow City of Penticton Advanced Wastewater Plant



Effluent and Irrigation Flow WWTP 2013-2022 City of Penticton Advanced Wastewater Plant



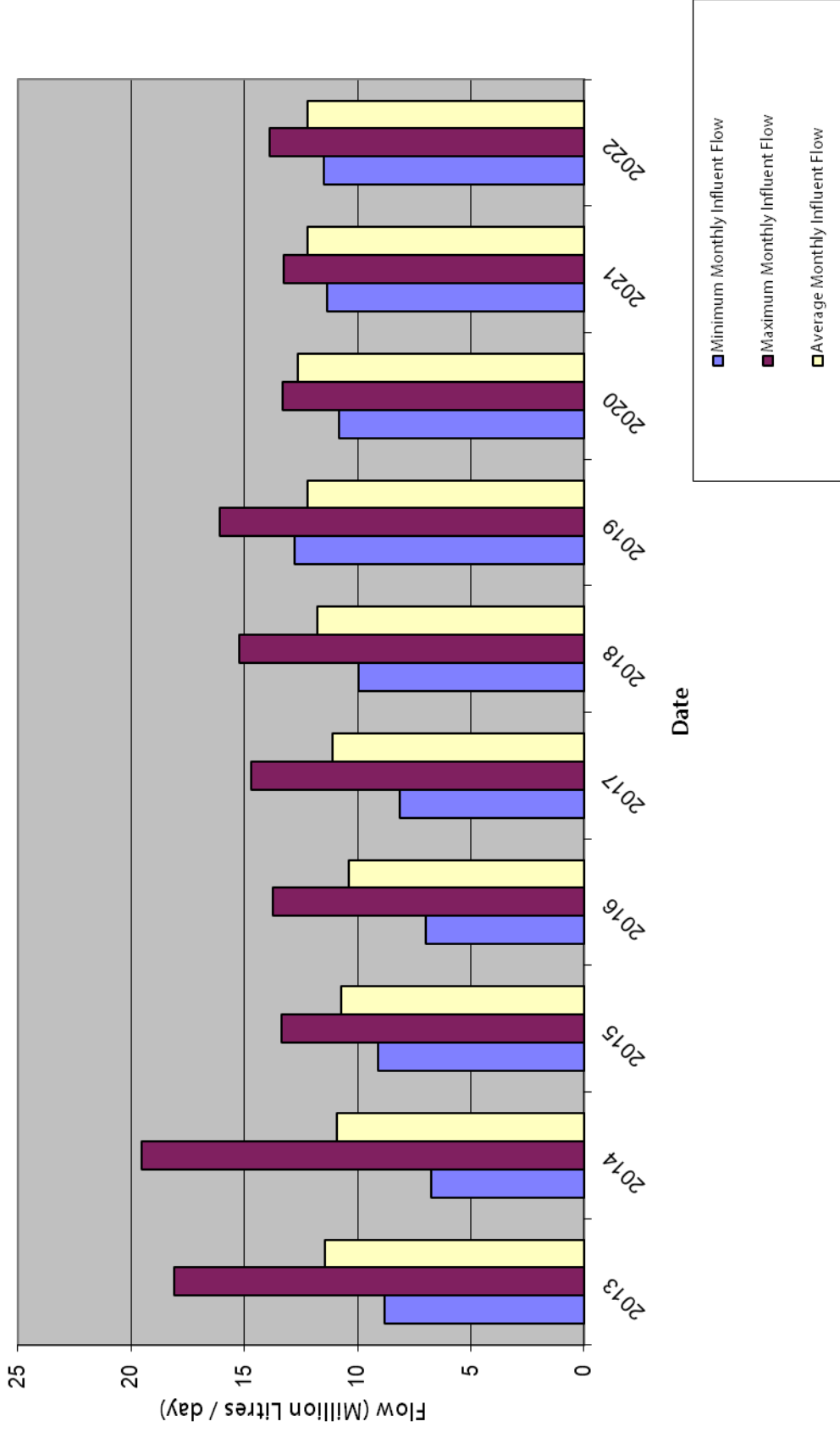
Minimum and Maximum Daily Effluent Flows; 2013-2022 Compared to Permitted Maximum Daily Allowable Effluent Flow City of Penticton Advanced Wastewater Plant



**Monthly Average, Monthly Maximum, Monthly Minimum Flows; Influent, Effluent and Irrigation
City of Penticton Advanced Wastewater Treatment Plant 2013-2022**

Date	Average Monthly Flow (ML/Day)			Max Monthly Flow (ML/Day)			Minimum Monthly Flow (ML/Day)		
	Influent	Effluent	Irrigation	Influent	Effluent	Irrigation	Influent	Effluent	Irrigation
2013	11.42	8.68	1.22	18.09	12.77	4.56	8.82	3.86	0.00
2014	10.91	8.69	1.19	19.53	13.08	4.19	6.76	5.71	0.00
2015	10.73	8.05	1.45	13.35	10.56	4.32	9.08	4.44	0.00
2016	10.39	7.76	1.74	13.76	10.66	5.14	7.01	4.22	0.00
2017	11.12	8.17	1.54	14.71	10.19	4.82	8.14	5.38	0.00
2018	11.79	8.89	1.35	15.21	12.19	5.14	9.97	5.55	0.00
2019	12.21	8.43	1.27	16.10	10.87	4.30	12.80	5.23	0.00
2020	12.65	8.69	1.07	13.30	11.17	1.55	10.80	4.77	0.00
2021	12.20	8.23	2.16	13.26	9.65	3.39	11.34	5.81	0.00
2022	12.20	9.00	0.60	13.90	10.30	1.40	11.50	7.40	0.00

Minimum Monthly, Maximum Monthly, and Average Monthly Influent Flows; 2013 - 2022
City of Penticton Advanced Wastewater Plant



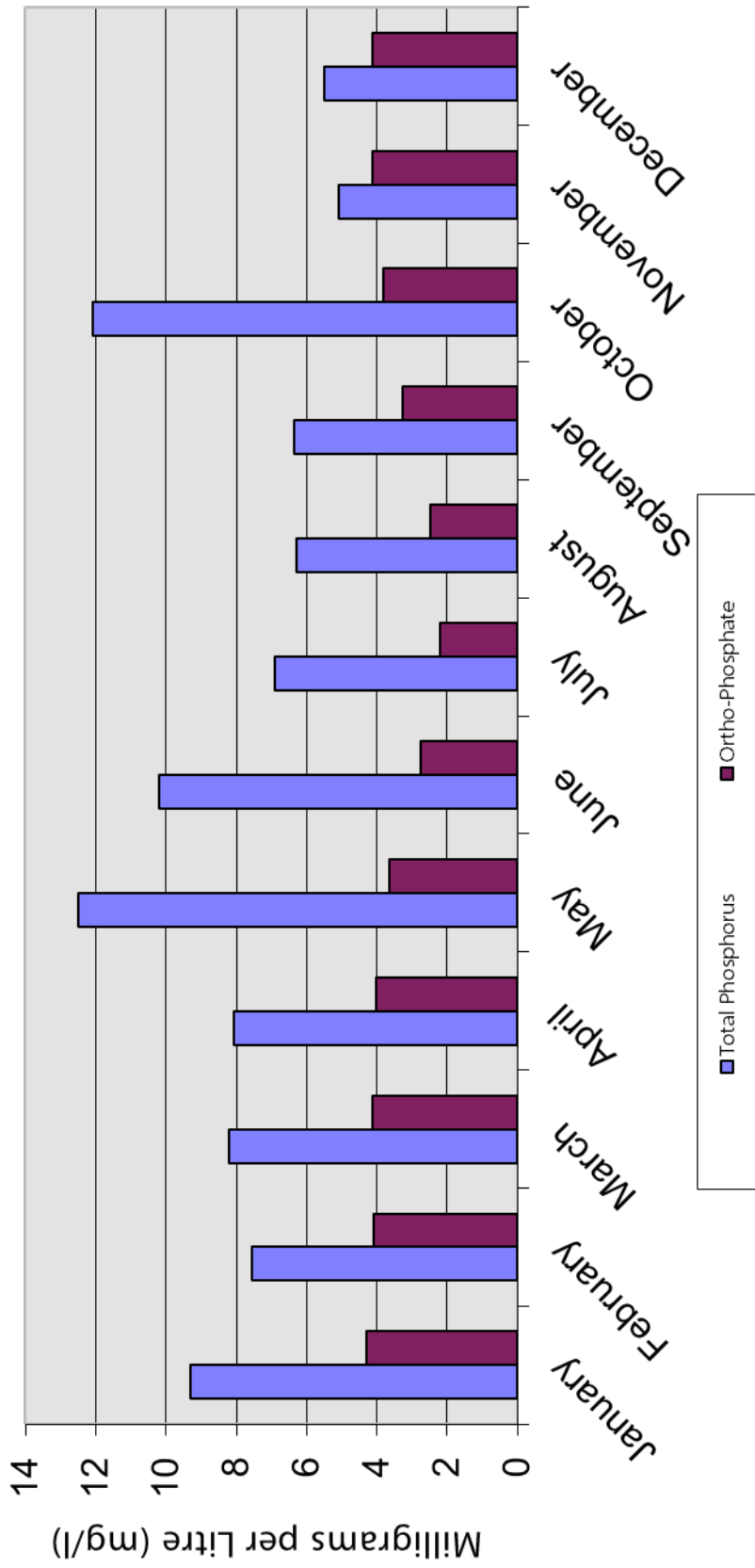
Appendix B.2.

Ortho & Total Phosphorus Data

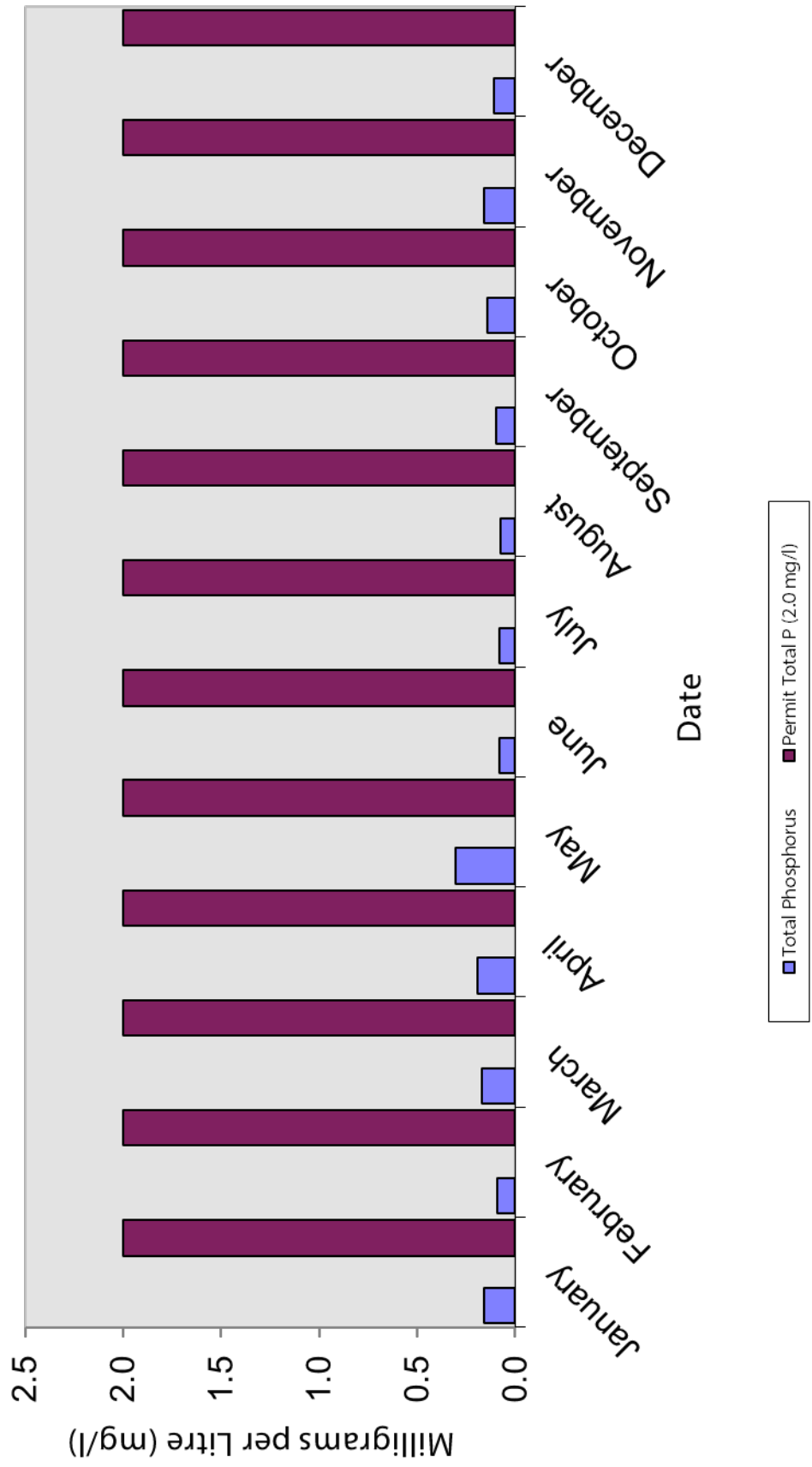
**Monthly Average Ortho and Total Phosphorus; Influent and Effluent
City of Penticton Advanced Wastewater Treatment Plant 2021**

Date	Ortho Phosphate as P			Influent			Total Phosphorous			Effluent			Total Phosphorous			Reduction Efficiency
	Average mg/L ¹	Std Dev.	n	Average mg/L ¹	kgs / month	n	Std Dev.	n	Average mg/L ¹	kgs / month	n	Std Dev.	n	Permit Annual Average Total P (Yearly Average) ²	kgs / month	
January	4.3	0.6	31	9.3	2611.1	1	n/a	31	0.06	0.03	31	0.16	0.05	0.20	44.5	98.3
February	4.1	0.4	28	7.6	2372.3	1	n/a	28	0.02	0.03	28	0.09	0.02	0.20	23.2	99.0
March	4.1	0.3	29	8.2	2965.8	1	n/a	31	0.06	0.05	31	0.17	0.08	0.20	47.0	98.4
April	4.0	0.4	30	8.1	2786.0	1	n/a	30	0.08	0.05	30	0.19	0.08	0.20	53.0	98.1
May	3.6	0.3	31	12.5	4780.0	1	n/a	31	0.15	0.40	31	0.30	0.21	0.20	80.6	98.3
June	2.7	0.9	30	10.2	4125.9	1	n/a	30	0.04	0.04	30	0.08	0.02	0.20	22.9	99.4
July	2.2	0.3	31	6.9	2985.4	1	n/a	31	0.04	0.04	31	0.08	0.01	0.20	22.7	99.2
August	2.5	0.6	31	6.3	2724.2	1	n/a	31	0.06	0.07	31	0.07	0.01	0.20	18.7	99.3
September	3.3	0.3	30	6.4	2442.2	1	n/a	30	0.05	0.03	30	0.10	0.02	0.20	26.0	98.9
October	3.8	1.0	31	12.1	4691.2	1	n/a	31	0.07	0.04	31	0.14	0.02	0.20	38.3	99.2
November	4.1	0.4	30	5.1	1895.7	1	n/a	30	0.07	0.04	30	0.16	0.08	0.20	44.2	97.7
December	4.1	0.2	31	5.5	2047.7	1	n/a	31	0.05	0.03	31	0.11	0.02	0.20	31.2	98.5
Annual Avg.	3.6	0.5	30.3	8.2	3036	1.0	n/a	30	0.06	0.07	30	0.14	0.05	0.20	37.7	98.8
Annual Total			363		36427	12		365			365				452	

Monthly Average Influent Total Phosphorus & Ortho-Phosphate levels City of Penticton Advanced Wastewater Treatment Plant 2022

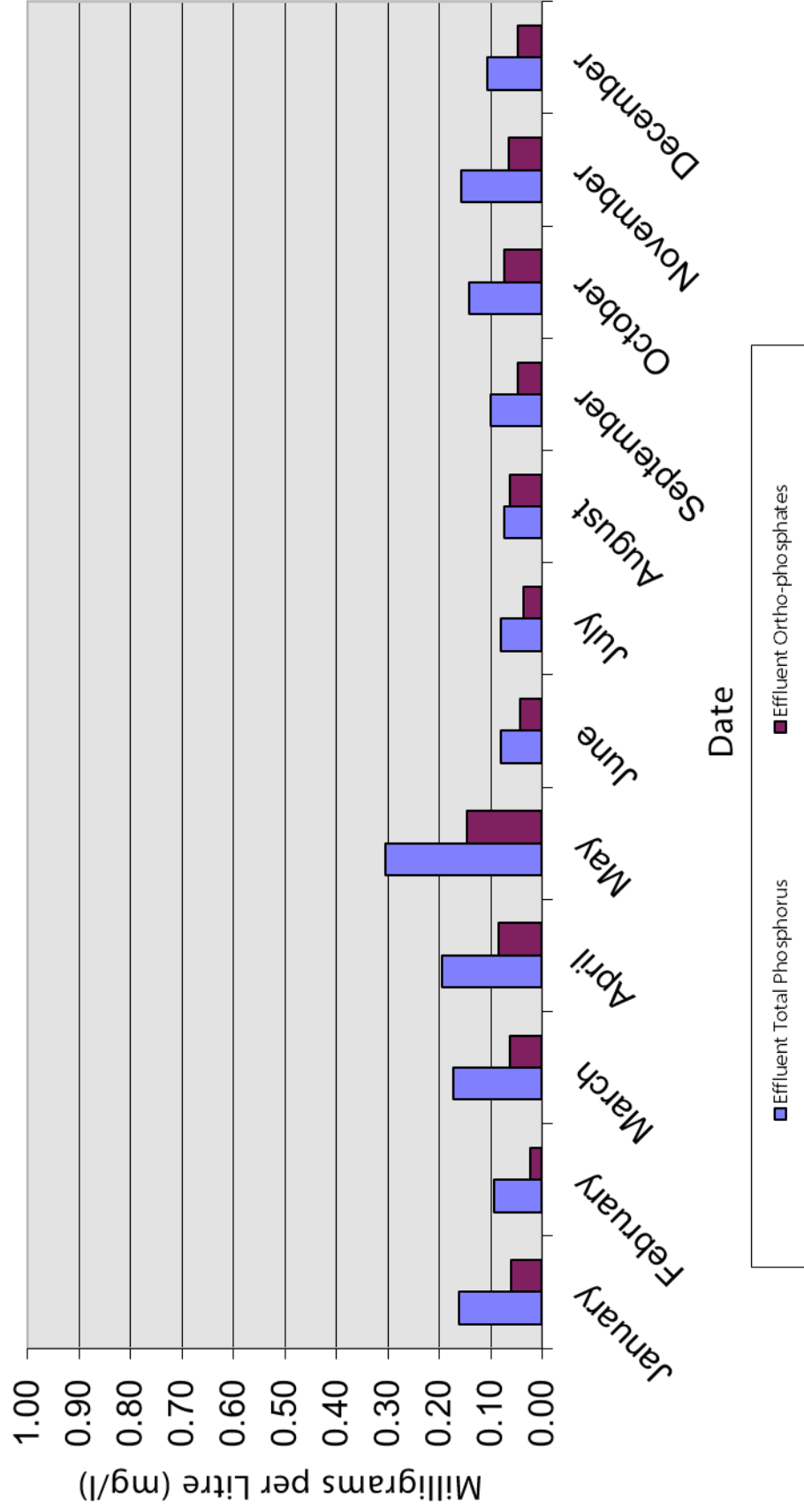


Monthly Average Effluent Total Phosphorus Compared to Permit.
City of Penticton Advanced Wastewater Treatment Plant 2022



Monthly Average Effluent Total Phosphorus & Ortho-phosphate Levels.

City of Penticton Advanced Wastewater Treatment Plant 2022



**Monthly Ortho and Total Phosphorus; Okanagan River
City of Penticton Advanced Wastewater Treatment Plant 2022**

Date	Upstream				Downstream			
	Ortho Phosphate as P ¹		Total Phosphorous ¹		Ortho Phosphate as P ¹		Total Phosphorous ¹	
	mg/L	n	mg/L	n	mg/L	n	mg/L	n
January	< 0.0050	1	< 0.050	1	< 0.0050	1	< 0.050	1
February	< 0.0050	1	< 0.050	1	< 0.0050	1	< 0.050	1
March	< 0.0050	1	0.012	1	< 0.0050	1	0.006	1
April	< 0.0050	1	0.015	1	< 0.0050	1	< 0.050	1
May	< 0.0050	1	0.012	1	< 0.0050	1	< 0.050	1
June	< 0.0050	1	0.010	1	< 0.0050	1	0.010	1
July	< 0.0050	1	0.010	1	< 0.0050	1	0.011	1
August	< 0.0050	1	< 0.050	1	< 0.0050	1	0.006	1
September	< 0.0050	1	< 0.050	1	< 0.0050	1	< 0.050	1
October	< 0.0050	1	0.011	1	< 0.0050	1	< 0.050	1
November	< 0.0050	1	< 0.050	1	< 0.0050	1	< 0.050	1
December	0.0025	1	0.011	1	0.0025	1	0.003	1
Annual Average	0.0000	1	0.006	1	0.0000	1	0.0028	1
Annual Total		12		12		12		12

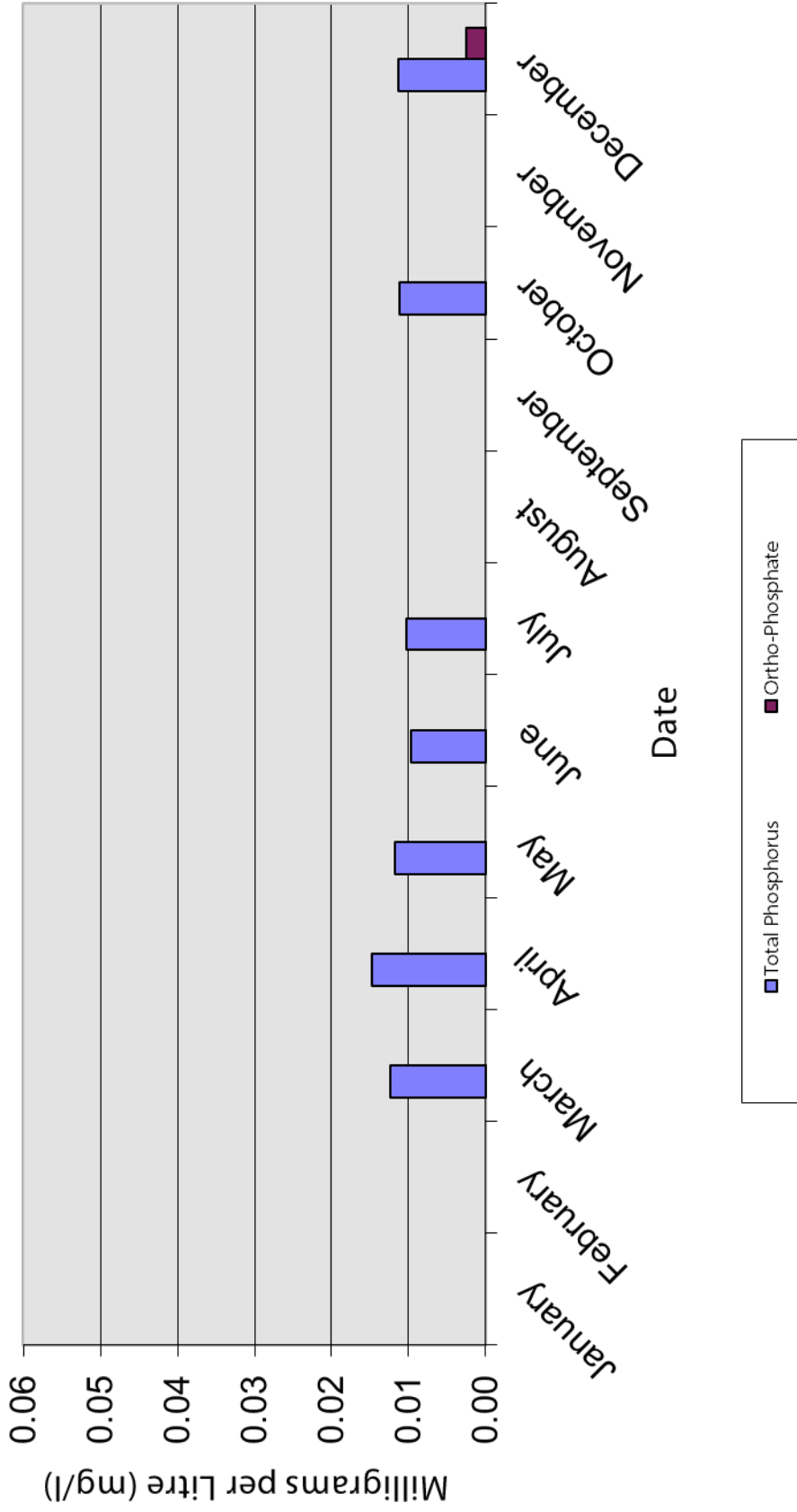
Upstream Sampling Location = East bank of Okanagan River from loading stairs at Coyote Cruises.

Downstream Sampling Location = West bank of Okanagan River from landing stairs upstream of Shingle Creek

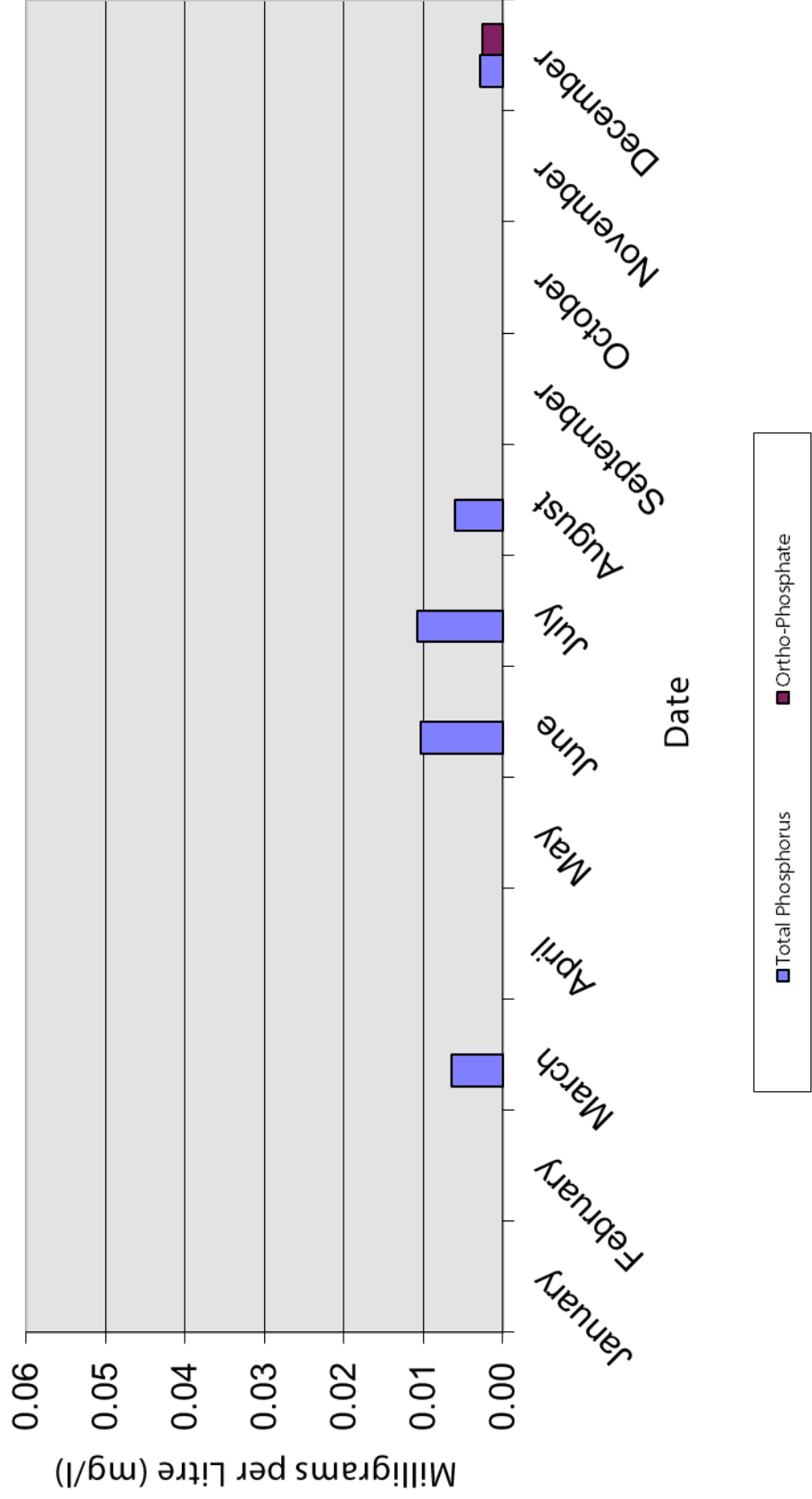
¹ Less than data values were included in the monthly & annual average calculations. They were assumed to be (0.00 mg/l).

² Monthly Averages

Upstream Okanagan River Channel Monthly Average
Total Phosphorus & Ortho-Phosphate levels
City of Penticton Advanced Wastewater Treatment Plant 2022



Downstream Okanagan River Channel Monthly Average
Total Phosphorus & Ortho-Phosphate levels
City of Penticton Advanced Wastewater Treatment Plant 2022



Appendix B.3.

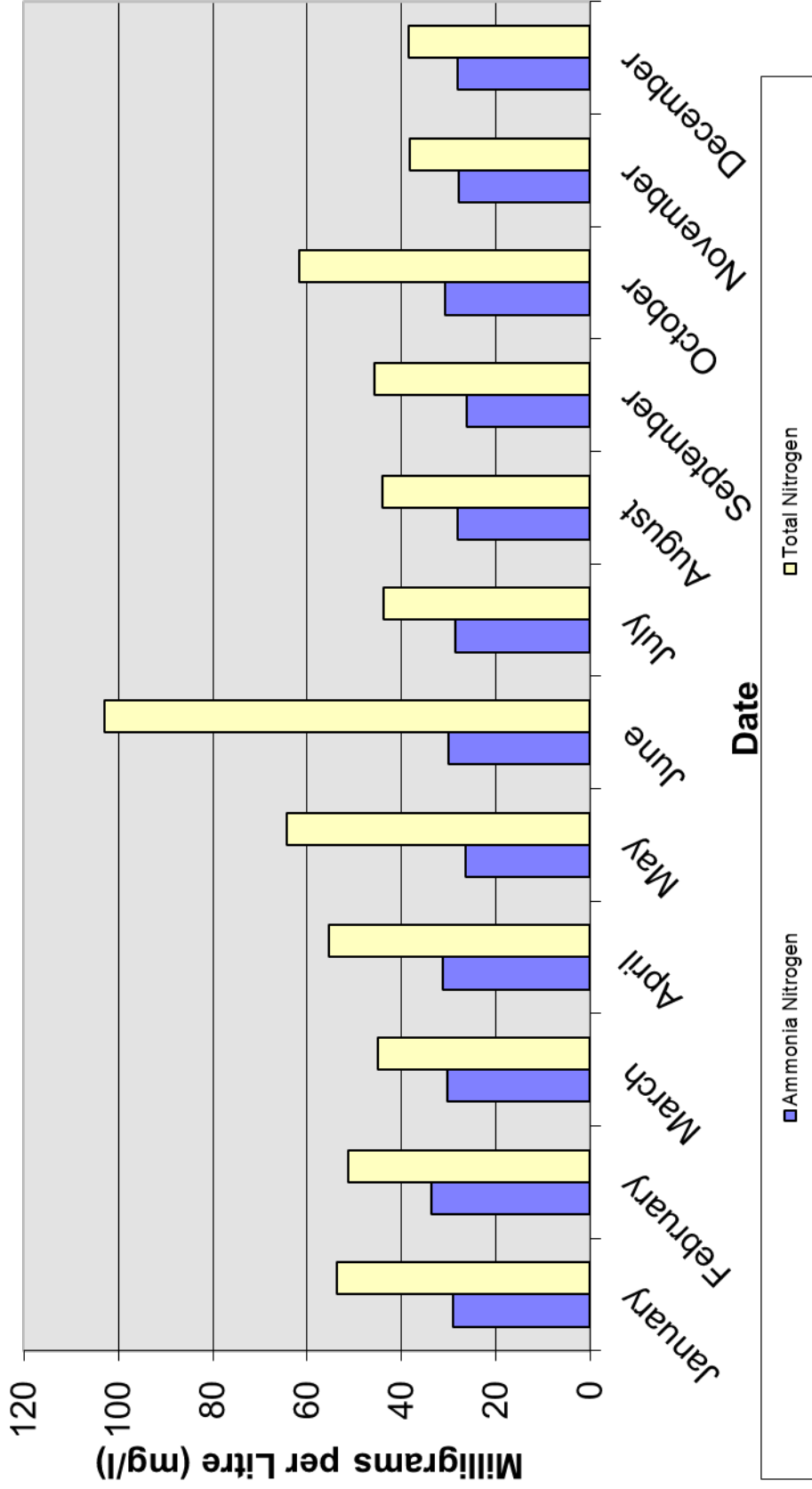
Ammonia, Total Nitrogen and Nitrate + Nitrite Data

**Monthly Average Ammonia, Total Nitrogen and Nitrite + Nitrate; Influent and Effluent
City of Penticton Advanced Wastewater Treatment Plant 2021**

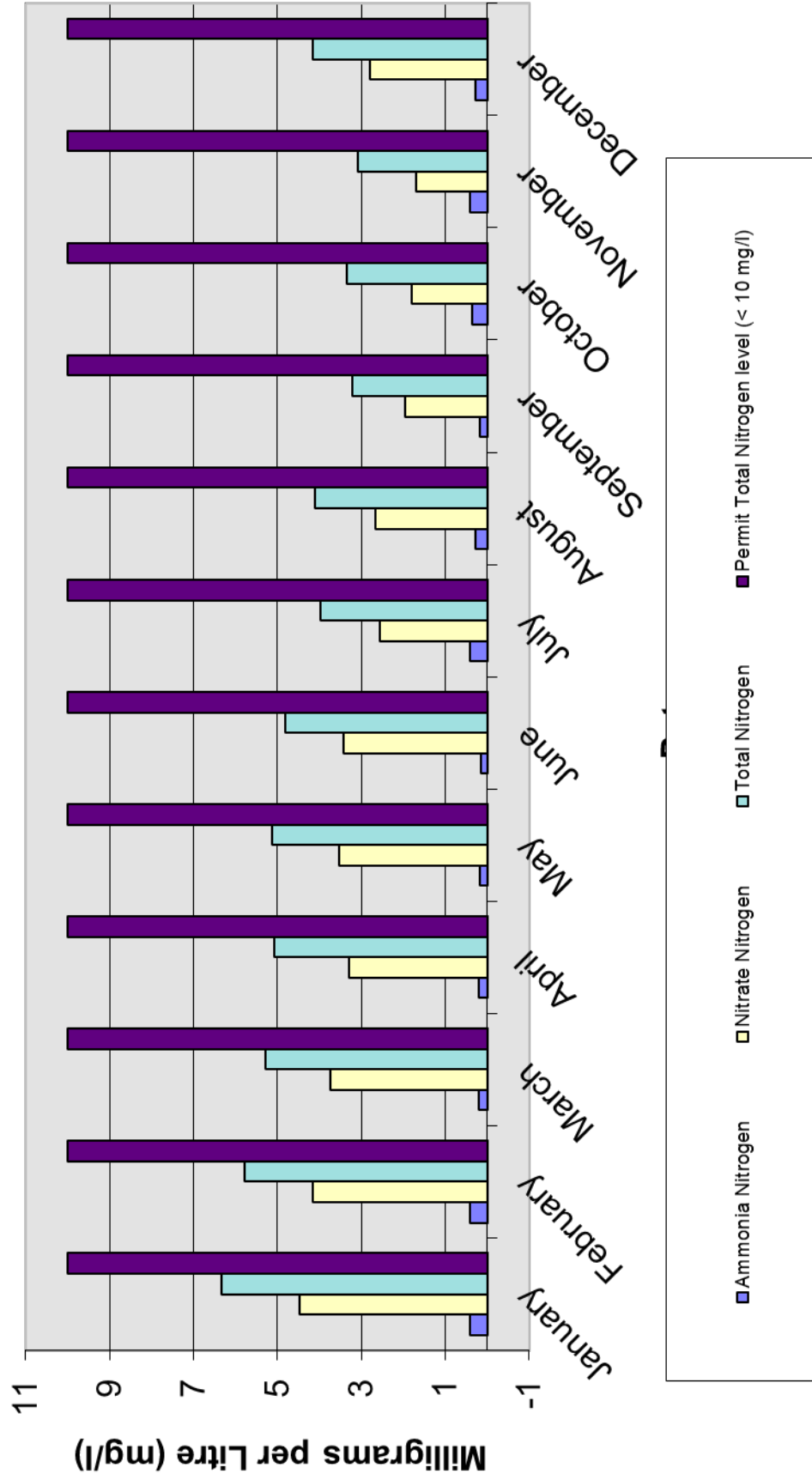
Date	Ammonia						Influent Nitrate/Nitrite						Total Nitrogen						Effluent Nitrate/Nitrite						Total Nitrogen						Reduction Efficiency	
	(NH ₃) as N						(NO ₂ + NO ₃) as N						(NH ₃) as N						(NO ₂ + NO ₃) as N												Total N	
	Average mg/L	Std Dev.	n	Average mg/L	Std Dev.	n	Average mg/L	Std Dev.	n	Average mg/L	Std Dev.	n	Average mg/L	Std Dev.	n	Average mg/L	Std Dev.	n	Average mg/L	Std Dev.	n	Average mg/L	Std Dev.	n	kg / month	kg / month	kg / month	kg / month	mg/l	%		
January	29.1	3.2	31	0.9	0.2	31	53.7	N/A	N/A	15045	0.42	0.55	31	4.47	0.57	31	6.3	1745	10.0	88.4												
February	33.7	2.7	28	0.7	0.3	28	51.3	N/A	N/A	18509	0.42	0.35	28	4.16	0.20	28	5.8	1413	10.0	92.4												
March	30.4	2.0	31	0.9	0.5	31	45.1	N/A	N/A	16272	0.21	0.17	31	3.74	0.30	31	5.3	1444	10.0	91.1												
April	31.2	2.4	30	1.0	0.4	30	55.3	N/A	N/A	19067	0.19	0.10	30	3.28	0.21	30	5.1	1371	10.0	92.8												
May	26.3	6.3	31	1.4	0.3	31	64.4	N/A	N/A	24627	0.17	0.12	31	3.52	0.25	31	5.1	1350	10.0	94.5												
June	30.0	4.2	23	1.6	0.4	23	103.0	N/A	N/A	41664	0.14	0.07	30	3.41	0.38	30	4.8	1361	10.0	96.7												
July	28.5	1.0	31	1.6	0.1	31	43.9	N/A	N/A	19022	0.41	0.35	31	2.55	0.69	31	4.0	1112	10.0	94.2												
August	28.1	1.3	31	1.2	0.4	31	44.1	N/A	N/A	19100	0.27	0.29	31	2.67	0.58	31	4.1	1063	10.0	94.4												
September	26.3	1.2	30	1.2	0.2	30	45.7	N/A	N/A	17576	0.18	0.09	30	1.94	0.40	30	3.2	836	10.0	95.2												
October	30.7	4.7	31	0.6	0.2	31	61.7	N/A	N/A	23921	0.37	0.23	31	1.80	0.38	31	3.3	937	10.0	96.1												
November	27.8	1.5	30	1.2	0.2	30	38.3	N/A	N/A	14320	0.41	0.35	30	1.68	0.51	30	3.1	860	10.0	94.0												
December	28.1	2.1	31	1.1	0.6	26	38.6	N/A	N/A	14371	0.27	0.22	31	2.80	0.22	31	4.2	1210	10.0	91.6												
Annual Average	29.2	2.7	29.8	1.1	0.3	29.4	53.8	N/A	N/A	20291	0.29	0.24	365	3.00	0.39	365	4.5	1225	10.0	93.5												
Annual Total			358			353			243493			365							14701													

² Permit Values Originate From the BC Ministry of Environment Operational Certificate for the Penticton Advanced Wastewater Treatment Plant (12212) Section 1.1.2

**Monthly Average Influent Ammonia Nitrogen,
& Total Nitrogen levels
City of Penticton Advanced Wastewater Treatment Plant 2022**



**Monthly Average Effluent Ammonia Nitrogen, Nitrate Nitrogen & Total Nitrogen levels Compared to Permit
City of Penticton Advanced Wastewater Treatment Plant 2022**



Monthly Ammonia, Total Nitrogen and Nitrate + Nitrite; Okanagan River City of Penticton Advanced Wastewater Treatment Plant 2022

Date	Upstream						Downstream					
	Ammonia ² NH ₃ as N		Nitrate/Nitrite (NO ₃ ⁻ + NO ₂ ⁻) as N		Total Nitrogen		Ammonia ² NH ₃ as N		Nitrate/Nitrite (NO ₃ ⁻ + NO ₂ ⁻) as N		Total Nitrogen	
	mg/L	n	mg/L	n	mg/L	n	mg/L	n	mg/L	n	mg/L	n
January	0.00	1	0.086	1	0.33	1	0.00	1	0.081	1	0.28	1
February	0.00	1	0.045	1	0.24	1	0.00	1	0.067	1	0.22	1
March	0.00	1	0.055	1	0.26	1	0.00	1	0.076	1	0.25	1
April	0.00	1	0.066	1	0.23	1	0.00	1	0.067	1	0.29	1
May	0.00	1	0.051	1	0.24	1	0.00	1	0.061	1	0.31	1
June	0.00	1	< 0.0100	1	0.54	1	0.00	1	0.005	1	0.25	1
July	0.00	1	< 0.0100	1	0.50	1	0.00	1	0.005	1	0.24	1
August	< 0.050	1	< 0.0100	1	0.22	1	< 0.050	1	0.005	1	0.18	1
September	< 0.050	1	< 0.0100	1	0.25	1	< 0.050	1	0.005	1	0.25	1
October	< 0.050	1	< 0.0100	1	0.18	1	< 0.050	1	0.005	1	0.22	1
November	0.91	1	0.072	1	1.17	1	0.51	1	0.077	1	0.74	1
December	0.70	1	0.036	1	0.79	1	0.52	1	0.072	1	0.83	1
Annual¹	0.18		0.06		0.41		0.11		0.04		0.34	
Annual Total		12		12		12		12		12		12

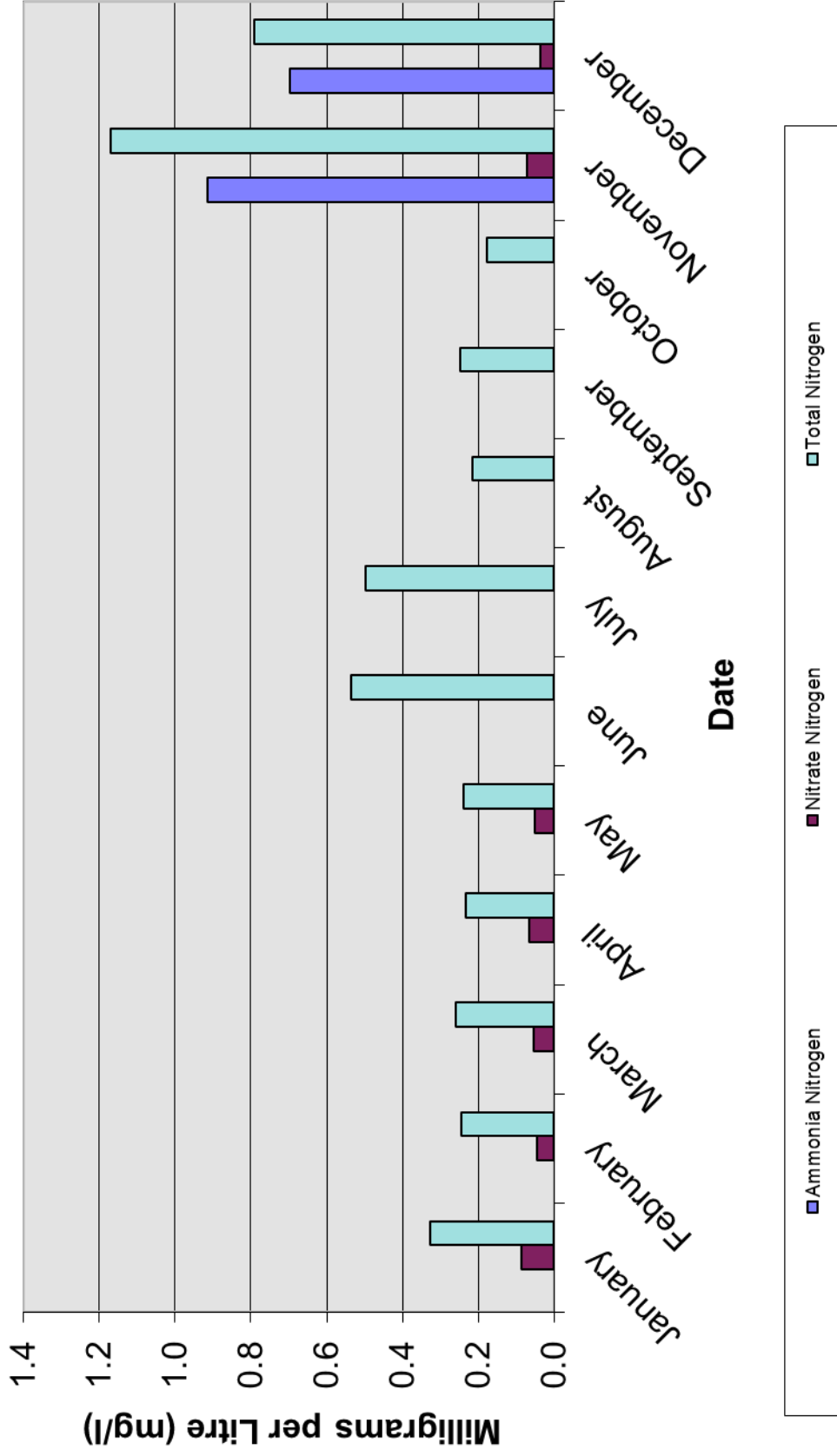
¹Total Nitrogen (mg/L) = Monthly Average TKN + Monthly Average NO₃⁻ + NO₂⁻

² Less than data values were included in the monthly & annual average calculations. They were assumed to be (0.00 mg/l).

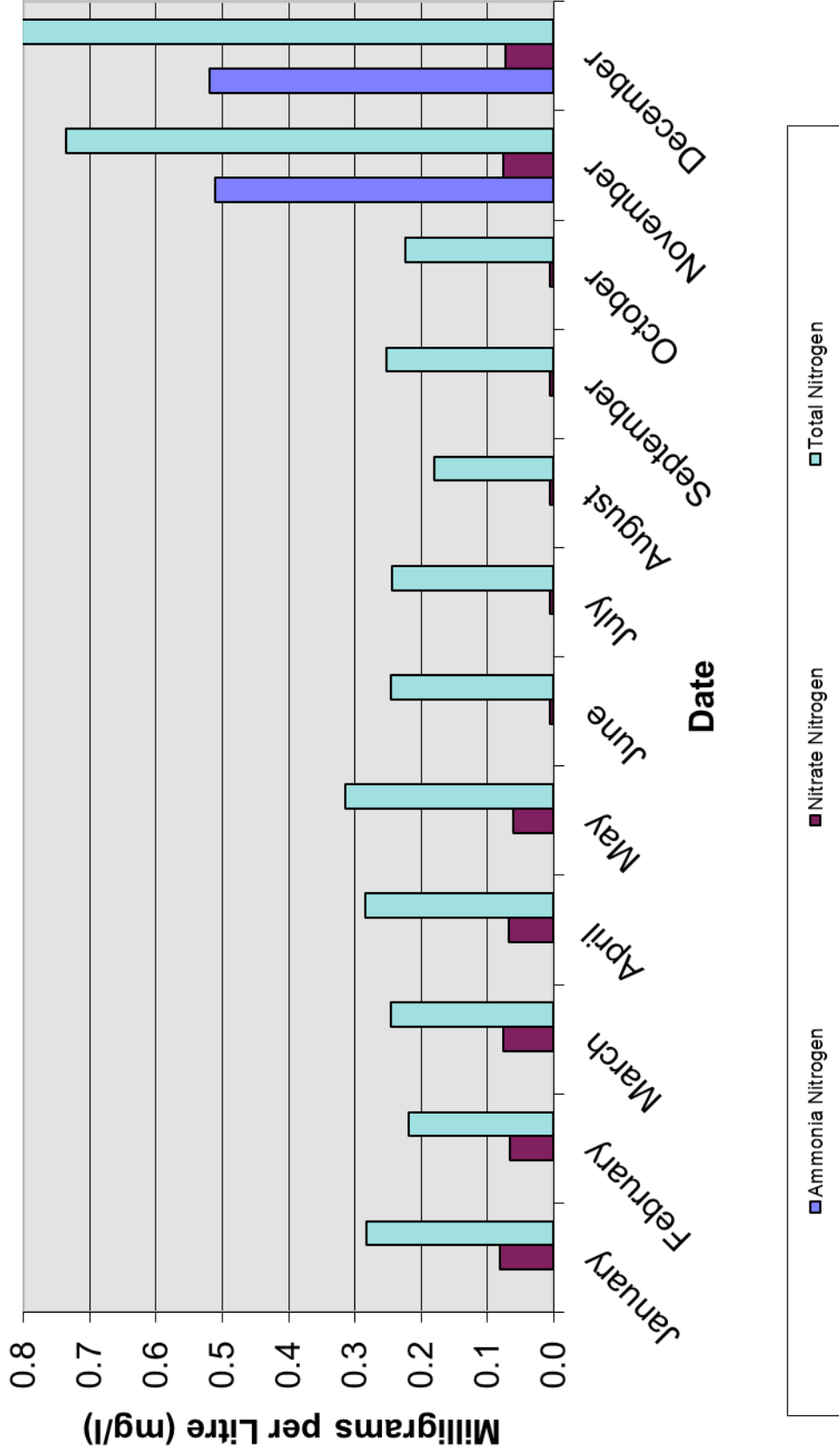
Upstream Sampling Location = East bank of Okanagan River from loading stairs at Coyote Cruises.

Downstream Sampling Location = West bank of Okanagan River from landing stairs upstream of Shingle Creek.

Upstream Okanagan River Channel Monthly Average Ammonia Nitrogen,
 Nitrate Nitrogen & Total Nitrogen levels
 City of Penticton Advanced Wastewater Treatment Plant 2022



Downstream Okanagan River Channel Monthly Average Ammonia Nitrogen,
Nitrate Nitrogen & Total Nitrogen levels
City of Penticton Advanced Wastewater Treatment Plant 2022



Appendix B.4.

Total Chlorine Data

**Monthly Average Total Chlorine Residual
City of Penticton Advanced Wastewater
Treatment Plant 2022**

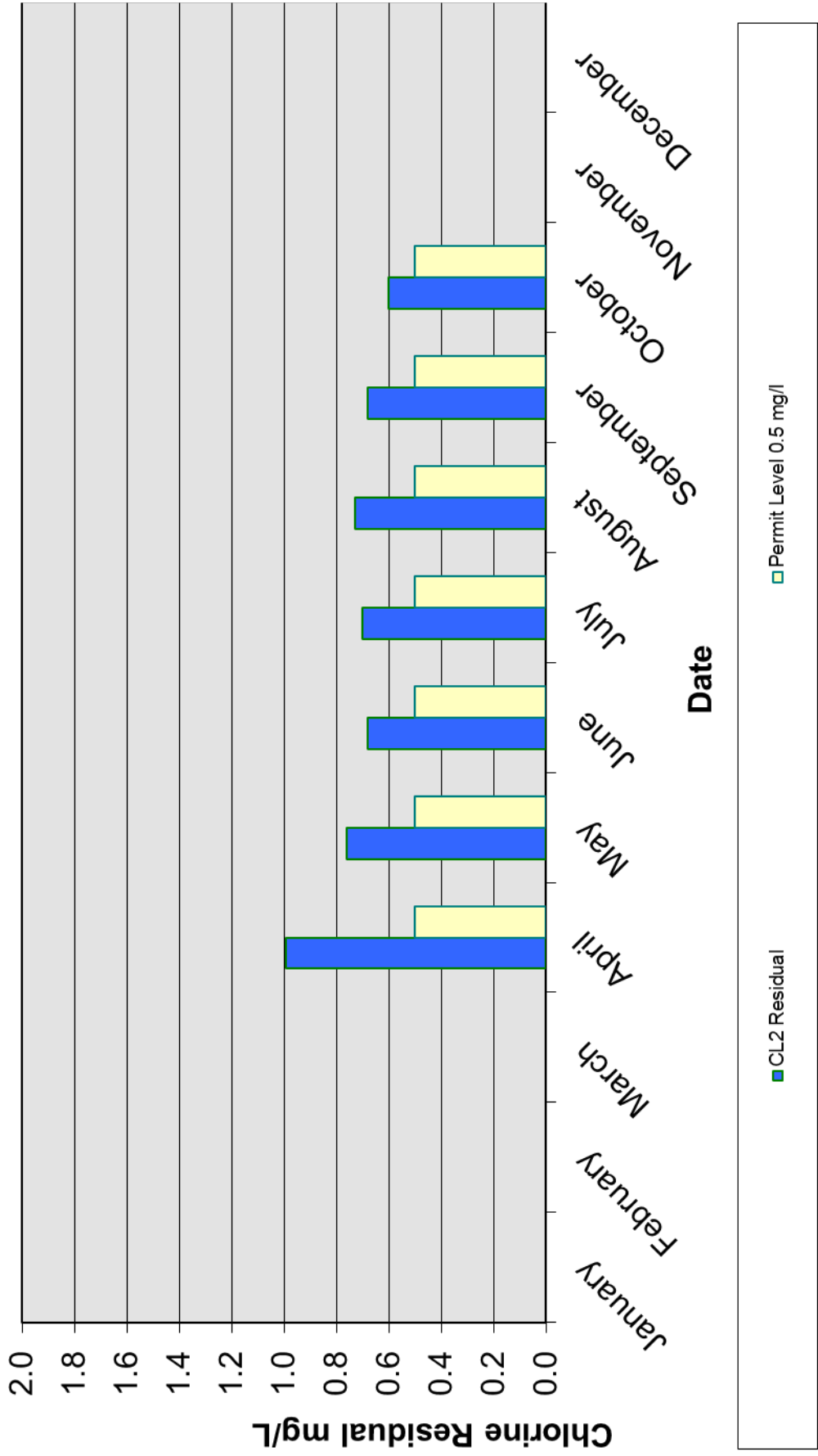
Date	Irrigation	
	Average mg/L ¹	Permit Total Chlorine Residual > 0.50 mg/l ³
January		
February		
March		
April	0.99	0.5
May	0.76	0.5
June	0.68	0.5
July	0.70	0.5
August	0.73	0.5
September	0.68	0.5
October	0.60	0.5
November		
December		
Annual Average	0.74	0.5
Annual Total		

¹ Monthly Averages

² Permit Values Originate From the BC Ministry of Environment Operational Certificate for the Penticton Advanced Wastewater Treatment Plant (12212) Section 3.11.2

³ Permit Values Originate From the BC Ministry of Environment Municipal Wastewater Regulation

**Reclaimed Water Chlorine Residual
City of Penticton Advanced Wastewater Treatment Plant 2022**



Appendix B.5.

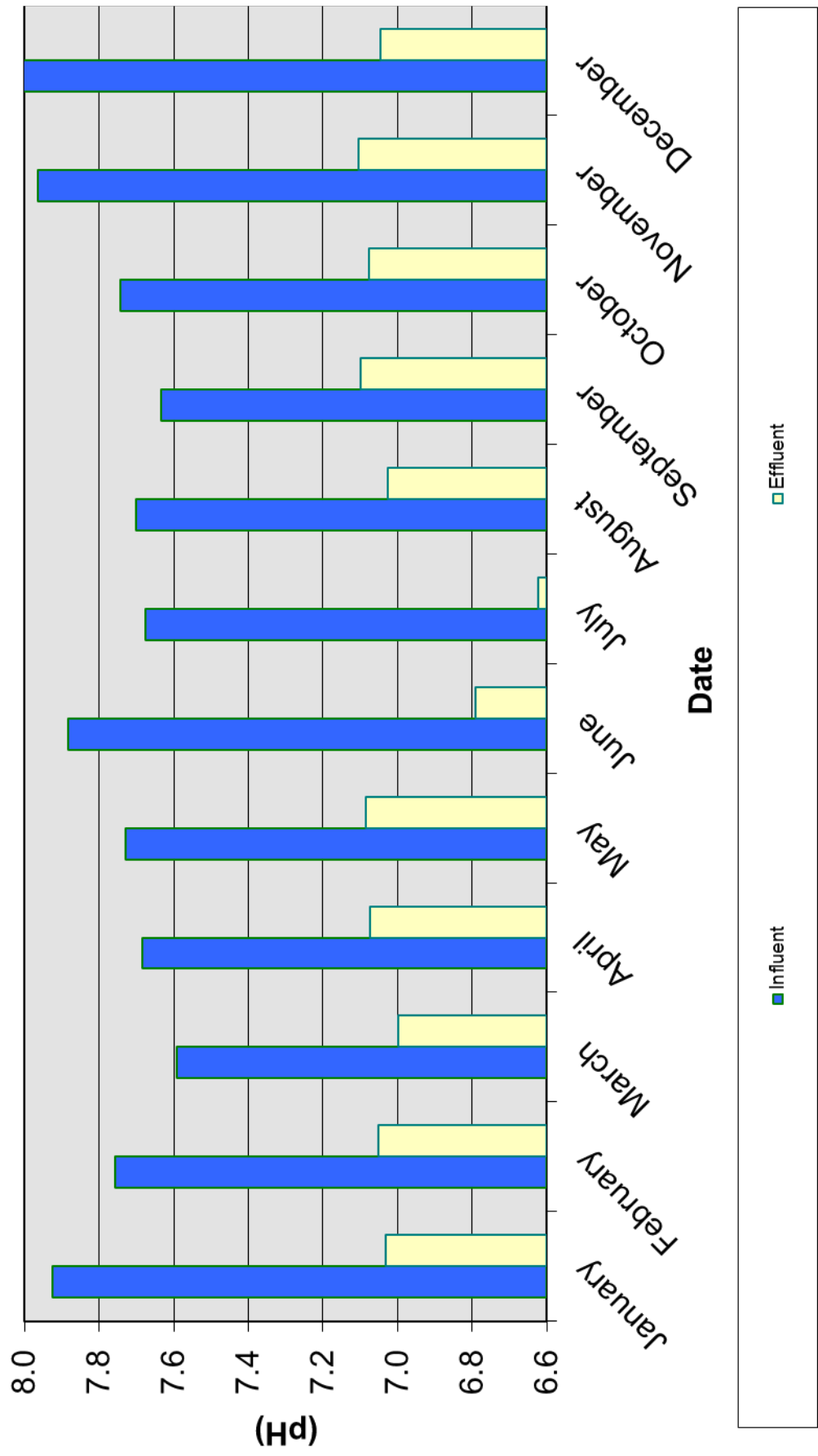
pH Data

**Monthly pH; Influent, Effluent and Okanagan River
City of Penticton Advanced Wastewater Treatment Plant 2022**

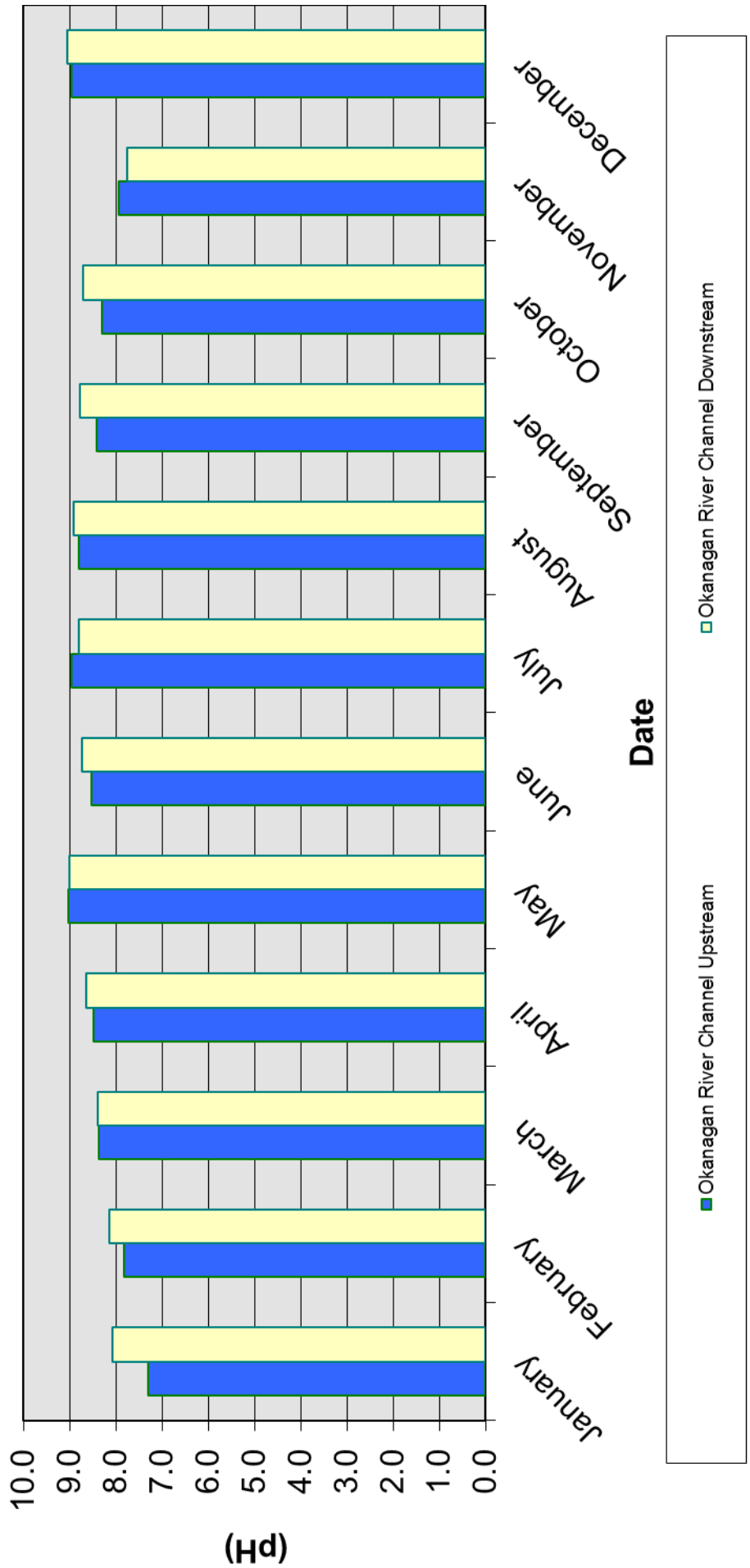
	Wastewater Profile						Okanagan River		Okanagan River	
	Influent			Effluent			Upstream		Downstream	
	Average pH	Std Dev.	n	Average pH	Std Dev.	n	pH	n	pH	n
January	7.9	0.29	5	7.0	0.09	31	7.3	1	8.1	1
February	7.8	0.38	4	7.1	0.09	28	7.8	1	8.1	1
March	7.6	0.23	4	7.0	0.06	31	8.4	1	8.4	1
April	7.7	0.20	4	7.1	0.04	30	8.5	1	8.7	1
May	7.7	0.27	5	7.1	0.09	31	9.0	1	9.0	1
June	7.9	0.60	11	6.8	0.14	30	8.5	1	8.7	1
July	7.7	0.17	13	6.6	1.21	31	9.0	1	8.8	1
August	7.7	0.17	5	7.0	0.03	31	8.8	1	8.9	1
September	7.6	0.27	4	7.1	0.05	30	8.4	1	8.8	1
October	7.7	0.19	5	7.1	0.05	31	8.3	1	8.7	1
November	8.0	0.14	4	7.1	0.08	30	7.9	1	7.8	1
December	8.0	0.34	4	7.0	0.11	31	9.0	1	9.0	1
Annual Average	7.8	0.27	6	7.0	0.17		8.41	1	8.59	1
Annual Total			68			365		12		12

Upstream Sampling Location = East bank of Okanagan River from loading stairs at Coyote Cruises.
Downstream Sampling Location = West bank of Okanagan River from landing stairs upstream of Shingle Creek.

**Influent & Effluent pH levels
City of Penticton Advanced Wastewater Treatment Plant 2022**



Okanagan River Channel Upstream & Downstream pH levels City of Penticton Advanced Wastewater Treatment Plant 2022



Appendix B.7.

Total Suspended Solids Data

**Monthly Total Suspended Solids; Influent, Effluent and Okanagan River
City of Penticton Advanced Wastewater Treatment Plant 2022**

Date	Influent			Effluent				Reduction Efficiency	Okanagan River	
	Average mg/L	Std Dev.	n	Average mg/L	Std Dev.	n	Permit TSS < 10.0 mg/l ²		Upstream ¹ TSS mg/L	Downstream ¹ TSS mg/L
January	235	20	31	3.8	1.4	12	10	2.4	5.0	
February	306	48	28	3.5	2.5	28	10	1.0	1.0	
March	360	85	28	3.4	0.8	31	10	0.4	0.8	
April	281	51	31	3.4	0.4	30	10	1.0	2.0	
May	299	75	5	5.7	1.3	31	10	1.0	10.7	
June	309	27	3	3.8	4.0	30	10	1.0	1.0	
July	376	46	4	1.4	1.3	31	10	3.8	2.0	
August	299	26	4	6.0	2.3	31	10	0.2	0.6	
September	279	34	3	8.2	3.6	30	10	1.0	1.0	
October	322	65	5	8.9	4.3	31	10	<9.4	<9.8	
November	244	17	4	12.5	7.6	30	10	<2.0	<2.0	
December	225	9	4	14.2	5.1	31	10	<2.0	<2.0	
Annual	294	24	12.5	6.2	5.3	28.8		1.31	2.68	
Annual Total			150			346			12	

¹ Less than data values were included in the monthly & annual average calculations. They were assumed to be the same as the lowest detection limit (0.4 mg/l).

² Permit Value Originates From the BC Ministry of Environment Operational Certificate for the Penticton Advanced Wastewater Treatment Plant (12212) Section 1.1.2

Upstream Sampling Location = East bank of Okanagan River from loading stairs at Coyote Cruises.

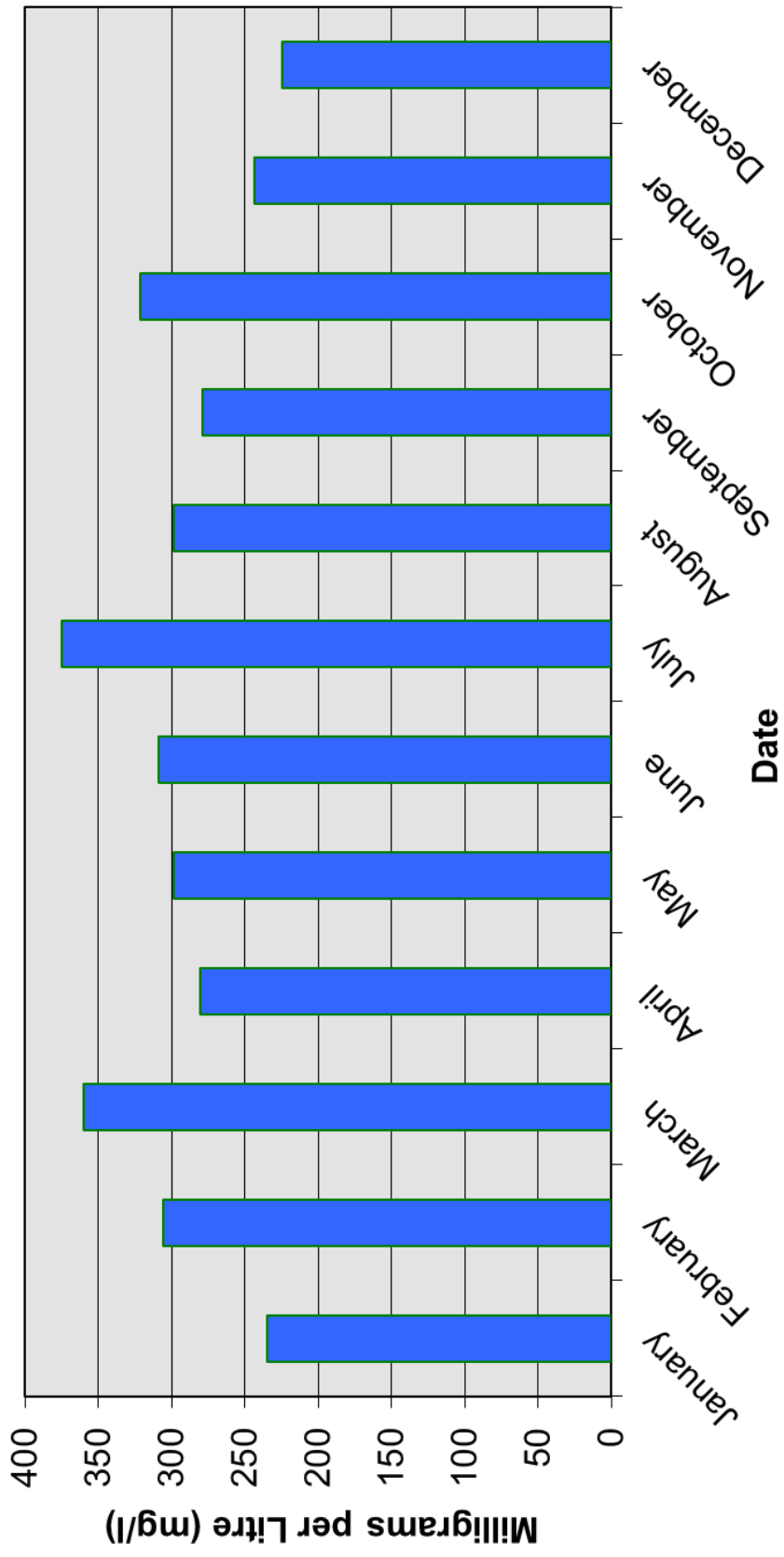
Downstream Sampling Location = West bank of Okanagan River from landing stairs upstream of Shingle Creek.

TSS Loading from Annual Averaged 2022 Data

Influent = 1,330,489 kg/year Effluent = 20,374 kg/year

Loading Reduction = 98.5%

**Influent Total Suspended Solids level
City of Penticton Advanced Wastewater Treatment Plant 2022**



Influent TSS

Appendix B.6.

BOD & COD Data

Monthly 5-Day Biochemical Oxygen Demand (BOD₅) and Monthly Average Chemical Oxygen Demand (COD); Influent and Effluent

City of Penticton Advanced Wastewater Treatment Plant 2022

Date	Influent			Effluent ¹					
	COD ²			BOD ₅			COD ²		
	Average mg/L	Std Dev.	n	Average mg/L	n	Permit BOD < 10.0 mg/l ³	Average mg/L	Std Dev.	n
January	497	185	4	6.90	1	10	35.4	2.8	31
February	564	96	4	9.50	1	10	36.0	3.7	28
March	535	146	5	5.30	1	10	38.4	3.6	31
April	625	215	4	3.30	1	10	39.9	2.8	30
May	789	248	5	2.00	1	10	34.5	0.7	31
June	640	69	5	2.00	1	10	53.9	19.0	30
July	585	184	4	2.00	1	10	83.2	58.2	31
August	658	326	4	2.00	1	10	44.6	6.4	31
September	460	102	3	2.00	1	10	50.9	5.0	30
October	502	178	4	2.00	1	10	43.8	2.1	31
November	479	117	4	2.00	1	10	35.8	7.5	30
December	575	118	5	7.00	1	10	47.7	13.6	31
Annual Average	576	165.3	4		1		45.3	10.4	30
Annual Total			51		12				365

¹ Less than data values were included in the monthly & annual average calculations. They were assumed to be the same as the lowest detection limit (2 mg/l).

² COD methodology Manganese colorimetric method developed by Hach.

³ Permit Value Originates From the BC Ministry of Environment Operational Certificate for the Penticton Advanced Wastewater Treatment Plant (12212) Section 1.1.2

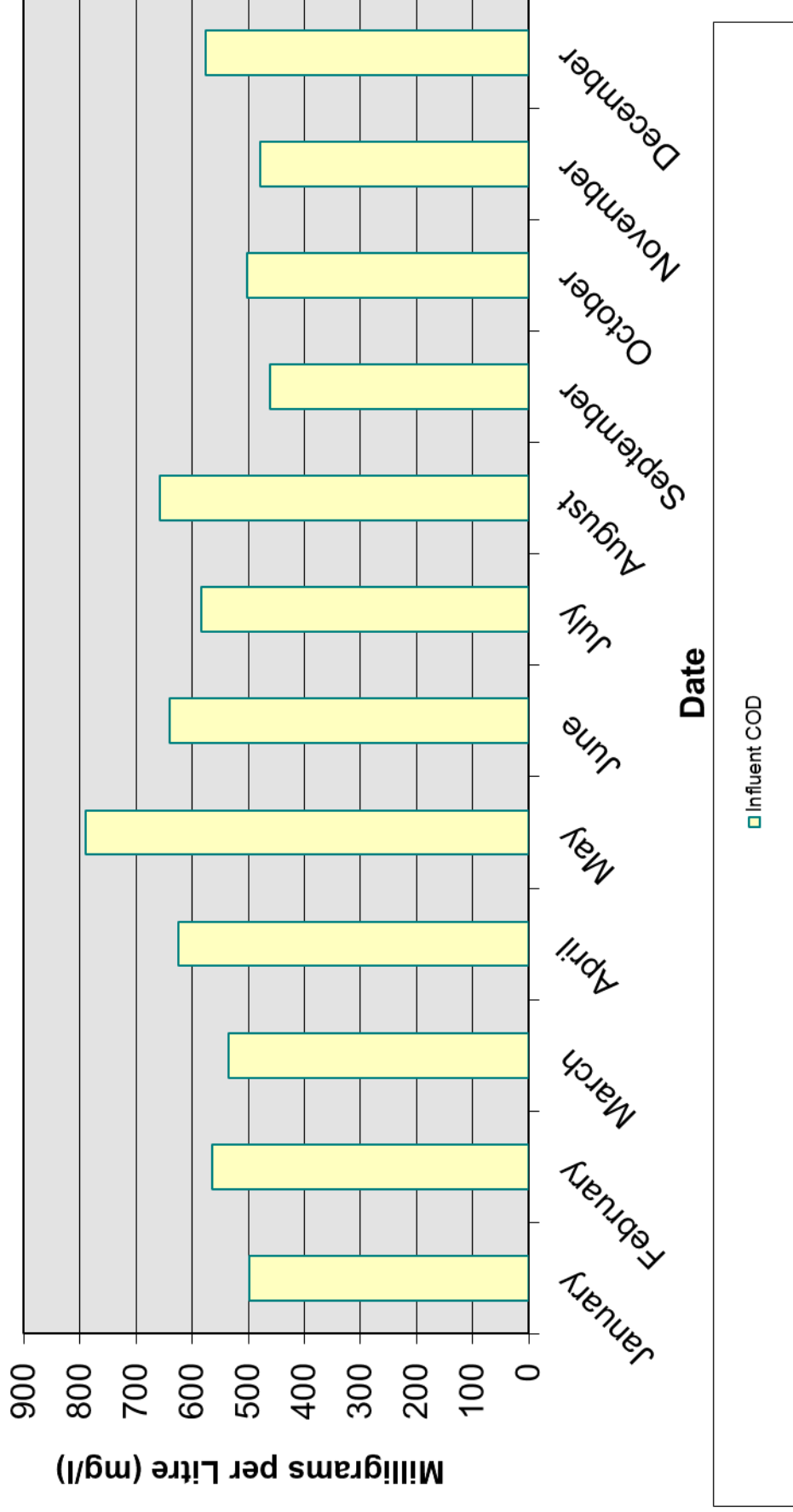
TBOD Loading from Annual Averaged 2018 Data

Influent = 118,833 kg/yr. Effluent = 654 kg/yr. Loading Reduction = 99.4%

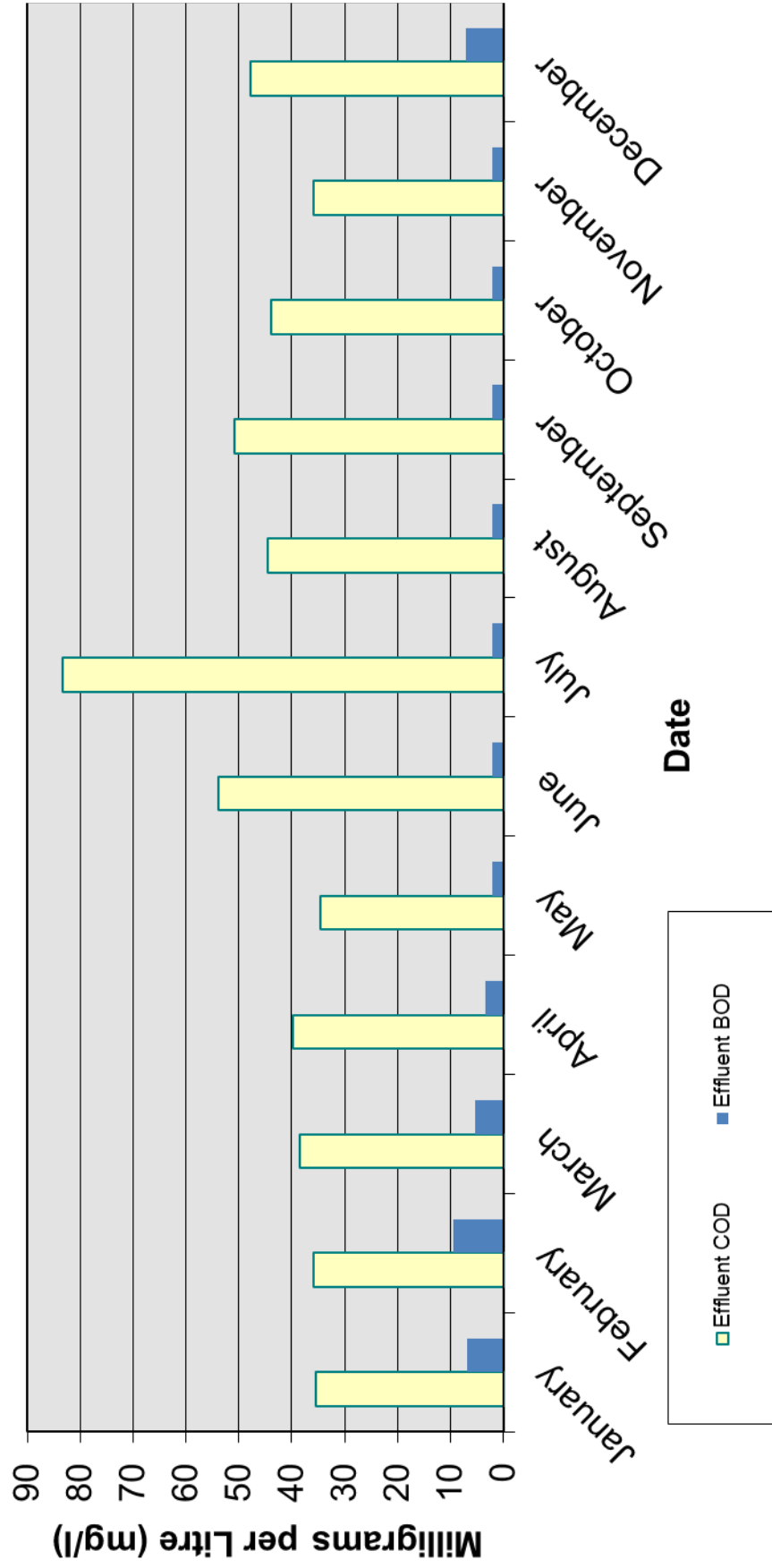
COD Loading from Annual Averaged 2018 Data

Influent = 260,183 kg/yr. Effluent = 14,823 kg/yr. Loading Reduction = 94.3%

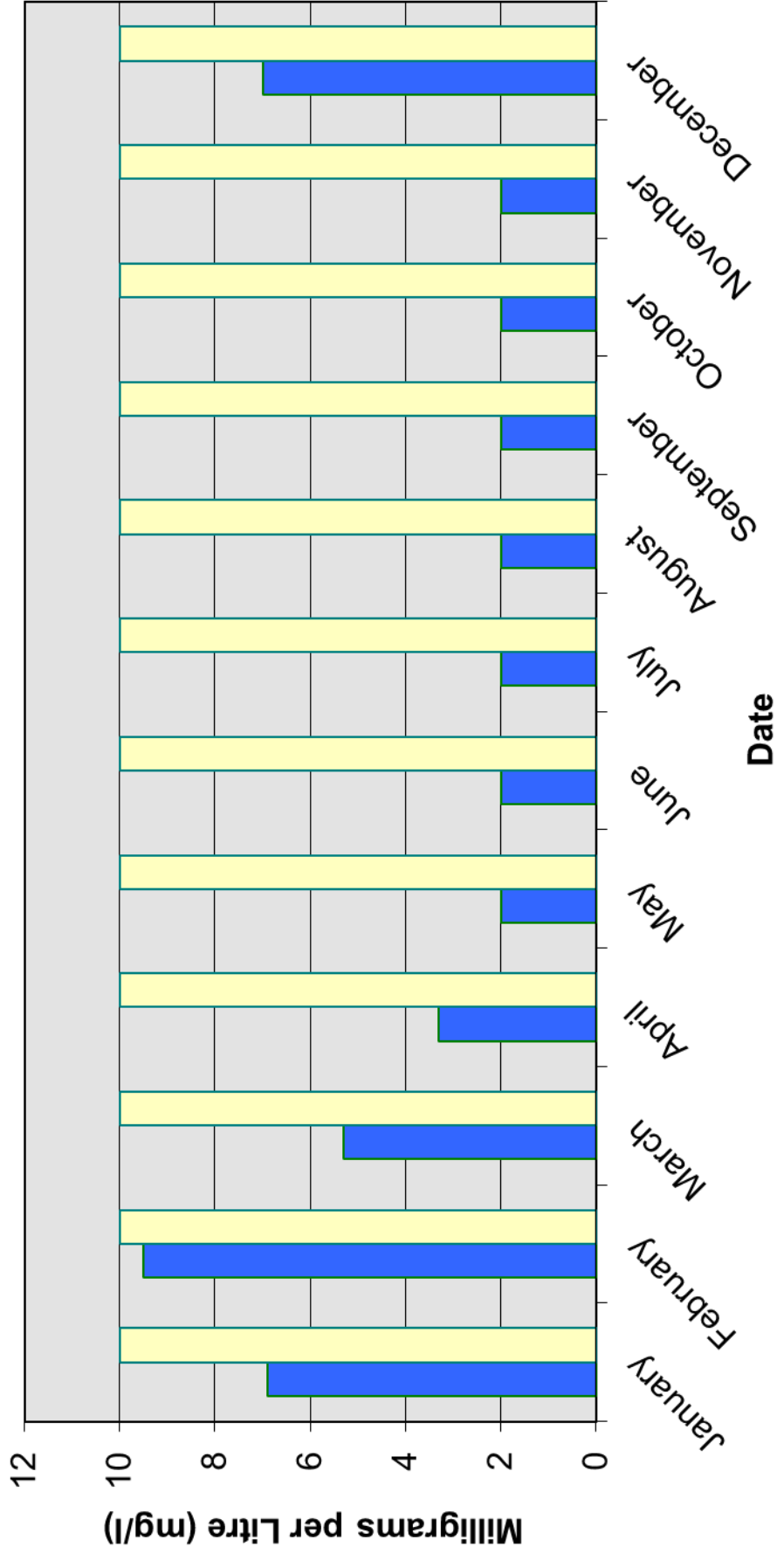
**Influent Chemical Oxygen Demand levels
City of Penticton Advanced Wastewater Treatment Plant 2022**



Effluent Chemical Oxygen Demand levels City of Penticton Advanced Wastewater Treatment Plant 2022



Effluent Biochemical Oxygen Demand level Compared with Permit City of Penticton Advanced Wastewater Treatment Plant 2022



Appendix B.8.

Total & Fecal Coliform Data

Monthly Average Total and Fecal Coliforms and; Effluent and Irrigation
City of Penticton Advanced Wastewater Treatment Plant 2022

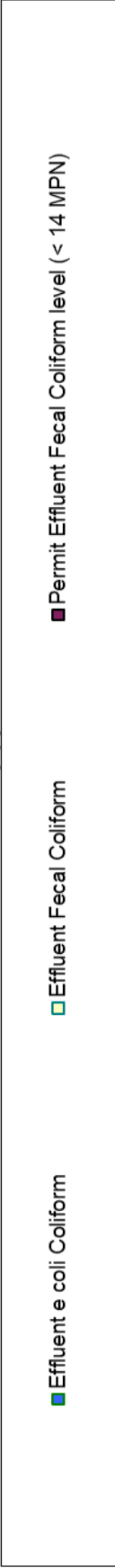
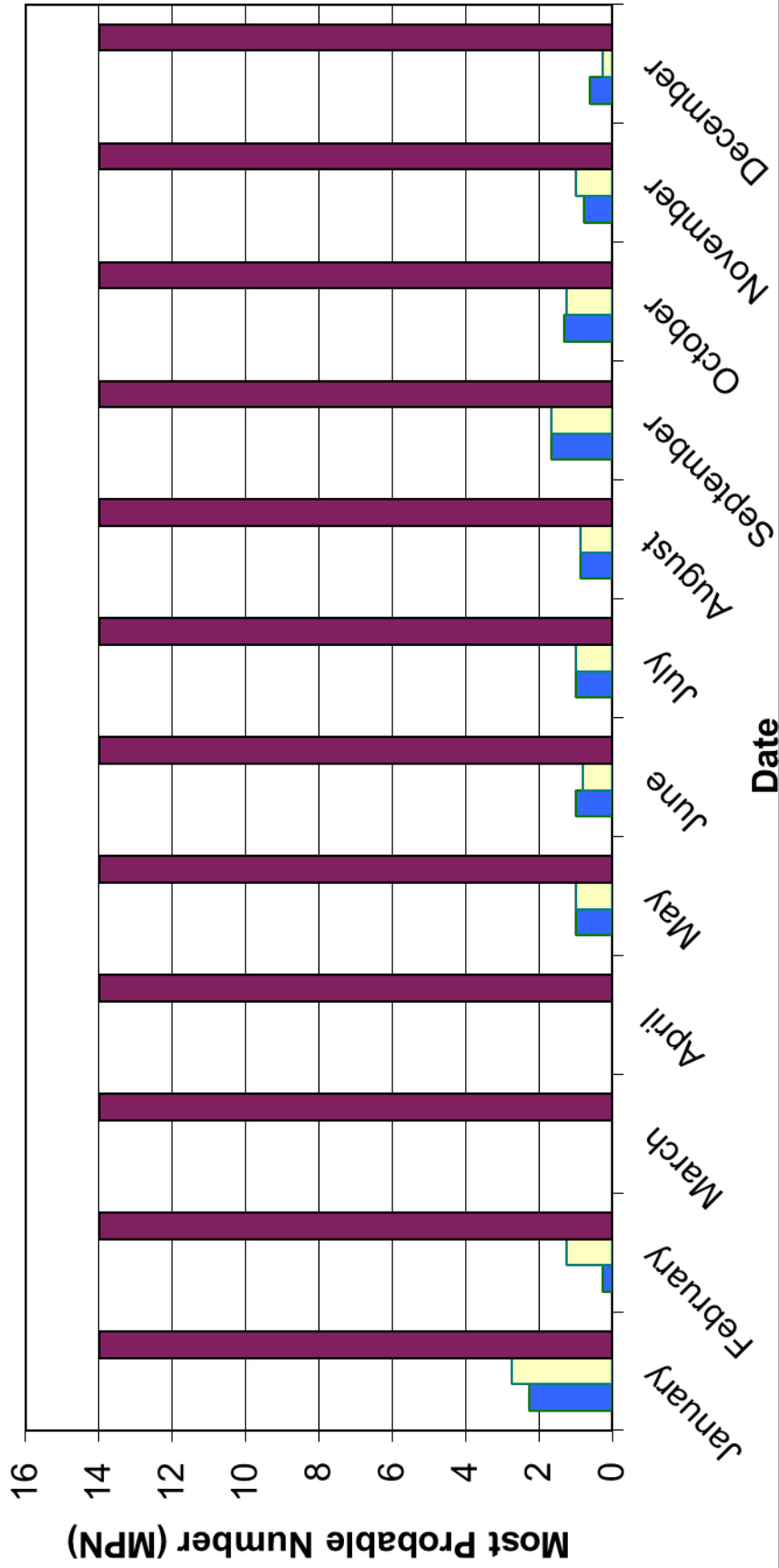
Date	Effluent						Reclaimed Irrigation Water				
	Fecal Coliforms			E. coli Coliforms			Fecal Coliforms				
	Average MPN ¹	Std Dev.	n	Permit Fecal Coliforms < 14 MPN ²	Average MPN ¹	Std Dev.	n	Average MPN ¹	Std Dev.	n	Permit Fecal Coliforms 14 MPN ²
January	2.8	3.3	4.0	14	2.3	2	4.0				
February	1.3	1.3	4.0	14	0.3	0.4	4.0				
March	0.0	0.0	5.0	14	0.0	0.0	5.0				
April	0.0	0.0	4.0	14	0.0	0.0	4.0				
May	1.0	0.7	4.0	14	1.0	0.7	4.0	0.0	0.0	4	14
June	0.8	0.7	5.0	14	1.0	0.8	5.0	0.0	0.0	5	14
July	1.0	0.9	31.0	14	1.0	0.9	31.0	0.0	0.0	4	14
August	0.9	0.4	31.0	14	0.9	0.4	31.0	6.0	2.4	5	14
September	1.7	6.0	30.0	14	1.7	6.0	30.0	0.0	0.0	4	14
October	1.2	1.8	20.0	14	1.3	1.8	20.0	0.0	0.0	3	14
November	1.0	2.0	5.0	14	0.8	1.0	2.0				
December	0.3	0.4	4.0	14	0.6	0.2	5.0				
Annual¹	1.0	1.5	12.3		0.9	1.2	12.1	0.0	0.4	4.2	
Annual Total			147				145			25	

¹Arithmetic mean

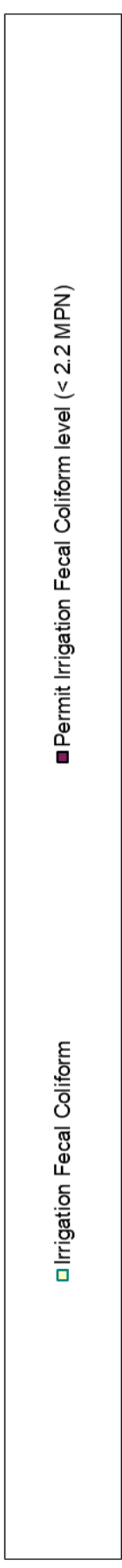
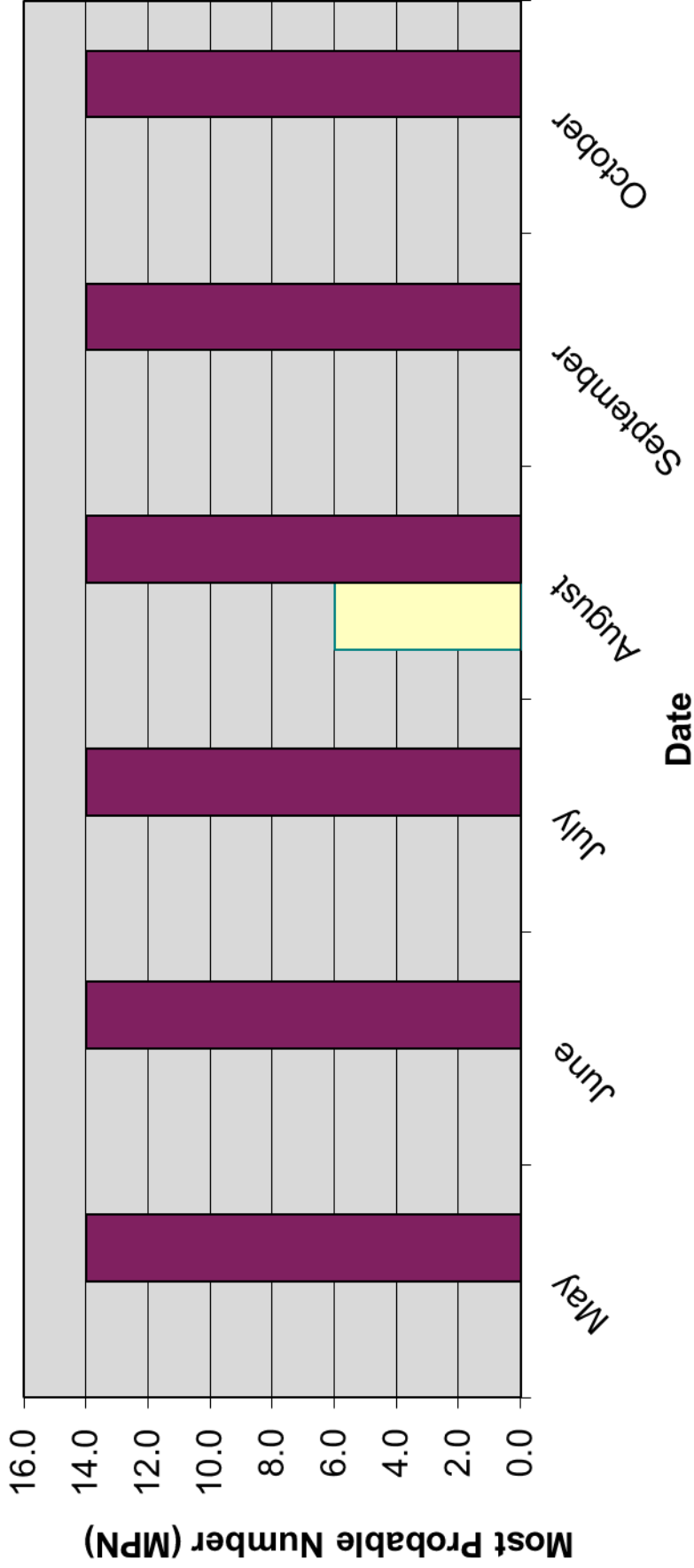
² Permit Value Originates From the BC Ministry of Environment Operational Certificate for the Penticton Advanced Wastewater Treatment Plant (12212) Section 3.11.1
 MPN = most probable number

Reclaimed Irrigation Water Sampling Location = Penticton Golf & Country Club.

Effluent e coli & Fecal Coliform levels Compared with Permit City of Penticton Advanced Wastewater Treatment Plant 2022



Irrigation Fecal Coliform levels Compared with Permit City of Penticton Advanced Wastewater Treatment Plant 2022



**Monthly Total and Fecal Coliforms; Okanagan River
City of Penticton Advanced Wastewater Treatment Plant 2022**

Date	Okanagan River Coliforms									
	Upstream					Downstream				
	e coli		Total		e coli		Total			
	MPN ¹	n	MPN ¹	n	MPN ¹	n	MPN ¹	n		
January	49.0	1	154	1	365	1	649	1		
February	16.0	1	36	1	14	1	96	1		
March	1.0	1	16	1	6	1	36	1		
April	< 1	1	12	1	6	1	53	1		
May	12.0	1	29	1	8	1	70	1		
June	3.0	1	17	1	16	1	179	1		
July	6.0	1	291	1	6	1	435	1		
August	3.0	1	1550	1	5	1	2420	1		
September	16.0	1	1300	1	20	1	3610	1		
October	18.0	1	1410	1	10	1	1060	1		
November	12.0	1	210	1	23	1	517	1		
December	50	1	162	1	1120	1	1990	1		
Annual	15.5	1	432.3	1	133.3	1	926.3	1		
Annual Total		12		12		12		12		

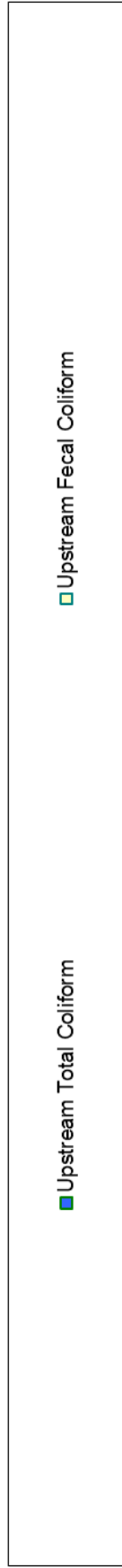
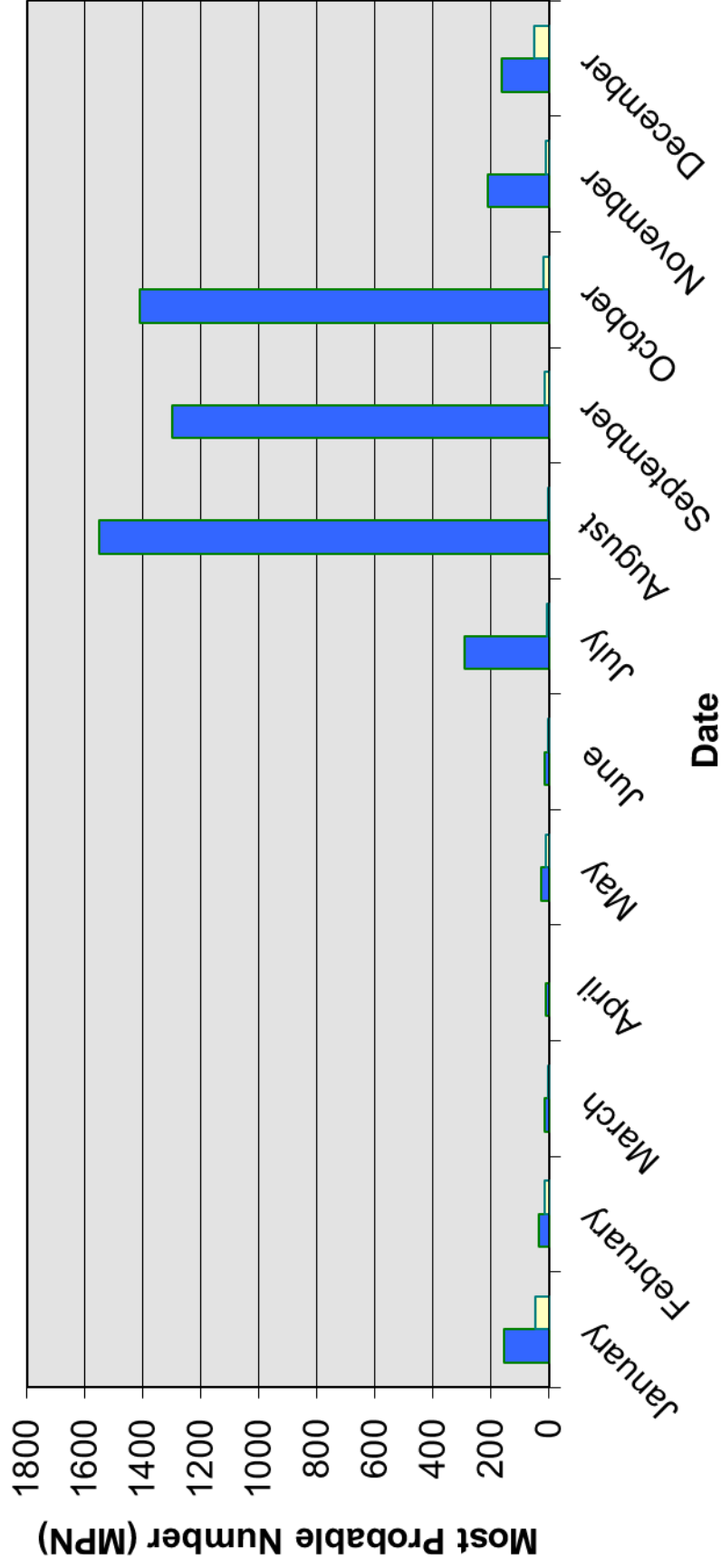
¹ Arithmetic mean

MPN = most probable number

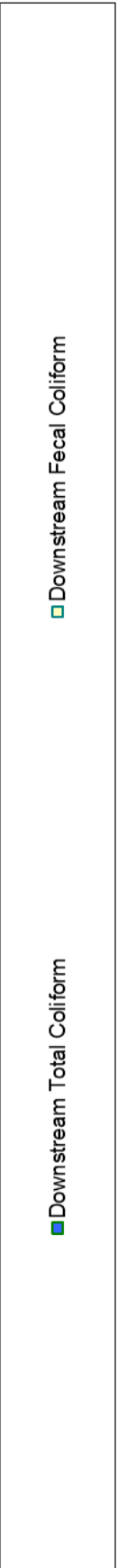
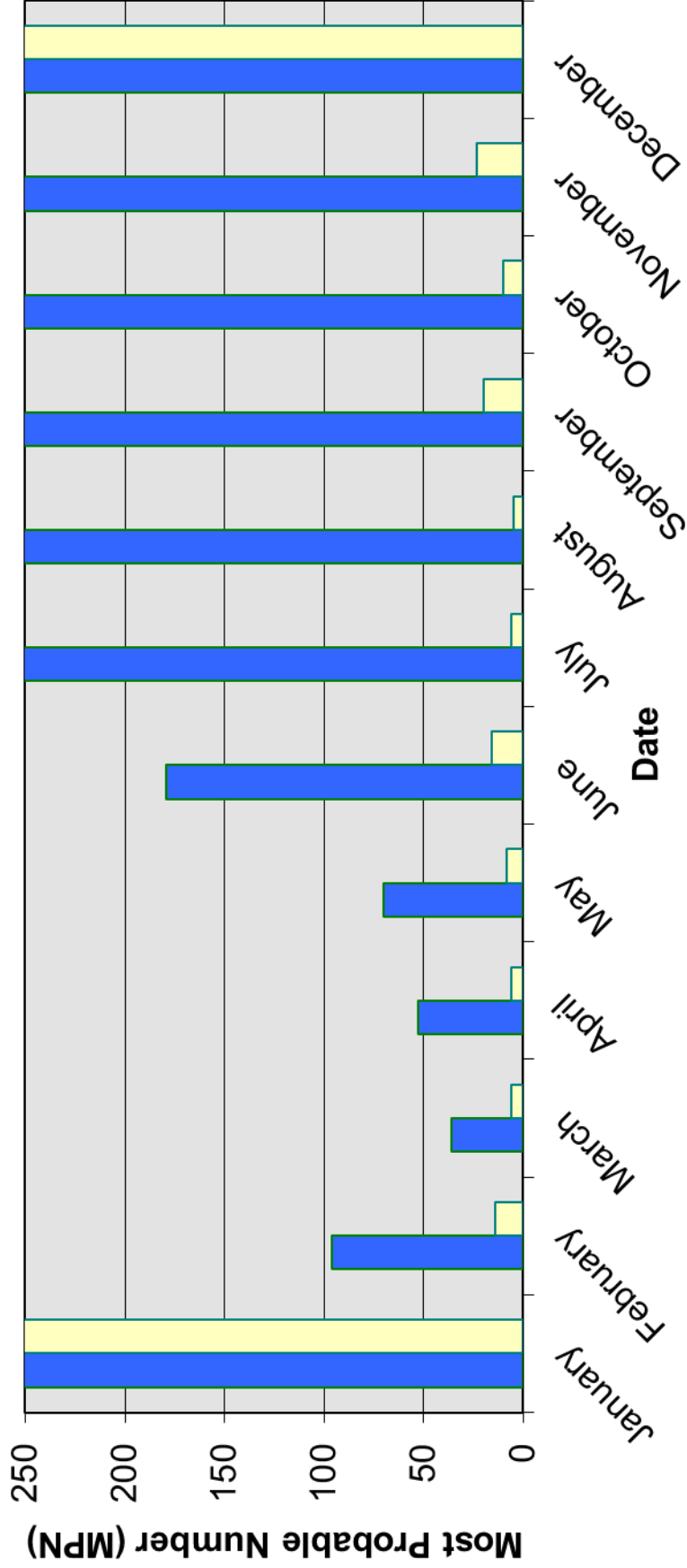
Upstream Sampling Location = East bank of Okanagan River from loading stairs at Coyote Cruises.

Downstream Sampling Location = West bank of Okanagan River from landing stairs upstream of Shingle Creek.

Okanagan River Upstream Total & Fecal Coliform levels City of Penticton Advanced Wastewater Treatment Plant 2022



Okanagan River Downstream Total & Fecal Coliform levels City of Penticton Advanced Wastewater Treatment Plant 2022



Appendix B.9.

Sludge Hauling Data

Sludge Hauled to Compost Facility						
City of Penticton Advanced Wastewater Treatment Plant 2022						
Date	Sludge Hauling to Landfill					
	Loads to Landfill			Cost of Hauling ²		Per dry kg
	Number of Bins per Month ⁴	Kgs of Dewatered Sludge ¹	Kgs of Dry Solids ¹	Average # of Bins Day ³	Per Month (Total Bin)	
January	57	643587	114623	2.9	\$6,840.00	\$ 0.06
February	54	609714	108590	2.8	\$6,480.00	\$ 0.06
March	52	587132	104568	2.3	\$6,240.00	\$ 0.06
April	52	587132	104568	2.7	\$6,240.00	\$ 0.06
May	65	733915	130710	3.1	\$7,800.00	\$ 0.06
June	71	801661	142776	3.2	\$8,520.00	\$ 0.06
July	77	869407	154841	3.9	\$9,240.00	\$ 0.06
August	72	812952	144787	3.3	\$8,640.00	\$ 0.06
September	56	632296	112612	2.7	\$6,720.00	\$ 0.06
October	51	575841	102557	2.6	\$6,120.00	\$ 0.06
November	53	598423	106579	2.5	\$6,360.00	\$ 0.06
December	49	553259	98535	2.5	\$5,880.00	\$ 0.06
Monthly Average	59	667110	118812	2.9	\$7,090.00	\$0.06
Annual Total	709	8,005,319	1,408,936		\$85,080.00	

¹ The Calculations for kilograms of Dewatered Sludge and kilograms of dry sludge (17.81%) hauled to the landfill are calculated using an average bin weight of 11291 kg/bin (1000 kg of sludge = 1 m3)

² The Calculations for costs are based on \$99.80

³ Based on a five day/week hauling schedule minus stat holidays

⁴ Bins per month data obtained from Sludge Hauling Records

The sludge composition is typically made up of 70% TWAS Sludge, 30% Fermented Primary Sludge

Appendix B.10.

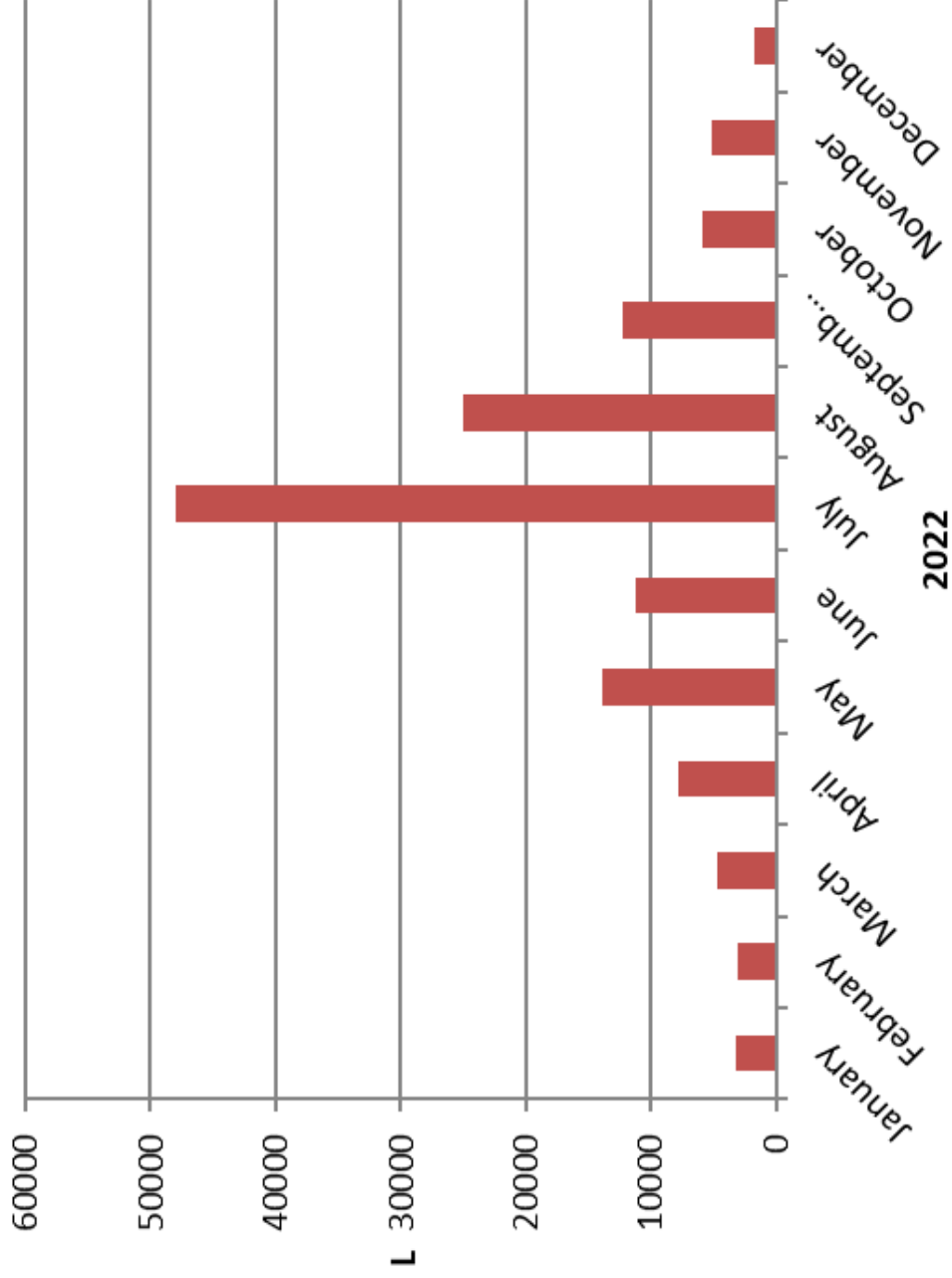
Water Treatment Plant Process PAC Discharges to Sanitary Sewer System

**Monthly Total of PAC from WTP
Wastewater Treatment Plant
2022**

Date	L of coagulant used by WTP
January	3244
February	3027
March	4650
April	7781
May	13909
June	11184
July	47932
August	25079
September	12227
October	5952
November	5225
December	1786
Annual Average	11833
Annual Total	141996

WTP Coagulant

■ L of coagulant used by WTP



Appendix B.11.

System Expenditures Data

City of Penticton Advanced Wastewater Treatment Plant			
<u>Wastewater Treatment Costs</u>			
General Administration	\$ 884,437.00		
Transfer from Sewer Utility to General Revenue			
Supervision	\$ 128,550.00		
Supervision costs are direct upper management costs, not including WWTP Supervisor.			
Treatment Plant (General)	\$ 473,428.00		
General costs include several items; employees general duty wages, grounds & building maintenance, small tools, permits, software support, safety, Stats & OT			
Treatment Plant (Liquids Stream)	\$ 810,698.29		
Liquids includes Lab Supplies, Process Chemicals, part & equipment, Technical assistance & wages			
Utilities	\$ 322,446.00		
Electricity and Natural Gas			
Treatment Plant (Solids Stream)	\$ 430,482.50		
Solids Stream costs include operator wages, polymer, sludge to landfill, scum screenings & technical assistance			
Vehicles	\$ 44,960.00		
Cost to operate plant vehicles, generators, and two 6" pumps			
Reclaimed Water	\$ 99,293.56		
Costs include sodium hypochlorite, wages, lab supplies, electricity, parts & equipment			
Total WWTP Costs	\$ 3,194,295.35		
Not included in the total cost are Capital Improvement Costs, Composting, Septage Receiving & Collection system cost's			
Cost per m³ treated	\$ 0.7144		
Wastewater Collection System Costs			
Maintenance	\$ 150,875.00		
Tools/Safety/Standby	\$ 21,880.00		
Manhole Repairs	\$ 7,252.00		
Video Inspection	\$ 59,980.00		
General Repairs	\$ 94,295.00		
Total	\$ 334,282.00		

Appendix B.13.

Raw Data

City of Penticton Advanced Wastewater Treatment Plant: Influent

2022		Influent Flow ML/Day	SS	pH	Alk. as CaCO3	COD, Mn Mthd	NO3/NO2 as N	NH3 as N	Total-N	Ortho-P as P	Total-P
January	1	8.83	272.00				0.31	22.20		4.50	
	2	8.53	272.00				0.31	22.20		4.50	
	3	10.12	272.00	7.59	240.00		0.31	22.20		4.50	
	4	10.02	238.00				0.94	30.60		4.59	
	5	8.98	238.00			618.00	0.94	30.60	53.70	4.59	9.32
	6	8.75	238.00				0.94	30.60		4.59	
	7	8.92	238.00				0.94	30.60		4.59	
	8	8.71	238.00				0.94	30.60		4.59	
	9	8.94	238.00				0.94	30.60		4.59	
	10	8.91	238.00	8.23	227.00		0.94	30.60		4.59	
	11	8.82	248.00				0.78	32.10		5.00	
	12	9.64	248.00			693.00	0.78	32.10		5.00	
	13	9.39	248.00				0.78	32.10		5.00	
	14	8.93	248.00				0.78	32.10		5.00	
	15	8.91	248.00				0.78	32.10		5.00	
	16	8.98	248.00				0.78	32.10		5.00	
	17	9.00	248.00	8.22	275.00	345.00	0.78	32.10		5.00	
	18	8.91	203.00				0.97	30.70		4.00	
	19	8.99	203.00				0.97	30.70		4.00	
	20	9.37	203.00				0.97	30.70		4.00	
	21	8.91	203.00				0.97	30.70		4.00	
	22	8.84	203.00				0.97	30.70		4.00	
	23	9.12	203.00				0.97	30.70		4.00	
	24	9.07	203.00	7.77	258.33		0.97	30.70		4.00	
	25	8.99	235.00				1.02	26.10		3.50	
	26	9.02	235.00			333.00	1.02	26.10		3.50	
	27	8.86	235.00				1.02	26.10		3.50	
	28	8.93	235.00				1.02	26.10		3.50	
	29	8.76	235.00				1.02	26.10		3.50	
	30	9.04	235.00				1.02	26.10		3.50	
	31	8.97	235.00	7.81	242.00		1.02	26.10		3.50	
Average		9.04	234.97	7.92	248.47	497.25	0.87	29.13	53.70	4.29	9.32
Total		280.16									
Std. Dev.		0.34	20.43	0.29	18.54	185.34	0.20	3.18		0.56	
n		31.00	31.00	5.00	5.00	4.00	31.00	31.00	1.00	31.00	1.00
Minimum		8.53	203.00	7.59	227.00	333.00	0.31	22.20	53.70	3.50	9.32
Maximum		10.12	272.00	8.23	275.00	693.00	1.02	32.10	53.70	5.00	9.32

2022		Influent Flow ML/Day	SS	pH	Alk. as CaCO3	COD, Mn Mthd	NO3/NO2 as N	NH3 as N	Total-N	Ortho-P as P	Total-P
	February	1	11.10	365.00				0.53	35.50		4.00
2		11.10	365.00			561.00	0.53	35.50	51.30	4.00	7.56
3		11.00	365.00				0.53	35.50		4.00	
4		11.10	365.00				0.53	35.50		4.00	
5		11.20	365.00				0.53	35.50		4.00	
6		11.40	365.00				0.53	35.50		4.00	
7		11.40	365.00	7.59	238.57		0.53	35.50		4.00	
8		11.20	338.00				0.31	36.80		4.25	
9		11.20	338.00			435.00	0.31	36.80		4.25	
10		11.50	338.00				0.31	36.80		4.25	
11		11.20	338.00				0.31	36.80		4.25	
12		11.30	338.00				0.31	36.80		4.25	
13		11.40	338.00				0.31	36.80		4.25	
14		11.10	338.00	7.42	245.00		0.31	36.80		4.25	
15		10.90	266.00				1.15	32.20		3.50	
16		10.90	266.00			662.00	1.15	32.20		3.50	
17		11.00	266.00				1.15	32.20		3.50	
18		11.20	266.00				1.15	32.20		3.50	
19		11.20	266.00				1.15	32.20		3.50	
20		11.20	266.00				1.15	32.20		3.50	
21		11.40	266.00	7.72	241.43		1.15	32.20		3.50	
22		11.30	255.00				0.96	30.10		4.55	
23		11.20	255.00			599.00	0.96	30.10		4.55	
24		11.10	255.00				0.96	30.10		4.55	
25		11.20	255.00				0.96	30.10		4.55	
26		11.40	255.00				0.96	30.10		4.55	
27		11.30	255.00				0.96	30.10		4.55	
28		11.30	255.00	8.30	275.00		0.96	30.10		4.55	
Average		11.21	306.00	7.76	250.00	564.25	0.74	33.65	51.30	4.08	7.56
Total		313.80									
Std. Dev.		0.15	47.51	0.38	16.87	95.71	0.34	2.70		0.39	
n		28.00	28.00	4.00	4.00	4.00	28.00	28.00	1.00	28.00	1.00
Minimum		10.90	255.00	7.42	238.57	435.00	0.31	30.10	51.30	3.50	7.56
Maximum		11.50	365.00	8.30	275.00	662.00	1.15	36.80	51.30	4.55	7.56

2022		Influent Flow ML/Day	SS	pH	Alk. as CaCO3	COD, Mn Mthd	NO3/NO2 as N	NH3 as N	Total-N	Ortho-P as P	Total-P
	March	1	11.10	349.00				0.77	32.70		
2		11.10	349.00			630.00	0.77	32.70	45.10		8.22
3		11.20	349.00				0.77	32.70		4.00	
4		11.00	349.00				0.77	32.70		4.00	
5		11.10	349.00				0.77	32.70		4.00	
6		11.30	349.00				0.77	32.70		4.00	
7		11.70	349.00	7.42	236.66		0.77	32.70		4.00	
8		12.00	243.00				1.62	31.70		3.75	
9		12.20	243.00			554.00	1.62	31.70		3.75	
10		12.60	243.00				1.62	31.70		3.75	
11		14.10	243.00				1.62	31.70		3.75	
12		13.90	243.00				1.62	31.70		3.75	
13		14.00	243.00				1.62	31.70		3.75	
14		11.70	243.00	7.73	223.00		1.62	31.70		3.75	
15		11.40	472.00				0.33	27.20		4.50	
16		12.10	472.00			424.00	0.33	27.20		4.50	
17		11.70	472.00				0.33	27.20		4.50	
18		11.30	472.00				0.33	27.20		4.50	
19		11.20	472.00				0.33	27.20		4.50	
20		11.20	472.00				0.33	27.20		4.50	
21		11.20	472.00	7.38	237.00		0.33	27.20		4.50	
22		11.10	406.00				1.12	29.70		4.25	
23		11.10	406.00			713.00	1.12	29.70		4.25	
24		11.20	406.00				1.12	29.70		4.25	
25		11.10	406.00				1.12	29.70		4.25	
26		11.00	406.00				1.12	29.70		4.25	
27		11.20	406.00				1.12	29.70		4.25	
28		11.30	406.00	7.84	202.50		1.12	29.70		4.25	
29		11.20	289.00				0.71	30.70		4.10	
30		11.20	289.00			355.00	0.71	30.70		4.10	
31		11.30	289.00				0.71	30.70		4.10	
Average		11.64	359.90	7.59	224.79	535.20	0.93	30.36	45.10	4.13	8.22
Total		360.80									
Std. Dev.		0.87	84.54	0.23	16.23	146.45	0.46	2.03		0.28	
n		31.00	31.00	4.00	4.00	5.00	31.00	31.00	1.00	29.00	1.00
Minimum		11.00	243.00	7.38	202.50	355.00	0.33	27.20	45.10	3.75	8.22
Maximum		14.10	472.00	7.84	237.00	713.00	1.62	32.70	45.10	4.50	8.22

2022		Influent Flow ML/Day	SS	pH	Alk. as CaCO3	COD, Mn Mthd	NO3/NO2 as N	NH3 as N	Total-N	Ortho-P as P	Total-P
April	1	11.20	289.00				0.71	30.70		4.10	
	2	11.30	289.00				0.71	30.70		4.10	
	3	11.60	289.00				0.71	30.70		4.10	
	4	11.50	289.00	7.54	245.00		0.71	30.70		4.10	
	5	11.40					1.42	31.10		3.75	
	6	11.50				631.00	1.42	31.10	55.30	3.75	8.08
	7	11.40					1.42	31.10		3.75	
	8	11.40					1.42	31.10		3.75	
	9	11.50					1.42	31.10		3.75	
	10	11.40					1.42	31.10		3.75	
	11	11.30	232.00	7.57	220.00		1.42	31.10		3.75	
	12	11.40					0.54	35.20		3.58	
	13	11.40				748.00	0.54	35.20		3.58	
	14	11.30					0.54	35.20		3.58	
	15	11.40					0.54	35.20		3.58	
	16	11.60					0.54	35.20		3.58	
	17	11.50					0.54	35.20		3.58	
	18	11.60	369.00	7.98	300.00		0.54	35.20		3.58	
	19	11.60					1.53	28.70		4.75	
	20	11.40				801.00	1.53	28.70		4.75	
	21	11.50					1.53	28.70		4.75	
	22	11.40					1.53	28.70		4.75	
	23	11.20					1.53	28.70		4.75	
	24	11.30					1.53	28.70		4.75	
	25	11.70	210.00	7.65	227.00		1.53	28.70		4.75	
	26	11.80					0.70	29.80		4.00	
	27	11.80					0.70	29.80		4.00	
	28	11.80				321.00	0.70	29.80		4.00	
	29	11.80					0.70	29.80		4.00	
	30	11.80					0.70	29.80		4.00	
	Average		11.49	281.00	7.69	248.00	625.25	1.02	31.23	55.30	4.03
Total		344.80									
Std. Dev.		0.18	50.73	0.20	36.23	214.91	0.43	2.40		0.44	
n		30.00	7.00	4.00	4.00	4.00	30.00	30.00	1.00	30.00	1.00
Minimum		11.20	210.00	7.54	220.00	321.00	0.54	28.70	55.30	3.58	8.08
Maximum		11.80	369.00	7.98	300.00	801.00	1.53	35.20	55.30	4.75	8.08

2022		Influent Flow	SS	pH	Alk. as CaCO3	COD, Mn Mthd	NO3/NO2 as N	NH3 as N	Total-N	Ortho-P as P	Total-P
		ML/Day									
May	1	12.00					0.70	29.80		4.00	
	2	11.70	187.00	7.35	270.00		0.70	29.80		4.00	
	3	11.50					1.34	31.50		3.87	
	4	11.60				783.00	1.34	31.50	64.40	3.87	12.50
	5	12.70					1.34	31.50		3.87	
	6	12.00					1.34	31.50		3.87	
	7	11.90					1.34	31.50		3.87	
	8	12.10					1.34	31.50		3.87	
	9	12.10	280.00	8.09	298.00		1.34	31.50		3.87	
	10	12.10					1.42	30.60		3.50	
	11	12.10				650.00	1.42	30.60		3.50	
	12	12.30					1.42	30.60		3.50	
	13	12.60					1.42	30.60		3.50	
	14	12.10					1.42	30.60		3.50	
	15	12.50					1.42	30.60		3.50	
	16	12.30	313.00	7.79	240.00		1.42	30.60		3.50	
	17	12.10					1.85	26.70		3.75	
	18	12.30				1219.00	1.85	26.70		3.75	
	19	12.30				619.00	1.85	26.70		3.75	
	20	12.40					1.85	26.70		3.75	
	21	12.80					1.85	26.70		3.75	
	22	12.30					1.85	26.70		3.75	
	23	12.80	394.00	7.77	260.00		1.85	26.70		3.75	
	24	12.70					1.24	15.40		3.50	
	25	12.60				674.00	1.24	15.40		3.50	
	26	12.60					1.24	15.40		3.50	
	27	13.00					1.24	15.40		3.50	
	28	12.50					1.24	15.40		3.50	
	29	12.80					1.24	15.40		3.50	
	30	12.90	321.00	7.64	243.63		1.24	15.40		3.50	
	31	12.70					1.22	27.00		2.68	
Average		12.34	299.00	7.73	262.33	789.00	1.41	26.32	64.40	3.65	12.50
Total		382.40									
Std. Dev.		0.39	75.18	0.27	23.37	248.18	0.30	6.26		0.25	
n		31.00	5.00	5.00	5.00	5.00	31.00	31.00	1.00	31.00	1.00
Minimum		11.50	187.00	7.35	240.00	619.00	0.70	15.40	64.40	2.68	12.50
Maximum		13.00	394.00	8.09	298.00	1219.00	1.85	31.50	64.40	4.00	12.50

2022		Influent Flow ML/Day	SS	pH	Alk. as CaCO3	COD, Mn Mthd	NO3/NO2 as N	NH3 as N	Total-N	Ortho-P as P	Total-P
June	1	12.90				602.00	1.22	27.00	103.00	2.68	10.20
	2	13.10					1.22	27.00		2.68	
	3	14.00					1.22	27.00		2.68	
	4	12.80					1.22	27.00		2.68	
	5	13.20					1.22	27.00		2.68	
	6	13.00	279.00	7.65	240.00		1.22	27.00		2.68	
	7	12.80					2.13	36.20		4.25	
	8	12.80				731.00	2.13	36.20		4.25	
	9	12.80			186.10		2.13	36.20		4.25	
	10	13.00					2.13	36.20		4.25	
	11	15.80		7.56	197.44		2.13	36.20		4.25	
	12	13.20					2.13	36.20		4.25	
	13	13.60	319.00	7.33	176.14		2.13	36.20		4.25	
	14	13.20					2.11**	28.4**		2.25	
	15	13.10		7.37	178.00	578.00	2.11**	28.4**		2.25	
	16	12.80					2.11**	28.4**		2.25	
	17	18.80		7.86	220.00		2.11**	28.4**		2.25	
	18	12.70					2.11**	28.4**		2.25	
	19	13.60		7.57	217.50		2.11**	28.4**		2.25	
	20	13.30	358**	7.61**	181.7**		2.11**	28.4**		2.25	
	21	13.10					1.48	27.30		2.25	
	22	13.40		8.03	246.60	697.00	1.48	27.30		2.25	
	23	13.30					1.48	27.30		2.25	
	24	13.40		9.02	360.00		1.48	27.30		2.25	
	25	13.20					1.48	27.30		2.25	
	26	13.40		7.46	177.50		1.48	27.30		2.25	
	27	13.50	330.00	9.03	343.30		1.48	27.30		1.77	
	28	13.90					1.58	27.90		1.77	
	29	13.30		7.84	237.50	592.00	1.58	27.90		1.77	
	30	13.50					1.58	27.90		1.77	
Average		13.48	309.33	7.88	231.67	640.00	1.62	30.01	103.00	2.74	10.20
Total		404.50									
Std. Dev.		1.16	26.84	0.60	61.60	69.14	0.36	4.20		0.89	
n		30.00	3.00	11.00	12.00	5.00	23.00	23.00	1.00	30.00	1.00
Minimum		12.70	279.00	7.33	176.14	578.00	1.22	27.00	103.00	1.77	10.20
Maximum		18.80	330.00	9.03	360.00	731.00	2.13	36.20	103.00	4.25	10.20

2022		Influent Flow ML/Day	SS	pH	Alk. as CaCO3	COD, Mn Mthd	NO3/NO2 as N	NH3 as N	Total-N	Ortho-P as P	Total-P
	July	1	13.40		7.58	191.70		1.58	27.90		1.77
2		13.50					1.58	27.90		1.77	
3		13.80		7.54	216.70		1.58	27.90		1.77	
4		16.50	382.00	7.86	226.00		1.58	27.90		1.77	
5		13.90					1.63	27.60		2.40	
6		13.90		7.65	237.50	814.00	1.63	27.60	43.90	2.40	6.89
7		14.40					1.63	27.60		2.40	
8		14.10					1.63	27.60		2.40	
9		13.60					1.63	27.60		2.40	
10		13.60		7.73	218.30		1.63	27.60		2.40	
11		13.90	408.00	7.67	223.30		1.63	27.60		2.40	
12		13.80					1.52	28.80		2.50	
13		15.30		7.34	180.00	365.00	1.52	28.80		2.50	
14		14.00					1.52	28.80		2.50	
15		13.80		7.65	223.30		1.52	28.80		2.50	
16		13.40					1.52	28.80		2.50	
17		13.40					1.52	28.80		2.50	
18		13.90	404.00	7.46	215.00		1.52	28.80		2.50	
19		14.10					1.60	27.90		2.25	
20		14.20		7.78	255.00	593.00	1.60	27.90		2.25	
21		14.00					1.60	27.90		2.25	
22		13.80		7.91	238.30		1.60	27.90		2.25	
23		13.40					1.60	27.90		2.25	
24		13.50		7.67	252.87		1.60	27.90		2.25	
25		13.80	308.00	7.93	269.23		1.60	27.90		2.25	
26		14.00					1.50	30.20		1.80	
27		14.00				566.00	1.50	30.20		1.80	
28		14.10					1.50	30.20		1.80	
29		14.20					1.50	30.20		1.80	
30		14.10					1.50	30.20		1.80	
31		13.90					1.50	30.20		1.80	
Average		13.98	375.50	7.67	226.71	584.50	1.57	28.48	43.90	2.19	6.89
Total		433.30	1502.00								
Std. Dev.		0.60	46.43	0.17	24.64	183.73	0.05	0.96		0.30	
n		31.00	4.00	13.00	13.00	4.00	31.00	31.00	1.00	31.00	1.00
Minimum		13.40	308.00	7.34	180.00	365.00	1.50	27.60	43.90	1.77	6.89
Maximum		16.50	408.00	7.93	269.23	814.00	1.63	30.20	43.90	2.50	6.89

2022		Influent Flow ML/Day	SS	pH	Alk. as CaCO3	COD, Mn Mthd	NO3/NO2 as N	NH3 as N	Total-N	Ortho-P as P	Total-P
	August	1	14.10		7.62	254.00		1.50	30.20		1.80
2		14.10					1.15	28.90		1.98	
3		14.30				582.00	1.15	28.90	44.10	1.98	6.29
4		14.30					1.15	28.90		1.98	
5		14.00					1.15	28.90		1.98	
6		13.80					1.15	28.90		1.98	
7		13.80					1.15	28.90		1.98	
8		14.10	310.00	7.59	228.30		1.15	28.90		1.98	
9		14.00					0.51	26.00		2.00	
10		14.10				1094.00	0.51	26.00		2.00	
11		14.20					0.51	26.00		2.00	
12		14.70					0.51	26.00		2.00	
13		14.70					0.51	26.00		2.00	
14		14.20					0.51	26.00		2.00	
15		14.00	277.00	7.93	288.00		0.51	26.00		2.00	
16		14.00					1.52	29.00		3.50	
17		14.80					1.52	29.00		3.50	
18		14.00					1.52	29.00		3.50	
19		13.90					1.52	29.00		3.50	
20		13.80					1.52	29.00		3.50	
21		14.10					1.52	29.00		3.50	
22		14.20	331.00	7.53	254.29		1.52	29.00		3.50	
23		13.90					1.58	28.70		2.50	
24		13.80				650.00	1.58	28.70		2.50	
25		13.90					1.58	28.70		2.50	
26		13.70					1.58	28.70		2.50	
27		13.30					1.58	28.70		2.50	
28		13.20					1.58	28.70		2.50	
29		13.50	278.00	7.83	310.00		1.58	28.70		2.50	
30		13.40					1.19	26.80		2.68	
31		13.20				307.00	1.19	26.80		2.68	
Average		13.97	299.00	7.70	266.92	658.25	1.20	28.13	44.10	2.48	6.29
Total		433.10									
Std. Dev.		0.39	26.27	0.17	32.09	326.16	0.42	1.31		0.61	
n		31.00	4.00	5.00	5.00	4.00	31.00	31.00	1.00	31.00	1.00
Minimum		13.20	277.00	7.53	228.30	307.00	0.51	26.00	44.10	1.80	6.29
Maximum		14.80	331.00	7.93	310.00	1094.00	1.58	30.20	44.10	3.50	6.29

2022		Influent Flow ML/Day	SS	pH	Alk. as CaCO3	COD, Mn Mthd	NO3/NO2 as N	NH3 as N	Total-N	Ortho-P as P	Total-P
		September	1	13.50					1.19	26.80	
2	13.30						1.19	26.80		2.68	
3	13.30						1.19	26.80		2.68	
4	13.20						1.19	26.80		2.68	
5	13.50		290.00	7.70	297.00		1.19	26.80		2.68	
6	13.00						1.19	27.10		3.22	
7	13.00						1.19	27.10	45.70	3.22	6.35
8	13.20						1.19	27.10		3.22	
9	12.60						1.19	27.10		3.22	
10	12.80						1.19	27.10		3.22	
11	12.60						1.19	27.10		3.22	
12	13.60		306.00	7.86	300.00		1.19	27.10		3.22	
13	13.10						1.25	26.50		3.25	
14	12.70					566.00	1.25	26.50		3.25	
15	12.70						1.25	26.50		3.25	
16	12.70						1.25	26.50		3.25	
17	12.40						1.25	26.50		3.25	
18	12.50						1.25	26.50		3.25	
19	12.80			7.73	269.00		1.25	26.50		3.25	
20	12.70						1.37	24.10		3.50	
21	12.70					452.00	1.37	24.10		3.50	
22	12.50						1.37	24.10		3.50	
23	12.50						1.37	24.10		3.50	
24	12.30						1.37	24.10		3.50	
25	12.60						1.37	24.10		3.50	
26	12.70		241.00	7.25	223.00		1.37	24.10		3.50	
27	12.40						0.67	27.40		3.75	
28	12.50					363.00	0.67	27.40		3.75	
29	12.50						0.67	27.40		3.75	
30	12.70						0.67	27.40		3.75	
Average			12.82	279.00	7.64	272.25	460.33	1.18	26.25	45.70	3.27
Total		384.60									
Std. Dev.		0.36	33.87	0.27	35.68	101.76	0.22	1.24		0.32	
n		30.00	3.00	4.00	4.00	3.00	30.00	30.00	1.00	30.00	1.00
Minimum		12.30	241.00	7.25	223.00	363.00	0.67	24.10	45.70	2.68	6.35
Maximum		13.60	306.00	7.86	300.00	566.00	1.37	27.40	45.70	3.75	6.35

2022		Influent Flow ML/Day	SS	pH	Alk. as CaCO3	COD, Mn Mthd	NO3/NO2 as N	NH3 as N	Total-N	Ortho-P as P	Total-P
		October	1	12.40					0.67	27.40	
2	12.70						0.67	27.40		3.75	
3	12.60		397.00	7.78	260.00		0.67	27.40		3.75	
4	12.20						0.28	25.30		4.92	
5	12.70					423.00	0.28	25.30	61.70	4.92	12.10
6	12.90						0.28	25.30		4.92	
7	13.00						0.28	25.30		4.92	
8	12.90						0.28	25.30		4.92	
9	13.00						0.28	25.30		4.92	
10	13.00		376.00	7.57	265.00		0.28	25.30		4.92	
11	12.90						0.81	37.00		4.00	
12	12.80					433.00	0.81	37.00		4.00	
13	12.80						0.81	37.00		4.00	
14	12.70						0.81	37.00		4.00	
15	12.70						0.81	37.00		4.00	
16	13.00						0.81	37.00		4.00	
17	12.90		259.00	7.53	286.00		0.81	37.00		4.00	
18	12.70						0.38	27.60		2.10	
19	12.80					767.00	0.38	27.60		2.10	
20	12.50						0.38	27.60		2.10	
21	12.60						0.38	27.60		2.10	
22	11.30						0.38	27.60		2.10	
23	12.70						0.38	27.60		2.10	
24	12.30		254.00	7.87	211.00		0.38	27.60		2.10	
25	12.40						0.81	34.20		4.25	
26	12.20					385.00	0.81	34.20		4.25	
27	10.10						0.81	34.20		4.25	
28	12.10						0.81	34.20		4.25	
29	12.20						0.81	34.20		4.25	
30	12.40						0.81	34.20		4.25	
31	12.20		322.00	7.96	292.00		0.81	34.20		4.25	
Average		12.51	321.60	7.74	262.80	502.00	0.58	30.67	61.70	3.81	12.10
Total		387.70									
Std. Dev.		0.58	65.45	0.19	31.96	177.87	0.24	4.72		1.01	
n		31.00	5.00	5.00	5.00	4.00	31.00	31.00	1.00	31.00	1.00
Minimum		10.10	254.00	7.53	211.00	385.00	0.28	25.30	61.70	2.10	12.10
Maximum		13.00	397.00	7.96	292.00	767.00	0.81	37.00	61.70	4.92	12.10

2022		Influent Flow ML/Day	SS	pH	Alk. as CaCO3	COD, Mn Mthd	NO3/NO2 as N	NH3 as N	Total-N	Ortho-P as P	Total-P
	November	1	12.30					0.79	29.80		4.25
2		12.20				449.00	0.79	29.80	38.30	4.25	5.07
3		13.20					0.79	29.80		4.25	
4		15.20					0.79	29.80		4.25	
5		12.70					0.79	29.80		4.25	
6		13.10					0.79	29.80		4.25	
7		12.70	245.00	7.95	272.00		0.79	29.80		4.25	
8		12.60					1.42	27.20		3.50	
9		12.60				399.00	1.42	27.20		3.50	
10		12.40					1.42	27.20		3.50	
11		12.30					1.42	27.20		3.50	
12		12.30					1.42	27.20		3.50	
13		12.70					1.42	27.20		3.50	
14		12.50	239.00	7.82	289.00		1.42	27.20		3.50	
15		12.40					1.23	25.80		4.43	
16		12.80				416.00	1.23	25.80		4.43	
17		12.50					1.23	25.80		4.43	
18		12.40					1.23	25.80		4.43	
19		12.30					1.23	25.80		4.43	
20		12.40					1.23	25.80		4.43	
21		12.20	265.00	7.93	301.00		1.23	25.80		4.43	
22		11.80					1.35	28.70		4.25	
23		11.90				652.00	1.35	28.70		4.25	
24		12.20					1.35	28.70		4.25	
25		11.80					1.35	28.70		4.25	
26		12.00					1.35	28.70		4.25	
27		12.30					1.35	28.70		4.25	
28		12.20	225.00	8.15	271.00		1.35	28.70		4.25	
29		11.90					1.35	26.50		4.25	
30		12.00					1.35	26.50		4.25	
Average		12.46	243.50	7.96	283.25	479.00	1.21	27.78	38.30	4.12	5.07
Total		373.90									
Std. Dev.		0.62	16.60	0.14	14.43	117.19	0.24	1.53		0.35	
n		30.00	4.00	4.00	4.00	4.00	30.00	30.00	1.00	30.00	1.00
Minimum		11.80	225.00	7.82	271.00	399.00	0.79	25.80	38.30	3.50	5.07
Maximum		15.20	265.00	8.15	301.00	652.00	1.42	29.80	38.30	4.43	5.07

2022		Influent Flow ML/Day	SS	pH	Alk. as CaCO3	COD, Mn Mthd	NO3/NO2 as N	NH3 as N	Total-N	Ortho-P as P	Total-P
	December	1	12.00				525.00	1.35	26.50		4.25
2		12.10					1.35	26.50		4.25	
3		12.00					1.35	26.50		4.25	
4		12.10					1.35	26.50		4.25	
5		12.00	220.00	8.07	230.00		1.35	26.50		4.25	
6		11.90					0.78	27.60		4.25	
7		11.80				673.00	0.78	27.60	38.60	4.25	5.50
8		11.80					0.78	27.60		4.25	
9		11.80					0.78	27.60		4.25	
10		11.80					0.78	27.60		4.25	
11		12.20					0.78	27.60		4.25	
12		12.00	222.00	7.68	241.00		0.78	27.60		4.25	
13		11.70					1.72	27.30		4.25	
14		11.50					1.72	27.30		4.25	
15		11.80				439.00	1.72	27.30		4.25	
16		12.00					1.72	27.30		4.25	
17		11.70					1.72	27.30		4.25	
18		11.70					1.72	27.30		4.25	
19		12.00	238.00	8.46	300.00		1.72	27.30		4.25	
20		11.80					0.28	31.80		4.00	
21		11.80				721.00	0.28	31.80		4.00	
22		12.10					0.28	31.80		4.00	
23		12.10					0.28	31.80		4.00	
24		12.00					0.28	31.80		4.00	
25		11.10					0.28	31.80		4.00	
26		12.20	219.00	7.81	225.00		0.28	31.80		4.00	
27		14.10						26.50		3.75	
28		12.90				517.00		26.50		3.75	
29		12.00						26.50		3.75	
30		12.10						26.50		3.75	
31		12.20						26.50		3.75	
Average		12.01	224.75	8.01	249.00	575.00	1.01	28.13	38.60	4.11	5.50
Total		372.30									
Std. Dev.		0.48	8.92	0.34	34.65	117.56	0.57	2.06		0.19	
n		31.00	4.00	4.00	4.00	5.00	26.00	31.00	1.00	31.00	1.00
Minimum		11.10	219.00	7.68	225.00	439.00	0.28	26.50	38.60	3.75	5.50
Maximum		14.10	238.00	8.46	300.00	721.00	1.72	31.80	38.60	4.25	5.50

Annual											
Annual Average		12.20	297.79	7.77	246.94	582.73	1.10	29.13	53.76	3.57	8.17
Annual Totals (Kg or ML)		4471.36	1331529.41		1104166.06	2605575.45	4935.20	130246.47	240372.9	15957.21	36545.92
Average Std. Dev.		#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
n		365.00	129.00	68.00	69.00	51.00	353.00	358.00	12.00	363.00	12.00

**City of Penticton Advanced Wastewater Treatment Plant:
Effluent**

2022	24 hour composite sample											Grab sample				Loadings		
	Effluent Flow (ML)	Turbidity (NTU)	S.S.	pH	Alk. as CaCO3	BOD5	COD, Mn III Mthd	NO3- & NO2- as N	NH3 as N	Total N	Ortho-P as P	Total P	E. coli Coliform (/100 mL) CARO	Faecal (/100 mL) CARO	e-Coli Coliform (/100ml)	Total Coliform (/100mL)	Total N (kg/Day)	Total P (kg/Day)
1	9.07	3.04		6.94				5.05	0.10	7.28	0.05	0.195					66	1.77
2	8.48	2.80		6.97				5.31	0.328	7.28	0.03	0.195					62	1.65
3	9.10	3.47		7.00	155			4.78	0.67	7.28	0.08	0.195					66	1.77
4	8.98	3.32		6.97				4.80	1.26	7.28	0.08	0.195					66	1.75
5	8.43	3.36	< 2.0	7.03		6.9	37.7	5.03	0.69	7.28	0.08	0.195	< 1				61	1.64
6	8.33	3.22		7.17				5.09	0.302	6.83	0.11	0.224			93.30	579.40	57	1.87
7	8.50	2.99		7.01				5.24	0.373	6.83	0.07	0.224			2.00	6.30	58	1.90
8	8.69	2.71		7.11				4.92	0.363	6.83	0.09	0.224			8.60	29.50	59	1.95
9	8.92	2.49		7.03				4.73	0.355	6.83	0.11	0.224					61	2.00
10	8.73	2.67		6.99	110			4.47	0.370	6.83	0.10	0.224					60	1.96
11	8.62	2.42		7.00				4.27	1.01	6.83	0.07	0.224					59	1.93
12	9.52	2.36		7.14		36.8		4.93	0.260	6.83	0.09	0.224	6.00	8.00	4.10	23.10	65	2.13
13	9.36	2.16		6.99				4.19	0.380	5.86	0.06	0.168					55	1.57
14	8.96	2.00		6.99				3.98	0.315	5.86	0.05	0.168					53	1.51
15	8.69	1.83		7.05				4.21	0.168	5.86	0.06	0.168					51	1.46
16	8.92	1.70		7.02				3.93	0.141	5.86	0.03	0.168					52	1.50
17	8.95	1.76		6.78	108.3			3.72	0.286	5.86	0.06	0.168					52	1.50
18	8.79	1.78		7.30				2.82	2.95	5.86	0.14	0.168					52	1.48
19	8.45	1.34		7		36.3		3.84	1.01	5.86	0.07	0.168	3.00	3.00	1.00	3.10	50	1.42
20	9.41	1.39		3.6				4.24	0.101	5.63	0.04	0.0960					53	0.90
21	9.08	1.19		3.6	7.04			4.01	0.219	5.63	0.04	0.0960					51	0.87
22	8.94	1.12		3.6	6.99			3.89	0.065	5.63	0.03	0.0960					50	0.86
23	9.26	1.05		3.6	7.19			4.17	0.053	5.63	0.02	0.0960					52	0.89
24	9.11	1.05		3.6	6.95	116.6		4.25	0.085	5.63	0.03	0.0960					51	0.87
25	8.99	1.05		3.6	6.95			3.96	0.206	5.63	0.07	0.0960					51	0.86
26	8.82	0.96		3.6	6.99		30.6	4.04	0.073	5.63	0.03	0.0960	< 1	< 1	1.00	2.00	50	0.85
27	9.09	0.95		6.99				4.73	0.043	6.37	0.04	0.1260					58	1.15
28	8.83	0.96		5.2	7.02			5.52	0.058	6.37	0.02	0.1260					56	1.11
29	8.79	0.96		5.2	7.17			5.04	0.059	6.37	0.01	0.1260					56	1.11
30	9.02	0.99		5.2	7.01			4.76	0.209	6.37	0.02	0.1260					57	1.14
31	8.72	2.77	5.20	7.04				4.66	0.369	6.37	0.07	0.1260					56	1.10
Average	8.89	2.00	3.83	7.03	122.48	6.90	35.35	4.47	0.42	6.34	0.06	0.162	2.25	2.75	18.33	107.23	56.28	1.43
Total	275.55																1744.80	44.47
Std. Dev. in	0.29	0.85	1.37	0.09	19.03	0.00	2.79	0.57	0.55	0.60	0.03	0.047	2.49	3.27	33.63	211.41	5.08	0.41
Minimum	8.33	31.00	12.00	31.00	4.00	1.00	4.00	31.00	31.00	31.00	31.00	31.00	4.00	4.00	6.00	6.00	31.00	31.00
Maximum	9.52	3.47	5.20	7.30	155.00	6.90	37.70	5.52	2.95	7.28	0.14	0.224	6.00	8.00	93.30	579.40	66.25	2.13

January

2022	24 hour composite sample											Grab sample				Loadings		
	Effluent Flow (ML)	Turbidity (NTU)	S.S.	pH	Alk. as CaCO3	BOD5	COD, Mn III Mthd	NO3- & NO2- as N	NH3 as N	Total N	Ortho-P as P	Total P	E. coli Coliform (/100 mL) CARO	Faecal (/100 mL) CARO	e.Coli Coliform (/100ml)	Total Coliform (/100mL)	Total N (kg/Day)	Total P (kg/Day)
1	9.14	1.09	5.20	6.99			4.34	0.55	6.37	0.02	0.126	<1	2.00	2.00	6.10	58.22	1.15	
2	9.12	1.13	4.6**	6.97		9.50	41.90	4.46	6.37	0.03	0.126	<1	2.00	2.00	6.10	58.09	1.15	
3	8.91	1.14	4.6**	7.05				4.50	5.55	0.01	0.108					49.45	0.96	
4	9.06	1.18	4.6**	7.13				4.27	5.55	0.17	0.108					50.28	0.98	
5	9.17	1.12	4.6**	7.15				4.18	5.55	0.02	0.108					50.89	0.99	
6	9.55	1.04	4.6**	6.89				4.30	5.55	0.01	0.108					53.00	1.03	
7	9.52	1.05	4.6**	7.15	121.16			4.22	5.55	0.02	0.108					52.84	1.03	
8	9.26	1.05	4.6**	7.03				4.05	5.55	0.01	0.108					51.39	1.00	
9	8.71	1.03	6.40	7.01		32.10		4.07	5.55	0.03	0.108	<1	<1	3.10	17.00	48.34	0.94	
10	9.18	1.04	6.40	6.96				4.06	5.40	0.02	0.070					49.57	0.65	
11	9.02	1.06	6.40	7.05				4.08	5.40	0.03	0.070					48.71	0.64	
12	9.00	1.14	6.40	7.11				3.71	5.40	0.05	0.070					48.60	0.63	
13	9.31	1.14	6.40	6.97				3.96	5.40	0.02	0.070					50.27	0.66	
14	9.01	1.25	6.40	7.02	114.00			4.13	5.40	0.02	0.070					48.65	0.63	
15	8.39	1.42	6.40	6.98				3.61	5.40	0.01	0.070					45.31	0.59	
16	8.95	1.40	<10.0	6.86		35.90		4.15	5.40	0.02	0.070	<1	<1	<1	7.40	48.33	0.63	
17	8.74	1.50	5.00	7.03				4.00	5.96	0.02	0.103					52.09	0.90	
18	8.98	1.48	5.00	6.98				4.13	5.96	0.02	0.103					53.52	0.92	
19	8.85	1.50	5.00	7.11				4.00	5.96	0.01	0.103					52.75	0.91	
20	9.18	1.80	5.00	7.02				4.25	5.96	0.01	0.103					54.71	0.95	
21	9.42	1.31	5.00	7.03	121.00			4.54	5.96	0.01	0.103					56.14	0.97	
22	8.68	1.28	5.00	6.97				4.39	5.96	0.02	0.103					51.73	0.89	
23	9.36	1.29	5.00	7.09		34.00		4.26	5.96	0.01	0.103	1.00	3.00	3.00	1.00	55.79	0.96	
24	9.15	1.63	2.40	7.23				4.17	6.20	0.01	0.084					56.73	0.77	
25	9.01	1.23	2.40	7.19				4.18	6.20	0.01	0.084					55.86	0.76	
26	8.94	1.23	2.40	7.13				4.01	6.20	0.01	0.084					55.43	0.75	
27	9.11	1.21	2.40	7.15				4.24	6.20	0.01	0.084					56.48	0.76	
28	9.11	1.21	2.40	7.18	106.70			4.24	6.20	0.01	0.084					0.00	0.00	
Average	9.06	1.25	3.46	7.05	115.72	9.50	35.98	4.16	5.79	0.02	0.094	0.25	1.25	2.03	7.88	1413.19	23.20	
Total	244.72																	
Std. Dev. in	0.26	0.20	2.55	0.09	5.95	0.00	3.68	0.20	0.34	0.03	0.017	0.43	1.30	1.25	5.79	10.27	0.23	
Minimum	27.00	27.00	28.00	28.00	4.00	1.00	4.00	28.00	28.00	28.00	28.00	4.00	4.00	4.00	4.00	28.00	28.00	28.00
Maximum	8.39	1.03	0.00	6.86	106.70	9.50	32.10	3.61	5.40	0.01	0.070	0.00	0.00	0.00	1.00	0.00	0.00	0.00
Maximum	9.55	1.80	6.40	7.23	121.16	9.50	41.90	4.54	6.37	0.17	0.126	1.00	3.00	3.10	17.00	58.22	1.15	1.15

February

2022	24 hour composite sample											Grab sample			Loadings			
	Effluent Flow (ML)	Turbidity (NTU)	S.S.	pH	Alk. as CaCO3	BOD5	COD, Mn III Mthd	NO3- & NO2-as N	NH3 as N	Total N	Ortho-P as P	Total P	E. coli Coliform (/100 mL) CARO	Faecal (/100 mL) CARO	e.Coli Coliform (/100ml)	Total Coliform (/100mL)	Total N (kg/Day)	Total P (kg/Day)
1	9.11	1.26	2.40	7.03				4.25	0.57	6.20	0.02	0.084	<1	<1	1.00	4.10	56.48	0.76
2	6.770000	1.20	2.4	7.02		2.15	33.7	4.34	0.369	6.20	0.01	0.084	<1	<1	1.00	4.10	41.97	0.57
3	8.180000	1.08	4.8	7.00				4.79	0.598	5.32	0.06	0.093					43.52	0.76
4	9.290000	1.15	4.8	7.09				3.94	0.285	5.32	0.03	0.093					49.42	0.86
5	9.210000	1.14	4.8	6.96				3.76	0.330	5.32	0.02	0.093					49.00	0.85
6	9.240000	1.11	4.8	6.90				3.74	0.119	5.32	0.02	0.093					49.16	0.85
7	9.420000	1.12	4.8	6.88	143.75			3.83	0.110	5.32	0.02	0.093					50.11	0.87
8	9.870000	1.18	4.8	6.86				3.77	0.079	5.32	0.01	0.093					52.51	0.91
9	9.850000	1.26	4.8	6.94		35		3.76	0.139	5.32	0.04	0.093	<1	<1	0.00	0.00	52.40	0.91
10	9.5900	1.39	3.0	6.95				3.73	0.116	5.31	0.06	0.114					50.92	1.09
11	9.3800	1.51	3.0	6.96				3.69	0.164	5.31	0.03	0.114					49.81	1.07
12	9.3000	1.54	3.0	6.99				3.46	0.83	5.31	0.01	0.114					49.38	1.06
13	9.4400	1.57	3.0	7.00				3.75	0.250	5.31	0.03	0.114					50.13	1.08
14	9.430000	1.71	3.0	6.95	110			3.77	0.150	5.31	0.05	0.114					50.07	1.08
15	9.52000	1.90	3.0	7.01				3.82	0.08	5.31	0.04	0.114	<1	<1	<1	<1	50.55	1.09
16	9.530000	2.13	3.0	7.02		43		3.85	0.080	5.31	0.04	0.114	<1	<1	<1	<1	50.60	1.09
17	9.660000	2.46	3.2	7.03				3.77	0.080	5.06	0.05	0.207					48.88	2.00
18	9.270000	2.04	3.2	7.01				3.68	0.081	5.06	0.04	0.207					46.91	1.92
19	09.32000	1.83	3.2	6.98				3.40	0.083	5.06	0.07	0.207					47.16	1.93
20	09.19000	1.72	3.2	6.97				3.51	0.180	5.06	0.06	0.207					46.50	1.90
21	09.26000	1.80	3.2	7.03	116.7			3.84	0.140	5.06	0.04	0.207					46.86	1.92
22	09.0500	2.01	3.2	7.01				3.71	0.110	5.06	0.09	0.207	<1	<1			45.79	1.87
23	09.00000	2.03	3.2	7.03		38.5		3.54	0.095	5.06	0.08	0.207	<1	<1			45.54	1.86
24	09.1100	2.19	3	7.01				3.71	0.112	5.21	0.08	0.304		0.00	0.00	2.00	47.46	2.77
25	08.99000	2.40	3	7.09				3.69	0.122	5.21	0.14	0.304					46.84	2.73
26	08.91000	2.20	3	7.01				3.97	0.134	5.21	0.18	0.304					46.42	2.71
27	09.06000	2.15	3	7.06				3.44	0.163	5.21	0.10	0.304					47.20	2.75
28	09.02000	2.29	3	7.09	130			3.39	0.207	5.21	0.12	0.304					46.99	2.74
29	08.39000	2.70	3	7.06				3.3	0.247	5.21	0.07	0.304					43.71	2.55
30	7.970000	2.73	3	6.98		41.8		3.37	0.223	5.21	0.19	0.304	<1	<1	0.00	1.00	41.52	2.42
31	10.64000	2.73	3.3	7.03				3.36	0.201	5.21	0.14	0.304					0.00	0.00
Average	9.16	1.76	3.42	7.00	125.11	2.15	38.40	3.74	0.21	5.29	0.06	0.173	0.00	0.00	0.20	1.42	46.58	1.52
Total	283.97																1443.83	46.98
Std. Dev.	0.65	0.50	0.77	0.06	12.95	0.00	3.64	0.30	0.17	0.26	0.05	0.084	0.00	0.00	0.40	1.53	9.05	0.78
Minimum	31.00	30.00	31.00	31.00	4.00	1.00	5.00	31.00	31.00	30.00	31.00	30.00	5.00	5.00	5.00	5.00	31.00	31.00
Maximum	6.77	1.08	2.40	6.86	110.00	2.15	33.70	3.30	0.08	5.06	0.01	0.084	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	10.64	2.73	4.80	7.09	143.75	2.15	43.00	4.79	0.83	6.20	0.19	0.304	0.00	0.00	1.00	4.10	56.48	2.77

March

2022	24 hour composite sample										Grab sample				Loadings		
	Effluent Flow (ML)	Turbidity (NTU)	S.S.	pH	Alk. as CaCO3	BOD5	COD, Mn III Mthd	NO3- & NO2- as N	NH3 as N	Total N	Ortho-P as P	Total P	E. coli Coliform (/100 mL) CARO	Faecal (/100 mL) CARO	e. Coli Coliform (/100ml)	Total Coliform (/100mL)	Total N (kg/Day)
1	9.20	2.47	3.30	7.09			3.34	0.20	4.97	0.16	0.34					47.60	3.13
2	9.23	2.42	3.30	7.06			3.49	0.15	4.97	0.21	0.340					47.04	3.14
3	9.59	2.09	3.30	7.15			3.33	0.20	4.97	0.15	0.340					46.43	3.26
4	9.30	2.09	3.30	7.09	121.66		3.59	0.18	4.97	0.07	0.340					46.84	3.16
5	8.89	2.06	3.30	6.99			3.48	0.15	4.97	0.08	0.340					44.18	3.02
6	9.36	1.86	3.30	7.09		3.60	3.31	0.13	4.97	0.10	0.340	<1	<1	0.50	1.00	46.52	3.18
7	8.97	1.71	3.70	7.08			3.25	0.17	4.72	0.19	0.210			0.50	0.50	42.34	1.88
8	9.13	1.68	3.70	7.10			3.05	0.14	4.72	0.14	0.210			0.00	0.00	43.09	1.92
9	8.98	2.71	3.70	7.15			3.21	0.17	4.72	0.05	0.210			0.00	0.00	42.39	1.89
10	9.20	1.50	3.70	7.19			3.19	0.12	4.72	0.06	0.210			0.50	0.50	43.42	1.93
11	9.19	1.46	3.70	7.09	130.00		3.00	0.12	4.72	0.04	0.210			0.00	0.00	43.38	1.93
12	8.81	1.51	3.70	7.14			2.87	0.13	4.72	0.09	0.210			0.50	0.50	41.58	1.85
13	9.09	1.52	3.70	7.05		7.50	2.85	0.15	4.72	0.09	0.210			1.00	2.00	42.90	1.91
14	9.04	1.57	3.00	7.05			2.91	0.14	5.01	0.05	0.162			1.00	2.00	45.29	1.46
15	8.91	1.56	3.00	7.10			3.17	0.21	5.01	0.07	0.162			1.00	3.00	44.64	1.44
16	8.99	1.45	3.00	7.03			3.39	0.18	5.01	0.06	0.162			1.00	2.00	45.04	1.46
17	8.85	1.37	3.00	7.02			3.54	0.22	5.01	0.03	0.162			0.50	0.50	44.34	1.43
18	9.00	1.39	3.00	6.99	126.00		3.25	0.20	5.01	0.04	0.162			0.00	0.00	45.09	1.46
19	9.05	1.34	3.00	7.05			3.26	0.32	5.01	0.06	0.162			1.00	1.00	45.34	1.47
20	8.79	1.16	3.00	7.07		3.10	3.13	0.39	5.01	0.06	0.162			0.50	2.00	44.04	1.42
21	9.23	1.65	3.80	7.04			3.21	0.44	5.58	0.08	0.131			0.50	0.50	51.50	1.21
22	8.93	1.24	3.80	7.09			3.29	0.52	5.58	0.16	0.131			0.00	0.00	49.83	1.17
23	9.00	1.22	3.80	7.09			3.33	0.27	5.58	0.20	0.131			1.00	1.00	50.22	1.18
24	9.38	1.17	3.80	7.07			3.12	0.15	5.58	0.09	0.131			0.00	0.00	52.34	1.23
25	9.47	1.13	3.80	7.10	125.00		3.59	0.13	5.58	0.04	0.131			0.50	0.50	52.84	1.24
26	9.41	1.22	3.80	7.09			3.41	0.09	5.58	0.05	0.131			0.50	0.50	52.51	1.23
27	6.99	4.10	3.80	7.04		2.25	3.65	0.11	5.58	0.04	0.131			0.00	1.00	39.00	0.92
28	9.01	1.11	2.80	7.08			3.63	0.10	5.10	0.02	0.096			0.00	0.00	45.95	0.87
29	8.11	1.12	2.80	7.02			3.27	0.09	5.10	0.02	0.096			0.00	0.00	41.36	0.78
30	8.70	1.07	2.80	7.05			3.37	0.09	5.10	0.03	0.096			0.00	0.00	44.37	0.84
Average	8.99	1.67	3.39	7.08	125.67		3.85	0.19	5.08	0.08	0.195	0.00	0.00	0.44	1.95	45.71	1.77
Total	269.80															1371.42	53.01
Std. Dev.	0.46	0.62	0.37	0.04	2.97	2.01	2.75	0.21	0.10	0.05	0.080	0.00	0.00	0.39	4.74	3.46	0.77
n	30.00	30.00	30.00	30.00	4.00	4.00	30.00	30.00	30.00	30.00	30.00	4.00	4.00	24.00	24.00	30.00	30.00
Minimum	6.99	1.07	2.80	6.99	121.66	2.25	3.00	2.85	0.09	0.02	0.096	0.00	0.00	0.00	0.00	39.00	0.78
Maximum	9.59	4.10	3.80	7.19	130.00	7.50	44.40	3.65	0.52	0.21	0.340	0.00	0.00	1.00	24.30	52.84	3.26

April

2022	24 hour composite sample													Grab sample			Loadings	
	Effluent Flow (ML)	Turbidity (NTU)	S.S.	pH	Alk. as CaCO3	BOD5	COD, Mn III Mthd	NO3- & NO2- as N	NH3 as N	Total N	Ortho-P as P	Total P	E. coli Coliform (/100 mL) CARO	Faecal Coliform (/100 mL) CARO	e.Coli Coliform (/100ml)	Total Coliform (/100mL)	Total N (kg/Day)	Total P (kg/Day)
1	9.36	1.09	2.8	7.05			3.47	0.17	5.10	0.02	0.096			1.00	0.00	47.74	0.90	
2	8.73	1.13	2.8	7.07	133.00		3.56	0.16	5.10	0.01	0.096			0.00	0.00	44.52	0.84	
3	8.89	1.13	2.8	7.12			3.77	0.11	5.10	0.01	0.096			0.00	0.00	45.34	0.86	
4	8.65	1.12	2.8	7.09		2.25	34.00	0.07	5.10	0.03	0.096	< 1	< 1	0.50	0.50	44.12	0.83	
5	9.85	1.07	5.2	7.15			3.72	0.09	5.39	0.03	0.209			2.00		53.09	2.06	
6	8.88	1.09	5.2	7.13			3.16	0.46	5.39	0.05	0.209			0.00	1.00	47.86	1.86	
7	8.55	1.01	5.2	7.11			3.29	0.23	5.39	0.03	0.209			0.00	0.00	46.08	1.79	
8	8.69	1.02	5.2	7.14			3.35	0.08	5.39	0.06	0.209			0.00	0.00	46.84	1.82	
9	8.34	1.07	5.2	7.23	134.00		3.49	0.09	5.39	0.02	0.209			0.50	0.50	44.95	1.74	
10	8.70	1.14	5.2	7.25			3.38	0.09	5.39	0.02	0.209				2.00	46.89	1.82	
11	6.71	1.14	5.2	7.19		3.50	33.90	0.07	5.39	0.47	0.209	2.00	2.00	0.50	0.50	36.17	1.40	
12	7.62	1.09	6.2	7.08			3.51	0.06	5.46	0.09	0.645			0.00	0.00	41.61	4.91	
13	9.05	1.16	6.2	7.10			3.70	0.06	5.46	0.03	0.645			0.00	2.00	49.41	5.84	
14	9.04	1.17	6.2	7.07			3.99	0.11	5.46	0.01	0.645			0.00	0.00	49.36	5.83	
15	9.47	1.16	6.2	7.03			3.97	0.10	5.46	0.02	0.645			0.00	2.00	49.14	6.11	
16	9.00	1.16	6.2	7.08	144.30		3.88	0.14	5.46	0.03	0.645			2.00	2.00	49.14	5.81	
17	9.04	1.24	6.2	7.10			3.63	0.07	5.46	0.02	0.645			0.00	0.00	49.36	5.83	
18	8.00	1.38	6.2	7.27		2.60	35.60	0.07	5.46	1.85	0.645	1.00	1.00	0.00	1.00	43.68	5.16	
19	7.11	1.25	6.4	7.21			3.21	0.06	4.96	1.40	0.355			0.00	1.00	35.27	2.52	
20	8.40	1.21	6.4	7.14			3.56	0.15	4.96	0.06	0.355			0.00	0.00	41.66	2.98	
21	9.12	1.17	6.4	7.14			3.69	0.35	4.96	0.02	0.355			0.00	0.00	45.24	3.24	
22	8.60	1.14	6.4	7.01			3.93	0.42	4.96	0.02	0.355			0.00	0.00	42.66	3.05	
23	8.80	1.10	6.4	7.07	140.00		3.70	0.38	4.96	0.02	0.355			0.00	2.00	43.65	3.12	
24	7.00	1.13	6.4	6.99			3.71	0.29	4.96	0.02	0.355			0.00	0.00	34.72	2.49	
25	8.23	1.19	6.4	7.01		3.60	34.50	0.11	4.96	0.02	0.355	1.00	1.00	0.00	0.00	40.82	2.92	
26	5.50	1.22	7	6.99			3.08	0.11	4.68	0.04	0.101			0.00	1.00	25.74	0.55	
27	7.74	1.25	7	6.97			3.24	0.31	4.68	0.04	0.101			0.00	0.00	36.22	0.78	
28	9.36	1.22	7	6.97			3.37	0.29	4.68	0.02	0.101			0.00	1.00	43.80	0.94	
29	9.46	1.17	7	6.95			3.44	0.14	4.68	0.02	0.101			0.00	0.00	44.27	0.95	
30	7.78	1.23	7	6.96			3.54	0.34	4.68	0.02	0.101			1.00	2.00	36.41	0.78	
31	8.47	1.16	5.74	7.08	137.83	2.99	34.50	0.14	4.68	0.02	0.101			1.00	1.00	41.89	0.90	
Average Total	262.62							3.52	5.13	0.15	0.305	1.00	1.00	0.50	1.00	43.56	2.60	
Std. Dev. in	0.92	0.08	1.28	0.09	4.60	0.58	0.67	0.25	0.12	0.40	0.206	0.71	0.71	0.50	0.50	5.70	1.82	
Minimum	31.00	31.00	31.00	31.00	4.00	4.00	4.00	31.00	31.00	31.00	31.00	4.00	4.00	0.50	2.00	31.00	31.00	
Maximum	5.50	1.01	2.80	6.95	133.00	2.25	33.90	3.08	0.06	0.01	0.096	0.00	0.00	0.50	2.00	25.74	0.55	
Maximum	9.85	1.38	7.00	7.27	144.30	3.60	35.60	3.99	0.46	1.85	0.645	2.00	2.00	2.00	2.00	53.09	6.11	

May

2022	24 hour composite sample										Grab sample				Loadings			
	Effluent Flow (ML)	Turbidity (NTU)	S.S.	pH	Alk. as CaCO3	BOD5	COD, Mn III Mthd	NO3- & NO2- as N	NH3 as N	Total N	Ortho-P as P	Total P	E. coli Coliform (/100 mL) CARO	Faecal (/100 mL) CARO	e.Coli Coliform (/100ml)	Total Coliform (/100mL)	Total N (kg/Day)	Total P (kg/Day)
1	7.51	1.39	7.00	6.97		3.50	34.10	3.22	0.17	4.68	0.02	0.101	2.00	2.00	1.00	2.00	35.15	0.76
2	7.98	3.14	10.70	7.00				2.99	0.09	4.67	0.01	0.102			1.00	3.00	37.27	0.81
3	10.05	1.38	10.70	7.01				3.19	0.14	4.67	0.05	0.102			0.50	1.00	46.93	1.03
4	10.45	1.36	10.70	7.02				3.06	0.13	4.67	0.11	0.102			0.50	0.50	48.80	1.07
5	9.78	1.35	10.70	7.05				3.27	0.09	4.67	0.04	0.102			0.50	0.50	45.67	1.00
6	9.20	1.32	10.70	7.04	135.00			3.05	0.10	4.67	0.02	0.102			0.50	0.50	42.96	0.94
7	8.21	1.31	10.70	7.05				2.95	0.05	4.67	0.04	0.102			0.50	0.50	38.34	0.84
8	8.61	1.26	10.70	6.91		3.55	37.60	2.83	0.19	4.67	0.02	0.102	< 1	< 1	0.50	0.50	40.21	0.88
9	9.56	1.28	2.60	6.80	92.34			3.61	0.11	5.34	0.02	0.082			3.10	3.10	51.05	0.79
10	9.81	1.31	2.60	6.78	85.70			3.90	0.14	5.34	0.02	0.082			0.50	0.50	52.39	0.81
11	9.58	1.33	2.60	6.70	78.13			3.92	0.11	5.34	0.02	0.082			1.00	2.00	51.16	0.79
12	9.42	1.32	2.60	6.68				4.09	0.10	5.34	0.01	0.082			0.50	4.10	50.30	0.77
13	10.49	1.43	2.60	6.65	64.29			4.06	0.10	5.34	0.01	0.082			2.00	11.90	56.02	0.86
14	10.47	1.28	2.60	6.68	66.70			3.68	0.14	5.34	0.16	0.082			6.30	1.00	55.91	0.86
15	9.79	1.70	2.60	6.66	63.30	3.55	77.50	3.37	0.33	5.34	0.02	0.082	< 1	< 1	1.00	20.10	49.04	0.81
16	10.26	0.97	< 5.6	6.66	63.30			3.41	0.41	4.78	0.01	0.079			0.50	2.00	47.90	0.79
17	10.02	0.95	< 5.5	6.66	72.00			3.45	0.14	4.78	0.02	0.079			0.50	4.10	45.08	0.74
18	9.43	0.95	< 5.4	6.73	75.00			3.52	0.10	4.78	0.02	0.079			2.00	4.10	45.08	0.74
19	10.74	0.88	< 5.3	6.72	75.00			3.48	0.06	4.78	0.02	0.079			0.50	1.00	51.34	0.85
20	10.36	0.88	< 5.2	6.67	71.70			3.71	0.15	4.78	0.01	0.079			0.50	0.50	49.52	0.82
21	9.76	0.84	< 5.1	6.80	70.00			3.48	0.09	4.78	0.02	0.079			0.50	2.00	46.65	0.77
22	9.60	0.89	< 5.0	6.68	70.00	3.55	44.10	3.43	0.09	4.78	0.05	0.079	< 1	1.00	0.50	3.10	45.89	0.76
23	9.26	0.84	2.00	6.78	70.00			3.17	0.11	4.62	0.04	0.069			1.00	0.50	42.78	0.55
24	8.27	0.80	2.00	6.79	70.00			3.31	0.14	4.62	0.02	0.069			0.50	0.50	38.21	0.49
25	7.93	0.86	2.00	6.70	67.90			3.68	0.13	4.62	0.19	0.069			0.50	0.50	36.64	0.47
26	8.65	0.84	2.00	6.61	66.70			3.91	0.17	4.62	0.02	0.069			0.50	0.50	39.96	0.51
27	8.42	0.99	2.00	6.68	69.20			3.92	0.16	4.62	0.06	0.069			1.00	13.40	38.90	0.50
28	9.59	0.89	2.00	6.75				3.20	0.13	4.62	0.07	0.069			3.10	13.50	44.31	0.57
29	9.54	0.90	2.00	6.76	73.30	3.30	76.30	2.76	0.21	4.62	0.11	0.069	< 1	1.00	3.00	16.00	44.07	0.57
30	9.70	0.92	< 3.3	6.75	78.30			2.75	0.12	3.76	0.04	0.074			0.50	2.00	36.47	0.72
Average	9.41	1.19	3.80	6.79	75.14	3.49	53.92	3.41	0.14	4.81	0.04	0.081	1.00	0.80	1.15	3.71	45.37	0.76
Total	282.44																1361.19	22.91
Std. Dev.	0.84	0.44	4.05	0.14	15.07	0.10	19.04	0.38	0.07	0.34	0.04	0.015	0.80	0.75	1.25	5.29	5.89	0.16
n	30.00	30.00	30.00	30.00	21.00	5.00	5.00	30.00	30.00	30.00	30.00	30.00	5.00	5.00	30.00	30.00	30.00	30.00
Minimum	7.51	0.80	0.00	6.61	63.30	3.30	34.10	2.75	0.05	3.76	0.01	0.059	0.00	0.00	0.50	0.50	35.15	0.47
Maximum	10.74	3.14	10.70	7.05	135.00	3.55	77.50	4.09	0.41	5.34	0.19	0.102	2.00	2.00	6.30	20.10	56.02	1.07

June

2022	24 hour composite sample											Grab sample				Loadings			
	Effluent Flow (ML)	Turbidity (NTU)	S.S.	pH	Alk. as CaCO3	BOD5	COD, Mn III Mthd	NO3- & NO2- as N	NH3 as N	Total N	Ortho-P as P	Total P	E. coli Coliform (/100 mL) CARO	Faecal Coliform (/100 mL) CARO	e.Coli Coliform (/100ml)	Total Coliform (/100mL)	Total N (kg/Day)	Total P (kg/Day)	
1	9.48	1.02	< 3.3	6.75	73.30			2.62	0.12	3.76	0.02	0.074	1.00	1.00	1.00	11.00	35.64	0.70	
2	10.10	1.00	< 3.3	6.70	70.00			2.79	0.14	3.76	0.02	0.074	0.50	0.50	0.50	12.00	37.98	0.75	
3	10.82	1.02	< 3.3	6.69	68.30			3.33	0.33	3.76	0.03	0.074	2.00	2.00	2.00	11.00	40.68	0.80	
4	12.47	1.22	< 3.3	6.79	75.00			3.17	0.55	3.76	0.02	0.074	1.00	1.00	1.00	2.00	46.89	0.92	
5	10.88	1.42	< 3.3	6.86	87.50			2.08	1.99	3.76	0.03	0.074	0.00	0.00	0.00	5.20	40.91	0.80	
6	10.89	1.25	< 3.3	6.78	85.00	184.00		1.64	0.98	3.76	0.03	0.074	1.00	1.00	1.00	4.10	40.95	0.80	
7	10.61	1.20	2.20	6.75	88.57			1.85	0.36	3.41	0.02	0.070	4.10	4.10	4.10	13.20	36.18	0.74	
8	10.37	1.16	2.20	6.76	86.40			1.79	0.15	3.41	0.04	0.070	1.00	1.00	1.00	5.10	35.36	0.72	
9	9.75	1.15	2.20	6.76	75.00			2.24	0.12	3.41	0.02	0.070	0.50	0.50	0.50	6.30	33.25	0.68	
10	10.41	1.15	2.20	6.76	73.30			2.78	0.20	3.41	0.03	0.070	0.50	0.50	0.50	5.20	35.50	0.73	
11	9.71	1.24	2.20	6.72	70.00			3.41	0.27	3.41	0.02	0.070	0.50	0.50	0.50	7.40	33.11	0.68	
12	9.16	1.58	2.20	6.75	78.30			2.85	0.31	3.41	0.02	0.070	2.00	2.00	2.00	44.10	31.24	0.64	
13	8.82	1.04	2.20	6.79	81.60	50.20		2.28	0.26	3.41	0.11	0.070	0.50	0.50	0.50	3.10	30.08	0.61	
14	8.39	1.07	< 4.6	6.76	80.00			2.29	0.57	3.84	0.05	0.077	0.50	0.50	0.50	4.10	32.22	0.64	
15	8.21	1.06	< 4.5	6.86	88.00			2.43	0.81	3.84	0.03	0.077	0.50	0.50	0.50	4.10	31.53	0.63	
16	8.71	0.98	< 4.4	6.93	82.50			2.17	0.48	3.84	0.04	0.077	0.50	0.50	0.50	7.30	33.45	0.67	
17	8.63	0.91	< 4.3	6.85	80.00			2.19	0.40	3.84	0.08	0.077	0.50	0.50	0.50	2.00	33.14	0.66	
18	8.06	0.91	< 4.2	6.94	215.00			2.77	0.30	3.84	0.03	0.077	0.50	0.50	0.50	3.00	30.95	0.62	
19	7.37	1.02	< 4.1	6.87				2.62	0.27	3.84	0.04	0.077	1.00	1.00	1.00	2.00	28.30	0.56	
20	8.04	1.12	< 4.0	6.89	106.70	53.20		2.23	0.47	3.84	0.03	0.077	0.50	0.50	0.50	8.50	30.87	0.62	
21	7.76	1.21	2.00	6.96	108.30			2.39	0.45	4.87	0.02	0.085	0.50	0.50	0.50	2.00	37.79	0.66	
22	7.93	1.22	2.00	6.93	113.30			2.40	0.40	4.87	0.02	0.085	1.00	1.00	1.00	9.80	38.62	0.68	
23	8.99	1.18	2.00	6.95	119.25			2.73	0.38	4.87	0.02	0.085	1.00	1.00	1.00	17.50	43.78	0.77	
24	8.78	1.12	2.00	6.90	111.92			3.40	0.44	4.87	0.03	0.085	3.10	3.10	3.10	19.90	42.76	0.75	
25	7.67	1.12	2.00	6.89	116.15			3.79	0.34	4.87	0.02	0.085	1.00	1.00	1.00	15.80	37.35	0.65	
26	8.46	1.16	2.00	6.92				3.19	0.59	4.87	0.01	0.085	2.00	2.00	2.00	18.50	41.20	0.72	
27	7.91	1.11	2.00	6.95	103.00	45.50		2.67	0.60	4.87	0.03	0.085	1.00	1.00	1.00	5.20	38.52	0.67	
28	8.01	1.11	3.40	6.94				2.98	0.24	3.88	0.02	0.110	0.50	0.50	0.50	14.60	31.08	0.88	
29	8.18	1.10	3.40	6.99**				3.16**	0.161**	3.88	0.03**	0.110	0.5**	0.5**	18.5**	31.74	0.90		
30	9.21	1.11	3.40	6.99				2.93	0.16	3.88	0.05	0.110	0.50	0.50	0.50	3.10	35.73	1.01	
31	9.01	1.14	3.40	6.96				3.13	0.18	3.88	0.20	0.110	1.00	1.00	1.00	2.00	34.96	0.99	
Average	9.12	1.13	1.39	6.62	92.66	3.28	83.23	2.55	0.41	3.97	0.04	0.081	0.97	0.97	0.97	8.68	35.86	0.73	
Total	282.79																1111.75	22.66	
Std. Dev. in	1.20	0.13	1.25	1.21	29.71	0.15	58.25	0.69	0.35	0.52	0.04	0.013	0.85	0.85	0.85	8.42	4.48	0.11	
Minimum	31.00	31.00	31.00	31.00	25.00	4.00	4.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00
Maximum	7.37	0.91	0.00	0.00	68.00	3.10	45.50	0.00	0.00	3.41	0.00	0.070	0.00	0.00	0.00	0.00	28.30	0.56	
Maximum	12.47	1.58	3.40	6.99	215.00	3.50	184.00	3.79	1.99	4.87	0.20	0.110	4.10	4.10	4.10	44.10	46.89	1.01	

July

2022	24 hour composite sample											Grab sample			Loadings			
	Effluent Flow (ML)	Turbidity (NTU)	S.S.	pH	Alk. as CaCO3	BOD5	COD, Mn III Mthd	NO3- & NO2-as N	NH3 as N	Total N	Ortho-P as P	Total P	E. coli Coliform (/100 mL) CARO	Faecal Coliform (/100 mL) CARO	e.Coli Coliform (/100ml)	Total Coliform (100mL)	Total N (kg/Day)	Total P (kg/Day)
1	8.21	1.22	3.40	7.00	105.00		3.27	0.28	3.88	0.08	0.11	0.50	0.50	0.50	9.60	31.85	0.90	
2	7.25	1.40	3.40	7.06			2.41	0.39	3.88	0.12	0.11	1.00	1.00	1.00	5.20	28.13	0.80	
3	6.86	1.50	3.40	7.09		3.40	1.13	0.95	3.88	0.07	0.11	0.50	0.50	0.50	5.20	26.62	0.76	
4	8.02	1.48	5.70	7.08			1.26	1.01	4.17	0.08	0.08	0.50	0.50	0.50	9.60	33.44	0.66	
5	8.31	2.02	5.70	7.05			1.71	0.96	4.17	0.05	0.08	0.50	0.50	0.50	10.90	34.65	0.69	
6	9.14	1.73	5.70	7.00			2.14	0.52	4.17	0.12	0.08	0.50	0.50	0.50	9.70	38.11	0.75	
7	9.10	1.56	5.70	7.05			2.92	0.25	4.17	0.02	0.08	0.50	0.50	0.50	29.80	37.95	0.75	
8	8.27	1.69	5.70	6.99	125.00		3.35	0.15	4.17	0.03	0.08	2.00	2.00	2.00	12.20	34.49	0.68	
9	6.93	1.77	5.70	7.05			2.35	0.08	4.17	0.02	0.08	2.00	2.00	2.00	14.80	28.90	0.57	
10	8.23	2.34	5.70	7.03		3.50	2.13	0.09	4.17	0.15	0.08	1.00	1.00	1.00	16.10	34.32	0.68	
11	8.00	0.88	6.80	7.00			2.45	0.22	4.27	0.32	0.07	1.00	1.00	1.00	8.40	34.16	0.55	
12	9.01	0.85	6.80	6.98			2.68	0.11	4.27	0.27	0.07	1.00	1.00	1.00	8.40	38.47	0.62	
13	10.03		6.80	7.01			2.80	0.17	4.27	0.03	0.07	1.00	1.00	1.00	7.30	42.83	0.69	
14	9.89		6.80	7.02			2.91	0.12	4.27	0.05	0.07	2.00	2.00	2.00	15.50	42.23	0.68	
15	8.61	0.87	6.80	7.06	107.00		3.32	0.18	4.27	0.03	0.07	0.50	0.50	0.50	13.20	36.76	0.59	
16	8.61	0.95	6.80	7.02			2.96	0.07	4.27	0.03	0.07	1.00	1.00	1.00	56.30	36.76	0.59	
17	7.83	0.82	6.80	7.04		2.40	45.20	0.05	4.27	0.05	0.06	1.00	1.00	1.00	6.30	33.43	0.54	
18	8.43		9.40	7.01			2.95	0.04	4.34	0.02	0.06	1.00	1.00	1.00	6.30	36.59	0.53	
19	7.01		9.40	7.02			3.02	0.04	4.34	0.02	0.06	1.00	1.00	1.00	2.00	30.42	0.44	
20	7.85		9.40	7.06			2.91	0.04	4.34	0.02	0.06	1.00	1.00	1.00	9.60	34.07	0.49	
21	8.30		9.40	7.00			3.32	0.05	4.34	0.02	0.06	0.50	0.50	0.50	2.00	36.02	0.52	
22	8.78		9.40	6.93	117.30		3.55	0.06	4.34	0.02	0.06	0.50	0.50	0.50	3.10	38.11	0.55	
23	8.59		9.40	6.99			3.24	0.05	4.34	0.01	0.06	0.50	0.50	0.50	12.00	37.28	0.54	
24	8.75		9.40	7.06		3.05	38.90	0.04	4.34	0.03	0.06	1.00	1.00	1.00	2.00	37.98	0.55	
25	9.18		3.20	7.03			2.60	0.04	3.77	0.03	0.06	0.50	0.50	0.50	19.90	34.61	0.56	
26	8.58		3.20	7.03			2.57	0.63	3.77	0.02	0.06	0.50	0.50	0.50	2.00	32.35	0.52	
27	9.47		3.20	7.02			2.81	0.66	3.77	0.01	0.06	1.00	1.00	1.00	14.50	35.70	0.57	
28	9.09		3.20	7.03			2.97	0.40	3.77	0.16	0.06	0.50	0.50	0.50	30.50	34.27	0.55	
29	6.86		3.20	7.07	130.00		3.04	0.30	3.77	0.02	0.06	1.00	1.00	1.00	20.30	25.86	0.42	
30	7.87	2.69	3.20	7.03			2.47	0.12	3.77	0.03	0.06	0.50	0.50	0.50	16.90	29.67	0.48	
31	7.06	0.99	3.20	7.03		3.10	46.00	0.20	3.77	0.04	0.06	0.50	0.50	0.50	15.80	26.62	0.43	
Average	8.33	1.46	6.00	7.03	116.86	3.09	44.58	0.27	4.11	0.06	0.073	0.85	0.85	0.85	12.60	34.28	0.60	
Total	258.12															1062.65	18.66	
Std. Dev.	0.84	0.53	2.28	0.03	9.77	0.39	6.38	0.29	0.22	0.07	0.015	0.44	0.44	0.44	10.80	4.19	0.11	
Minimum	31.00	17.00	31.00	31.00	5.00	5.00	5.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00
Maximum	6.86	0.82	3.20	6.93	105.00	2.40	37.40	1.13	3.77	0.01	0.061	0.50	0.50	0.50	0.50	25.86	0.42	0.42
Maximum	10.03	2.69	9.40	7.09	130.00	3.50	55.40	3.55	4.34	0.32	0.110	2.00	2.00	2.00	56.30	42.83	0.90	0.90

2022	24 hour composite sample										Grab sample				Loadings		
	Effluent Flow (ML)	Turbidity (NTU)	S.S.	pH	Alk. as CaCO3	BOD5	COD, Mn III Mthd	NO3- & NO2- as N	NH3 as N	Total N	Ortho-P as P	Total P	E. coli Coliform (/100 mL) CARO	Faecal (/100 mL) CARO	e.Coli Coliform (/100ml)	Total Coliform (/100mL)	Total N (kg/Day)
1	8.10	0.99	12.60	7.04			2.00	0.07	3.30	0.03	0.070	0.50	0.50	8.60	0.50	26.73	0.56
2	7.69	1.05	12.60	7.04			2.17	0.11	3.40	0.03	0.067	0.50	0.50	8.60	0.50	26.15	0.52
3	8.57	1.05	12.60	7.05			2.19	0.14	3.40	0.02	0.067	0.50	0.50	6.10	0.50	29.14	0.58
4	8.76	1.01	12.60	7.16			2.45	0.24	3.40	0.02	0.067	0.50	0.50	63.70	0.50	29.78	0.59
5	8.16	1.04	12.60	7.17	124.00		2.79	0.26	3.40	0.02	0.067	34.10	34.10	34.50	34.10	27.74	0.55
6	8.78	1.02	12.60	7.13			2.58	0.20	3.40	0.02	0.067	0.50	0.50	13.40	0.50	29.85	0.59
7	7.89	1.08	12.60	7.11		3.70	2.46	0.07	3.40	0.05	0.067	0.50	0.50	13.40	0.50	26.83	0.53
8	8.10	2.85	2.40	7.07			2.27	0.06	3.43	0.02	0.099	0.50	0.50	9.70	0.50	27.78	0.80
9	8.25	4.67	2.40	7.15			2.39	0.09	3.43	0.06	0.099	0.50	0.50	29.20	0.50	28.30	0.82
10	8.64	7.01	2.40	7.09			2.17	0.10	3.43	0.05	0.099	0.50	0.50	16.00	0.50	29.64	0.85
11	9.84	5.69	2.40	7.07			2.33	0.11	3.43	0.09	0.099	0.50	0.50	13.40	0.50	33.75	0.97
12	8.85	4.16	2.40	7.15	142.50		2.21	0.11	3.43	0.01	0.099	0.50	0.50	17.10	0.50	30.36	0.87
13	9.62	5.70	2.40	7.11			1.94	0.13	3.43	0.01	0.099	0.50	0.50	8.60	0.50	33.00	0.95
14	9.30	4.47	2.40	7.11		3.15	1.70	0.16	3.43	0.16	0.099	0.50	0.50	1.00	0.50	31.90	0.92
15	9.59	0.78	8.60	7.12			1.50	0.17	3.18	0.04	0.101	0.50	0.50	15.60	0.50	30.50	0.97
16	9.13	0.81	8.60	7.10			1.69	0.24	3.18	0.05	0.101	0.50	0.50	4.10	0.50	29.03	0.92
17	9.16	0.86	8.60	7.17			1.57	0.20	3.18	0.04	0.101	0.50	0.50	0.50	0.50	29.13	0.93
18	9.60	0.84	8.60	7.11			1.65	0.42	3.18	0.04	0.101	0.50	0.50	1.00	0.50	30.53	0.97
19	9.12	0.83	8.60	7.11	134.00		1.67	0.37	3.18	0.04	0.101	0.50	0.50	8.60	0.50	29.00	0.92
20	9.38	0.88	8.60	7.18			1.52	0.36	3.18	0.03	0.101	0.50	0.50	2.00	0.50	29.83	0.95
21	8.46	0.96	8.60	7.19		3.40	1.33	0.25	3.18	0.02	0.101	0.50	0.50	7.40	0.50	26.90	0.85
22	8.87	1.78	8.20	7.18			1.31	0.32	3.18	0.06	0.103	1.00	1.00	6.20	1.00	28.21	0.91
23	8.08	0.89	8.20	7.09			1.72	0.25	2.89	0.04	0.127	0.50	0.50	1.00	0.50	23.35	1.03
24	9.02	0.87	8.20	7.01			1.82	0.16	2.89	0.05	0.127	0.50	0.50	0.50	0.50	26.07	1.15
25	8.77	0.86	8.20	7.01			2.02	0.12	2.89	0.06	0.127	1.00	1.00	3.10	1.00	25.35	1.11
26	6.21	1.68	8.20	7.11	126.00		2.21	0.11	2.89	0.04	0.127	0.00	0.00	4.10	0.00	17.95	0.79
27	9.24	0.80	8.20	7.02			2.13	0.13	2.89	0.05	0.127	0.00	0.00	2.00	0.00	26.70	1.17
28	7.63	0.84	8.20	7.04		3.35	43.10	0.20	2.89	0.07	0.127	0.50	0.50	2.00	0.50	22.05	0.97
29	8.72	0.91	11.20	7.05			1.43	0.12	2.89	0.07	0.127	1.00	1.00	4.10	1.00	25.20	1.11
30	8.66	1.13	11.20	7.07			1.37	0.16	2.89	0.06	0.127	1.00	1.00	1.00	1.00	25.03	1.10
Average	8.67	1.92	8.17	7.10	131.63	3.40	50.85	1.94	3.21	0.05	0.100	1.65	1.65	10.22	1.65	27.86	0.87
Total	260.19															835.76	25.96
Std. Dev.	0.74	1.78	3.61	0.05	7.31	0.20	4.96	0.40	0.22	0.03	0.021	6.03	6.03	12.78	6.03	3.18	0.19
n	30.00	30.00	30.00	30.00	4.00	4.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Minimum	6.21	0.78	2.40	7.01	124.00	3.15	43.10	1.31	0.06	0.01	0.067	0.00	0.00	0.50	0.00	17.95	0.52
Maximum	9.84	7.01	12.60	7.19	142.50	3.70	56.90	2.79	0.42	0.16	0.127	34.10	34.10	63.70	34.10	33.75	1.17

September

2022	24 hour composite sample											Grab sample				Loadings			
	Effluent Flow (ML)	Turbidity (NTU)	S.S.	pH	Alk. as CaCO3	BOD5	COD, Mn III Mthd	NO3- & NO2- as N	NH3 as N	Total N	Ortho-P as P	Total P	E. coli Coliform (/100 mL) CARO	Faecal Coliform (/100 mL) CARO	e.Coli Coliform (/100ml)	Total Coliform (/100mL)	Total N (kg/Day)	Total P (kg/Day)	
1	8.88	1.06	11.20	7.07			1.52	0.23	2.89	0.06	0.13	1.00	1.00	1.00	1.00	25.66	1.13		
2	8.91	1.01	11.20	7.09			1.60	0.18	2.89	0.05	0.127	0.50	0.50	0.50	1.00	25.75	1.13		
3	7.92	1.08	11.20	7.18	133.00		1.64	0.19	2.89	0.03	0.127	1.00	1.00	1.00	9.70	22.89	1.01		
4	9.29	1.04	11.20	7.08			1.57	0.12	2.89	0.05	0.127	0.50	0.50	0.50	0.50	26.85	1.18		
5	8.63	1.21	11.20	7.07		3.35	1.42	0.15	2.89	0.07	0.127	0.50	0.50	0.50	0.50	24.94	1.10		
6	8.77	1.18	9.40	7.06			1.37	0.16	3.28	0.09	0.148	2.00	2.00	2.00	4.10	28.77	1.30		
7	8.48	1.14	9.40	7.05			1.48	0.20	3.28	0.07	0.148	2.00	2.00	2.00	4.10	27.81	1.26		
8	9.71	1.48	9.40	7.09			1.15	0.20	3.28	0.09	0.148	1.00	1.00	1.00	4.10	31.85	1.44		
9	9.82	1.00	9.40	7.17			0.92	0.43	3.28	0.09	0.148	0.50	0.50	0.50	0.50	32.21	1.45		
10	9.09	0.94	9.40	7.07	131.00		1.47	0.59	3.28	0.11	0.148	0.50	0.50	0.50	0.50	29.82	1.35		
11	8.66	0.97	9.40	7.13			2.21	0.54	3.28	0.05	0.148	0.50	0.50	0.50	0.50	28.40	1.28		
12	8.55	1.03	9.40	7.13		3.50	2.02	0.85	3.28	0.05	0.148	0.50	0.50	0.50	2.00	28.04	1.27		
13	8.10	0.97	9.40	7.16			2.11	0.53	3.53	0.04	0.167	0.50	0.50	0.50	2.00	28.59	1.35		
14	9.65	1.00	13.70	7.05			2.13	0.14	3.53	0.24	0.167	0.50	0.50	0.50	1.00	34.06	1.61		
15	9.41	0.97	13.70	7.05			1.32	0.17	3.53	0.13	0.167	2.00	2.00	2.00	6.20	33.22	1.57		
16	9.79	0.91	13.70	7.02			2.11	0.23	3.53	0.06	0.167	2.00	2.00	2.00	8.50	34.56	1.63		
17	8.65	0.87	13.70	7.01	172.00		2.44	0.25	3.53	0.05	0.167	8.60	8.60	8.60	8.60	30.53	1.44		
18	8.56	0.85	13.70	7.02			2.22	0.31	3.53	0.06	0.167	0.00	0.00	0.00	1.00	30.22	1.43		
19	8.71	0.82	13.70	7.05		2.85	45.40	0.19	3.53	0.06	0.167					30.75	1.45		
20	9.08	1.29	8.80	7.10			2.01	0.34	3.53	0.06	0.120					32.05	1.09		
21	9.45	0.77	8.80	7.02			2.04	0.23	3.66	0.07	0.120	0.50	0.50	0.50	0.50	34.59	1.13		
22	9.29	0.66	8.80	7.03			2.12	0.20	3.66	0.14	0.120					34.00	1.11		
23	9.66	0.76	8.80	7.08			2.17	0.18	3.66	0.04	0.120					35.36	1.16		
24	9.27	0.81	8.80	7.04	164.00		2.23	0.38	3.66	0.06	0.120					33.93	1.11		
25	9.50	0.82	8.80	7.04			1.87	0.80	3.66	0.03	0.120					34.77	1.14		
26	8.87	0.74	8.80	7.24		3.55	43.30	0.93	3.66	0.05	0.120			6.20	4.00	32.46	1.06		
27	8.74	0.84	< 2.0	7.06			1.99	0.82	3.18	0.04	0.137					27.79	1.20		
28	9.32	0.92	< 2.0	7.07			1.99	0.49	3.18	0.11	0.137					29.64	1.28		
29	8.91	0.93	< 2.0	7.08			1.22	0.63	3.18	0.07	0.137					28.33	1.22		
30	9.35	0.85	< 2.0	7.05			1.47	0.36	3.18	0.07	0.137					29.73	1.28		
31	9.14	0.96	< 2.0	7.03	128.00		1.94	0.32	3.18	0.06	0.137					29.07	1.25		
Average	9.04	0.96	8.87	7.08	145.60	3.31	43.78	1.80	3.34	0.07	0.141	1.29	1.23	1.14	3.02	30.21	1.28		
Total	280.16															936.65	38.29		
Std. Dev.	0.48	0.17	4.26	0.05	18.53	0.28	2.13	0.38	0.26	0.04	0.017	1.83	1.81	1.31	2.97	3.19	0.16		
Minimum	31.00	31.00	31.00	31.00	5.00	4.00	4.00	31.00	31.00	31.00	31.000	19.00	20.00	20.00	20.00	20.00	31.00	30.00	
Maximum	7.92	0.66	0.00	7.01	128.00	2.85	40.50	0.92	2.89	0.03	0.120	0.00	0.00	0.00	0.50	22.89	1.01		
Maximum	9.82	1.48	13.70	7.24	172.00	3.55	45.90	2.44	3.66	0.24	0.167	8.60	8.60	6.20	9.70	35.36	1.63		

October

2022	24 hour composite sample													Grab sample				Loadings	
	Effluent Flow (ML)	Turbidity (NTU)	S.S.	pH	Alk. as CaCO3	BOD5	COD, Mn/ll Mthd	NO3- & NO2- as N	NH3 as N	Total N	Ortho-P as P	Total P	E. coli Coliform (/100 mL) CARO	Faecal (/100 mL) CARO	e.Coli Coliform (/100ml)	Total Coliform (/100mL)	Total N (Kg/Day)	Total P (Kg/Day)	
1	9.21	0.96	< 2.0	7.10			1.46	0.51	3.18	0.06	0.137					29.29	1.26		
2	9.20	1.02	< 2.0	7.03		3.25	44.20	1.47	0.25	3.18	0.07	0.137	1.00	< 1	1.00	2.00	29.26	1.26	
3	9.26	1.08	5.00	7.07				1.15	0.14	2.50	0.06	0.116					23.15	1.07	
4	10.73	1.01	5.00	7.06				0.78	0.07	2.50	0.06	0.116					26.83	1.24	
5	9.65	2.19	5.00	7.11				1.00	0.25	2.50	0.07	0.116					24.13	1.12	
6	9.72	0.78	5.00	7.06				0.87	0.09	2.50	0.07	0.116					24.30	1.13	
7	9.40	0.78	5.00	7.09	129.00			1.29	0.19	2.50	0.09	0.116					23.50	1.09	
8	9.33	0.79	5.00	7.09				1.57	0.15	2.50	0.06	0.116					23.33	1.08	
9	9.35	0.79	5.00	7.01		2.50	38.60	2.10	0.15	2.50	0.05	0.116	5.00	0.50	1.00	23.38	1.08		
10	9.15	0.80	9.30	7.06				2.03	0.10	2.66	0.03	0.112				24.34	1.02		
11	9.03	0.82	9.30	7.11				1.26	0.79	2.66	0.06	0.112				24.02	1.01		
12	8.98	0.74	9.30	7.28				0.91	1.19	2.66	0.10	0.112				23.89	1.01		
13	9.25	0.69	9.30	7.12				1.79	0.30	2.66	0.04	0.112				24.61	1.04		
14	9.14	0.68	9.30	7.20	136.00			2.11	0.36	2.66	0.06	0.112				24.31	1.02		
15	9.12	0.72	9.30	6.98				1.76	0.28	2.66	0.12	0.112				24.26	1.02		
16	9.07	0.70	9.30	7.09		3.00	21.80	1.01	0.16	2.66	0.15	0.112	< 1	4.10	14.50	24.13	1.02		
17	9.31	0.69	15.80	7.05				1.90	0.40	3.77	0.07	0.112				35.10	1.04		
18	9.20	0.68	15.80	7.04				1.79	0.80	3.77	0.05	0.112				34.68	1.03		
19	9.15	2.21	15.80	7.05				1.51	0.79	3.77	0.04	0.112				34.50	1.02		
20	9.40	0.63	15.80	7.07				1.58	0.70	3.77	0.06	0.112				35.44	1.05		
21	9.43	0.65	15.80	7.17	145.00			1.73	0.98	3.77	0.01	0.112				35.55	1.06		
22	8.84	0.65	15.80	7.08				1.64	0.84	3.77	0.06	0.112				33.33	0.99		
23	8.90	0.64	15.80	7.08		2.55	37.80	1.88	0.84	3.77	0.07	0.112	0.50	0.50	0.50	33.55	1.00		
24	9.10	0.61	23.60	7.09				2.16	1.18	3.39	0.04	0.299				30.85	2.72		
25	9.22	0.64	23.60	7.09				2.61	0.18	3.39	0.04	0.299				31.26	2.76		
26	8.90	0.70	23.60	7.08				1.82	0.07	3.39	0.04	0.299				30.17	2.66		
27	9.66	0.65	23.60	7.07				1.74	0.06	3.39	0.08	0.299				32.75	2.89		
28	9.78	0.64	23.60	7.29	133.00			2.33	0.11	3.39	0.03	0.299				33.15	2.92		
29	9.45	0.66	23.60	7.24				2.54	0.20	3.39	0.06	0.299				32.04	2.83		
30	9.05	0.64	23.60	7.31		2.70	36.70	2.70	0.21	3.39	0.25	0.299	< 1			30.68	2.71		
Average	9.30	0.84	12.53	7.11	135.75	2.70	35.82	1.68	0.41	3.09	0.07	0.158	0.75	1.00	1.53	4.50	28.66	1.47	
Total	278.98		375.90	213.17	543.00					0.50	0.04	0.078	0.25	2.00	1.50	5.80	859.73	44.16	
Std. Dev.	0.35	0.38	7.56	0.08	5.89		7.47	0.51	0.35	0.50	0.04	0.078	0.25	2.00	1.50	5.80	4.52	0.73	
n	30.00	30.00	30.00	30.00	4.00	5.00	30.00	30.00	30.00	30.00	30.00	30.000	2.00	5.00	4.00	4.00	30.00	30.00	
Minimum	8.84	0.61	0.00	6.98	129.00	2.50	21.80	0.78	0.06	2.50	0.01	0.112	0.50	0.00	0.50	0.50	23.15	0.99	
Maximum	10.73	2.21	23.60	7.31	145.00	3.25	44.20	2.70	1.19	3.77	0.25	0.299	1.00	5.00	4.10	14.50	35.55	2.92	

November

2022	24 hour composite sample											Grab sample				Loadings	
	Effluent Flow (ML)	Turbidity (NTU)	S.S.	pH	Alk. as CaCO3	BOD5	COD, Mn III Mthd	NO3- & NO2- as N	NH3 as N	Total N	Ortho-P as P	Total P	E. coli Coliform (/100 mL) CARO	Faecal (/100 mL) CARO	e. Coli Coliform (/100ml)	Total Coliform (/100mL)	Total N (kg/Day)
1	9.48	0.67	16.60	7.43			2.46	0.31	4.33	0.07	0.09	0.50		0.50	0.50	41.05	0.84
2	9.44	0.68	16.60	7.15			2.16	0.48	4.33	0.20	0.09					40.88	0.84
3	9.44	0.68	16.60	6.99			2.26	0.55	4.33	0.05	0.09					40.88	0.84
4	9.47	0.67	16.60	7.00			2.48	0.55	4.33	0.06	0.09					41.01	0.84
5	9.23	0.68	16.60	7.01	150.00		2.70	0.53	4.33	0.03	0.09					39.97	0.82
6	9.39	0.71	16.60	7.12			2.27	0.46	4.33	0.04	0.09					40.66	0.83
7	9.35	0.72	16.60	7.00		30.50	2.74	0.54	4.33	0.04	0.09	0.50	<1	0.50	0.50	40.49	0.83
8	9.26	0.72	11.40	7.03			3.18	0.21	4.27	0.03	0.11					39.54	1.06
9	9.28	0.75	11.40	7.06			3.08	0.46	4.27	0.06	0.11					39.63	1.06
10	9.17	0.74	11.40	7.16			2.77	0.10	4.27	0.04	0.11					39.16	1.05
11	9.54	0.73	11.40	7.02			2.83	0.06	4.27	0.04	0.11					40.74	1.09
12	9.47	0.75	11.40	7.03	117.00		2.79	0.08	4.27	0.02	0.11					40.44	1.08
13	9.23	0.80	11.40	7.24			2.47	0.22	4.27	0.03	0.11					39.41	1.05
14	9.42	0.81	11.40	6.99		58.00	2.62	0.08	4.27	0.03	0.11	1.00	1.00	1.00	1.00	40.22	1.07
15	9.02	0.83	22.00	7.14			2.00	0.41	4.01	0.05	0.09					36.17	0.80
16	9.29	0.81	22.00	7.17			2.24	0.20	4.01	0.06	0.09					37.25	0.82
17	9.12	1.01	22.00	7.12			2.66	0.03	4.01	0.02	0.09					36.57	0.81
18	9.11	0.83	22.00	7.01			2.89	0.03	4.01	0.03	0.09					36.53	0.81
19	9.28	0.85	22.00	7.12	137.00		3.03	0.03	4.01	0.02	0.09					37.21	0.82
20	9.35	0.90	22.00	7.00			3.28	0.04	4.01	0.09	0.09					37.49	0.83
21	8.96	0.92	22.00	6.95		63.60	3.15	0.11	4.01	0.04	0.09	0.50	<1	1.00	0.50	35.93	0.79
22	9.12	0.90	9.20	6.91			3.32	0.13	4.00	0.02	0.11					36.48	1.04
23	9.41	1.10	9.20	6.88			3.18	0.09	4.00	0.02	0.11					37.64	1.07
24	9.27	0.87	9.20	6.96			2.98	0.20	4.00	0.03	0.11					37.08	1.06
25	8.67	0.83	9.20	7.02			3.07	0.14	4.00	0.02	0.11					34.68	0.99
26	9.34	0.82	9.20	6.96	109.00		3.01	0.04	4.00	0.03	0.11					37.36	1.06
27	11.16	0.88	9.20	6.92			3.37	0.25	4.00	0.02	0.11					44.64	1.27
28	10.12	0.88	9.20	7.05		38.70	3.29	0.61	4.00	0.04	0.11	0.50	<1	0.50	0.50	40.48	1.15
29	9.32	0.85	8.20	7.00			3.07	0.24	4.23	0.08	0.16					39.42	1.51
30	9.45	0.99	8.20	7.01			2.73	0.38	4.23	0.06	0.16					39.97	1.53
31	9.72	0.86	8.20	7.00			2.59	0.89	4.23	0.10	0.16					41.12	1.57
Average	9.38	0.81	14.16	7.05	128.25	4.10	47.70	2.80	4.16	0.05	0.107	0.60	0.25	0.70	0.60	39.03	1.01
Total	290.88	25.24														1210.06	31.18
Std. Dev.	0.40	0.10	5.09	0.11	16.18	0.00	13.56	0.37	0.14	0.03	0.022	0.20	0.43	0.24	0.20	2.12	0.22
n	31.00	31.00	31.00	31.00	4.00	1.00	4.00	31.00	31.00	31.00	31.00	5.00	4.00	5.00	5.00	31.00	31.00
Minimum	8.67	0.67	8.20	6.88	109.00	4.10	30.50	2.00	4.00	0.02	0.089	0.50	0.00	0.50	0.50	34.68	0.79
Maximum	11.16	1.10	22.00	7.43	150.00	4.10	63.60	3.37	4.33	0.20	0.162	1.00	1.00	1.00	1.00	44.64	1.57

December

City of Penticton
Advanced Wastewater Treatment Plant
Reclaimed Water

City of Penticton
Advanced Wastewater Treatment Plant
Reclaimed Water

2022		South Flow M3/day	North Flow M3/day	Total Flow M3/day	Total Chlorine Residual	Fecal (/100 mL)
April	1	5.7	47.1	52.8		
	2	5	21	27		
	3	5	16	22		
	4	7	51	58		
	5	5	49	54		
	6	6	86	91		
	7	6	110	116		
	8	5	127	132		
	9	5	47	53		
	10	5	79	84		
	11	10	85	95		
	12	22	110	133		
	13	6	65	71	1.08	
	14	33	97	131		
	15	5	140	146		
	16	5	94	99		
	17	6	115	121		
	18	5	172	177		
	19	5	147	152		
	20	5	47	52	0.72	< 1
	21	5	117	121		
	22	5	44	49		
	23	5	228	233		
	24	5	134	139		
	25	27	0	27		
	26	230	80	310		
	27	327	235	562	1.18	< 1
	28	282	505	788		
	29	375	1200	1575		
	30	228	967	1195		
Average		55	174	229	0.99	0.0
Total		1648	5218	6866		
Std. Dev.		109	266	356	0.24	0.0
n		30	30	30	3.00	2.0
Minimum		5	0	22	0.72	0.0
Maximum		375	1200	1575	1.18	0.0

Chlorine sampled from North and South Irrigation pumphouses prior to leaving the building.

Coliform samples from North and South irrigation system.

2022		South Flow M3/day	North Flow M3/day	Total Flow M3/day	Total Chlorine Residual	Fecal (/100 mL)
May	1	320	417	737		
	2	284	717	1001		
	3	323	530	854		
	4	299	543	842	0.46	< 1
	5	389	163	552		
	6	298	453	750		
	7	334	282	616		
	8	243	526	769		
	9	387	583	971		
	10	243	372	614		
	11	387	1776	2163	0.90	< 1
	12	297	1201	1498		
	13	386	317	703		
	14	241	160	401		
	15	333	65	399		
	16	297	223	519		
	17	333	85	418		
	18	297	917	1214	0.85	< 1
	19	386	1504	1890		
	20	296	706	1002		
	21	332	315	647		
	22	242	505	747		
	23	385	479	864		
	24	241	1698	1939		
	25	387	784	1170	0.83	< 1
	26	297	2635	2932		
	27	388	1177	1566		
	28	241	25	266		
	29	339	35	374		
	30	296	1252	1548		
	31	342	220	561		
Average		318	667	985	0.76	0.0
Total		9864	20663	30526	3.04	
Std. Dev.		52	605	609	0.20	0.0
n		31	31	31	4.00	4.0
Minimum		241	25	266	0.46	0.0
Maximum		389	2635	2932	0.90	0.0

Chlorine sampled from North and South Irrigation pumphouses prior to leaving the building.

Coliform samples from North and South irrigation system.

2022		South Flow M3/day	North Flow M3/day	Total Flow M3/day	Total Chlorine Residual	Fecal (/100 mL)
June	1	394	1309	1704	0.85	< 1
	2	339	1049	1388		
	3	391	383	773		
	4	0	31	31		
	5	1	26	27		
	6	54	657	711		
	7	1	1009	1010		
	8	83	1025	1108	0.75	< 1
	9	51	424	475		
	10	51	267	318		
	11	0	512	512		
	12	0	572	572		
	13	50	203	253		
	14	1	80	81		
	15	4	483	486	0.50	< 1
	16	3	90	92		
	17	1	73	74		
	18	0	370	370		
	19	0	72	72		
	20	0	146	146		
	21	0	535	535		
	22	44	836	880	0.56	< 1
	23	48	1036	1084		
	24	48	1295	1343		
	25	346	1261	1607		
	26	246	1275	1520		
	27	393	1323	1717		
	28	354	869	1223		
	29	471	431	902	0.75	< 1
	30	354	471	825		
Average		124	604	728	0.68	0.0
Total		3726	18110	21836		
Std. Dev.		162	435	534	0.13	0.0
n		30	30	30	5.00	5.0
Minimum		0	26	27	0.50	0.0
Maximum		471	1323	1717	0.85	0.0

Chlorine sampled from North and South Irrigation pumphouses prior to leaving the building.

Coliform samples from North and South irrigation system.

2022		South Flow M3/day	North Flow M3/day	Total Flow M3/day	Total Chlorine Residual	Fecal (/100 mL)
July	1	481	659	1140		
	2	292	601	893		
	3	416	43	459		
	4	356	136	492		
	5	476	139	615		
	6	352	254	605	0.56	< 1
	7	479	308	787		
	8	357	734	1091		
	9	417	614	1031		
	10	290	311	601		
	11	477	639	1117		
	12	355	998	1353		
	13	654	425	1079	0.94	< 1
	14	1197	1279	2476		
	15	1010	1313	2323		
	16	295	1135	1430		
	17	438	1074	1512		
	18	922	1390	2312		
	19	1353	1502	2855		
	20	898	1447	2346	0.71	< 1
	21	1067	1423	2490		
	22	939	1424	2363		
	23	415	953	1368		
	24	299	886	1185		
	25	1071	1398	2468		
	26	963	1099	2061		
	27	1095	1394	2489	0.60	< 1
	28	990	1444	2434		
	29	1113	1332	2445		
	30	289	1094	1383		
	31	431	1045	1476		
Average		651	919	1570	0.70	#DIV/0!
Total		20185	28494	48680		
Std. Dev.		335	457	736	0.15	0.0
n		31	31	31	4.00	4.0
Minimum		289	43	459	0.56	0.0
Maximum		1353	1502	2855	0.94	0.0
Chlorine sampled from North and South Irrigation pumphouses prior to leaving the building.						
Coliform samples from North and South irrigation system.						

2022		South Flow M3/day	North Flow M3/day	Total Flow M3/day	Total Chlorine Residual	Fecal (/100 mL)
August	1	1139	1305	2443		
	2	1000	1402	2402		
	3	1166	2120	3286	0.84	< 1
	4	1025	1456	2481		
	5	1032	1154	2186		
	6	288	979	1267		
	7	430	912	1342		
	8	996	1095	2091		
	9	1184	1967	3151		
	10	1032	1236	2268	0.86	< 1
	11	1179	1176	2355		
	12	1148	947	2094		
	13	425	770	1195		
	14	288	697	986		
	15	1217	733	1950		
	16	1062	942	2004		
	17	1199	1042	2240	0.67	
	18	1033	989	2021		6.0
	19	1183	1732	2915		
	20	287	1804	2091		
	21	423	1534	1957		
	22	862	873	1735		
	23	660	948	1608		
	24	925	668	1593	0.72	< 1
	25	510	806	1316		
	26	905	1009	1914		
	27	483	282	765		
	28	344	577	921		
	29	613	2134	2747		
	30	292	1514	1805		
	31	993	1461	2454	0.55	< 1
Average		817	1170	1987	1	6
Total		25319	36263	61583		
Std. Dev.		335	447	615	0.11	2.4
n		31	31	31	5.00	5.0
Minimum		287	282	765	0.55	0.0
Maximum		1217	2134	3286	0.86	0.0

Chlorine sampled from North and South Irrigation pumphouses prior to leaving the building.

Coliform samples from North and South irrigation system.

2022		South Flow M3/day	North Flow M3/day	Total Flow M3/day	Total Chlorine Residual	Fecal (/100 mL)
September	1	471	1275	1746		
	2	830	1232	2062		
	3	420	760	1180		
	4	286	758	1044		
	5	958	1034	1993		
	6	289	901	1190		
	7	1033	1002	2034	0.80	< 1
	8	330	1368	1698		
	9	719	597	1316		
	10	8	845	852		
	11	8	90	98		
	12	338	1192	1530		
	13	20	529	549		
	14	398	25	424	0.60	< 1
	15	111	85	196		
	16	428	103	530		
	17	8	371	379		
	18	7	82	89		
	19	257	331	588		
	20	10	543	552		
	21	550	595	1145	0.76	< 1
	22	31	700	731		
	23	549	753	1302		
	24	8	526	534		
	25	6	546	551		
	26	552	2381	2933		
	27	29	413	442		
	28	544	878	1423	0.57	< 1
	29	30	700	730		
	30	689	363	1052		
Average		331	699	1030	0.68	0.0
Total		9917	20976	30893		
Std. Dev.		306	481	668	0.10	0.0
n		30	30	30	4.00	4.0
Minimum		6	25	89	0.57	<2.2
Maximum		1033	2381	2933	0.80	0.0

Chlorine sampled from North and South Irrigation pumphouses prior to leaving the building.

Coliform samples from North and South irrigation system.

2022		South Flow M3/day	North Flow M3/day	Total Flow M3/day	Total Chlorine Residual	Fecal (/100 mL)
October	1	7.3	602.6	0,610		
	2	7.8	618.9	627		
	3	551.113	813.75	1,365		
	4	28.9001	415.42	0,444		
	5	576.706	413.42	990	0.62	< 1
	6	29.6001	826.15	856		
	7	69.6995	721.57	791		
	8	7.6	52.8	060		
	9	7.5	71.199	79		
	10	448.618	316.91	766		
	11	7.9	810.95	819	0.57	
	12	23.7001	726.67	750		< 1
	13	396.315	728.67	1125		
	14	7.5	28.5	036		
	15	5.1	23.9	29		
	16	5.6	44.6	50		
	17	0.7	773.06	774		
	18	0	741.57	742		< 1
	19	0	617.1	617	0.61	
	20	0	146.4	146		
	21	0	26	26		
	22	0	23	23		
	23	0	40	40		
	24	0	244	244		
	25	0	75	75		
	26	0	32	32		
	27	0	21	21		
	28	0	6	6		
	29	0	0	0		
	30	0	0	0		
	31	0	0	0		
Average		70	321	392	0.60	0.0
Total		2182	9961	12143		
Std. Dev.		165	321	407	0.02	0.0
n		31	31	31	3.00	3.0
Minimum		0	0	0	0.57	0.0
Maximum		577	826	1365	0.62	0.0

Chlorine sampled from North and South Irrigation pumphouses prior to leaving the building.

Coliform samples from North and South irrigation system.

Total	72840	139686	212527		
Number of tests	210	210	210	28.00	27.0
Annual Average	347	665	1012	0.73	0.0

Treatment Plant Impact Monitoring of Okanagan River Channel

Upstream Sampling Location: East bank of Okanagan River from Coyote Cruises loading site												
2022	S.S.	pH	Temp , °C	NH3 as N	Total N	NO3- & NO2- as N	Ortho-P as P	Total P	Total Colifor m (/100 mL)	e coli (/100 mL)	DO (mg/L)	Chlorides
January	2.4	7.3	1.7		0.33	0.0859	< 0.0050	< 0.050	154	49	13.88	6.38
February	1.0	7.82	2.1		0.24	0.0452	< 0.0050	< 0.050	36	16	12.71	5.78
March	0.4	8.4	3		0.26	0.0549	< 0.0050	0.0123	16	1	12.66	5.81
April	1.0	8.48	4.2		0.23	0.0658	< 0.0050	0.0148	12	< 1	12.82	5.84
May	1.0	9.0	8.7		0.24	0.0507	< 0.0050	0.0118	29	12	11.48	< 0.10
June	1.0	8.5	13		0.54	< 0.0100	< 0.0050	0.0097	17	3	9.35	5.53
July	3.8	9.0	19.5		0.5	< 0.0100	< 0.0050	0.0102	291	6	9.35	5.34
August	0.2	8.8	25.5	< 0.050	0.22	< 0.0100	< 0.0050	< 0.050	1,550	3	8.2	5.04
September	1.0	8.4	21.8	< 0.050	0.25	< 0.0100	< 0.0050	< 0.050	1,300	16	8.54	5.74
October	< 9.4	8.3	18.6	< 0.050	0.18	< 0.0100	< 0.0050	0.0111	1,410	18	9.13	5.99
November	< 2.0	7.94	11.5	0.913	1.17	0.0715	< 0.0050	< 0.050	210	12	11.49	5.98
December		8.96	4	0.696	0.79	0.0359	< 0.0050	< 0.050	162	50	12.61	6.13
Average	1.1	8.4	11.1	0.32	0.41	0.03	0.00	0.01	432.3	15.5	11.0	5.3
Std. Dev.	1.1	0.5	8.1	0.40	0.29	0.0	0.00	0.01	579	16	1.9	1.63
n	11	12	12	5	12	12	12	12	12	12	12	12
Minimum	0.0	7.3	1.7	0.00	0.18	0.0	0.0	0.0	12	0	8.2	0.00
Maximum	3.8	9.0	25.5	0.91	1.17	0.1	0.00	0.01	1550	50	13.9	6.38

Downstream Sampling Location: East bank of Okanagan River												
from Shingle Creek												
2022	S.S.	pH	Temp, oC	NH3 as N	Total N	NO3- & NO2- as N	Ortho-P as P	Total P	Total Coliform (/100 mL)	e coli (/100 mL)	DO (mg/L)	Chloride
January	5	8.07	1.3		0.282	0.0814	< 0.0050	< 0.050	649	365	13.32	6.45
February	1	8.14	1.6		0.218	0.0668	< 0.0050	< 0.050	96	14	12.89	6.09
March	0.8	8.4	3		0.245	0.0759	< 0.0050	0.0064	36	6	12.23	5.89
April	2	8.65	4.4		0.285	0.0674	< 0.0050	< 0.050	53	6	12.25	6.51
May	10.7	9.01	8.9		0.314	0.0608	< 0.0050	< 0.050	70	8	11.15	6.23
June	1	8.74	13.1		0.246	0.0208	< 0.0050	0.0103	179	16	10.56	5.79
July	2	8.8	19.6		0.244	< 0.0100	< 0.0050	0.0108	435	6	9.35	5.35
August	0.6	8.92	25.4	< 0.050	0.181	< 0.0100	< 0.0050	0.006	2,420	5	8.12	5.12
September	1	8.77	21.5	< 0.050	0.252	< 0.0100	< 0.0050	< 0.050	3,610	20	8.38	5.79
October	<9.8	8.72	18.2	< 0.050	0.223	< 0.0100	< 0.0050	< 0.050	1,060	10	8.86	6.5
November	<2.0	7.76	11.18	0.51	0.736	0.0769	< 0.0050	< 0.050	517	23	11.18	6.43
December	<2.0	9.04	3.7	0.519	0.832	0.072	< 0.0050	< 0.050	1,990	1,120	12.62	6.64
Average	2.0	8.6	11.0	0.206	0.34	0.0	0.00	0.00	926.3	133.3	10.9	6.1
Std. Dev.	2.9	0.4	8.1	0.252	0.20	0.0	0.00	0.00	1103	313	1.8	0.47
n	12	12	12.0	5.000	12	12.0	12	12	12	12	12	12
Minimum	0.0	7.8	1.3	0.000	0.18	0.0	0.00	0.00	36	5	8.1	5.12
Maximum	10.7	9.0	25.4	0.519	0.83	0.1	0.00	0.01	3610	1120	13.3	6.64

Appendix B.12.

British Columbia Municipal Population Estimates



CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	21L3233
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2021-12-22 12:35 / 0.2°C 2022-01-04 10:03
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

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



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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.

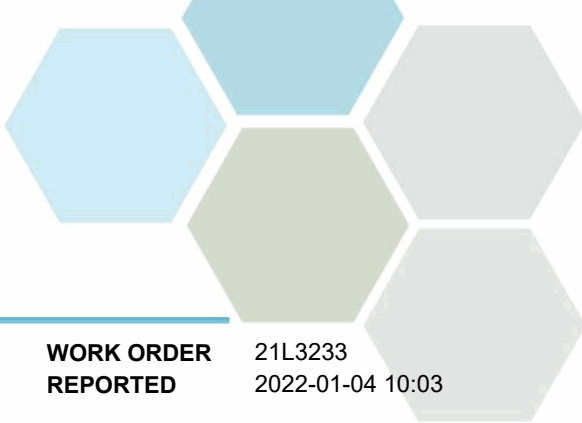
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Client Service Team Lead

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TEST RESULTS

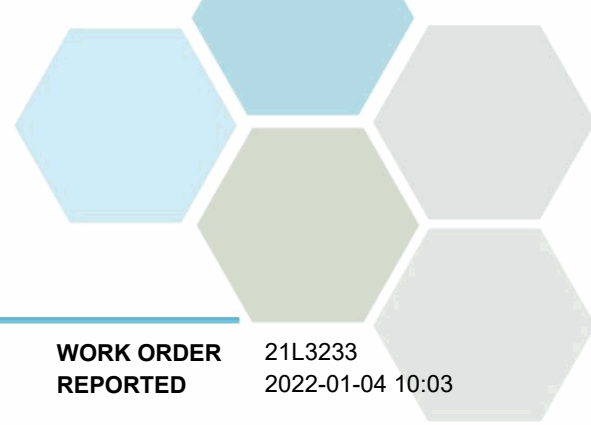
REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 21L3233
2022-01-04 10:03

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Effluent Grab- WT# 3813A (E105000) (21L3233-01) Matrix: Wastewater Sampled: 2021-12-22 07:30						
<i>Microbiological Parameters</i>						
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2021-12-22	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2021-12-22	
Effluent 7 Day Composite- WT# 3813A (E105000) (21L3233-02) Matrix: Wastewater Sampled: 2021-12-16 00:00 To 2021-12-22 00:00						PRES
<i>Anions</i>						
Nitrate (as N)	4.30	± 0.27		0.010 mg/L	2021-12-23	
Nitrite (as N)	0.096	± 0.010		0.010 mg/L	2021-12-23	
<i>Calculated Parameters</i>						
Nitrate+Nitrite (as N)	4.40			0.0100 mg/L		N/A
Nitrogen, Total	7.20			0.100 mg/L		N/A
<i>General Parameters</i>						
Nitrogen, Total Kjeldahl	2.80	± 0.36		0.050 mg/L	2021-12-29	
Phosphorus, Total (as P)	0.153	± 0.017		0.0050 mg/L	2022-01-03	

Sample Qualifiers:

PRES Sample has been preserved for Phos in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 21L3233
2022-01-04 10:03

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	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
MPN/100 mL	Most Probable Number per 100 millilitres
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.

General Comments:

The results in this report apply to the 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. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing. The quality control (QC) data is available upon request

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	21L3566
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2021-12-29 14:00 / 1.0°C 2022-01-06 15:12
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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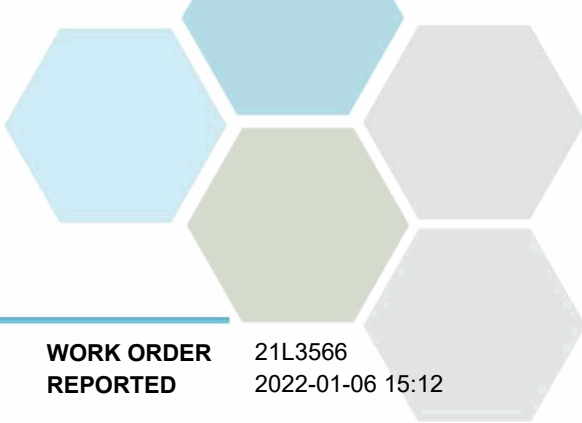
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Client Service Team Lead

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TEST RESULTS

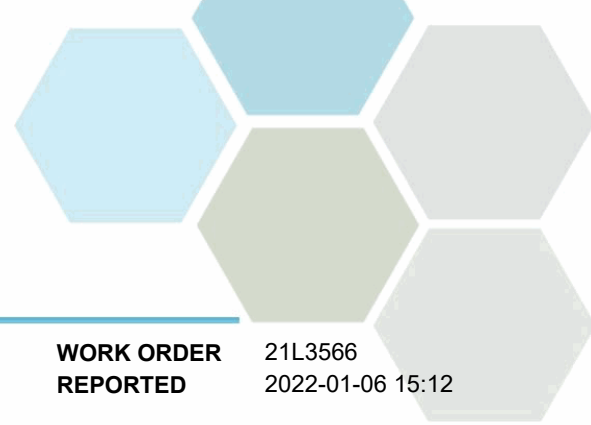
REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 21L3566
2022-01-06 15:12

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Effluent Grab- WT# 3813A (E105000) (21L3566-01) Matrix: Wastewater Sampled: 2021-12-29						
<i>Microbiological Parameters</i>						
Coliforms, Fecal (Q-Tray)	2		1	MPN/100 mL	2021-12-29	
E. coli (Q-Tray)	1		1	MPN/100 mL	2021-12-29	
Effluent 7 Day Composite- WT# 3813A (E105000) (21L3566-02) Matrix: Wastewater Sampled: 2021-12-23 00:00 To 2021-12-29 00:00						PRES
<i>Anions</i>						
Nitrate (as N)	4.25	± 0.27	0.010	mg/L	2021-12-30	
Nitrite (as N)	0.161	± 0.017	0.010	mg/L	2021-12-30	
<i>Calculated Parameters</i>						
Nitrate+Nitrite (as N)	4.41		0.0100	mg/L	N/A	
Nitrogen, Total	9.61		0.100	mg/L	N/A	
<i>General Parameters</i>						
Nitrogen, Total Kjeldahl	5.20	± 0.64	0.050	mg/L	2022-01-06	
Phosphorus, Total (as P)	0.247	± 0.027	0.0050	mg/L	2022-01-04	

Sample Qualifiers:

PRES Sample has been preserved for Phos in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 21L3566
2022-01-06 15:12

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	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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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22A0241
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-01-05 13:00 / - 1.8°C 2022-01-12 16:00
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

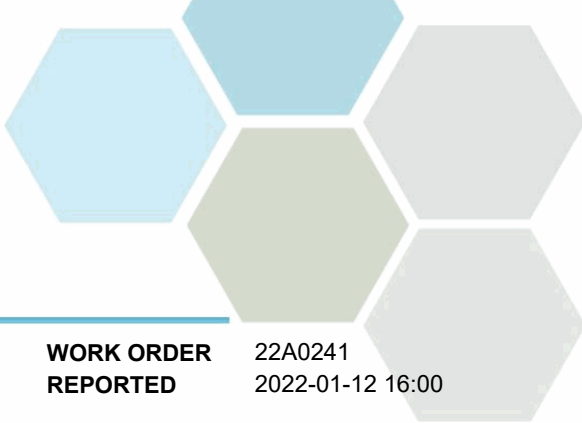
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If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Client Service Team Lead



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22A0241 2022-01-12 16:00

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22A0241-01) | Matrix: Wastewater | Sampled: 2022-01-05 07:00

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-01-05	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-01-05	

Effluent 24 hr Comp.- WT# 3813A (E105000) (22A0241-02) | Matrix: Wastewater | Sampled: 2022-01-05 07:00

Anions

Nitrate (as N)	4.64 ± 0.29		0.010	mg/L	2022-01-06	
Nitrite (as N)	0.087 ± 0.009		0.010	mg/L	2022-01-06	
Phosphate (as P)	0.0166 ± 0.0038		0.0050	mg/L	2022-01-06	

Calculated Parameters

Nitrate+Nitrite (as N)	4.72		0.0100	mg/L	N/A	
Nitrogen, Total	7.06		0.0500	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	0.753 ± 0.071		0.050	mg/L	2022-01-07	
BOD, 5-day	6.9 ± 3.9		2.0	mg/L	2022-01-11	
Chemical Oxygen Demand	26 ± 18		20	mg/L	2022-01-10	
Nitrogen, Total Kjeldahl	2.34 ± 0.29		0.050	mg/L	2022-01-10	
Phosphorus, Total (as P)	0.198 ± 0.022		0.0050	mg/L	2022-01-11	
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-01-10	

Upstream of O/F- WT# 3812F (0500050) (22A0241-03) | Matrix: Fresh Water | Sampled: 2022-01-05 08:15

Anions

Chloride	6.38 ± 0.36		0.10	mg/L	2022-01-06	
Nitrate (as N)	0.086 ± 0.007		0.010	mg/L	2022-01-06	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-01-06	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-01-06	

Calculated Parameters

Hardness, Total (as CaCO3)	130		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0859		0.0100	mg/L	N/A	
Nitrogen, Total	0.328		0.0500	mg/L	N/A	

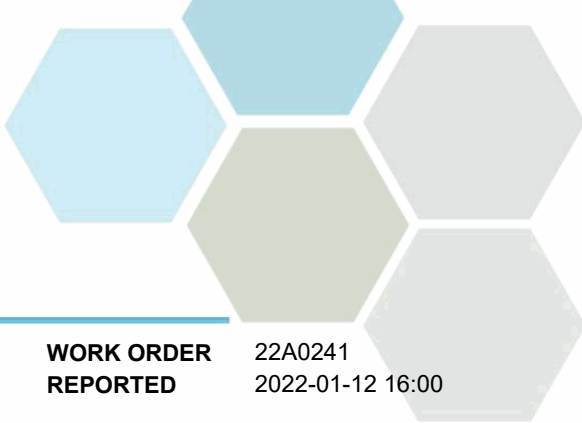
General Parameters

Nitrogen, Total Kjeldahl	0.242 ± 0.055		0.050	mg/L	2022-01-10	
Phosphorus, Total (as P)	0.0166 ± 0.0021		0.0050	mg/L	2022-01-11	

Microbiological Parameters

Coliforms, Total (Q-Tray)	154		1	MPN/100 mL	2022-01-05	
E. coli (Q-Tray)	49		1	MPN/100 mL	2022-01-05	

Total Metals



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22A0241
2022-01-12 16:00

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Upstream of O/F- WT# 3812F (0500050) (22A0241-03) | Matrix: Fresh Water | Sampled: 2022-01-05 08:15, Continued

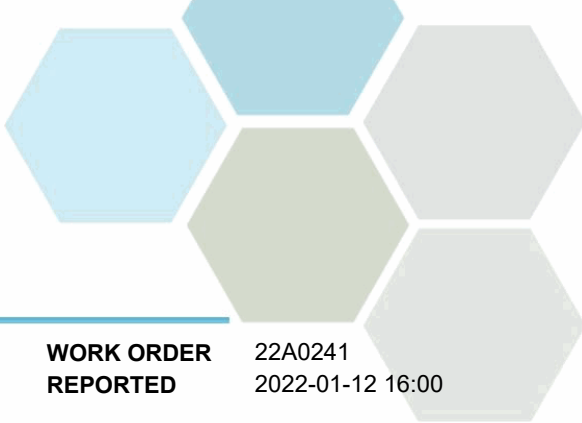
Total Metals, Continued

Aluminum, total	0.0876	± 0.0201	0.0050	mg/L	2022-01-12	
Antimony, total	0.00043	± 0.00020	0.00020	mg/L	2022-01-12	
Arsenic, total	0.00064	± 0.00041	0.00050	mg/L	2022-01-12	
Barium, total	0.0243	± 0.0032	0.0050	mg/L	2022-01-12	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-01-12	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-01-12	
Boron, total	< 0.0500		0.0500	mg/L	2022-01-12	
Cadmium, total	0.000022	± 0.000015	0.000010	mg/L	2022-01-12	
Calcium, total	35.9	± 5.1	0.20	mg/L	2022-01-12	
Chromium, total	0.00078	± 0.00052	0.00050	mg/L	2022-01-12	
Cobalt, total	0.00011	± 0.00004	0.00010	mg/L	2022-01-12	
Copper, total	0.00267	± 0.00052	0.00040	mg/L	2022-01-12	
Iron, total	0.385	± 0.075	0.010	mg/L	2022-01-12	
Lead, total	0.00036	± 0.00020	0.00020	mg/L	2022-01-12	
Lithium, total	0.00350	± 0.00064	0.00010	mg/L	2022-01-12	
Magnesium, total	9.71	± 1.36	0.010	mg/L	2022-01-12	
Manganese, total	0.00770	± 0.00684	0.00020	mg/L	2022-01-12	
Molybdenum, total	0.00391	± 0.00057	0.00010	mg/L	2022-01-12	
Nickel, total	0.00130	± 0.00047	0.00040	mg/L	2022-01-12	
Phosphorus, total	< 0.050		0.050	mg/L	2022-01-12	
Potassium, total	2.43	± 0.40	0.10	mg/L	2022-01-12	
Selenium, total	0.00052	± 0.00039	0.00050	mg/L	2022-01-12	
Silicon, total	4.3	± 1.8	1.0	mg/L	2022-01-12	
Silver, total	< 0.000050		0.000050	mg/L	2022-01-12	
Sodium, total	11.8	± 2.2	0.10	mg/L	2022-01-12	
Strontium, total	0.286	± 0.035	0.0010	mg/L	2022-01-12	
Sulfur, total	8.9	± 5.1	3.0	mg/L	2022-01-12	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-01-12	
Thallium, total	< 0.000020		0.000020	mg/L	2022-01-12	
Thorium, total	< 0.00010		0.00010	mg/L	2022-01-12	
Tin, total	< 0.00020		0.00020	mg/L	2022-01-12	
Titanium, total	0.0063	± 0.0022	0.0050	mg/L	2022-01-12	
Tungsten, total	< 0.0010		0.0010	mg/L	2022-01-12	
Uranium, total	0.00278	± 0.00034	0.000020	mg/L	2022-01-12	
Vanadium, total	< 0.0010		0.0010	mg/L	2022-01-12	
Zinc, total	0.0166	± 0.0058	0.0040	mg/L	2022-01-12	
Zirconium, total	0.00036	± 0.00021	0.00010	mg/L	2022-01-12	

Downstream of O/F- WT# 38130 (E221464) (22A0241-04) | Matrix: Fresh Water | Sampled: 2022-01-05 08:30

Anions

Chloride	6.45	± 0.36	0.10	mg/L	2022-01-06	
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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22A0241
2022-01-12 16:00

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Downstream of O/F- WT# 38130 (E221464) (22A0241-04) | Matrix: Fresh Water | Sampled: 2022-01-05 08:30, Continued

Anions, Continued

Nitrate (as N)	0.081	± 0.006	0.010	mg/L	2022-01-06	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-01-06	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-01-06	

Calculated Parameters

Hardness, Total (as CaCO3)	134		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0814		0.0100	mg/L	N/A	
Nitrogen, Total	0.282		0.0500	mg/L	N/A	

General Parameters

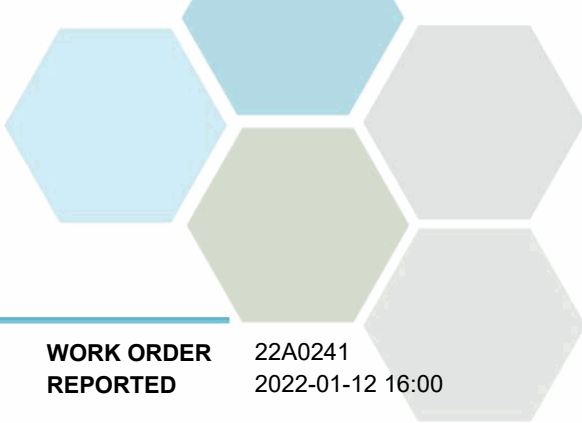
Nitrogen, Total Kjeldahl	0.201	± 0.052	0.050	mg/L	2022-01-10	
Phosphorus, Total (as P)	0.0197	± 0.0024	0.0050	mg/L	2022-01-11	

Microbiological Parameters

Coliforms, Total (Q-Tray)	649		1	MPN/100 mL	2022-01-05	
E. coli (Q-Tray)	365		1	MPN/100 mL	2022-01-05	

Total Metals

Aluminum, total	0.117	± 0.026	0.0050	mg/L	2022-01-12	
Antimony, total	0.00037	± 0.00019	0.00020	mg/L	2022-01-12	
Arsenic, total	0.00056	± 0.00041	0.00050	mg/L	2022-01-12	
Barium, total	0.0268	± 0.0035	0.0050	mg/L	2022-01-12	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-01-12	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-01-12	
Boron, total	< 0.0500		0.0500	mg/L	2022-01-12	
Cadmium, total	< 0.000010		0.000010	mg/L	2022-01-12	
Calcium, total	36.8	± 5.3	0.20	mg/L	2022-01-12	
Chromium, total	0.00058	± 0.00051	0.00050	mg/L	2022-01-12	
Cobalt, total	0.00018	± 0.00004	0.00010	mg/L	2022-01-12	
Copper, total	0.00170	± 0.00042	0.00040	mg/L	2022-01-12	
Iron, total	0.290	± 0.058	0.010	mg/L	2022-01-12	
Lead, total	0.00045	± 0.00020	0.00020	mg/L	2022-01-12	
Lithium, total	0.00370	± 0.00067	0.00010	mg/L	2022-01-12	
Magnesium, total	10.2	± 1.4	0.010	mg/L	2022-01-12	
Manganese, total	0.0129	± 0.0114	0.00020	mg/L	2022-01-12	
Molybdenum, total	0.00382	± 0.00056	0.00010	mg/L	2022-01-12	
Nickel, total	0.00220	± 0.00058	0.00040	mg/L	2022-01-12	
Phosphorus, total	< 0.050		0.050	mg/L	2022-01-12	
Potassium, total	2.68	± 0.44	0.10	mg/L	2022-01-12	
Selenium, total	< 0.00050		0.00050	mg/L	2022-01-12	
Silicon, total	4.5	± 1.8	1.0	mg/L	2022-01-12	
Silver, total	< 0.000050		0.000050	mg/L	2022-01-12	
Sodium, total	13.0	± 2.4	0.10	mg/L	2022-01-12	
Strontium, total	0.304	± 0.037	0.0010	mg/L	2022-01-12	



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22A0241 2022-01-12 16:00

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Downstream of O/F- WT# 38130 (E221464) (22A0241-04) | Matrix: Fresh Water | Sampled: 2022-01-05 08:30, Continued

Total Metals, Continued

Sulfur, total	10.2	± 5.2	3.0	mg/L	2022-01-12	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-01-12	
Thallium, total	< 0.000020		0.000020	mg/L	2022-01-12	
Thorium, total	< 0.00010		0.00010	mg/L	2022-01-12	
Tin, total	< 0.00020		0.00020	mg/L	2022-01-12	
Titanium, total	0.0080	± 0.0024	0.0050	mg/L	2022-01-12	
Tungsten, total	< 0.0010		0.0010	mg/L	2022-01-12	
Uranium, total	0.00281	± 0.00034	0.000020	mg/L	2022-01-12	
Vanadium, total	< 0.0010		0.0010	mg/L	2022-01-12	
Zinc, total	0.0071	± 0.0050	0.0040	mg/L	2022-01-12	
Zirconium, total	0.00017	± 0.00019	0.00010	mg/L	2022-01-12	

Influent- WT# 38131 (0500232) (22A0241-05) | Matrix: Wastewater | Sampled: 2022-01-05 07:30

Anions

Nitrate (as N)	< 0.010		0.010	mg/L	2022-01-06	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-01-06	
Phosphate (as P)	4.51	± 0.78	0.0050	mg/L	2022-01-06	

Calculated Parameters

Nitrate+Nitrite (as N)	< 0.0100		0.0100	mg/L	N/A	
Nitrogen, Total	53.7		1.00	mg/L	N/A	

General Parameters

Nitrogen, Total Kjeldahl	53.7	± 6.7	0.050	mg/L	2022-01-10	
Phosphorus, Total (as P)	9.32	± 1.03	0.0050	mg/L	2022-01-11	

Effluent 7 Day Composite- WT# 3813A (E105000) (22A0241-06) | Matrix: Wastewater | Sampled: 2021-12-30 00:00 To 2022-01-05 00:00

PRES

Anions

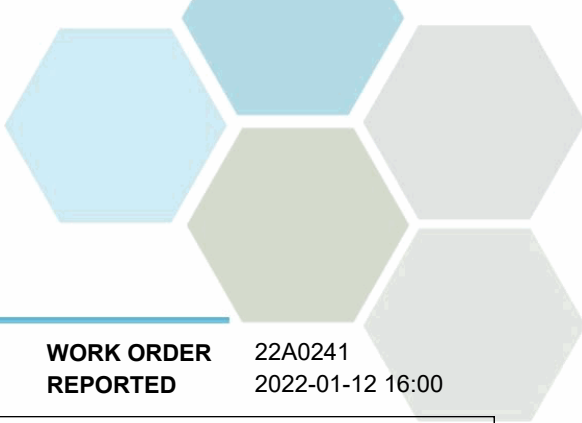
Nitrate (as N)	4.44	± 0.28	0.010	mg/L	2022-01-06	
Nitrite (as N)	0.106	± 0.011	0.010	mg/L	2022-01-06	

Calculated Parameters

Nitrate+Nitrite (as N)	4.55		0.0100	mg/L	N/A	
Nitrogen, Total	7.50		0.100	mg/L	N/A	

General Parameters

Nitrogen, Total Kjeldahl	2.95	± 0.37	0.050	mg/L	2022-01-10	
Phosphorus, Total (as P)	0.192	± 0.021	0.0050	mg/L	2022-01-11	



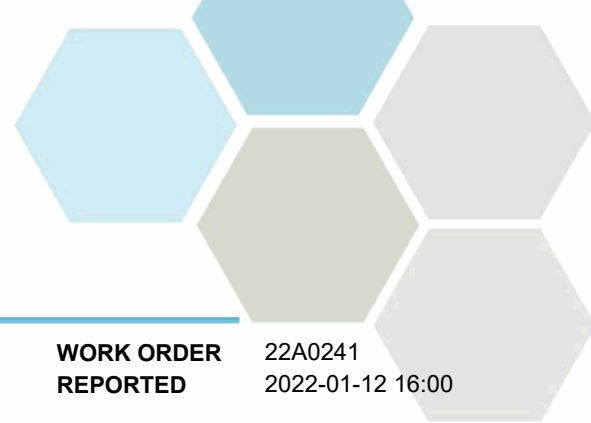
TEST RESULTS

REPORTED TO Penticton, City of - DW & STP
PROJECT Wastewater - PE12212

WORK ORDER 22A0241
REPORTED 2022-01-12 16:00

Sample Qualifiers:

PRES Sample has been preserved for TP in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22A0241 2022-01-12 16:00

Analysis Description	Method Ref.	Technique	Accredited	Location
Ammonia, Total in Water	SM 4500-NH3 G* (2017)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Chemical Oxygen Demand in Water	SM 5220 D* (2017)	Closed Reflux, Colorimetry	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Coliforms, Total in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Hardness in Water	SM 2340 B* (2017)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	SM 2540 D* (2017)	Gravimetry (Dried at 103-105C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

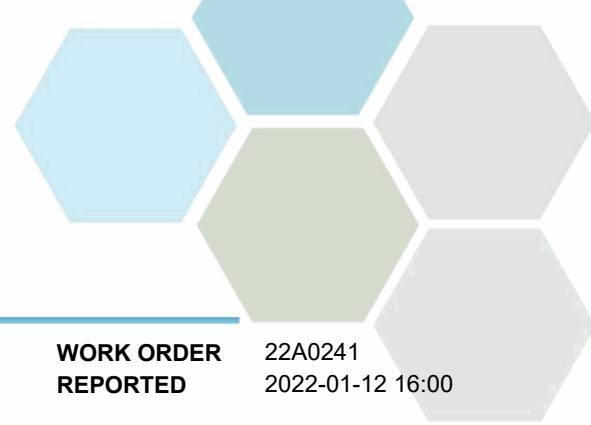
Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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
MPN/100 mL	Most Probable Number per 100 millilitres
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Penticton, City of - DW & STP
PROJECT Wastewater - PE12212

WORK ORDER 22A0241
REPORTED 2022-01-12 16:00

General Comments:

The results in this report apply to the 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. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing. The quality control (QC) data is available upon request

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.



CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22A0241
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-01-05 13:00 / - 1.8°C 2022-01-12 16:00
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

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.

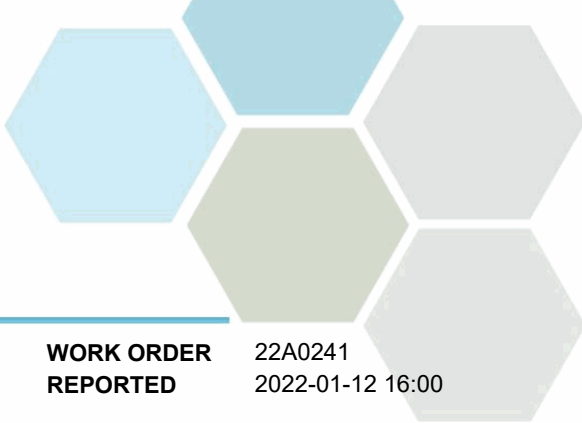
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Client Service Team Lead

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



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22A0241 2022-01-12 16:00

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22A0241-01) | Matrix: Wastewater | Sampled: 2022-01-05 07:00

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-01-05	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-01-05	

Effluent 24 hr Comp.- WT# 3813A (E105000) (22A0241-02) | Matrix: Wastewater | Sampled: 2022-01-05 07:00

Anions

Nitrate (as N)	4.64 ± 0.29		0.010	mg/L	2022-01-06	
Nitrite (as N)	0.087 ± 0.009		0.010	mg/L	2022-01-06	
Phosphate (as P)	0.0166 ± 0.0038		0.0050	mg/L	2022-01-06	

Calculated Parameters

Nitrate+Nitrite (as N)	4.72		0.0100	mg/L	N/A	
Nitrogen, Total	7.06		0.0500	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	0.753 ± 0.071		0.050	mg/L	2022-01-07	
BOD, 5-day	6.9 ± 3.9		2.0	mg/L	2022-01-11	
Chemical Oxygen Demand	26 ± 18		20	mg/L	2022-01-10	
Nitrogen, Total Kjeldahl	2.34 ± 0.29		0.050	mg/L	2022-01-10	
Phosphorus, Total (as P)	0.198 ± 0.022		0.0050	mg/L	2022-01-11	
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-01-10	

Upstream of O/F- WT# 3812F (0500050) (22A0241-03) | Matrix: Fresh Water | Sampled: 2022-01-05 08:15

Anions

Chloride	6.38 ± 0.36		0.10	mg/L	2022-01-06	
Nitrate (as N)	0.086 ± 0.007		0.010	mg/L	2022-01-06	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-01-06	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-01-06	

Calculated Parameters

Hardness, Total (as CaCO3)	130		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0859		0.0100	mg/L	N/A	
Nitrogen, Total	0.328		0.0500	mg/L	N/A	

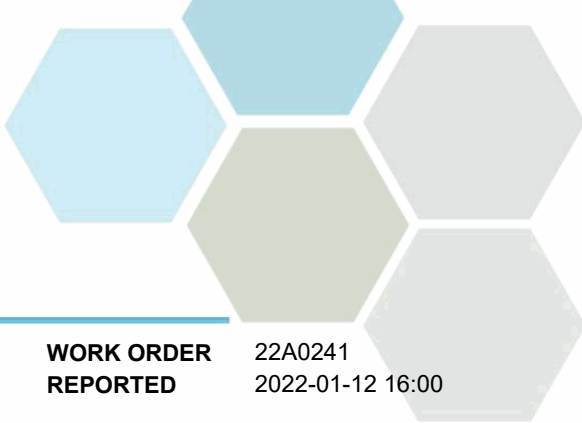
General Parameters

Nitrogen, Total Kjeldahl	0.242 ± 0.055		0.050	mg/L	2022-01-10	
Phosphorus, Total (as P)	0.0166 ± 0.0021		0.0050	mg/L	2022-01-11	

Microbiological Parameters

Coliforms, Total (Q-Tray)	154		1	MPN/100 mL	2022-01-05	
E. coli (Q-Tray)	49		1	MPN/100 mL	2022-01-05	

Total Metals



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22A0241
2022-01-12 16:00

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Upstream of O/F- WT# 3812F (0500050) (22A0241-03) | Matrix: Fresh Water | Sampled: 2022-01-05 08:15, Continued

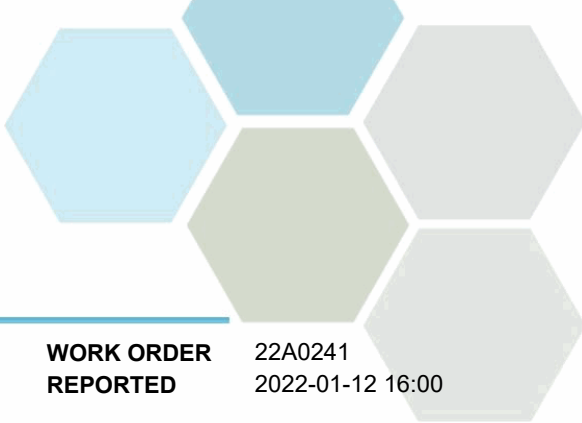
Total Metals, Continued

Aluminum, total	0.0876	± 0.0201	0.0050	mg/L	2022-01-12	
Antimony, total	0.00043	± 0.00020	0.00020	mg/L	2022-01-12	
Arsenic, total	0.00064	± 0.00041	0.00050	mg/L	2022-01-12	
Barium, total	0.0243	± 0.0032	0.0050	mg/L	2022-01-12	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-01-12	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-01-12	
Boron, total	< 0.0500		0.0500	mg/L	2022-01-12	
Cadmium, total	0.000022	± 0.000015	0.000010	mg/L	2022-01-12	
Calcium, total	35.9	± 5.1	0.20	mg/L	2022-01-12	
Chromium, total	0.00078	± 0.00052	0.00050	mg/L	2022-01-12	
Cobalt, total	0.00011	± 0.00004	0.00010	mg/L	2022-01-12	
Copper, total	0.00267	± 0.00052	0.00040	mg/L	2022-01-12	
Iron, total	0.385	± 0.075	0.010	mg/L	2022-01-12	
Lead, total	0.00036	± 0.00020	0.00020	mg/L	2022-01-12	
Lithium, total	0.00350	± 0.00064	0.00010	mg/L	2022-01-12	
Magnesium, total	9.71	± 1.36	0.010	mg/L	2022-01-12	
Manganese, total	0.00770	± 0.00684	0.00020	mg/L	2022-01-12	
Molybdenum, total	0.00391	± 0.00057	0.00010	mg/L	2022-01-12	
Nickel, total	0.00130	± 0.00047	0.00040	mg/L	2022-01-12	
Phosphorus, total	< 0.050		0.050	mg/L	2022-01-12	
Potassium, total	2.43	± 0.40	0.10	mg/L	2022-01-12	
Selenium, total	0.00052	± 0.00039	0.00050	mg/L	2022-01-12	
Silicon, total	4.3	± 1.8	1.0	mg/L	2022-01-12	
Silver, total	< 0.000050		0.000050	mg/L	2022-01-12	
Sodium, total	11.8	± 2.2	0.10	mg/L	2022-01-12	
Strontium, total	0.286	± 0.035	0.0010	mg/L	2022-01-12	
Sulfur, total	8.9	± 5.1	3.0	mg/L	2022-01-12	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-01-12	
Thallium, total	< 0.000020		0.000020	mg/L	2022-01-12	
Thorium, total	< 0.00010		0.00010	mg/L	2022-01-12	
Tin, total	< 0.00020		0.00020	mg/L	2022-01-12	
Titanium, total	0.0063	± 0.0022	0.0050	mg/L	2022-01-12	
Tungsten, total	< 0.0010		0.0010	mg/L	2022-01-12	
Uranium, total	0.00278	± 0.00034	0.000020	mg/L	2022-01-12	
Vanadium, total	< 0.0010		0.0010	mg/L	2022-01-12	
Zinc, total	0.0166	± 0.0058	0.0040	mg/L	2022-01-12	
Zirconium, total	0.00036	± 0.00021	0.00010	mg/L	2022-01-12	

Downstream of O/F- WT# 38130 (E221464) (22A0241-04) | Matrix: Fresh Water | Sampled: 2022-01-05 08:30

Anions

Chloride	6.45	± 0.36	0.10	mg/L	2022-01-06	
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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22A0241
2022-01-12 16:00

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Downstream of O/F- WT# 38130 (E221464) (22A0241-04) | Matrix: Fresh Water | Sampled: 2022-01-05 08:30, Continued

Anions, Continued

Nitrate (as N)	0.081	± 0.006	0.010	mg/L	2022-01-06	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-01-06	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-01-06	

Calculated Parameters

Hardness, Total (as CaCO3)	134		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0814		0.0100	mg/L	N/A	
Nitrogen, Total	0.282		0.0500	mg/L	N/A	

General Parameters

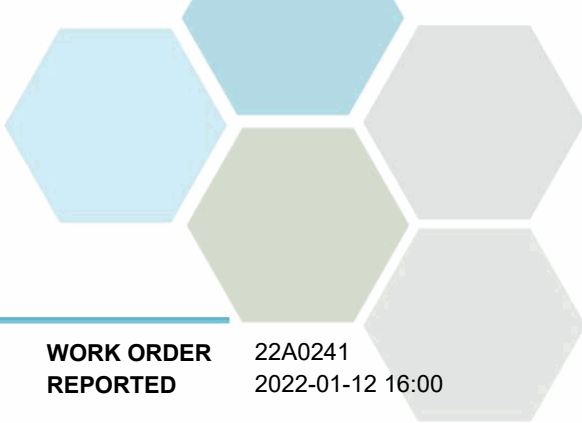
Nitrogen, Total Kjeldahl	0.201	± 0.052	0.050	mg/L	2022-01-10	
Phosphorus, Total (as P)	0.0197	± 0.0024	0.0050	mg/L	2022-01-11	

Microbiological Parameters

Coliforms, Total (Q-Tray)	649		1	MPN/100 mL	2022-01-05	
E. coli (Q-Tray)	365		1	MPN/100 mL	2022-01-05	

Total Metals

Aluminum, total	0.117	± 0.026	0.0050	mg/L	2022-01-12	
Antimony, total	0.00037	± 0.00019	0.00020	mg/L	2022-01-12	
Arsenic, total	0.00056	± 0.00041	0.00050	mg/L	2022-01-12	
Barium, total	0.0268	± 0.0035	0.0050	mg/L	2022-01-12	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-01-12	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-01-12	
Boron, total	< 0.0500		0.0500	mg/L	2022-01-12	
Cadmium, total	< 0.000010		0.000010	mg/L	2022-01-12	
Calcium, total	36.8	± 5.3	0.20	mg/L	2022-01-12	
Chromium, total	0.00058	± 0.00051	0.00050	mg/L	2022-01-12	
Cobalt, total	0.00018	± 0.00004	0.00010	mg/L	2022-01-12	
Copper, total	0.00170	± 0.00042	0.00040	mg/L	2022-01-12	
Iron, total	0.290	± 0.058	0.010	mg/L	2022-01-12	
Lead, total	0.00045	± 0.00020	0.00020	mg/L	2022-01-12	
Lithium, total	0.00370	± 0.00067	0.00010	mg/L	2022-01-12	
Magnesium, total	10.2	± 1.4	0.010	mg/L	2022-01-12	
Manganese, total	0.0129	± 0.0114	0.00020	mg/L	2022-01-12	
Molybdenum, total	0.00382	± 0.00056	0.00010	mg/L	2022-01-12	
Nickel, total	0.00220	± 0.00058	0.00040	mg/L	2022-01-12	
Phosphorus, total	< 0.050		0.050	mg/L	2022-01-12	
Potassium, total	2.68	± 0.44	0.10	mg/L	2022-01-12	
Selenium, total	< 0.00050		0.00050	mg/L	2022-01-12	
Silicon, total	4.5	± 1.8	1.0	mg/L	2022-01-12	
Silver, total	< 0.000050		0.000050	mg/L	2022-01-12	
Sodium, total	13.0	± 2.4	0.10	mg/L	2022-01-12	
Strontium, total	0.304	± 0.037	0.0010	mg/L	2022-01-12	



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22A0241 2022-01-12 16:00

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Downstream of O/F- WT# 38130 (E221464) (22A0241-04) | Matrix: Fresh Water | Sampled: 2022-01-05 08:30, Continued

Total Metals, Continued

Sulfur, total	10.2	± 5.2	3.0	mg/L	2022-01-12	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-01-12	
Thallium, total	< 0.000020		0.000020	mg/L	2022-01-12	
Thorium, total	< 0.00010		0.00010	mg/L	2022-01-12	
Tin, total	< 0.00020		0.00020	mg/L	2022-01-12	
Titanium, total	0.0080	± 0.0024	0.0050	mg/L	2022-01-12	
Tungsten, total	< 0.0010		0.0010	mg/L	2022-01-12	
Uranium, total	0.00281	± 0.00034	0.000020	mg/L	2022-01-12	
Vanadium, total	< 0.0010		0.0010	mg/L	2022-01-12	
Zinc, total	0.0071	± 0.0050	0.0040	mg/L	2022-01-12	
Zirconium, total	0.00017	± 0.00019	0.00010	mg/L	2022-01-12	

Influent- WT# 38131 (0500232) (22A0241-05) | Matrix: Wastewater | Sampled: 2022-01-05 07:30

Anions

Nitrate (as N)	< 0.010		0.010	mg/L	2022-01-06	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-01-06	
Phosphate (as P)	4.51	± 0.78	0.0050	mg/L	2022-01-06	

Calculated Parameters

Nitrate+Nitrite (as N)	< 0.0100		0.0100	mg/L	N/A	
Nitrogen, Total	53.7		1.00	mg/L	N/A	

General Parameters

Nitrogen, Total Kjeldahl	53.7	± 6.7	0.050	mg/L	2022-01-10	
Phosphorus, Total (as P)	9.32	± 1.03	0.0050	mg/L	2022-01-11	

Effluent 7 Day Composite- WT# 3813A (E105000) (22A0241-06) | Matrix: Wastewater | Sampled: 2021-12-30 00:00 To 2022-01-05 00:00

PRES

Anions

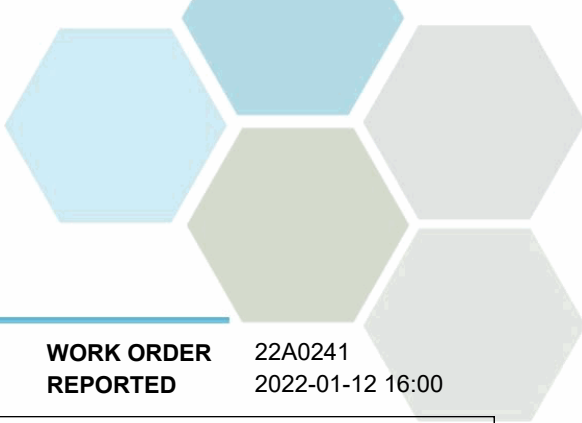
Nitrate (as N)	4.44	± 0.28	0.010	mg/L	2022-01-06	
Nitrite (as N)	0.106	± 0.011	0.010	mg/L	2022-01-06	

Calculated Parameters

Nitrate+Nitrite (as N)	4.55		0.0100	mg/L	N/A	
Nitrogen, Total	7.50		0.100	mg/L	N/A	

General Parameters

Nitrogen, Total Kjeldahl	2.95	± 0.37	0.050	mg/L	2022-01-10	
Phosphorus, Total (as P)	0.192	± 0.021	0.0050	mg/L	2022-01-11	



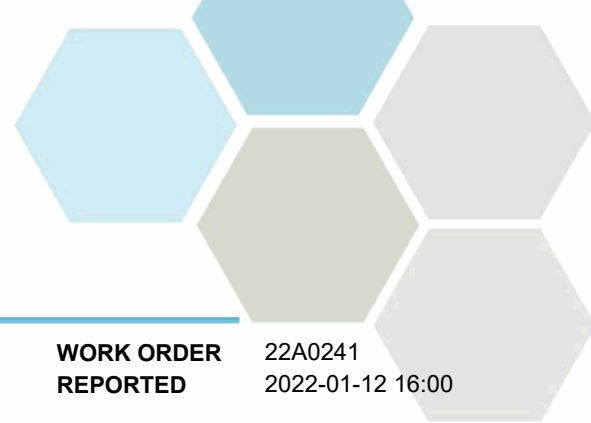
TEST RESULTS

REPORTED TO Penticton, City of - DW & STP
PROJECT Wastewater - PE12212

WORK ORDER 22A0241
REPORTED 2022-01-12 16:00

Sample Qualifiers:

PRES Sample has been preserved for TP in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22A0241 2022-01-12 16:00

Analysis Description	Method Ref.	Technique	Accredited	Location
Ammonia, Total in Water	SM 4500-NH3 G* (2017)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Chemical Oxygen Demand in Water	SM 5220 D* (2017)	Closed Reflux, Colorimetry	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Coliforms, Total in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Hardness in Water	SM 2340 B* (2017)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	SM 2540 D* (2017)	Gravimetry (Dried at 103-105C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

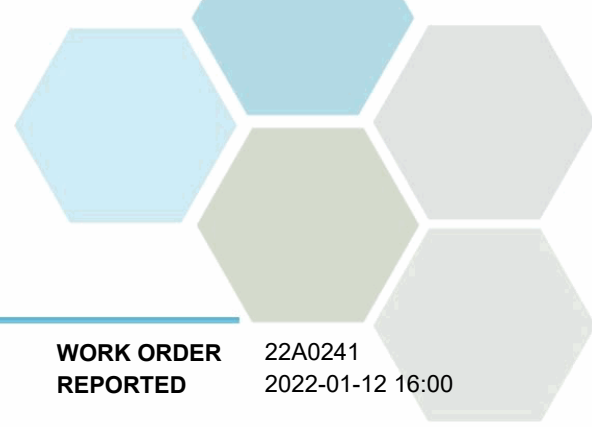
Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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
MPN/100 mL	Most Probable Number per 100 millilitres
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Penticton, City of - DW & STP
PROJECT Wastewater - PE12212

WORK ORDER 22A0241
REPORTED 2022-01-12 16:00

General Comments:

The results in this report apply to the 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. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing. The quality control (QC) data is available upon request

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.

CERTIFICATE OF ANALYSIS

REPORTED TO Penticton, City of - DW & STP
171 Main Street
PENTICTON, BC V2A 5A9

ATTENTION Joel Mertz

PO NUMBER

PROJECT Wastewater - PE12212

PROJECT INFO 0554-04

WORK ORDER 22A1154

RECEIVED / TEMP 2022-01-12 12:05 / 0.3°C

REPORTED 2022-01-18 15:44

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.

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.

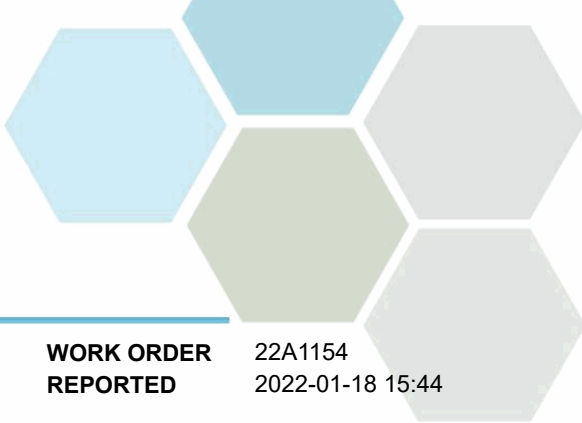
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Client Service Team Lead

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TEST RESULTS

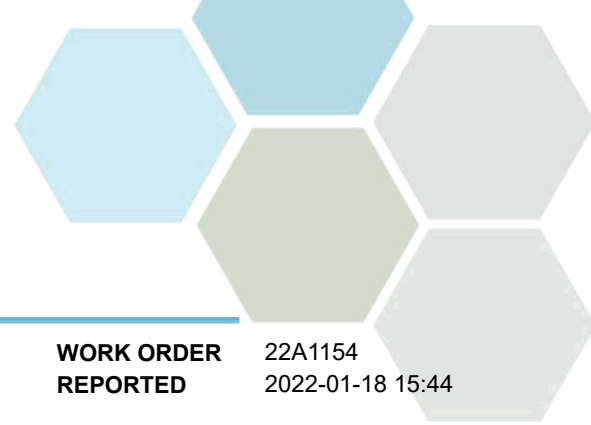
REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22A1154
2022-01-18 15:44

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Effluent Grab- WT# 3813A (E105000) (22A1154-01) Matrix: Wastewater Sampled: 2022-01-12 07:00						
<i>Microbiological Parameters</i>						
Coliforms, Fecal (Q-Tray)	8		1	MPN/100 mL	2022-01-13	
E. coli (Q-Tray)	6		1	MPN/100 mL	2022-01-13	
Effluent 7 Day Composite- WT# 3813A (E105000) (22A1154-02) Matrix: Wastewater Sampled: 2022-01-06 00:00 To 2022-01-12 00:00						PRES
<i>Anions</i>						
Nitrate (as N)	4.51	± 0.28	0.010	mg/L	2022-01-14	
Nitrite (as N)	0.068	± 0.007	0.010	mg/L	2022-01-14	
<i>Calculated Parameters</i>						
Nitrate+Nitrite (as N)	4.58		0.0100	mg/L	N/A	
Nitrogen, Total	6.83		0.100	mg/L	N/A	
<i>General Parameters</i>						
Nitrogen, Total Kjeldahl	2.25	± 0.29	0.050	mg/L	2022-01-17	
Phosphorus, Total (as P)	0.224	± 0.025	0.0050	mg/L	2022-01-18	

Sample Qualifiers:

PRES Sample has been preserved for TKN, TP in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22A1154
2022-01-18 15:44

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	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)
mg/L	Milligrams per litre
MPN/100 mL	Most Probable Number per 100 millilitres
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.

General Comments:

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22A2097
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-01-19 14:00 / 1.3°C 2022-01-25 14:44
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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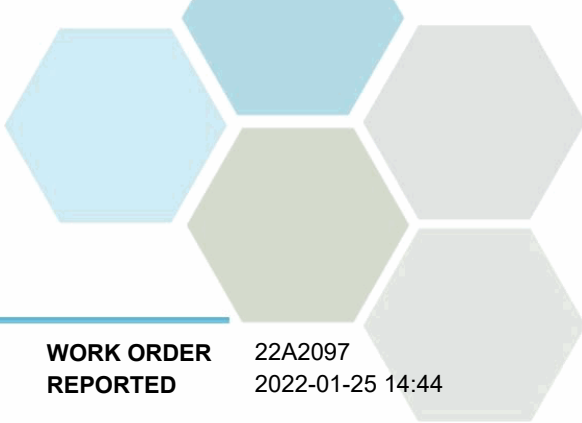
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Client Service Team Lead

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TEST RESULTS

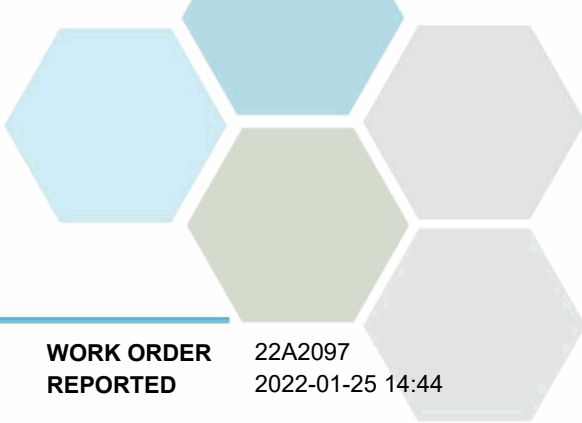
REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22A2097
2022-01-25 14:44

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Effluent Grab- WT# 3813A (E105000) (22A2097-01) Matrix: Wastewater Sampled: 2022-01-19						
<i>Microbiological Parameters</i>						
Coliforms, Fecal (Q-Tray)	3		1	MPN/100 mL	2022-01-19	
E. coli (Q-Tray)	3		1	MPN/100 mL	2022-01-19	
Effluent 7 Day Composite- WT# 3813A (E105000) (22A2097-02) Matrix: Wastewater Sampled: 2022-01-13 00:00 To 2022-01-19 00:00						PRES
<i>Anions</i>						
Nitrate (as N)	3.69	± 0.23	0.010	mg/L	2022-01-20	
Nitrite (as N)	0.061	± 0.007	0.010	mg/L	2022-01-20	
<i>Calculated Parameters</i>						
Nitrate+Nitrite (as N)	3.75		0.0100	mg/L	N/A	
Nitrogen, Total	5.86		0.100	mg/L	N/A	
<i>General Parameters</i>						
Nitrogen, Total Kjeldahl	2.10	± 0.27	0.050	mg/L	2022-01-21	
Phosphorus, Total (as P)	0.168	± 0.019	0.0050	mg/L	2022-01-21	

Sample Qualifiers:

PRES Sample has been preserved for N and P in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22A2097 2022-01-25 14:44

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	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)
mg/L	Milligrams per litre
MPN/100 mL	Most Probable Number per 100 millilitres
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.

General Comments:

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22A2533
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-01-21 12:30 / 0.6°C 2022-01-31 13:58
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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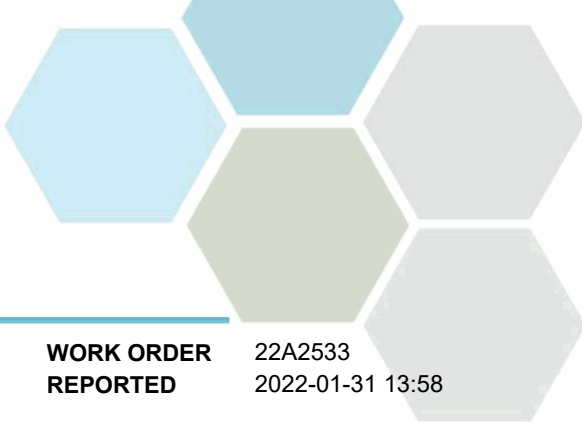
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Client Service Team Lead

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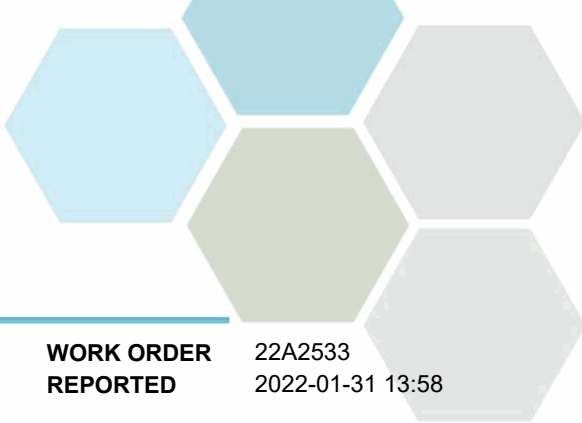


TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22A2533 2022-01-31 13:58

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Compost (22A2533-01) Matrix: Water Sampled: 2022-01-20 11:30						
Anions						
Nitrate (as N)	< 0.100		0.010	mg/L	2022-01-23	RA1
Nitrite (as N)	< 0.100		0.010	mg/L	2022-01-23	RA1
Phosphate (as P)	143	± 25	0.0050	mg/L	2022-01-23	
Calculated Parameters						
Hardness, Total (as CaCO3)	362		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	< 0.100		0.100	mg/L	N/A	
Nitrogen, Total	617		10.0	mg/L	N/A	
General Parameters						
Ammonia, Total (as N)	134	± 12	0.050	mg/L	2022-01-26	
BOD, 5-day	1390	± 469	2.0	mg/L	2022-01-27	
Chemical Oxygen Demand	5230	± 345	20	mg/L	2022-01-31	
Nitrogen, Total Kjeldahl	617	± 76	0.050	mg/L	2022-01-25	
Phosphorus, Total (as P)	147	± 16	0.0050	mg/L	2022-01-25	
Solids, Total Suspended	616	± 50	2.0	mg/L	2022-01-27	
Total Metals						
Aluminum, total	12.8	± 2.5	0.0050	mg/L	2022-01-28	
Antimony, total	0.00216	± 0.00047	0.00020	mg/L	2022-01-28	
Arsenic, total	0.107	± 0.013	0.00050	mg/L	2022-01-28	
Barium, total	0.231	± 0.030	0.0050	mg/L	2022-01-28	
Beryllium, total	0.00024	± 0.00005	0.00010	mg/L	2022-01-28	
Bismuth, total	0.00800	± 0.00151	0.00010	mg/L	2022-01-28	
Boron, total	0.917	± 0.279	0.0500	mg/L	2022-01-28	
Cadmium, total	0.00304	± 0.00083	0.000010	mg/L	2022-01-28	
Calcium, total	98.9	± 14.1	0.20	mg/L	2022-01-28	
Chromium, total	0.0262	± 0.0053	0.00050	mg/L	2022-01-28	
Cobalt, total	0.0220	± 0.0023	0.00010	mg/L	2022-01-28	
Copper, total	0.696	± 0.108	0.00040	mg/L	2022-01-28	
Iron, total	11.9	± 2.3	0.010	mg/L	2022-01-28	
Lead, total	0.0643	± 0.0139	0.00020	mg/L	2022-01-28	
Lithium, total	0.0245	± 0.0044	0.00010	mg/L	2022-01-28	
Magnesium, total	27.8	± 3.9	0.010	mg/L	2022-01-28	
Manganese, total	1.06	± 0.94	0.00020	mg/L	2022-01-28	
Molybdenum, total	0.00725	± 0.00104	0.00010	mg/L	2022-01-28	
Nickel, total	0.0502	± 0.0095	0.00040	mg/L	2022-01-28	
Phosphorus, total	154	± 31	0.050	mg/L	2022-01-28	
Potassium, total	400	± 62	0.10	mg/L	2022-01-28	
Selenium, total	0.00746	± 0.00100	0.00050	mg/L	2022-01-28	
Silicon, total	19.9	± 4.2	1.0	mg/L	2022-01-28	
Silver, total	0.00197	± 0.00040	0.000050	mg/L	2022-01-28	
Sodium, total	87.3	± 16.0	0.10	mg/L	2022-01-28	
Strontium, total	0.577	± 0.070	0.0010	mg/L	2022-01-28	



TEST RESULTS

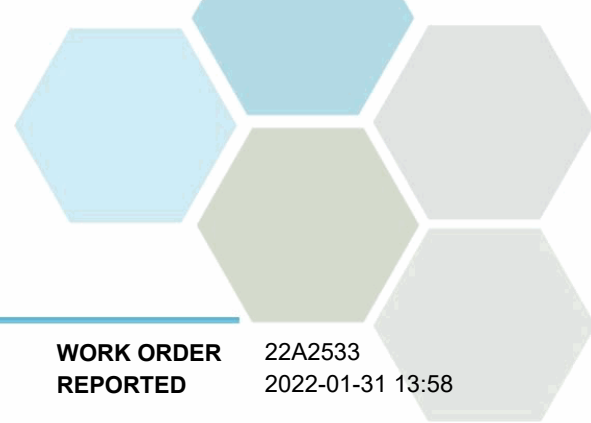
REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22A2533
2022-01-31 13:58

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Compost (22A2533-01) Matrix: Water Sampled: 2022-01-20 11:30, Continued						
<i>Total Metals, Continued</i>						
Sulfur, total	92.8	± 22.2	3.0	mg/L	2022-01-28	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-01-28	
Thallium, total	0.000175	± 0.000041	0.000020	mg/L	2022-01-28	
Thorium, total	0.00039	± 0.00013	0.00010	mg/L	2022-01-28	
Tin, total	0.00152	± 0.00030	0.00020	mg/L	2022-01-28	
Titanium, total	0.0918	± 0.0189	0.0050	mg/L	2022-01-28	
Tungsten, total	0.0026	± 0.0017	0.0010	mg/L	2022-01-28	
Uranium, total	0.00751	± 0.00090	0.000020	mg/L	2022-01-28	
Vanadium, total	0.0276	± 0.0033	0.0010	mg/L	2022-01-28	
Zinc, total	0.886	± 0.169	0.0040	mg/L	2022-01-28	
Zirconium, total	0.00455	± 0.00135	0.00010	mg/L	2022-01-28	

Sample Qualifiers:

RA1 The Reporting Limit has been raised due to matrix interference.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22A2533 2022-01-31 13:58

Analysis Description	Method Ref.	Technique	Accredited	Location
Ammonia, Total in Water	SM 4500-NH3 G* (2017)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Chemical Oxygen Demand in Water	SM 5220 D* (2017)	Closed Reflux, Colorimetry	✓	Kelowna
Hardness in Water	SM 2340 B* (2017)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	SM 2540 D* (2017)	Gravimetry (Dried at 103-105C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

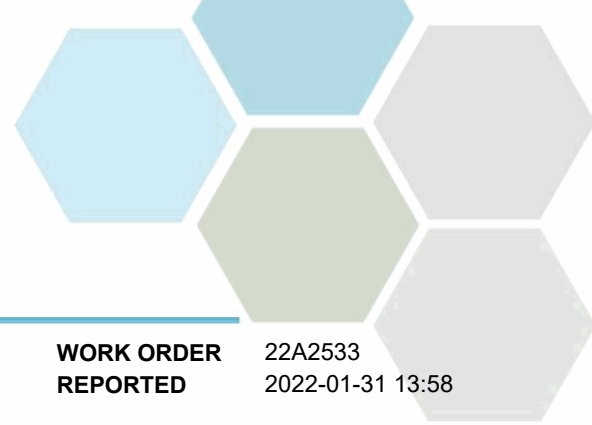
Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Penticton, City of - DW & STP
PROJECT Wastewater - PE12212

WORK ORDER 22A2533
REPORTED 2022-01-31 13:58

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22A3119
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-01-26 12:30 / - 0.1°C 2022-02-02 16:03
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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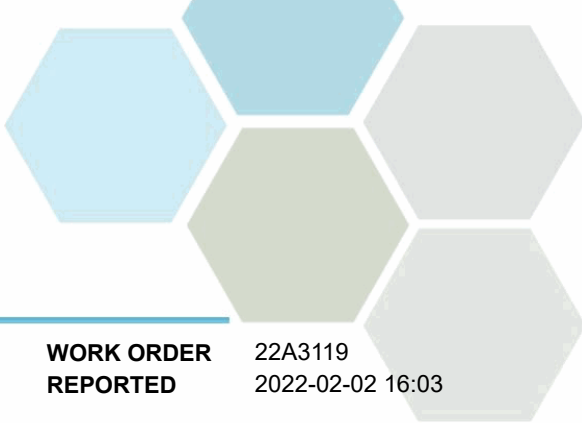
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Client Service Team Lead

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TEST RESULTS

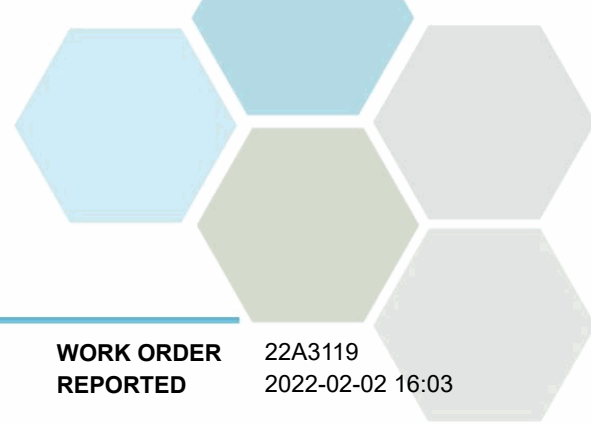
REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22A3119
2022-02-02 16:03

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Effluent Grab- WT# 3813A (E105000) (22A3119-01) Matrix: Wastewater Sampled: 2022-01-26 07:30						
<i>Microbiological Parameters</i>						
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-01-26	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-01-26	
Effluent 7 Day Composite- WT# 3813A (E105000) (22A3119-02) Matrix: Wastewater Sampled: 2022-01-20 00:00 To 2022-01-26 00:00						PRES
<i>Anions</i>						
Nitrate (as N)	3.88	± 0.24		0.010 mg/L	2022-01-27	
Nitrite (as N)	0.032	± 0.004		0.010 mg/L	2022-01-27	
<i>Calculated Parameters</i>						
Nitrate+Nitrite (as N)	3.91			0.0100 mg/L		N/A
Nitrogen, Total	5.63			0.100 mg/L		N/A
<i>General Parameters</i>						
Nitrogen, Total Kjeldahl	1.72	± 0.23		0.050 mg/L	2022-01-31	
Phosphorus, Total (as P)	0.0960	± 0.0107		0.0050 mg/L	2022-01-31	
Solids, Total Suspended	3.6	± 1.0		2.0 mg/L	2022-02-02	

Sample Qualifiers:

PRES Sample has been preserved for TP, TKN in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22A3119 2022-02-02 16:03

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	SM 2540 D* (2017)	Gravimetry (Dried at 103-105C)	✓	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
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SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22B0374
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-02-02 14:30 / 3.2°C 2022-02-09 14:53
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

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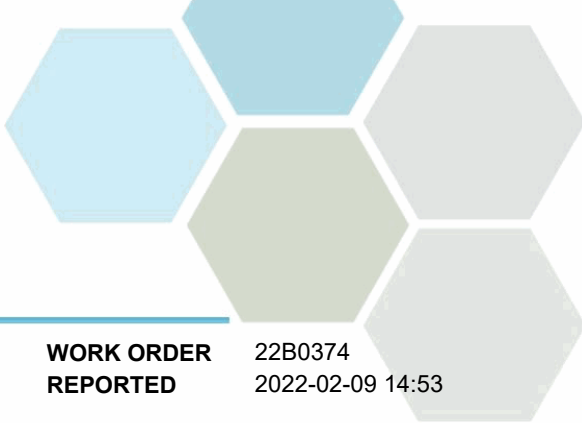
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Client Service Team Lead

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22B0374
2022-02-09 14:53

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22B0374-01) | Matrix: Wastewater | Sampled: 2022-02-02 06:15

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	2		1	MPN/100 mL	2022-02-03	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-02-03	

Effluent 24 hr Comp.- WT# 3813A (E105000) (22B0374-02) | Matrix: Wastewater | Sampled: 2022-02-01 00:00 To 2022-02-02 00:00

Anions

Nitrate (as N)	4.07 ± 0.26		0.010	mg/L	2022-02-03	
Nitrite (as N)	0.017 ± 0.003		0.010	mg/L	2022-02-03	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-02-03	

Calculated Parameters

Nitrate+Nitrite (as N)	4.09		0.0100	mg/L	N/A	
Nitrogen, Total	6.36		0.0500	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	0.708 ± 0.067		0.050	mg/L	2022-02-07	
BOD, 5-day	9.5 ± 6.3		2.0	mg/L	2022-02-09	
Chemical Oxygen Demand	41 ± 18		20	mg/L	2022-02-06	
Nitrogen, Total Kjeldahl	2.27 ± 0.28		0.050	mg/L	2022-02-08	
Phosphorus, Total (as P)	0.144 ± 0.016		0.0050	mg/L	2022-02-07	
Solids, Total Suspended	4.0 ± 1.0		2.0	mg/L	2022-02-07	

Upstream of O/F- WT# 3812F (0500050) (22B0374-03) | Matrix: Fresh Water | Sampled: 2022-02-02 06:30

Anions

Chloride	5.78 ± 0.32		0.10	mg/L	2022-02-03	
Nitrate (as N)	0.045 ± 0.005		0.010	mg/L	2022-02-03	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-02-03	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-02-03	

Calculated Parameters

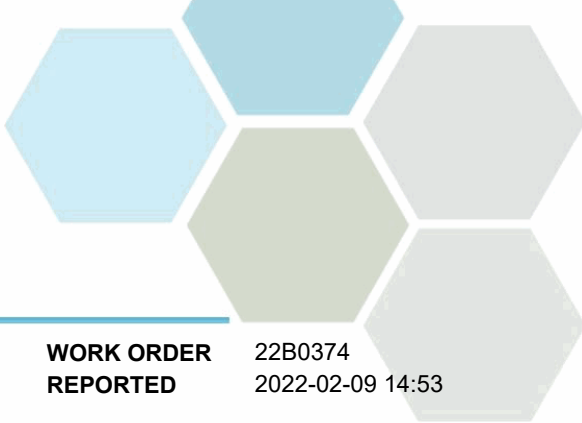
Hardness, Total (as CaCO3)	109		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0452		0.0100	mg/L	N/A	
Nitrogen, Total	0.244		0.0500	mg/L	N/A	

General Parameters

Nitrogen, Total Kjeldahl	0.199 ± 0.052		0.050	mg/L	2022-02-08	
Phosphorus, Total (as P)	0.0095 ± 0.0015		0.0050	mg/L	2022-02-07	
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-02-07	

Microbiological Parameters

Coliforms, Total (Q-Tray)	36		1	MPN/100 mL	2022-02-03	
E. coli (Q-Tray)	16		1	MPN/100 mL	2022-02-03	



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

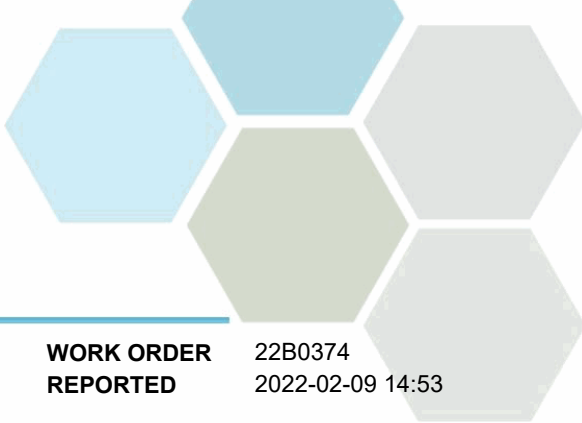
WORK ORDER REPORTED 22B0374 2022-02-09 14:53

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Upstream of O/F- WT# 3812F (0500050) (22B0374-03) Matrix: Fresh Water Sampled: 2022-02-02 06:30, Continued						
Total Metals						
Aluminum, total	0.0106	± 0.0085	0.0050	mg/L	2022-02-07	
Antimony, total	< 0.00020		0.00020	mg/L	2022-02-07	
Arsenic, total	0.00055	± 0.00041	0.00050	mg/L	2022-02-07	
Barium, total	0.0216	± 0.0028	0.0050	mg/L	2022-02-07	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-02-07	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-02-07	
Boron, total	< 0.0500		0.0500	mg/L	2022-02-07	
Cadmium, total	< 0.000010		0.000010	mg/L	2022-02-07	
Calcium, total	28.5	± 4.1	0.20	mg/L	2022-02-07	
Chromium, total	< 0.00050		0.00050	mg/L	2022-02-07	
Cobalt, total	< 0.00010		0.00010	mg/L	2022-02-07	
Copper, total	0.00076	± 0.00034	0.00040	mg/L	2022-02-07	
Iron, total	0.098	± 0.025	0.010	mg/L	2022-02-07	
Lead, total	< 0.00020		0.00020	mg/L	2022-02-07	
Lithium, total	0.00336	± 0.00061	0.00010	mg/L	2022-02-07	
Magnesium, total	9.19	± 1.29	0.010	mg/L	2022-02-07	
Manganese, total	0.00799	± 0.00710	0.00020	mg/L	2022-02-07	
Molybdenum, total	0.00322	± 0.00047	0.00010	mg/L	2022-02-07	
Nickel, total	0.00041	± 0.00041	0.00040	mg/L	2022-02-07	
Phosphorus, total	< 0.050		0.050	mg/L	2022-02-07	
Potassium, total	2.20	± 0.36	0.10	mg/L	2022-02-07	
Selenium, total	< 0.00050		0.00050	mg/L	2022-02-07	
Silicon, total	3.7	± 1.8	1.0	mg/L	2022-02-07	
Silver, total	< 0.000050		0.000050	mg/L	2022-02-07	
Sodium, total	11.2	± 2.1	0.10	mg/L	2022-02-07	
Strontium, total	0.254	± 0.031	0.0010	mg/L	2022-02-07	
Sulfur, total	9.3	± 5.3	3.0	mg/L	2022-02-07	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-02-07	
Thallium, total	< 0.000020		0.000020	mg/L	2022-02-07	
Thorium, total	< 0.00010		0.00010	mg/L	2022-02-07	
Tin, total	< 0.00020		0.00020	mg/L	2022-02-07	
Titanium, total	< 0.0050		0.0050	mg/L	2022-02-07	
Tungsten, total	< 0.0010		0.0010	mg/L	2022-02-07	
Uranium, total	0.00259	± 0.00031	0.000020	mg/L	2022-02-07	
Vanadium, total	0.0019	± 0.0006	0.0010	mg/L	2022-02-07	
Zinc, total	< 0.0040		0.0040	mg/L	2022-02-07	
Zirconium, total	< 0.00010		0.00010	mg/L	2022-02-07	

Downstream of O/F- WT# 38130 (E221464) (22B0374-04) | Matrix: Fresh Water | Sampled: 2022-02-02 06:30

Anions

Chloride	6.09	± 0.34	0.10	mg/L	2022-02-03	
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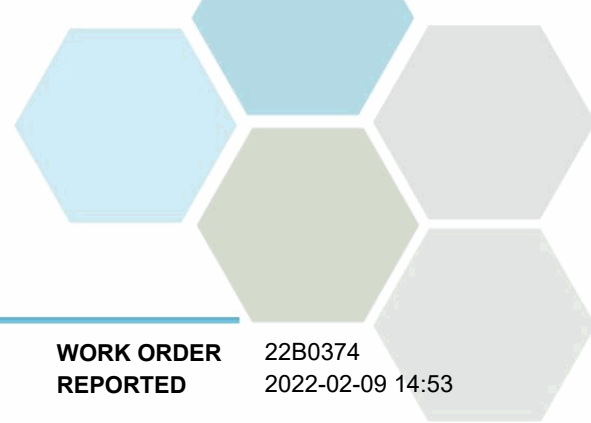


TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22B0374
2022-02-09 14:53

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Downstream of O/F- WT# 38130 (E221464) (22B0374-04) Matrix: Fresh Water Sampled: 2022-02-02 06:30, Continued						
Anions, Continued						
Nitrate (as N)	0.067	± 0.006	0.010	mg/L	2022-02-03	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-02-03	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-02-03	
Calculated Parameters						
Hardness, Total (as CaCO3)	109		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0668		0.0100	mg/L	N/A	
Nitrogen, Total	0.218		0.0500	mg/L	N/A	
General Parameters						
Nitrogen, Total Kjeldahl	0.151	± 0.050	0.050	mg/L	2022-02-09	
Phosphorus, Total (as P)	0.0112	± 0.0016	0.0050	mg/L	2022-02-07	
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-02-07	
Microbiological Parameters						
Coliforms, Total (Q-Tray)	96		1	MPN/100 mL	2022-02-03	
E. coli (Q-Tray)	14		1	MPN/100 mL	2022-02-03	
Total Metals						
Aluminum, total	0.0318	± 0.0103	0.0050	mg/L	2022-02-07	
Antimony, total	< 0.00020		0.00020	mg/L	2022-02-07	
Arsenic, total	0.00061	± 0.00041	0.00050	mg/L	2022-02-07	
Barium, total	0.0233	± 0.0031	0.0050	mg/L	2022-02-07	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-02-07	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-02-07	
Boron, total	< 0.0500		0.0500	mg/L	2022-02-07	
Cadmium, total	< 0.000010		0.000010	mg/L	2022-02-07	
Calcium, total	28.3	± 4.0	0.20	mg/L	2022-02-07	
Chromium, total	< 0.00050		0.00050	mg/L	2022-02-07	
Cobalt, total	< 0.00010		0.00010	mg/L	2022-02-07	
Copper, total	0.00102	± 0.00036	0.00040	mg/L	2022-02-07	
Iron, total	0.098	± 0.025	0.010	mg/L	2022-02-07	
Lead, total	< 0.00020		0.00020	mg/L	2022-02-07	
Lithium, total	0.00338	± 0.00062	0.00010	mg/L	2022-02-07	
Magnesium, total	9.34	± 1.31	0.010	mg/L	2022-02-07	
Manganese, total	0.00815	± 0.00724	0.00020	mg/L	2022-02-07	
Molybdenum, total	0.00321	± 0.00047	0.00010	mg/L	2022-02-07	
Nickel, total	0.00054	± 0.00041	0.00040	mg/L	2022-02-07	
Phosphorus, total	< 0.050		0.050	mg/L	2022-02-07	
Potassium, total	2.33	± 0.38	0.10	mg/L	2022-02-07	
Selenium, total	< 0.00050		0.00050	mg/L	2022-02-07	
Silicon, total	3.8	± 1.8	1.0	mg/L	2022-02-07	
Silver, total	< 0.000050		0.000050	mg/L	2022-02-07	
Sodium, total	11.6	± 2.1	0.10	mg/L	2022-02-07	



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22B0374
2022-02-09 14:53

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Downstream of O/F- WT# 38130 (E221464) (22B0374-04) Matrix: Fresh Water Sampled: 2022-02-02 06:30, Continued						
<i>Total Metals, Continued</i>						
Strontium, total	0.263	± 0.032	0.0010	mg/L	2022-02-07	
Sulfur, total	10.1	± 5.3	3.0	mg/L	2022-02-07	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-02-07	
Thallium, total	< 0.000020		0.000020	mg/L	2022-02-07	
Thorium, total	< 0.00010		0.00010	mg/L	2022-02-07	
Tin, total	< 0.00020		0.00020	mg/L	2022-02-07	
Titanium, total	< 0.0050		0.0050	mg/L	2022-02-07	
Tungsten, total	< 0.0010		0.0010	mg/L	2022-02-07	
Uranium, total	0.00257	± 0.00031	0.000020	mg/L	2022-02-07	
Vanadium, total	0.0021	± 0.0006	0.0010	mg/L	2022-02-07	
Zinc, total	< 0.0040		0.0040	mg/L	2022-02-07	
Zirconium, total	< 0.00010		0.00010	mg/L	2022-02-07	

Influent- WT# 38131 (0500232) (22B0374-05) | Matrix: Wastewater | Sampled: 2022-02-01 00:00 To 2022-02-02 00:00

Anions

Nitrate (as N)	0.385	± 0.024	0.010	mg/L	2022-02-03	
Nitrite (as N)	0.092	± 0.010	0.010	mg/L	2022-02-03	
Phosphate (as P)	4.93	± 0.86	0.0050	mg/L	2022-02-03	

Calculated Parameters

Nitrate+Nitrite (as N)	0.477		0.0100	mg/L	N/A	
Nitrogen, Total	51.3		2.00	mg/L	N/A	

General Parameters

Nitrogen, Total Kjeldahl	50.8	± 6.5	0.050	mg/L	2022-02-09	
Phosphorus, Total (as P)	7.56	± 0.84	0.0050	mg/L	2022-02-07	

Effluent 7 Day Composite- WT# 3813A (E105000) (22B0374-06) | Matrix: Wastewater | Sampled: 2022-01-28 00:00 To 2022-02-02 00:00

PRES

Anions

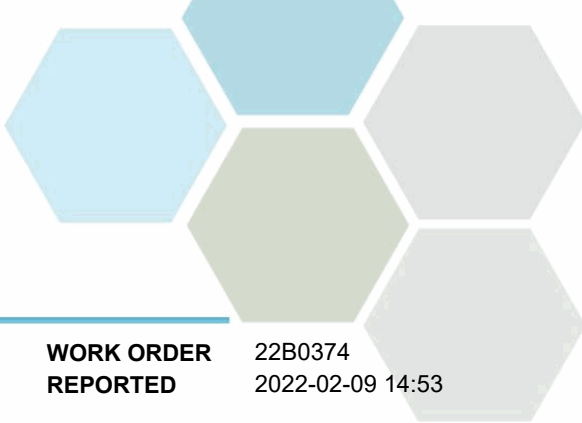
Nitrate (as N)	4.46	± 0.28	0.010	mg/L	2022-02-03	
Nitrite (as N)	0.012	± 0.002	0.010	mg/L	2022-02-03	

Calculated Parameters

Nitrate+Nitrite (as N)	4.48		0.0100	mg/L	N/A	
Nitrogen, Total	6.37		0.100	mg/L	N/A	

General Parameters

Nitrogen, Total Kjeldahl	1.90	± 0.25	0.050	mg/L	2022-02-09	
Phosphorus, Total (as P)	0.109	± 0.012	0.0050	mg/L	2022-02-07	
Solids, Total Suspended	5.2	± 1.0	2.0	mg/L	2022-02-07	



TEST RESULTS

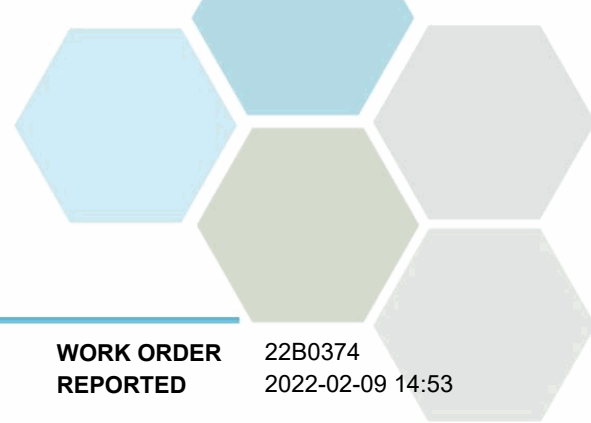
REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22B0374
2022-02-09 14:53

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Sample Qualifiers:

PRES Sample has been preserved for TP, TKN in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22B0374 2022-02-09 14:53

Analysis Description	Method Ref.	Technique	Accredited	Location
Ammonia, Total in Water	SM 4500-NH3 G* (2017)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Chemical Oxygen Demand in Water	SM 5220 D* (2017)	Closed Reflux, Colorimetry	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Coliforms, Total in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Hardness in Water	SM 2340 B* (2017)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	SM 2540 D* (2017)	Gravimetry (Dried at 103-105C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

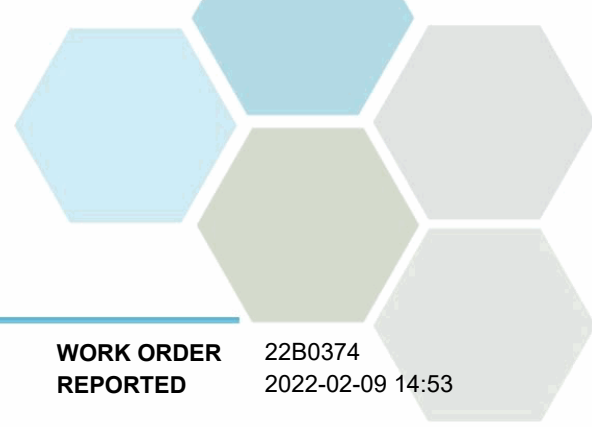
Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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
MPN/100 mL	Most Probable Number per 100 millilitres
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Penticton, City of - DW & STP
PROJECT Wastewater - PE12212

WORK ORDER 22B0374
REPORTED 2022-02-09 14:53

General Comments:

The results in this report apply to the 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. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing. The quality control (QC) data is available upon request

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.



CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22B1288
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-02-09 12:05 / 1.2°C 2022-02-16 11:35
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

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.

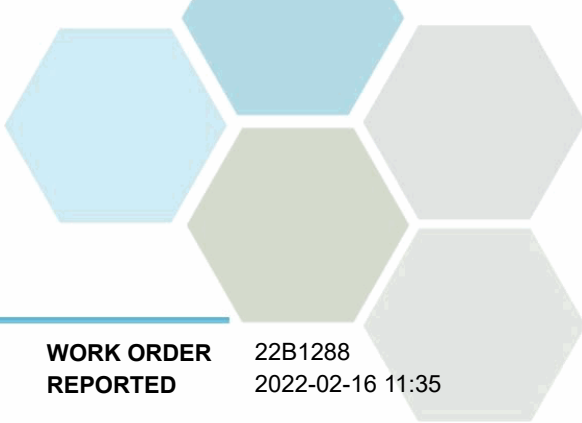
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Client Service Team Lead

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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



TEST RESULTS

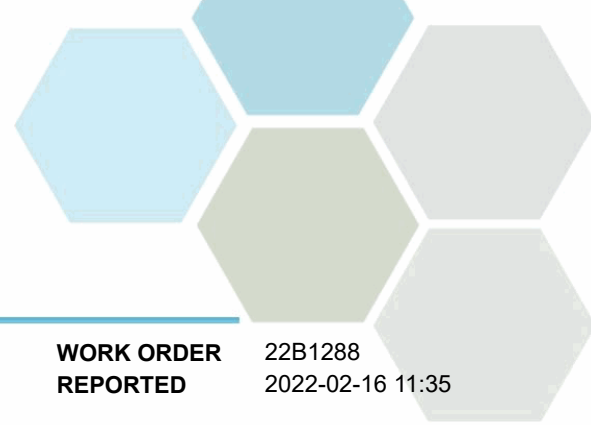
REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22B1288
2022-02-16 11:35

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Effluent Grab- WT# 3813A (E105000) (22B1288-01) Matrix: Wastewater Sampled: 2022-02-09 08:00						
<i>Microbiological Parameters</i>						
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-02-09	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-02-09	
Effluent 7 Day Composite- WT# 3813A (E105000) (22B1288-02) Matrix: Wastewater Sampled: 2022-02-03 00:00 To 2022-02-09 00:00						PRES
<i>Anions</i>						
Nitrate (as N)	3.88	± 0.24		0.010 mg/L	2022-02-10	
Nitrite (as N)	0.016	± 0.003		0.010 mg/L	2022-02-10	
<i>Calculated Parameters</i>						
Nitrate+Nitrite (as N)	3.89			0.0100 mg/L		N/A
Nitrogen, Total	5.55			0.100 mg/L		N/A
<i>General Parameters</i>						
Nitrogen, Total Kjeldahl	1.66	± 0.22		0.050 mg/L	2022-02-14	
Phosphorus, Total (as P)	0.108	± 0.012		0.0050 mg/L	2022-02-14	
Solids, Total Suspended	6.4	± 1.0		2.0 mg/L	2022-02-13	

Sample Qualifiers:

PRES Sample has been preserved for TP, TKN in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22B1288
2022-02-16 11:35

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	SM 2540 D* (2017)	Gravimetry (Dried at 103-105C)	✓	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
MPN/100 mL	Most Probable Number per 100 millilitres
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.

General Comments:

The results in this report apply to the 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. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing. The quality control (QC) data is available upon request

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22B2257
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-02-16 12:00 / 1.2°C 2022-02-24 15:36
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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Big Picture Sidekicks



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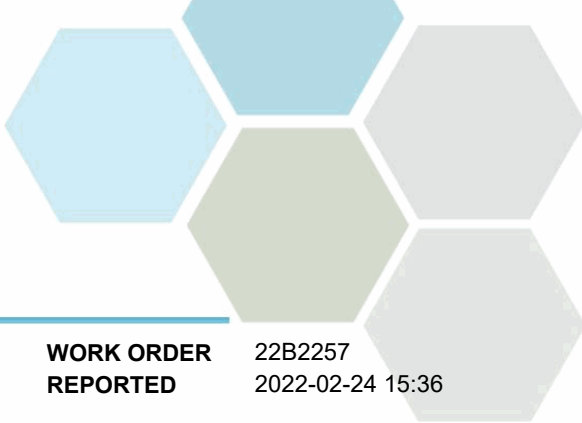
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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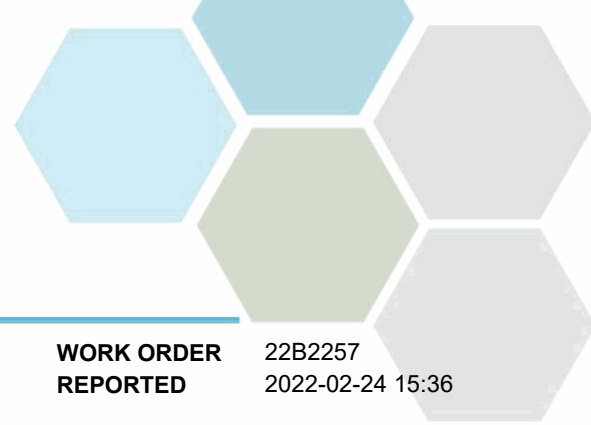


TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22B2257
2022-02-24 15:36

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Effluent Grab- WT# 3813A (E105000) (22B2257-01) Matrix: Wastewater Sampled: 2022-02-16						
<i>Microbiological Parameters</i>						
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-02-16	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-02-16	
Effluent 7 Day Composite- WT# 3813A (E105000) (22B2257-02) Matrix: Wastewater Sampled: 2022-02-10 00:00 To 2022-02-16 00:00						
<i>Anions</i>						
Nitrate (as N)	3.87	± 0.24	0.010	mg/L	2022-02-18	
Nitrite (as N)	0.029	± 0.004	0.010	mg/L	2022-02-18	
<i>Calculated Parameters</i>						
Nitrate+Nitrite (as N)	3.90		0.0100	mg/L	N/A	
Nitrogen, Total	5.40		0.100	mg/L	N/A	
<i>General Parameters</i>						
Nitrogen, Total Kjeldahl	1.50	± 0.21	0.050	mg/L	2022-02-23	
Phosphorus, Total (as P)	0.0704	± 0.0079	0.0050	mg/L	2022-02-24	
Solids, Total Suspended	< 10.0		2.0	mg/L	2022-02-22	



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22B2257
2022-02-24 15:36

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	SM 2540 D* (2017)	Gravimetry (Dried at 103-105C)	✓	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
MPN/100 mL	Most Probable Number per 100 millilitres
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.

General Comments:

The results in this report apply to the 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. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing. The quality control (QC) data is available upon request

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.

CERTIFICATE OF ANALYSIS

REPORTED TO Penticton, City of - DW & STP
171 Main Street
PENTICTON, BC V2A 5A9

ATTENTION Joel Mertz

PO NUMBER

PROJECT Wastewater - PE12212

PROJECT INFO 0554-04

WORK ORDER 22B3062

RECEIVED / TEMP REPORTED 2022-02-23 12:00 / - 0.3°C
2022-03-01 16:14

Introduction:

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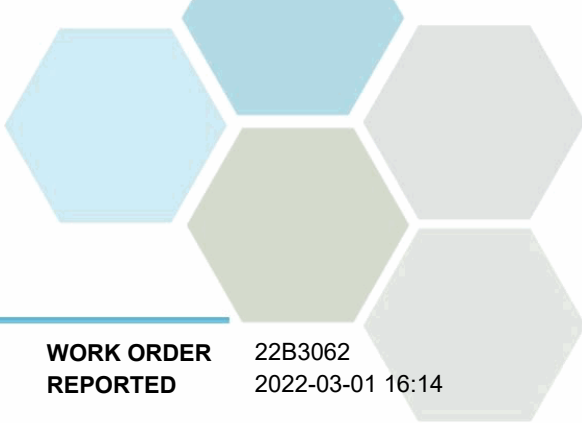
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

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TEST RESULTS

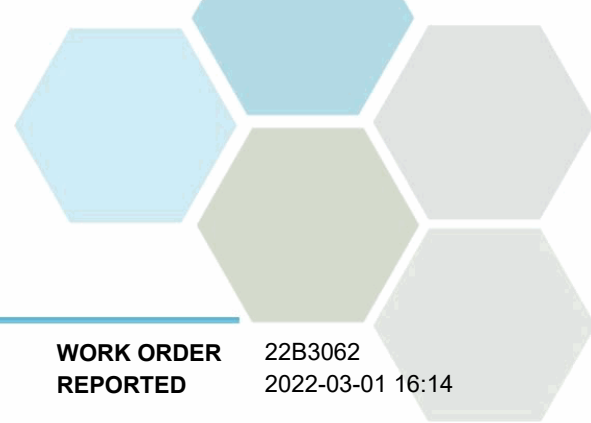
REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22B3062
2022-03-01 16:14

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Effluent Grab- WT# 3813A (E105000) (22B3062-01) Matrix: Wastewater Sampled: 2022-02-23 07:15						
<i>Microbiological Parameters</i>						
Coliforms, Fecal (Q-Tray)	3		1	MPN/100 mL	2022-02-24	
E. coli (Q-Tray)	1		1	MPN/100 mL	2022-02-24	
Effluent 7 Day Composite- WT# 3813A (E105000) (22B3062-02) Matrix: Wastewater Sampled: 2022-02-17 00:00 To 2022-02-23 00:00						PRES
<i>Anions</i>						
Nitrate (as N)	3.78	± 0.24	0.010	mg/L	2022-02-24	
Nitrite (as N)	0.038	± 0.004	0.010	mg/L	2022-02-24	
<i>Calculated Parameters</i>						
Nitrate+Nitrite (as N)	3.82		0.0100	mg/L	N/A	
Nitrogen, Total	5.96		0.100	mg/L	N/A	
<i>General Parameters</i>						
Nitrogen, Total Kjeldahl	2.14	± 0.28	0.050	mg/L	2022-03-01	
Phosphorus, Total (as P)	0.103	± 0.011	0.0050	mg/L	2022-03-01	
Solids, Total Suspended	5.0	± 1.0	2.0	mg/L	2022-02-27	

Sample Qualifiers:

PRES Sample has been preserved for TKN, TP in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22B3062
2022-03-01 16:14

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	SM 2540 D* (2017)	Gravimetry (Dried at 103-105C)	✓	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)
mg/L	Milligrams per litre
MPN/100 mL	Most Probable Number per 100 millilitres
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Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22C0385
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-03-02 14:45 / 2.8°C 2022-03-09 15:12
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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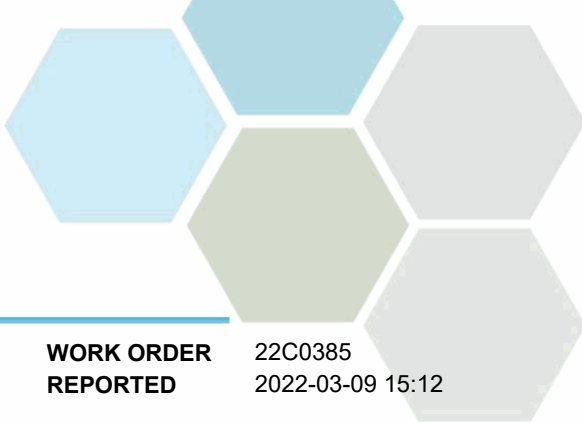
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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22C0385
2022-03-09 15:12

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22C0385-01) | Matrix: Wastewater | Sampled: 2022-03-02 06:45

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-03-03	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-03-03	

Effluent 24 hr Comp.- WT# 3813A (E105000) (22C0385-02) | Matrix: Wastewater | Sampled: 2022-03-02 06:45

Anions

Nitrate (as N)	4.02 ± 0.25		0.010	mg/L	2022-03-03	
Nitrite (as N)	0.064 ± 0.007		0.010	mg/L	2022-03-03	
Phosphate (as P)	0.0112 ± 0.0031		0.0050	mg/L	2022-03-03	

Calculated Parameters

Nitrate+Nitrite (as N)	4.08		0.0100	mg/L	N/A	
Nitrogen, Total	6.10		0.0500	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	0.427 ± 0.043		0.050	mg/L	2022-03-07	
BOD, 5-day	< 5.3		2.0	mg/L	2022-03-08	
Chemical Oxygen Demand	38 ± 18		20	mg/L	2022-03-08	
Nitrogen, Total Kjeldahl	2.02 ± 0.25		0.050	mg/L	2022-03-08	
Phosphorus, Total (as P)	0.0838 ± 0.0094		0.0050	mg/L	2022-03-08	
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-03-08	

Upstream of O/F- WT# 3812F (0500050) (22C0385-03) | Matrix: Fresh Water | Sampled: 2022-03-02 06:45

Anions

Chloride	5.81 ± 0.32		0.10	mg/L	2022-03-03	
Nitrate (as N)	0.055 ± 0.005		0.010	mg/L	2022-03-03	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-03-03	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-03-03	

Calculated Parameters

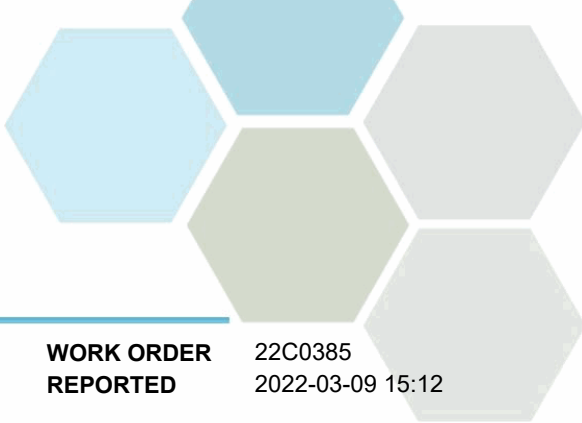
Hardness, Total (as CaCO3)	123		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0549		0.0100	mg/L	N/A	
Nitrogen, Total	0.260		0.0500	mg/L	N/A	

General Parameters

Nitrogen, Total Kjeldahl	0.205 ± 0.052		0.050	mg/L	2022-03-08	
Phosphorus, Total (as P)	0.0123 ± 0.0017		0.0050	mg/L	2022-03-08	
Solids, Total Suspended	< 10.4		2.0	mg/L	2022-03-08	RS2

Microbiological Parameters

Coliforms, Total (Q-Tray)	16		1	MPN/100 mL	2022-03-03	
E. coli (Q-Tray)	1		1	MPN/100 mL	2022-03-03	



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

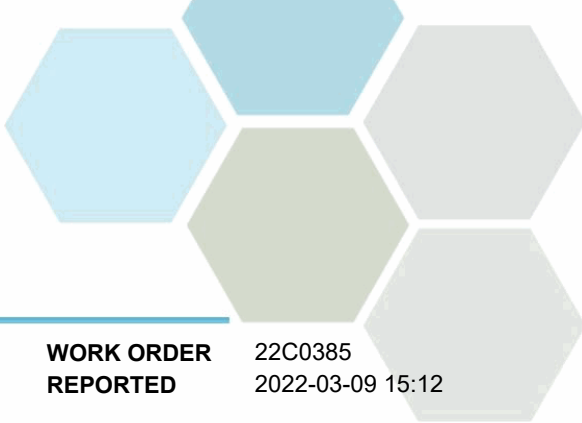
WORK ORDER REPORTED 22C0385 2022-03-09 15:12

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Upstream of O/F- WT# 3812F (0500050) (22C0385-03) Matrix: Fresh Water Sampled: 2022-03-02 06:45, Continued						
Total Metals						
Aluminum, total	0.0150	± 0.0087	0.0050	mg/L	2022-03-06	
Antimony, total	< 0.00020		0.00020	mg/L	2022-03-06	
Arsenic, total	< 0.00050		0.00050	mg/L	2022-03-06	
Barium, total	0.0256	± 0.0033	0.0050	mg/L	2022-03-06	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-03-06	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-03-06	
Boron, total	< 0.0500		0.0500	mg/L	2022-03-06	
Cadmium, total	< 0.000010		0.000010	mg/L	2022-03-06	
Calcium, total	30.6	± 4.4	0.20	mg/L	2022-03-06	
Chromium, total	< 0.00050		0.00050	mg/L	2022-03-06	
Cobalt, total	< 0.00010		0.00010	mg/L	2022-03-06	
Copper, total	0.00096	± 0.00035	0.00040	mg/L	2022-03-06	
Iron, total	0.059	± 0.020	0.010	mg/L	2022-03-06	
Lead, total	< 0.00020		0.00020	mg/L	2022-03-06	
Lithium, total	0.00348	± 0.00063	0.00010	mg/L	2022-03-06	
Magnesium, total	11.2	± 1.6	0.010	mg/L	2022-03-06	
Manganese, total	0.00773	± 0.00686	0.00020	mg/L	2022-03-06	
Molybdenum, total	0.00364	± 0.00053	0.00010	mg/L	2022-03-06	
Nickel, total	0.00056	± 0.00041	0.00040	mg/L	2022-03-06	
Phosphorus, total	< 0.050		0.050	mg/L	2022-03-06	
Potassium, total	2.78	± 0.45	0.10	mg/L	2022-03-06	
Selenium, total	0.00060	± 0.00039	0.00050	mg/L	2022-03-06	
Silicon, total	4.2	± 1.8	1.0	mg/L	2022-03-06	
Silver, total	< 0.000050		0.000050	mg/L	2022-03-06	
Sodium, total	13.3	± 2.4	0.10	mg/L	2022-03-06	
Strontium, total	0.282	± 0.034	0.0010	mg/L	2022-03-06	
Sulfur, total	9.7	± 5.2	3.0	mg/L	2022-03-06	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-03-06	
Thallium, total	< 0.000020		0.000020	mg/L	2022-03-06	
Thorium, total	< 0.00010		0.00010	mg/L	2022-03-06	
Tin, total	< 0.00020		0.00020	mg/L	2022-03-06	
Titanium, total	< 0.0050		0.0050	mg/L	2022-03-06	
Tungsten, total	< 0.0010		0.0010	mg/L	2022-03-06	
Uranium, total	0.00250	± 0.00030	0.000020	mg/L	2022-03-06	
Vanadium, total	< 0.0010		0.0010	mg/L	2022-03-06	
Zinc, total	< 0.0040		0.0040	mg/L	2022-03-06	
Zirconium, total	0.00010	± 0.00018	0.00010	mg/L	2022-03-06	

Downstream of O/F- WT# 38130 (E221464) (22C0385-04) | Matrix: Fresh Water | Sampled: 2022-03-02 07:00

Anions

Chloride	5.89	± 0.33	0.10	mg/L	2022-03-03	
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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22C0385 2022-03-09 15:12

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Downstream of O/F- WT# 38130 (E221464) (22C0385-04) | Matrix: Fresh Water | Sampled: 2022-03-02 07:00, Continued

Anions, Continued

Nitrate (as N)	0.076	± 0.006	0.010	mg/L	2022-03-03	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-03-03	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-03-03	

Calculated Parameters

Hardness, Total (as CaCO3)	117		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0759		0.0100	mg/L	N/A	
Nitrogen, Total	0.245		0.0500	mg/L	N/A	

General Parameters

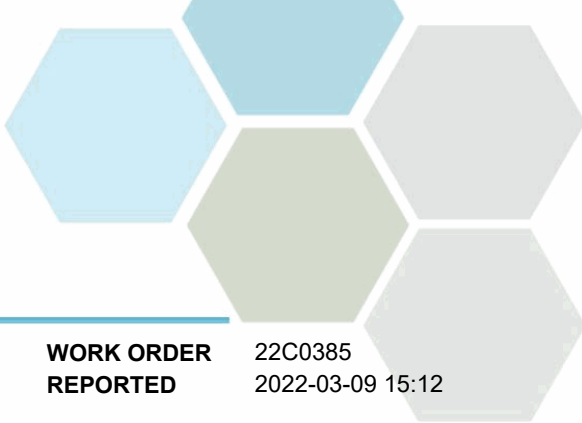
Nitrogen, Total Kjeldahl	0.169	± 0.050	0.050	mg/L	2022-03-08	
Phosphorus, Total (as P)	0.0064	± 0.0012	0.0050	mg/L	2022-03-08	
Solids, Total Suspended	< 10.9		2.0	mg/L	2022-03-08	RS2

Microbiological Parameters

Coliforms, Total (Q-Tray)	36		1	MPN/100 mL	2022-03-03	
E. coli (Q-Tray)	6		1	MPN/100 mL	2022-03-03	

Total Metals

Aluminum, total	0.0309	± 0.0102	0.0050	mg/L	2022-03-06	
Antimony, total	< 0.00020		0.00020	mg/L	2022-03-06	
Arsenic, total	< 0.00050		0.00050	mg/L	2022-03-06	
Barium, total	0.0230	± 0.0030	0.0050	mg/L	2022-03-06	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-03-06	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-03-06	
Boron, total	< 0.0500		0.0500	mg/L	2022-03-06	
Cadmium, total	< 0.000010		0.000010	mg/L	2022-03-06	
Calcium, total	29.2	± 4.2	0.20	mg/L	2022-03-06	
Chromium, total	< 0.00050		0.00050	mg/L	2022-03-06	
Cobalt, total	< 0.00010		0.00010	mg/L	2022-03-06	
Copper, total	0.00093	± 0.00035	0.00040	mg/L	2022-03-06	
Iron, total	0.053	± 0.019	0.010	mg/L	2022-03-06	
Lead, total	< 0.00020		0.00020	mg/L	2022-03-06	
Lithium, total	0.00340	± 0.00062	0.00010	mg/L	2022-03-06	
Magnesium, total	10.7	± 1.5	0.010	mg/L	2022-03-06	
Manganese, total	0.00751	± 0.00667	0.00020	mg/L	2022-03-06	
Molybdenum, total	0.00350	± 0.00051	0.00010	mg/L	2022-03-06	
Nickel, total	0.00050	± 0.00041	0.00040	mg/L	2022-03-06	
Phosphorus, total	< 0.050		0.050	mg/L	2022-03-06	
Potassium, total	2.74	± 0.44	0.10	mg/L	2022-03-06	
Selenium, total	0.00051	± 0.00039	0.00050	mg/L	2022-03-06	
Silicon, total	4.3	± 1.8	1.0	mg/L	2022-03-06	
Silver, total	< 0.000050		0.000050	mg/L	2022-03-06	
Sodium, total	13.0	± 2.4	0.10	mg/L	2022-03-06	



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22C0385
2022-03-09 15:12

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Downstream of O/F- WT# 38130 (E221464) (22C0385-04) | Matrix: Fresh Water | Sampled: 2022-03-02 07:00, Continued

Total Metals, Continued

Strontium, total	0.273	± 0.033	0.0010	mg/L	2022-03-06	
Sulfur, total	10.0	± 5.2	3.0	mg/L	2022-03-06	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-03-06	
Thallium, total	< 0.000020		0.000020	mg/L	2022-03-06	
Thorium, total	< 0.00010		0.00010	mg/L	2022-03-06	
Tin, total	< 0.00020		0.00020	mg/L	2022-03-06	
Titanium, total	< 0.0050		0.0050	mg/L	2022-03-06	
Tungsten, total	< 0.0010		0.0010	mg/L	2022-03-06	
Uranium, total	0.00243	± 0.00029	0.000020	mg/L	2022-03-06	
Vanadium, total	< 0.0010		0.0010	mg/L	2022-03-06	
Zinc, total	< 0.0040		0.0040	mg/L	2022-03-06	
Zirconium, total	0.00012	± 0.00018	0.00010	mg/L	2022-03-06	

Influent- WT# 38131 (0500232) (22C0385-05) | Matrix: Wastewater | Sampled: 2022-03-02 06:30

Anions

Nitrate (as N)	< 0.010		0.010	mg/L	2022-03-03	
Nitrite (as N)	0.017	± 0.003	0.010	mg/L	2022-03-03	
Phosphate (as P)	4.43	± 0.77	0.0050	mg/L	2022-03-03	

Calculated Parameters

Nitrate+Nitrite (as N)	0.0172		0.0100	mg/L	N/A	
Nitrogen, Total	45.1		1.00	mg/L	N/A	

General Parameters

Nitrogen, Total Kjeldahl	45.1	± 5.6	0.050	mg/L	2022-03-08	
Phosphorus, Total (as P)	8.22	± 0.91	0.0050	mg/L	2022-03-08	

Effluent 7 Day Composite- WT# 3813A (E105000) (22C0385-06) | Matrix: Wastewater | Sampled: 2022-02-24 00:00 To 2022-03-02 00:00

PRES

Anions

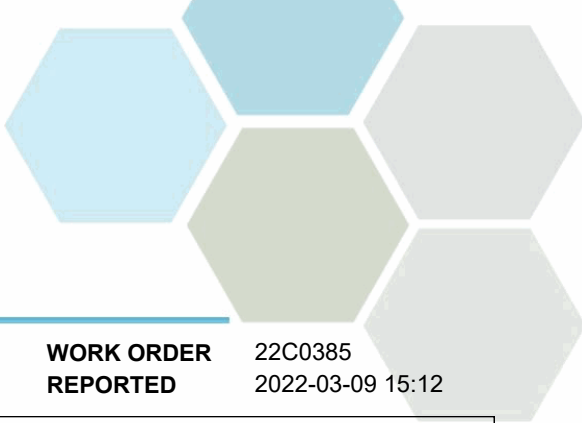
Nitrate (as N)	3.79	± 0.24	0.010	mg/L	2022-03-03	
Nitrite (as N)	0.090	± 0.010	0.010	mg/L	2022-03-03	

Calculated Parameters

Nitrate+Nitrite (as N)	3.88		0.0100	mg/L	N/A	
Nitrogen, Total	6.29		0.0500	mg/L	N/A	

General Parameters

Nitrogen, Total Kjeldahl	2.41	± 0.30	0.050	mg/L	2022-03-08	
Phosphorus, Total (as P)	0.0838	± 0.0094	0.0050	mg/L	2022-03-08	
Solids, Total Suspended	2.4	± 0.9	2.0	mg/L	2022-03-08	



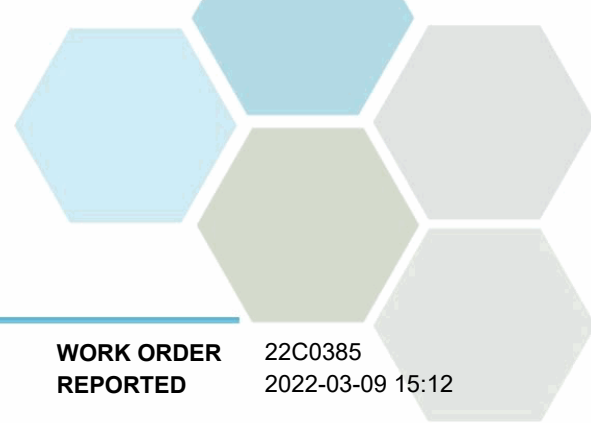
TEST RESULTS

REPORTED TO Penticton, City of - DW & STP
PROJECT Wastewater - PE12212

WORK ORDER 22C0385
REPORTED 2022-03-09 15:12

Sample Qualifiers:

PRES Sample has been preserved for TP in the laboratory and the holding time has been extended.
RS2 The Reporting Limits for this sample have been raised due to limited sample volume.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22C0385 2022-03-09 15:12

Analysis Description	Method Ref.	Technique	Accredited	Location
Ammonia, Total in Water	SM 4500-NH3 G* (2017)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Chemical Oxygen Demand in Water	SM 5220 D* (2017)	Closed Reflux, Colorimetry	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Coliforms, Total in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Hardness in Water	SM 2340 B* (2017)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	SM 2540 D* (2017)	Gravimetry (Dried at 103-105C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

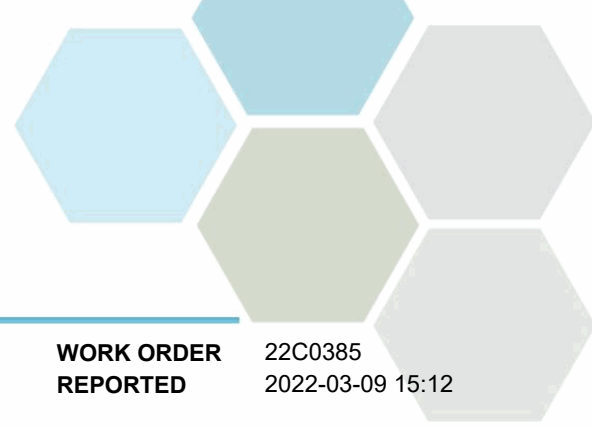
Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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
MPN/100 mL	Most Probable Number per 100 millilitres
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Penticton, City of - DW & STP
PROJECT Wastewater - PE12212

WORK ORDER 22C0385
REPORTED 2022-03-09 15:12

General Comments:

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22C1359
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-03-10 12:30 / 6.1°C 2022-03-17 11:24
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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Big Picture Sidekicks



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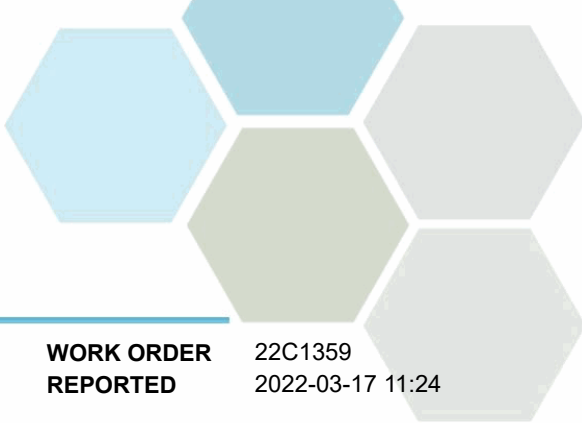
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

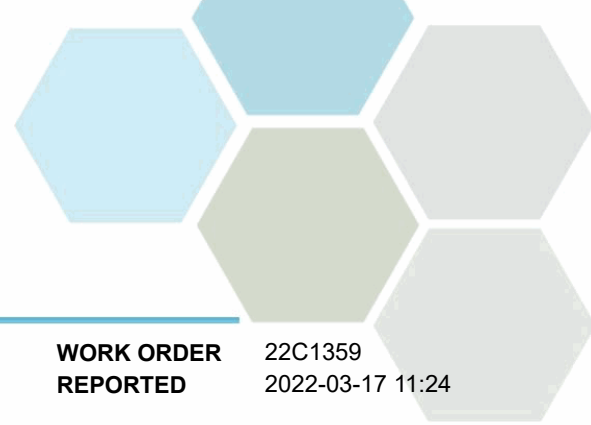
REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22C1359
2022-03-17 11:24

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Effluent Grab- WT# 3813A (E105000) (22C1359-01) Matrix: Wastewater Sampled: 2022-03-09 07:30						
<i>Microbiological Parameters</i>						
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-03-10	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-03-10	
Effluent 7 Day Composite- WT# 3813A (E105000) (22C1359-02) Matrix: Wastewater Sampled: 2022-03-03 00:00 To 2022-03-09 00:00						PRES
<i>Anions</i>						
Nitrate (as N)	3.60	± 0.23		0.010 mg/L	2022-03-10	
Nitrite (as N)	0.063	± 0.007		0.010 mg/L	2022-03-10	
<i>Calculated Parameters</i>						
Nitrate+Nitrite (as N)	3.66			0.0100 mg/L		N/A
Nitrogen, Total	5.32			0.0500 mg/L		N/A
<i>General Parameters</i>						
Nitrogen, Total Kjeldahl	1.66	± 0.21		0.050 mg/L	2022-03-17	
Phosphorus, Total (as P)	0.0925	± 0.0103		0.0050 mg/L	2022-03-15	
Solids, Total Suspended	4.8	± 1.0		2.0 mg/L	2022-03-14	

Sample Qualifiers:

PRES Sample has been preserved for TP, TKN in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22C1359
2022-03-17 11:24

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	SM 2540 D* (2017)	Gravimetry (Dried at 103-105C)	✓	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
MPN/100 mL	Most Probable Number per 100 millilitres
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.

General Comments:

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22C2332
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-03-16 14:15 / - 0.2°C 2022-03-23 12:16
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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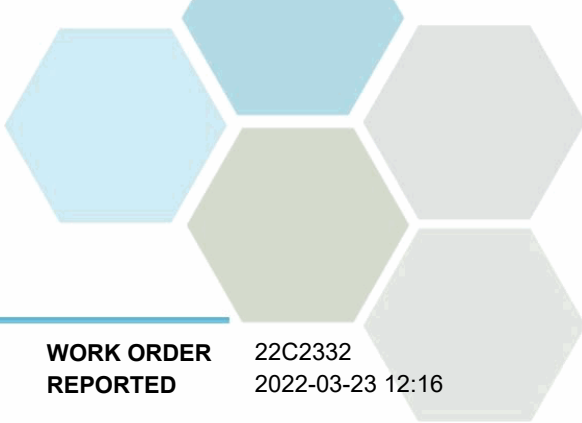
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Account Manager

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TEST RESULTS

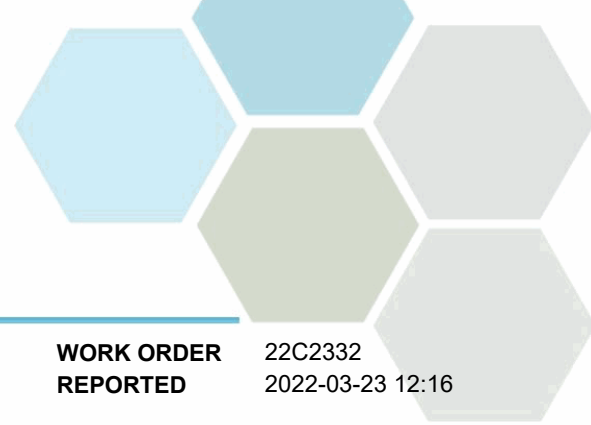
REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22C2332
2022-03-23 12:16

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Effluent Grab- WT# 3813A (E105000) (22C2332-01) Matrix: Wastewater Sampled: 2022-03-16 08:00						
<i>Microbiological Parameters</i>						
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-03-17	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-03-17	
Effluent 7 Day Composite- WT# 3813A (E105000) (22C2332-02) Matrix: Wastewater Sampled: 2022-03-10 00:00 To 2022-03-16 00:00						PRES
<i>Anions</i>						
Nitrate (as N)	3.61	± 0.23		0.010 mg/L	2022-03-17	
Nitrite (as N)	0.035	± 0.004		0.010 mg/L	2022-03-17	
<i>Calculated Parameters</i>						
Nitrate+Nitrite (as N)	3.64			0.0100 mg/L		N/A
Nitrogen, Total	5.31			0.0500 mg/L		N/A
<i>General Parameters</i>						
Nitrogen, Total Kjeldahl	1.67	± 0.21		0.050 mg/L	2022-03-21	
Phosphorus, Total (as P)	0.114	± 0.013		0.0050 mg/L	2022-03-21	
Solids, Total Suspended	3.0	± 0.9		2.0 mg/L	2022-03-23	

Sample Qualifiers:

PRES Sample has been preserved for TP, TKN in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22C2332 2022-03-23 12:16

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna

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

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SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22C3201
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-03-23 12:00 / 11.8°C 2022-03-30 13:20
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

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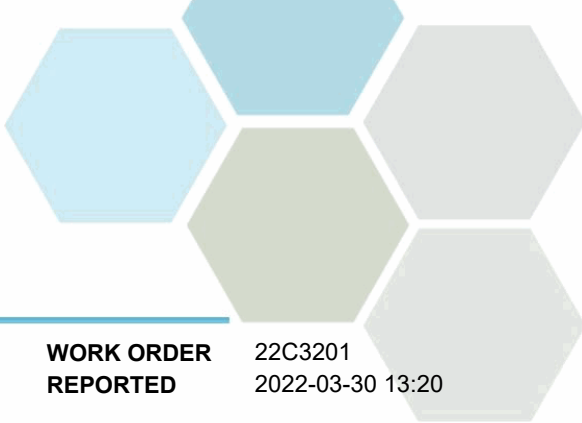
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TEST RESULTS

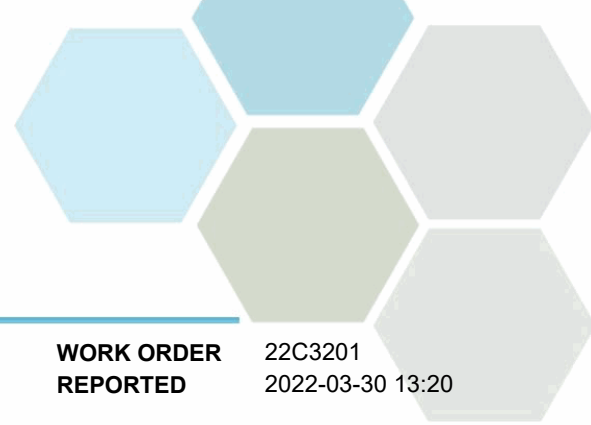
REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22C3201
2022-03-30 13:20

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Effluent Grab- WT# 3813A (E105000) (22C3201-01) Matrix: Wastewater Sampled: 2022-03-23 07:30						
<i>Microbiological Parameters</i>						
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-03-24	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-03-24	
Effluent 7 Day Composite- WT# 3813A (E105000) (22C3201-02) Matrix: Wastewater Sampled: 2022-03-17 00:00 To 2022-03-23 00:00						PRES
<i>Anions</i>						
Nitrate (as N)	3.31	± 0.21		0.010 mg/L	2022-03-25	
Nitrite (as N)	0.049	± 0.005		0.010 mg/L	2022-03-25	
<i>Calculated Parameters</i>						
Nitrate+Nitrite (as N)	3.36			0.0100 mg/L		N/A
Nitrogen, Total	5.06			0.0500 mg/L		N/A
<i>General Parameters</i>						
Nitrogen, Total Kjeldahl	1.70	± 0.21		0.050 mg/L	2022-03-30	
Phosphorus, Total (as P)	0.207	± 0.023		0.0050 mg/L	2022-03-29	
Solids, Total Suspended	3.2	± 1.0		2.0 mg/L	2022-03-29	

Sample Qualifiers:

PRES Sample has been preserved for TKN, TP in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22C3201 2022-03-30 13:20

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	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
MPN/100 mL	Most Probable Number per 100 millilitres
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.

General Comments:

The results in this report apply to the 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. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing. The quality control (QC) data is available upon request

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.



CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22C4191
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-03-30 13:00 / 0.6°C 2022-04-06 14:37
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

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.

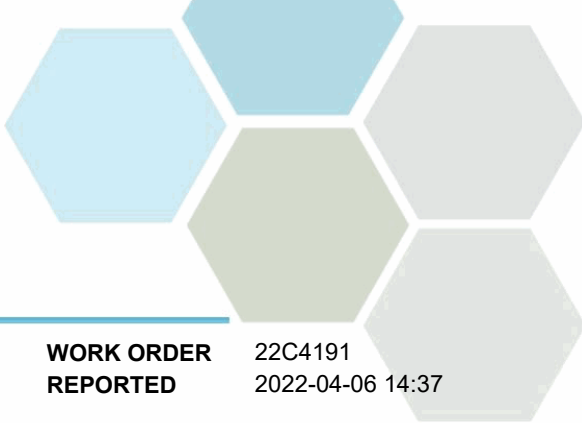
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticon, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22C4191 2022-04-06 14:37

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Effluent 7 Day Composite- WT# 3813A (E105000) (22C4191-01) Matrix: Wastewater Sampled: 2022-03-24 00:00 To 2022-03-30 00:00						PRES

Anions

Nitrate (as N)	3.21	± 0.20	0.010	mg/L	2022-04-01	
Nitrite (as N)	0.092	± 0.010	0.010	mg/L	2022-04-01	

Calculated Parameters

Nitrate+Nitrite (as N)	3.30		0.0100	mg/L	N/A	
Nitrogen, Total	5.21		0.0500	mg/L	N/A	

General Parameters

Nitrogen, Total Kjeldahl	1.91	± 0.24	0.050	mg/L	2022-04-05	
Phosphorus, Total (as P)	0.304	± 0.034	0.0050	mg/L	2022-04-04	
Solids, Total Suspended	3.0	± 0.9	2.0	mg/L	2022-04-04	

Effluent Grab- WT# 3813A (E105000) (22C4191-02) | Matrix: Wastewater | Sampled: 2022-03-30 07:30

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-03-31	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-03-31	

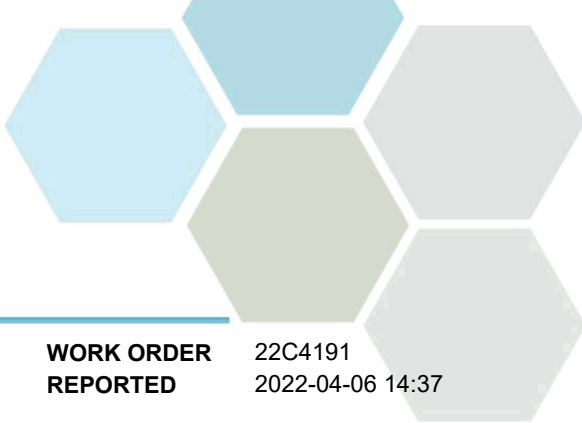
Leachate Clear (22C4191-03) | Matrix: Water | Sampled: 2022-03-30 07:30

Calculated Parameters

Hardness, Total (as CaCO3)	1100		1.00	mg/L	N/A	
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Total Metals

Aluminum, total	7.89	± 1.55	0.0050	mg/L	2022-04-05	
Antimony, total	0.00727	± 0.00151	0.00020	mg/L	2022-04-05	
Arsenic, total	0.182	± 0.021	0.00050	mg/L	2022-04-05	
Barium, total	0.336	± 0.044	0.0050	mg/L	2022-04-05	
Beryllium, total	0.00036	± 0.00008	0.00010	mg/L	2022-04-05	
Bismuth, total	0.00611	± 0.00116	0.00010	mg/L	2022-04-05	
Boron, total	3.09	± 0.94	0.0500	mg/L	2022-04-05	
Cadmium, total	0.00639	± 0.00174	0.000010	mg/L	2022-04-05	
Calcium, total	336	± 48	0.20	mg/L	2022-04-05	
Chromium, total	1.92	± 0.39	0.00050	mg/L	2022-04-05	
Cobalt, total	0.134	± 0.014	0.00010	mg/L	2022-04-05	
Copper, total	3.46	± 0.54	0.00040	mg/L	2022-04-05	
Iron, total	1260	± 240	0.010	mg/L	2022-04-05	
Lead, total	0.0188	± 0.0041	0.00020	mg/L	2022-04-05	
Lithium, total	0.0660	± 0.0118	0.00010	mg/L	2022-04-05	
Magnesium, total	62.6	± 8.8	0.010	mg/L	2022-04-05	
Manganese, total	19.4	± 17.2	0.00020	mg/L	2022-04-05	
Molybdenum, total	0.0782	± 0.0112	0.00010	mg/L	2022-04-05	
Nickel, total	1.11	± 0.21	0.00040	mg/L	2022-04-05	



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22C4191 2022-04-06 14:37

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Leachate Clear (22C4191-03) Matrix: Water Sampled: 2022-03-30 07:30, Continued						
<i>Total Metals, Continued</i>						
Phosphorus, total	40.6	± 8.2	0.050	mg/L	2022-04-05	
Potassium, total	1080	± 169	0.10	mg/L	2022-04-05	
Selenium, total	0.00603	± 0.00107	0.00050	mg/L	2022-04-05	
Silicon, total	39.7	± 8.4	1.0	mg/L	2022-04-05	
Silver, total	0.000828	± 0.000229	0.000050	mg/L	2022-04-05	
Sodium, total	259	± 47	0.10	mg/L	2022-04-05	
Strontium, total	1.47	± 0.18	0.0010	mg/L	2022-04-05	
Sulfur, total	75.9	± 20.2	3.0	mg/L	2022-04-05	
Tellurium, total	< 0.00100		0.00050	mg/L	2022-04-05	
Thallium, total	0.000171	± 0.000076	0.000020	mg/L	2022-04-05	
Thorium, total	0.00074	± 0.00025	0.00010	mg/L	2022-04-05	
Tin, total	0.0354	± 0.0056	0.00020	mg/L	2022-04-05	
Titanium, total	0.113	± 0.023	0.0050	mg/L	2022-04-05	
Tungsten, total	0.0064	± 0.0036	0.0010	mg/L	2022-04-05	
Uranium, total	0.0104	± 0.0013	0.000020	mg/L	2022-04-05	
Vanadium, total	0.0439	± 0.0053	0.0050	mg/L	2022-04-05	
Zinc, total	2.42	± 0.46	0.0040	mg/L	2022-04-05	
Zirconium, total	0.00266	± 0.00086	0.00010	mg/L	2022-04-05	

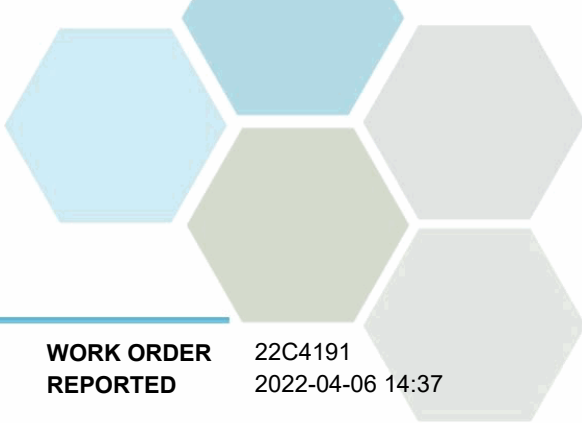
Leachate Sludge (22C4191-04) | Matrix: Water | Sampled: 2022-03-30 07:00

Calculated Parameters

Hardness, Total (as CaCO3)	349		0.500	mg/L	N/A	
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Total Metals

Aluminum, total	14.5	± 2.8	0.0050	mg/L	2022-04-05	
Antimony, total	0.0145	± 0.0029	0.00020	mg/L	2022-04-05	
Arsenic, total	0.132	± 0.016	0.00050	mg/L	2022-04-05	
Barium, total	0.340	± 0.044	0.0050	mg/L	2022-04-05	
Beryllium, total	0.00031	± 0.00006	0.00010	mg/L	2022-04-05	
Bismuth, total	0.0173	± 0.0033	0.00010	mg/L	2022-04-05	
Boron, total	0.862	± 0.263	0.0500	mg/L	2022-04-05	
Cadmium, total	0.00236	± 0.00064	0.000010	mg/L	2022-04-05	
Calcium, total	111	± 16	0.20	mg/L	2022-04-05	
Chromium, total	0.721	± 0.145	0.00050	mg/L	2022-04-05	
Cobalt, total	0.0635	± 0.0067	0.00010	mg/L	2022-04-05	
Copper, total	1.80	± 0.28	0.00040	mg/L	2022-04-05	
Iron, total	1130	± 216	0.010	mg/L	2022-04-05	
Lead, total	0.0491	± 0.0106	0.00020	mg/L	2022-04-05	
Lithium, total	0.0193	± 0.0034	0.00010	mg/L	2022-04-05	
Magnesium, total	17.5	± 2.4	0.010	mg/L	2022-04-05	
Manganese, total	5.50	± 4.88	0.00020	mg/L	2022-04-05	
Molybdenum, total	0.277	± 0.040	0.00010	mg/L	2022-04-05	



TEST RESULTS

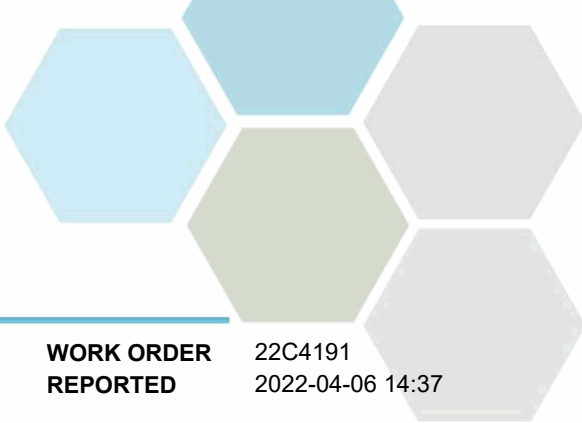
REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22C4191
2022-04-06 14:37

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Leachate Sludge (22C4191-04) Matrix: Water Sampled: 2022-03-30 07:00, Continued						
<i>Total Metals, Continued</i>						
Nickel, total	0.370	± 0.070	0.00040	mg/L	2022-04-05	
Phosphorus, total	155	± 31	0.050	mg/L	2022-04-05	
Potassium, total	262	± 41	0.10	mg/L	2022-04-05	
Selenium, total	0.0137	± 0.0017	0.00050	mg/L	2022-04-05	
Silicon, total	14.3	± 3.2	1.0	mg/L	2022-04-05	
Silver, total	0.00483	± 0.00096	0.000050	mg/L	2022-04-05	
Sodium, total	62.4	± 11.4	0.10	mg/L	2022-04-05	
Strontium, total	0.613	± 0.075	0.0010	mg/L	2022-04-05	
Sulfur, total	94.7	± 22.6	3.0	mg/L	2022-04-05	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-04-05	
Thallium, total	0.000049	± 0.000037	0.000020	mg/L	2022-04-05	
Thorium, total	0.00137	± 0.00045	0.00010	mg/L	2022-04-05	
Tin, total	0.134	± 0.021	0.00020	mg/L	2022-04-05	
Titanium, total	0.374	± 0.077	0.0050	mg/L	2022-04-05	
Tungsten, total	0.0124	± 0.0047	0.0010	mg/L	2022-04-05	
Uranium, total	0.00962	± 0.00116	0.000020	mg/L	2022-04-05	
Vanadium, total	0.145	± 0.017	0.0050	mg/L	2022-04-05	
Zinc, total	0.795	± 0.152	0.0040	mg/L	2022-04-05	
Zirconium, total	0.0135	± 0.0040	0.00010	mg/L	2022-04-05	

Sample Qualifiers:

PRES Sample has been preserved for TKN, TP in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22C4191 2022-04-06 14:37

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Hardness in Water	SM 2340 B* (2017)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO ₃ +HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

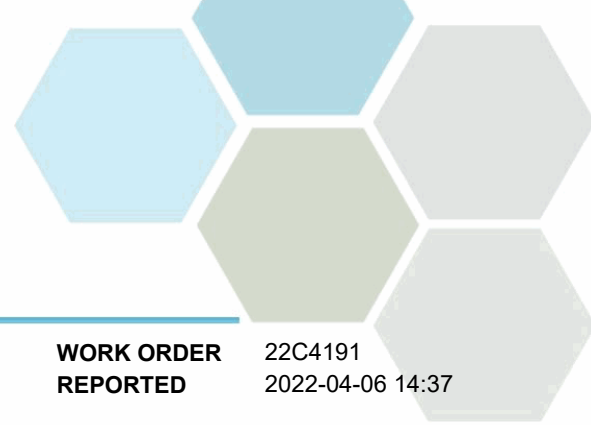
Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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
MPN/100 mL	Most Probable Number per 100 millilitres
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Penticton, City of - DW & STP
PROJECT Wastewater - PE12212

WORK ORDER 22C4191
REPORTED 2022-04-06 14:37

General Comments:

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22D0798
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-04-06 16:00 / 4.8°C 2022-04-14 16:45
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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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.

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.

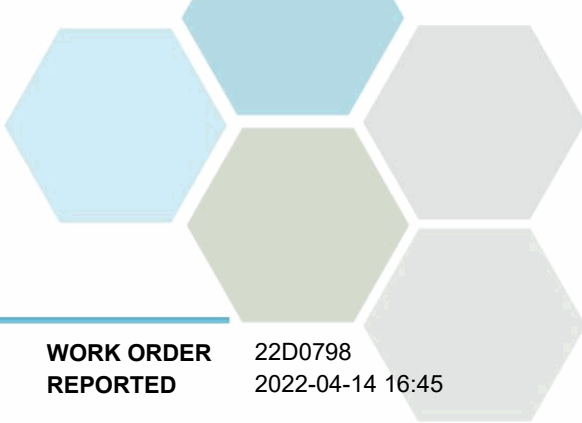
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Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22D0798 2022-04-14 16:45

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22D0798-01) | Matrix: Wastewater | Sampled: 2022-04-06 07:15

Microbiological Parameters

Coliforms, Total (Q-Tray)	< 1		1	MPN/100 mL	2022-04-07	HT1
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-04-07	HT1
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-04-07	HT1

Effluent 24 hr Comp.- WT# 3813A (E105000) (22D0798-02) | Matrix: Wastewater | Sampled: 2022-04-06 07:15

Anions

Nitrate (as N)	3.02 ± 0.19		0.010	mg/L	2022-04-08	
Nitrite (as N)	0.104 ± 0.011		0.010	mg/L	2022-04-08	
Phosphate (as P)	0.103 ± 0.018		0.0050	mg/L	2022-04-08	

Calculated Parameters

Nitrate+Nitrite (as N)	3.12		0.0100	mg/L		N/A
Nitrogen, Total	4.90		0.0500	mg/L		N/A

General Parameters

Ammonia, Total (as N)	0.105 ± 0.022		0.050	mg/L	2022-04-10	
BOD, 5-day	< 7.2		2.0	mg/L	2022-04-13	
Chemical Oxygen Demand	45 ± 18		20	mg/L	2022-04-11	
Nitrogen, Total Kjeldahl	1.78 ± 0.22		0.050	mg/L	2022-04-11	
Phosphorus, Total (as P)	0.333 ± 0.037		0.0050	mg/L	2022-04-11	
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-04-11	

Upstream of O/F- WT# 3812F (0500050) (22D0798-03) | Matrix: Fresh Water | Sampled: 2022-04-06 07:15

Anions

Chloride	5.84 ± 0.33		0.10	mg/L	2022-04-08	
Nitrate (as N)	0.066 ± 0.006		0.010	mg/L	2022-04-08	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-04-08	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-04-08	

Calculated Parameters

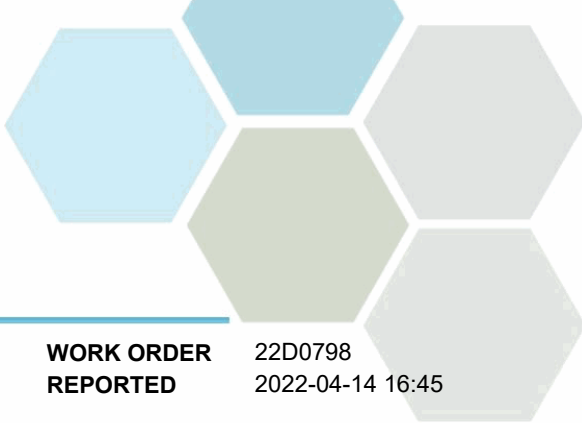
Hardness, Total (as CaCO3)	129		0.500	mg/L		N/A
Nitrate+Nitrite (as N)	0.0658		0.0100	mg/L		N/A
Nitrogen, Total	0.233		0.0500	mg/L		N/A

General Parameters

Nitrogen, Total Kjeldahl	0.167 ± 0.050		0.050	mg/L	2022-04-11	
Phosphorus, Total (as P)	0.0148 ± 0.0019		0.0050	mg/L	2022-04-11	
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-04-12	

Microbiological Parameters

Coliforms, Total (Q-Tray)	12		1	MPN/100 mL	2022-04-07	HT1
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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22D0798
2022-04-14 16:45

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Upstream of O/F- WT# 3812F (0500050) (22D0798-03) | Matrix: Fresh Water | Sampled: 2022-04-06 07:15, Continued

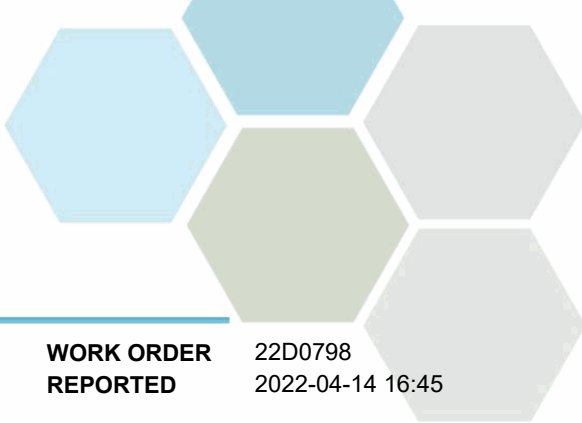
Microbiological Parameters, Continued

E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-04-07	HT1
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Total Metals

Aluminum, total	0.0221 ± 0.0093		0.0050	mg/L	2022-04-13	
Antimony, total	< 0.00020		0.00020	mg/L	2022-04-13	
Arsenic, total	< 0.00050		0.00050	mg/L	2022-04-13	
Barium, total	0.0254 ± 0.0033		0.0050	mg/L	2022-04-13	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-04-13	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-04-13	
Boron, total	< 0.0500		0.0500	mg/L	2022-04-13	
Cadmium, total	0.000087 ± 0.000028		0.000010	mg/L	2022-04-13	
Calcium, total	33.8 ± 4.8		0.20	mg/L	2022-04-13	
Chromium, total	< 0.00050		0.00050	mg/L	2022-04-13	
Cobalt, total	< 0.00010		0.00010	mg/L	2022-04-13	
Copper, total	0.00172 ± 0.00042		0.00040	mg/L	2022-04-13	
Iron, total	0.039 ± 0.018		0.010	mg/L	2022-04-13	
Lead, total	< 0.00020		0.00020	mg/L	2022-04-13	
Lithium, total	0.00353 ± 0.00064		0.00010	mg/L	2022-04-13	
Magnesium, total	10.7 ± 1.5		0.010	mg/L	2022-04-13	
Manganese, total	0.00308 ± 0.00275		0.00020	mg/L	2022-04-13	
Molybdenum, total	0.00371 ± 0.00054		0.00010	mg/L	2022-04-13	
Nickel, total	0.00060 ± 0.00042		0.00040	mg/L	2022-04-13	
Phosphorus, total	< 0.050		0.050	mg/L	2022-04-13	
Potassium, total	2.86 ± 0.46		0.10	mg/L	2022-04-13	
Selenium, total	< 0.00050		0.00050	mg/L	2022-04-13	
Silicon, total	3.7 ± 1.8		1.0	mg/L	2022-04-13	
Silver, total	< 0.000050		0.000050	mg/L	2022-04-13	
Sodium, total	13.0 ± 2.4		0.10	mg/L	2022-04-13	
Strontium, total	0.298 ± 0.036		0.0010	mg/L	2022-04-13	
Sulfur, total	10.9 ± 5.4		3.0	mg/L	2022-04-13	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-04-13	
Thallium, total	< 0.000020		0.000020	mg/L	2022-04-13	
Thorium, total	< 0.00010		0.00010	mg/L	2022-04-13	
Tin, total	< 0.00020		0.00020	mg/L	2022-04-13	
Titanium, total	< 0.0050		0.0050	mg/L	2022-04-13	
Tungsten, total	< 0.0010		0.0010	mg/L	2022-04-13	
Uranium, total	0.00262 ± 0.00032		0.000020	mg/L	2022-04-13	
Vanadium, total	< 0.0050		0.0050	mg/L	2022-04-13	
Zinc, total	0.0061 ± 0.0049		0.0040	mg/L	2022-04-13	
Zirconium, total	< 0.00010		0.00010	mg/L	2022-04-13	

Downstream of O/F- WT# 38130 (E221464) (22D0798-04) | Matrix: Fresh Water | Sampled: 2022-04-06 07:30



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22D0798
2022-04-14 16:45

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Downstream of O/F- WT# 38130 (E221464) (22D0798-04) | Matrix: Fresh Water | Sampled: 2022-04-06 07:30, Continued

Anions

Chloride	6.51	± 0.36	0.10	mg/L	2022-04-08	
Nitrate (as N)	0.067	± 0.006	0.010	mg/L	2022-04-08	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-04-08	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-04-08	

Calculated Parameters

Hardness, Total (as CaCO3)	119		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0674		0.0100	mg/L	N/A	
Nitrogen, Total	0.285		0.0500	mg/L	N/A	

General Parameters

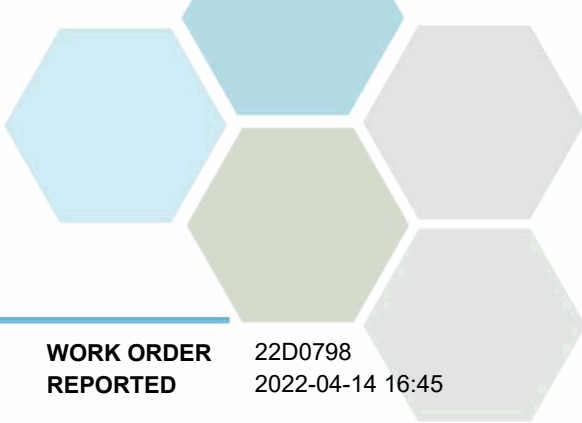
Nitrogen, Total Kjeldahl	0.218	± 0.053	0.050	mg/L	2022-04-11	
Phosphorus, Total (as P)	0.0197	± 0.0024	0.0050	mg/L	2022-04-11	
Solids, Total Suspended	2.0	± 0.9	2.0	mg/L	2022-04-12	

Microbiological Parameters

Coliforms, Total (Q-Tray)	53		1	MPN/100 mL	2022-04-07	HT1
E. coli (Q-Tray)	6		1	MPN/100 mL	2022-04-07	HT1

Total Metals

Aluminum, total	0.0399	± 0.0114	0.0050	mg/L	2022-04-12	
Antimony, total	< 0.00020		0.00020	mg/L	2022-04-12	
Arsenic, total	0.00058	± 0.00041	0.00050	mg/L	2022-04-12	
Barium, total	0.0242	± 0.0032	0.0050	mg/L	2022-04-12	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-04-12	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-04-12	
Boron, total	< 0.0500		0.0500	mg/L	2022-04-12	
Cadmium, total	0.000057	± 0.000021	0.000010	mg/L	2022-04-12	
Calcium, total	32.2	± 4.6	0.20	mg/L	2022-04-12	
Chromium, total	< 0.00050		0.00050	mg/L	2022-04-12	
Cobalt, total	< 0.00010		0.00010	mg/L	2022-04-12	
Copper, total	0.00170	± 0.00041	0.00040	mg/L	2022-04-12	
Iron, total	0.138	± 0.031	0.010	mg/L	2022-04-12	
Lead, total	0.00060	± 0.00022	0.00020	mg/L	2022-04-12	
Lithium, total	0.00329	± 0.00060	0.00010	mg/L	2022-04-12	
Magnesium, total	9.48	± 1.33	0.010	mg/L	2022-04-12	
Manganese, total	0.0133	± 0.0118	0.00020	mg/L	2022-04-12	
Molybdenum, total	0.00318	± 0.00047	0.00010	mg/L	2022-04-12	
Nickel, total	0.00074	± 0.00042	0.00040	mg/L	2022-04-12	
Phosphorus, total	< 0.050		0.050	mg/L	2022-04-12	
Potassium, total	2.64	± 0.43	0.10	mg/L	2022-04-12	
Selenium, total	< 0.00050		0.00050	mg/L	2022-04-12	
Silicon, total	3.4	± 1.7	1.0	mg/L	2022-04-12	
Silver, total	< 0.000050		0.000050	mg/L	2022-04-12	



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22D0798
2022-04-14 16:45

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Downstream of O/F- WT# 38130 (E221464) (22D0798-04) | Matrix: Fresh Water | Sampled: 2022-04-06 07:30, Continued

Total Metals, Continued

Sodium, total	12.0	± 2.2	0.10	mg/L	2022-04-12	
Strontium, total	0.284	± 0.035	0.0010	mg/L	2022-04-12	
Sulfur, total	11.3	± 5.5	3.0	mg/L	2022-04-12	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-04-12	
Thallium, total	< 0.000020		0.000020	mg/L	2022-04-12	
Thorium, total	< 0.00010		0.00010	mg/L	2022-04-12	
Tin, total	0.00026	± 0.00018	0.00020	mg/L	2022-04-12	
Titanium, total	< 0.0050		0.0050	mg/L	2022-04-12	
Tungsten, total	< 0.0010		0.0010	mg/L	2022-04-12	
Uranium, total	0.00240	± 0.00029	0.000020	mg/L	2022-04-12	
Vanadium, total	< 0.0050		0.0050	mg/L	2022-04-12	
Zinc, total	0.0176	± 0.0059	0.0040	mg/L	2022-04-12	
Zirconium, total	< 0.00010		0.00010	mg/L	2022-04-12	

Influent- WT# 38131 (0500232) (22D0798-05) | Matrix: Wastewater | Sampled: 2022-04-06 07:00

Anions

Nitrate (as N)	0.055	± 0.005	0.010	mg/L	2022-04-08	
Nitrite (as N)	0.413	± 0.043	0.010	mg/L	2022-04-08	
Phosphate (as P)	4.44	± 0.77	0.0050	mg/L	2022-04-08	

Calculated Parameters

Nitrate+Nitrite (as N)	0.469		0.0100	mg/L	N/A	
Nitrogen, Total	55.3		2.00	mg/L	N/A	

General Parameters

Nitrogen, Total Kjeldahl	54.8	± 7.0	0.050	mg/L	2022-04-11	
Phosphorus, Total (as P)	8.08	± 0.90	0.0050	mg/L	2022-04-11	

Effluent 7 Day Composite- WT# 3813A (E105000) (22D0798-06) | Matrix: Wastewater | Sampled: 2022-03-31 00:00 To 2022-04-06 00:00

PRES

Anions

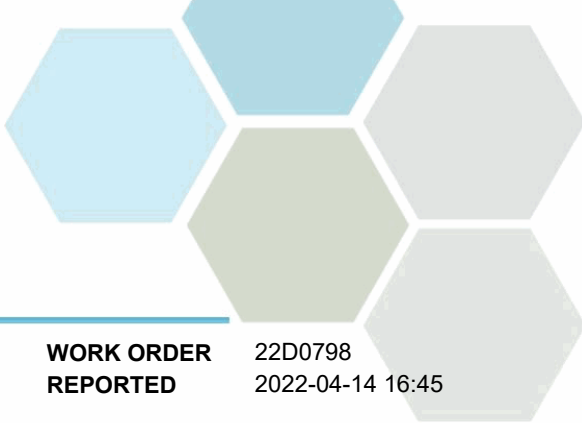
Nitrate (as N)	3.16	± 0.20	0.010	mg/L	2022-04-08	
Nitrite (as N)	0.113	± 0.012	0.010	mg/L	2022-04-08	

Calculated Parameters

Nitrate+Nitrite (as N)	3.27		0.0100	mg/L	N/A	
Nitrogen, Total	5.04		0.0500	mg/L	N/A	

General Parameters

Nitrogen, Total Kjeldahl	1.76	± 0.22	0.050	mg/L	2022-04-11	
Phosphorus, Total (as P)	0.346	± 0.038	0.0050	mg/L	2022-04-11	
Solids, Total Suspended	3.3	± 1.1	2.0	mg/L	2022-04-11	



TEST RESULTS

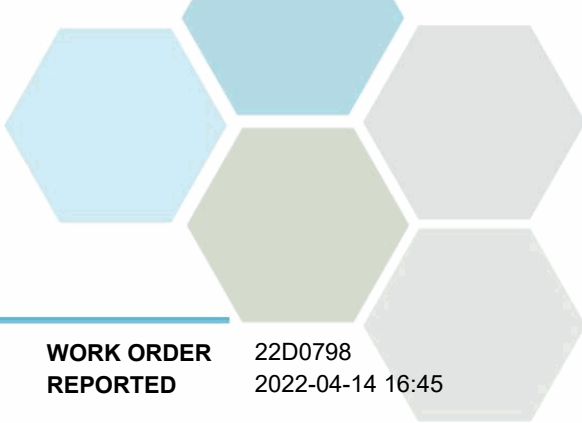
REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22D0798
2022-04-14 16:45

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Sample Qualifiers:

- HT1 The sample was prepared and/or analyzed past the recommended holding time.
- PRES Sample has been preserved for TKN, TP in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22D0798
2022-04-14 16:45

Analysis Description	Method Ref.	Technique	Accredited	Location
Ammonia, Total in Water	SM 4500-NH3 G* (2017)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Chemical Oxygen Demand in Water	SM 5220 D* (2017)	Closed Reflux, Colorimetry	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Coliforms, Total in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Hardness in Water	SM 2340 B* (2017)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

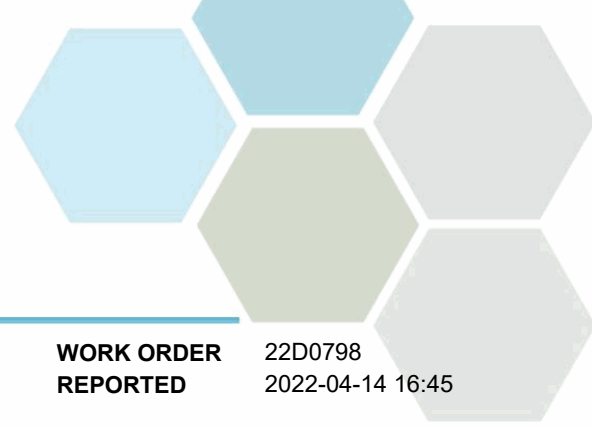
Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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
MPN/100 mL	Most Probable Number per 100 millilitres
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Penticton, City of - DW & STP
PROJECT Wastewater - PE12212

WORK ORDER 22D0798
REPORTED 2022-04-14 16:45

General Comments:

The results in this report apply to the 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. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing. The quality control (QC) data is available upon request

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.



CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22D1683
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-04-13 14:00 / 1.4°C 2022-04-22 12:13
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

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.

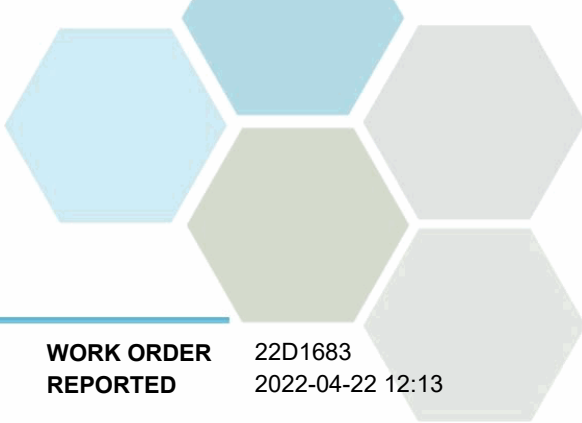
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22D1683
2022-04-22 12:13

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22D1683-01) | Matrix: Wastewater | Sampled: 2022-04-13 07:00

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-04-14	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-04-14	

Effluent 7 Day Composite- WT# 3813A (E105000) (22D1683-02) | Matrix: Wastewater | Sampled: 2022-04-07 00:00 To 2022-04-13 00:00

PRES

Anions

Nitrate (as N)	2.83 ± 0.18		0.010	mg/L	2022-04-15	
Nitrite (as N)	0.092 ± 0.010		0.010	mg/L	2022-04-15	

Calculated Parameters

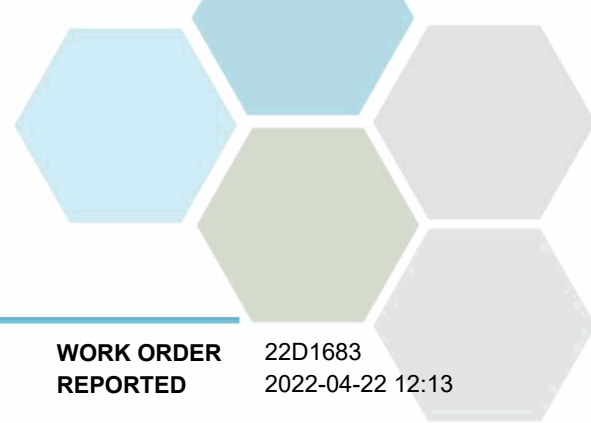
Nitrate+Nitrite (as N)	2.92		0.0100	mg/L	N/A	
Nitrogen, Total	4.72		0.0500	mg/L	N/A	

General Parameters

BOD, 5-day	7.5 ± 7.1		2.0	mg/L	2022-04-19	
Nitrogen, Total Kjeldahl	1.80 ± 0.23		0.050	mg/L	2022-04-21	
Phosphorus, Total (as P)	0.210 ± 0.023		0.0050	mg/L	2022-04-20	
Solids, Total Suspended	3.7 ± 1.6		2.0	mg/L	2022-04-22	HT1

Sample Qualifiers:

- HT1 The sample was prepared and/or analyzed past the recommended holding time.
- PRES Sample has been preserved for TP, TKN in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22D1683
2022-04-22 12:13

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	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
MPN/100 mL	Most Probable Number per 100 millilitres
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.

General Comments:

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CERTIFICATE OF ANALYSIS

REPORTED TO Penticton, City of - DW & STP
171 Main Street
PENTICTON, BC V2A 5A9

ATTENTION Joel Mertz

PO NUMBER

PROJECT Wastewater - PE12212

PROJECT INFO 0554-04

WORK ORDER 22D2428

RECEIVED / TEMP 2022-04-20 12:45 / 1.2°C

REPORTED 2022-04-27 16:47

COC NUMBER No Number

Introduction:

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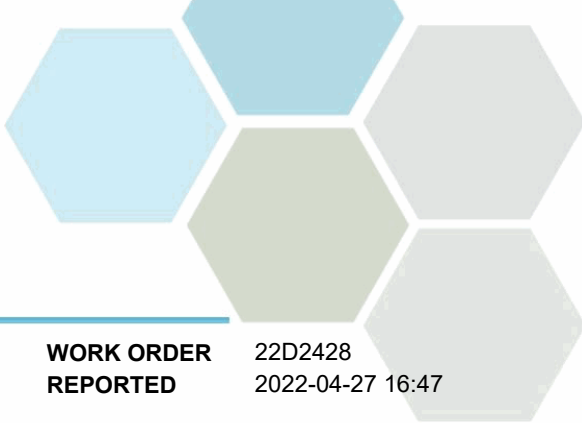
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22D2428
2022-04-27 16:47

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22D2428-01) | Matrix: Wastewater | Sampled: 2022-04-20 08:00

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-04-21	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-04-21	

Reclaimed Water - North WT# 3813C (E221689) (22D2428-02) | Matrix: Wastewater | Sampled: 2022-04-20 08:00

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-04-21	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-04-21	

Effluent 7 Day Composite- WT# 3813A (E105000) (22D2428-03) | Matrix: Wastewater | Sampled: 2022-04-14 00:00 To 2022-04-20 00:00

PRES

Anions

Nitrate (as N)	2.94 ± 0.18		0.010	mg/L	2022-04-22	
Nitrite (as N)	0.107 ± 0.011		0.010	mg/L	2022-04-22	

Calculated Parameters

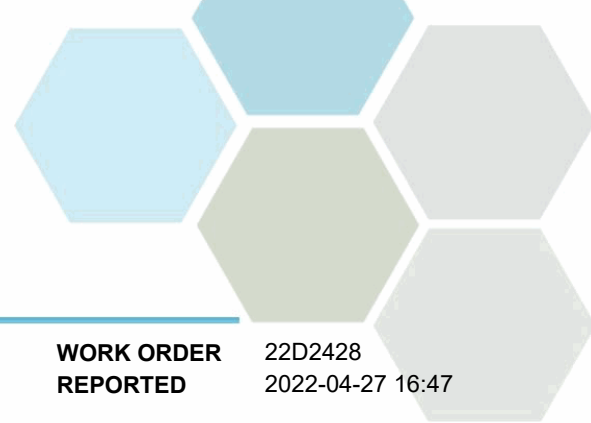
Nitrate+Nitrite (as N)	3.05		0.0100	mg/L	N/A	
Nitrogen, Total	5.01		0.0500	mg/L	N/A	

General Parameters

BOD, 5-day	< 6.2		2.0	mg/L	2022-04-27	
Nitrogen, Total Kjeldahl	1.96 ± 0.24		0.050	mg/L	2022-04-27	
Phosphorus, Total (as P)	0.162 ± 0.018		0.0050	mg/L	2022-04-27	
Solids, Total Suspended	3.0 ± 0.9		2.0	mg/L	2022-04-24	

Sample Qualifiers:

PRES Sample has been preserved for TP, TKN in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22D2428
2022-04-27 16:47

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	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
MPN/100 mL	Most Probable Number per 100 millilitres
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.

General Comments:

The results in this report apply to the 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. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing. The quality control (QC) data is available upon request

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.



CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22D3331
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-04-27 13:30 / 6.0°C 2022-05-04 11:18
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

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.

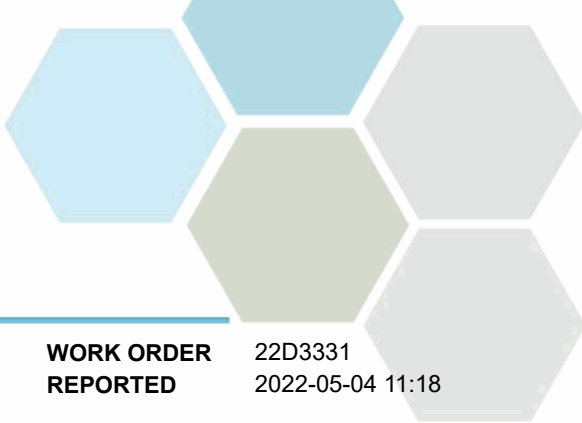
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22D3331
2022-05-04 11:18

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22D3331-01) | Matrix: Wastewater | Sampled: 2022-04-27 07:00

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-04-28	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-04-28	

Reclaimed Water - North WT# 3813C (E221689) (22D3331-02) | Matrix: Wastewater | Sampled: 2022-04-27 07:30

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-04-28	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-04-28	

Effluent 7 Day Composite- WT# 3813A (E105000) (22D3331-03) | Matrix: Wastewater | Sampled: 2022-04-21 00:00 To 2022-04-27 00:00

PRES

Anions

Nitrate (as N)	3.41 ± 0.21		0.010	mg/L	2022-04-28	
Nitrite (as N)	0.154 ± 0.016		0.010	mg/L	2022-04-28	

Calculated Parameters

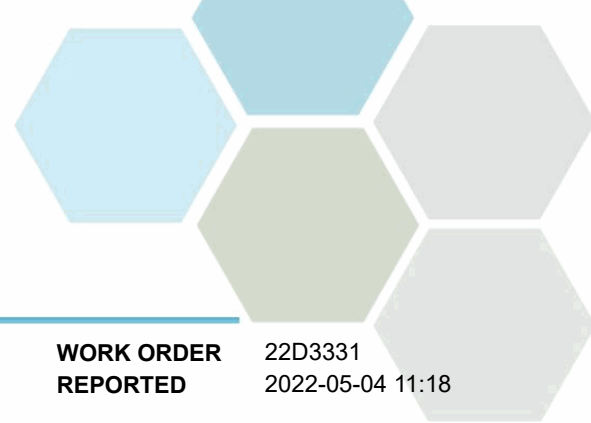
Nitrate+Nitrite (as N)	3.56		0.0100	mg/L		N/A
Nitrogen, Total	5.58		0.0500	mg/L		N/A

General Parameters

BOD, 5-day	< 5.5		2.0	mg/L	2022-05-03	
Nitrogen, Total Kjeldahl	2.02 ± 0.25		0.050	mg/L	2022-05-04	
Phosphorus, Total (as P)	0.131 ± 0.015		0.0050	mg/L	2022-05-03	
Solids, Total Suspended	3.8 ± 1.0		2.0	mg/L	2022-05-03	

Sample Qualifiers:

PRES Sample has been preserved for TKN, TP in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22D3331 2022-05-04 11:18

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna

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

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CERTIFICATE OF ANALYSIS

REPORTED TO Penticton, City of - DW & STP
171 Main Street
PENTICTON, BC V2A 5A9

ATTENTION Joel Mertz

PO NUMBER

PROJECT Wastewater - PE12212

PROJECT INFO 0554-04

WORK ORDER 22E0583

RECEIVED / TEMP 2022-05-04 13:30 / 5.0°C

REPORTED 2022-05-11 13:27

COC NUMBER No Number

Introduction:

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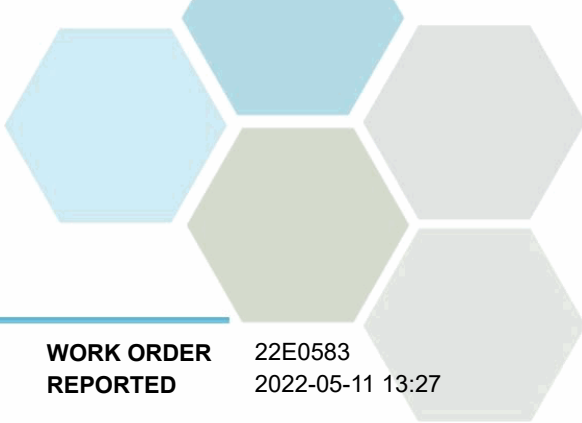
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22E0583
2022-05-11 13:27

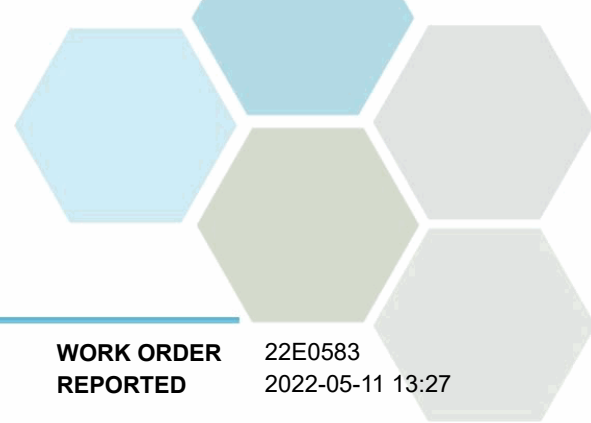
Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Effluent 24 hr Comp.- WT# 3813A (E105000) (22E0583-01) Matrix: Wastewater Sampled: 2022-05-04						
Anions						
Nitrate (as N)	3.53	± 0.22	0.010	mg/L	2022-05-06	
Nitrite (as N)	0.123	± 0.013	0.010	mg/L	2022-05-06	
Phosphate (as P)	0.0177	± 0.0039	0.0050	mg/L	2022-05-06	
Calculated Parameters						
Nitrate+Nitrite (as N)	3.65		0.0100	mg/L	N/A	
Nitrogen, Total	5.29		0.0500	mg/L	N/A	
General Parameters						
Ammonia, Total (as N)	0.153	± 0.024	0.050	mg/L	2022-05-08	
BOD, 5-day	< 5.5		2.0	mg/L	2022-05-10	
Chemical Oxygen Demand	38	± 18	20	mg/L	2022-05-08	
Nitrogen, Total Kjeldahl	1.64	± 0.21	0.050	mg/L	2022-05-11	
Phosphorus, Total (as P)	0.0973	± 0.0108	0.0050	mg/L	2022-05-10	
Solids, Total Suspended	2.2	± 0.9	2.0	mg/L	2022-05-10	

Effluent Grab- WT# 3813A (E105000) (22E0583-02) | Matrix: Wastewater | Sampled: 2022-05-04 07:00

Microbiological Parameters						
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-05-05	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-05-05	

Upstream of O/F- WT# 3812F (0500050) (22E0583-03) | Matrix: Fresh Water | Sampled: 2022-05-04 07:00

Anions						
Chloride	< 0.10		0.10	mg/L	2022-05-06	
Nitrate (as N)	0.051	± 0.005	0.010	mg/L	2022-05-06	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-05-06	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-05-06	
Calculated Parameters						
Hardness, Total (as CaCO3)	121		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0507		0.0100	mg/L	N/A	
Nitrogen, Total	0.240		0.0500	mg/L	N/A	
General Parameters						
Nitrogen, Total Kjeldahl	0.189	± 0.052	0.050	mg/L	2022-05-11	
Phosphorus, Total (as P)	0.0118	± 0.0016	0.0050	mg/L	2022-05-10	
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-05-10	
Microbiological Parameters						
Coliforms, Total (Q-Tray)	29		1	MPN/100 mL	2022-05-05	
E. coli (Q-Tray)	12		1	MPN/100 mL	2022-05-05	



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

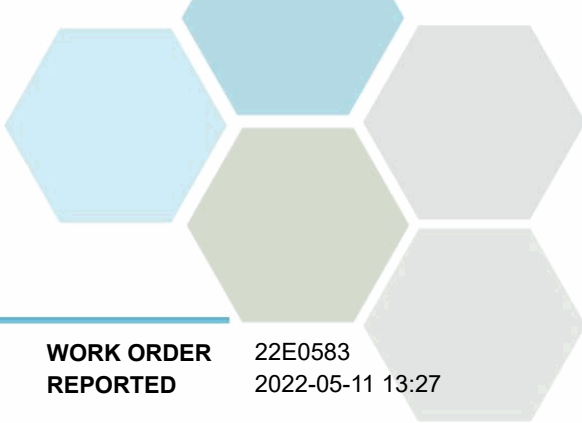
WORK ORDER REPORTED 22E0583
2022-05-11 13:27

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Upstream of O/F- WT# 3812F (0500050) (22E0583-03) Matrix: Fresh Water Sampled: 2022-05-04 07:00, Continued						
Total Metals						
Aluminum, total	0.0188	± 0.0040	0.0050	mg/L	2022-05-08	
Antimony, total	< 0.00020		0.00020	mg/L	2022-05-08	
Arsenic, total	< 0.00050		0.00050	mg/L	2022-05-08	
Barium, total	0.0226	± 0.0029	0.0050	mg/L	2022-05-08	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-05-08	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-05-08	
Boron, total	< 0.0500		0.0500	mg/L	2022-05-08	
Cadmium, total	< 0.000010		0.000010	mg/L	2022-05-08	
Calcium, total	32.0	± 4.6	0.20	mg/L	2022-05-08	
Chromium, total	< 0.00050		0.00050	mg/L	2022-05-08	
Cobalt, total	< 0.00010		0.00010	mg/L	2022-05-08	
Copper, total	0.00085	± 0.00015	0.00040	mg/L	2022-05-08	
Iron, total	0.033	± 0.007	0.010	mg/L	2022-05-08	
Lead, total	< 0.00020		0.00020	mg/L	2022-05-08	
Lithium, total	0.00322	± 0.00057	0.00010	mg/L	2022-05-08	
Magnesium, total	9.84	± 1.38	0.010	mg/L	2022-05-08	
Manganese, total	0.00360	± 0.00320	0.00020	mg/L	2022-05-08	
Molybdenum, total	0.00339	± 0.00049	0.00010	mg/L	2022-05-08	
Nickel, total	0.00055	± 0.00013	0.00040	mg/L	2022-05-08	
Phosphorus, total	< 0.050		0.050	mg/L	2022-05-08	
Potassium, total	2.57	± 0.40	0.10	mg/L	2022-05-08	
Selenium, total	< 0.00050		0.00050	mg/L	2022-05-08	
Silicon, total	3.6	± 0.8	1.0	mg/L	2022-05-08	
Silver, total	< 0.000050		0.000050	mg/L	2022-05-08	
Sodium, total	11.7	± 2.1	0.10	mg/L	2022-05-08	
Strontium, total	0.282	± 0.034	0.0010	mg/L	2022-05-08	
Sulfur, total	10.3	± 2.6	3.0	mg/L	2022-05-08	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-05-08	
Thallium, total	< 0.000020		0.000020	mg/L	2022-05-08	
Thorium, total	< 0.00010		0.100	mg/L	2022-05-08	
Tin, total	< 0.00004		0.00020	mg/L	2022-05-08	
Titanium, total	< 0.0050		0.0050	mg/L	2022-05-08	
Tungsten, total	< 0.0002		0.0010	mg/L	2022-05-08	
Uranium, total	0.00248	± 0.00030	0.000020	mg/L	2022-05-08	
Vanadium, total	< 0.0010		0.0050	mg/L	2022-05-08	
Zinc, total	< 0.0040		0.0040	mg/L	2022-05-08	
Zirconium, total	< 0.00010		0.00010	mg/L	2022-05-08	

Downstream of O/F- WT# 38130 (E221464) (22E0583-04) | Matrix: Fresh Water | Sampled: 2022-05-04 07:00

Anions

Chloride	6.23	± 0.35	0.10	mg/L	2022-05-06	
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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22E0583 2022-05-11 13:27

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Downstream of O/F- WT# 38130 (E221464) (22E0583-04) | Matrix: Fresh Water | Sampled: 2022-05-04 07:00, Continued

Anions, Continued

Nitrate (as N)	0.061	± 0.006	0.010	mg/L	2022-05-06	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-05-06	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-05-06	

Calculated Parameters

Hardness, Total (as CaCO3)	119		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0608		0.0100	mg/L	N/A	
Nitrogen, Total	0.314		0.0500	mg/L	N/A	

General Parameters

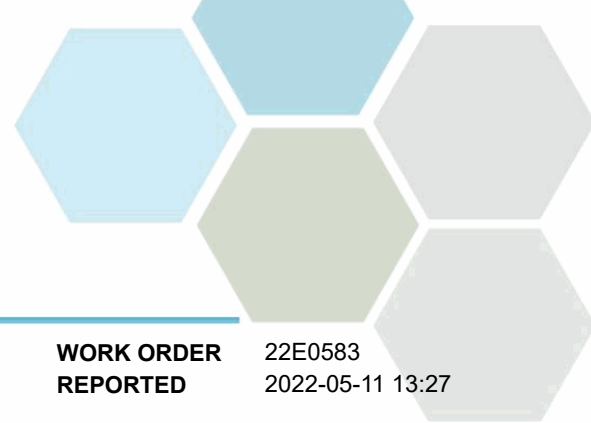
Nitrogen, Total Kjeldahl	0.253	± 0.055	0.050	mg/L	2022-05-11	
Phosphorus, Total (as P)	0.0238	± 0.0028	0.0050	mg/L	2022-05-10	
Solids, Total Suspended	10.7	± 1.7	2.0	mg/L	2022-05-10	

Microbiological Parameters

Coliforms, Total (Q-Tray)	70		1	MPN/100 mL	2022-05-05	
E. coli (Q-Tray)	8		1	MPN/100 mL	2022-05-05	

Total Metals

Aluminum, total	0.108	± 0.021	0.0050	mg/L	2022-05-08	
Antimony, total	< 0.00020		0.00020	mg/L	2022-05-08	
Arsenic, total	0.00051	± 0.00010	0.00050	mg/L	2022-05-08	
Barium, total	0.0240	± 0.0031	0.0050	mg/L	2022-05-08	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-05-08	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-05-08	
Boron, total	< 0.0500		0.0500	mg/L	2022-05-08	
Cadmium, total	< 0.000010		0.000010	mg/L	2022-05-08	
Calcium, total	31.9	± 4.5	0.20	mg/L	2022-05-08	
Chromium, total	< 0.00050		0.00050	mg/L	2022-05-08	
Cobalt, total	< 0.00010		0.00010	mg/L	2022-05-08	
Copper, total	0.00110	± 0.00018	0.00040	mg/L	2022-05-08	
Iron, total	0.213	± 0.041	0.010	mg/L	2022-05-08	
Lead, total	< 0.00020		0.00020	mg/L	2022-05-08	
Lithium, total	0.00329	± 0.00059	0.00010	mg/L	2022-05-08	
Magnesium, total	9.54	± 1.33	0.010	mg/L	2022-05-08	
Manganese, total	0.00962	± 0.00853	0.00020	mg/L	2022-05-08	
Molybdenum, total	0.00329	± 0.00047	0.00010	mg/L	2022-05-08	
Nickel, total	0.00072	± 0.00016	0.00040	mg/L	2022-05-08	
Phosphorus, total	< 0.050		0.050	mg/L	2022-05-08	
Potassium, total	2.58	± 0.40	0.10	mg/L	2022-05-08	
Selenium, total	< 0.00050		0.00050	mg/L	2022-05-08	
Silicon, total	3.7	± 0.8	1.0	mg/L	2022-05-08	
Silver, total	< 0.000050		0.000050	mg/L	2022-05-08	
Sodium, total	11.7	± 2.1	0.10	mg/L	2022-05-08	



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22E0583
2022-05-11 13:27

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Downstream of O/F- WT# 38130 (E221464) (22E0583-04) | Matrix: Fresh Water | Sampled: 2022-05-04 07:00, Continued

Total Metals, Continued

Strontium, total	0.278	± 0.034	0.0010	mg/L	2022-05-08	
Sulfur, total	10.2	± 2.6	3.0	mg/L	2022-05-08	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-05-08	
Thallium, total	< 0.000020		0.000020	mg/L	2022-05-08	
Thorium, total	< 0.00010		0.100	mg/L	2022-05-08	
Tin, total	< 0.00004		0.00020	mg/L	2022-05-08	
Titanium, total	0.0055	± 0.0012	0.0050	mg/L	2022-05-08	
Tungsten, total	< 0.0002		0.0010	mg/L	2022-05-08	
Uranium, total	0.00245	± 0.00030	0.000020	mg/L	2022-05-08	
Vanadium, total	0.0011	± 0.0002	0.0050	mg/L	2022-05-08	
Zinc, total	< 0.0040		0.0040	mg/L	2022-05-08	
Zirconium, total	0.00015	± 0.00006	0.00010	mg/L	2022-05-08	

Effluent 7 Day Composite- WT# 3813A (E105000) (22E0583-05) | Matrix: Wastewater | Sampled: 2022-05-04

PRES

Anions

Nitrate (as N)	3.41	± 0.21	0.010	mg/L	2022-05-06	
Nitrite (as N)	0.098	± 0.010	0.010	mg/L	2022-05-06	

Calculated Parameters

Nitrate+Nitrite (as N)	3.50		0.0100	mg/L	N/A	
Nitrogen, Total	4.90		0.0500	mg/L	N/A	

General Parameters

BOD, 5-day	< 5.5		2.0	mg/L	2022-05-10	
Nitrogen, Total Kjeldahl	1.39	± 0.18	0.050	mg/L	2022-05-11	
Phosphorus, Total (as P)	0.0952	± 0.0106	0.0050	mg/L	2022-05-10	
Solids, Total Suspended	3.4	± 1.6	2.0	mg/L	2022-05-10	

Influent- WT# 38131 (0500232) (22E0583-06) | Matrix: Wastewater | Sampled: 2022-05-04

Anions

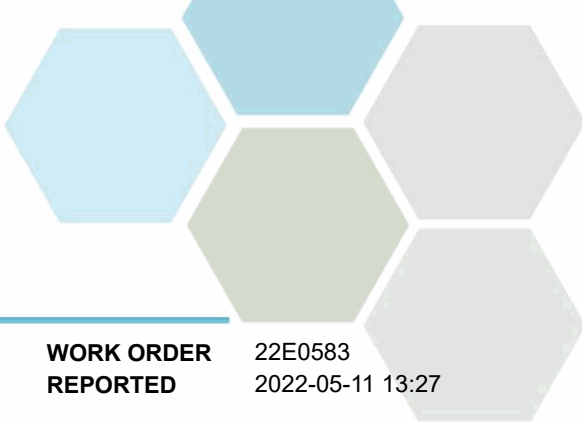
Nitrate (as N)	< 0.010		0.010	mg/L	2022-05-06	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-05-06	
Phosphate (as P)	6.76	± 1.17	0.0050	mg/L	2022-05-06	

Calculated Parameters

Nitrate+Nitrite (as N)	< 0.0100		0.0100	mg/L	N/A	
Nitrogen, Total	64.4		2.00	mg/L	N/A	

General Parameters

Nitrogen, Total Kjeldahl	64.4	± 8.1	0.050	mg/L	2022-05-11	
Phosphorus, Total (as P)	12.5	± 1.4	0.0050	mg/L	2022-05-10	



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22E0583
2022-05-11 13:27

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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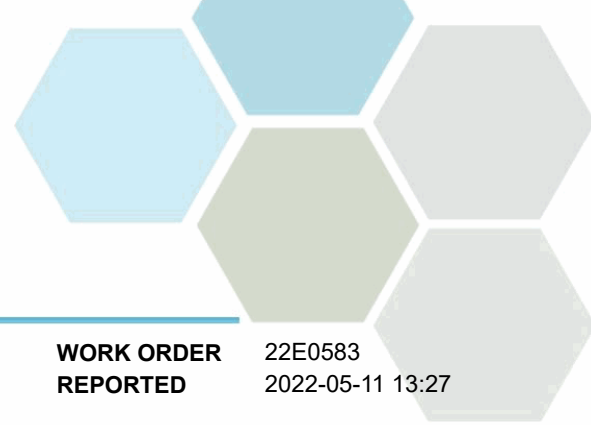
Reclaimed Water - North WT# 3813C (E221689) (22E0583-07) | Matrix: Wastewater | Sampled: 2022-05-04 07:00

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-05-05	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-05-05	

Sample Qualifiers:

PRES Sample has been preserved for TKN, TP in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22E0583
2022-05-11 13:27

Analysis Description	Method Ref.	Technique	Accredited	Location
Ammonia, Total in Water	SM 4500-NH3 G* (2017)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Chemical Oxygen Demand in Water	SM 5220 D* (2017)	Closed Reflux, Colorimetry	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Coliforms, Total in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Hardness in Water	SM 2340 B* (2017)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

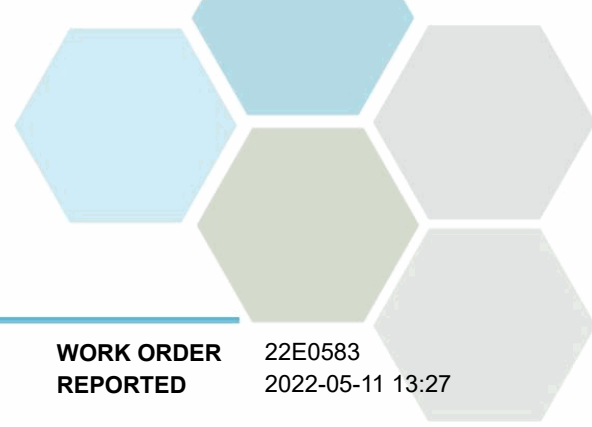
Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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
MPN/100 mL	Most Probable Number per 100 millilitres
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Penticton, City of - DW & STP
PROJECT Wastewater - PE12212

WORK ORDER 22E0583
REPORTED 2022-05-11 13:27

General Comments:

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CERTIFICATE OF ANALYSIS

REPORTED TO Penticton, City of - DW & STP
171 Main Street
PENTICTON, BC V2A 5A9

ATTENTION Joel Mertz

PO NUMBER

PROJECT Wastewater - PE12212

PROJECT INFO 0554-04

WORK ORDER 22E1491

RECEIVED / TEMP 2022-05-11 13:00 / 2.4°C

REPORTED 2022-05-18 15:14

COC NUMBER No Number

Introduction:

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Big Picture Sidekicks



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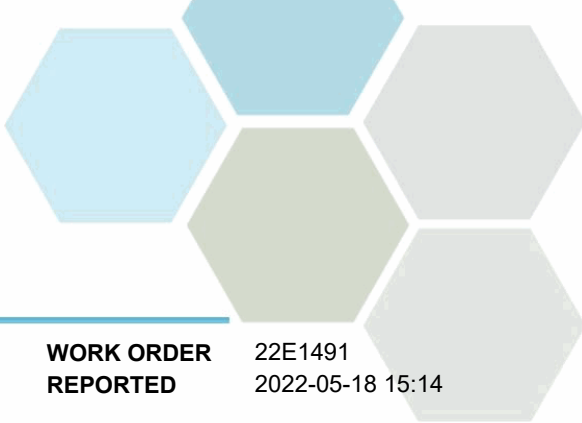
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22E1491
2022-05-18 15:14

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22E1491-01) | Matrix: Wastewater | Sampled: 2022-05-11 08:00

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	2		1	MPN/100 mL	2022-05-12	
E. coli (Q-Tray)	2		1	MPN/100 mL	2022-05-12	

Reclaimed Water - North WT# 3813C (E221689) (22E1491-02) | Matrix: Wastewater | Sampled: 2022-05-11 07:00

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-05-12	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-05-12	

Effluent 7 Day Composite- WT# 3813A (E105000) (22E1491-03) | Matrix: Wastewater | Sampled: 2022-05-05 00:00 To 2022-05-11 00:00

PRES

Anions

Nitrate (as N)	3.32 ± 0.21		0.010	mg/L	2022-05-12	
Nitrite (as N)	0.104 ± 0.011		0.010	mg/L	2022-05-12	

Calculated Parameters

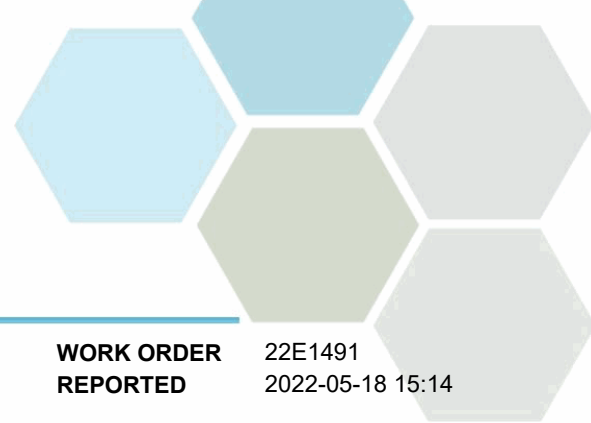
Nitrate+Nitrite (as N)	3.42		0.0100	mg/L	N/A	
Nitrogen, Total	5.39		0.0500	mg/L	N/A	

General Parameters

BOD, 5-day	< 7.0		2.0	mg/L	2022-05-18	
Nitrogen, Total Kjeldahl	1.97 ± 0.25		0.050	mg/L	2022-05-16	
Phosphorus, Total (as P)	0.209 ± 0.023		0.0050	mg/L	2022-05-17	
Solids, Total Suspended	5.2 ± 1.0		2.0	mg/L	2022-05-17	

Sample Qualifiers:

PRES Sample has been preserved for Phos in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22E1491
2022-05-18 15:14

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	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)
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mg/L	Milligrams per litre
MPN/100 mL	Most Probable Number per 100 millilitres
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.

General Comments:

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22E3413
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-05-25 13:00 / 6.6°C 2022-06-01 15:17
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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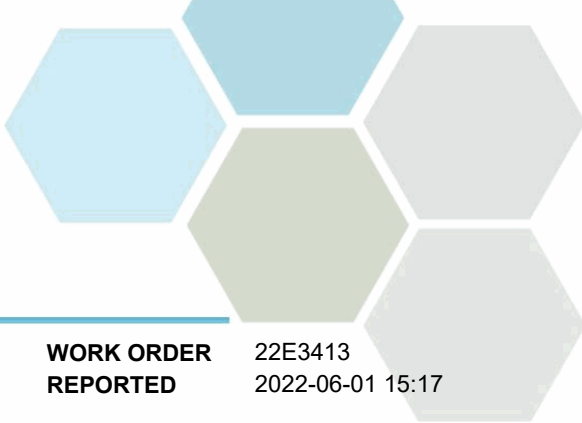
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22E3413
2022-06-01 15:17

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Reclaimed Water - North WT# 3813C (E221689) (22E3413-01) | Matrix: Wastewater | Sampled: 2022-05-25

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-05-26	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-05-26	

Effluent 7 Day Composite- WT# 3813A (E105000) (22E3413-02) | Matrix: Wastewater | Sampled: 2022-05-19 00:00 To 2022-05-25 00:00

PRES

Anions

Nitrate (as N)	3.26 ± 0.20		0.010	mg/L	2022-05-26	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-05-26	

Calculated Parameters

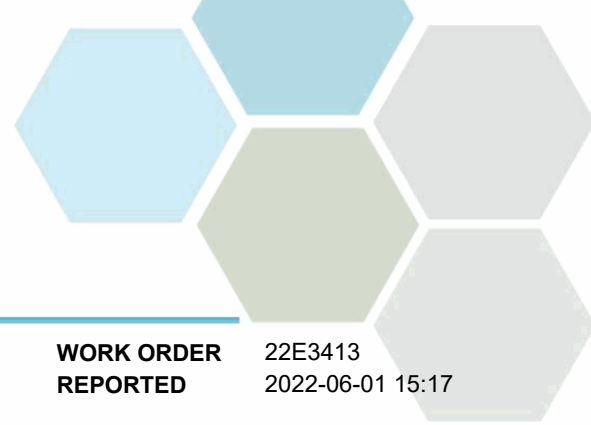
Nitrate+Nitrite (as N)	3.26		0.0100	mg/L	N/A	
Nitrogen, Total	4.96		0.0500	mg/L	N/A	

General Parameters

BOD, 5-day	< 7.2		2.0	mg/L	2022-06-01	
Nitrogen, Total Kjeldahl	1.70 ± 0.21		0.050	mg/L	2022-06-01	
Phosphorus, Total (as P)	0.355 ± 0.039		0.0050	mg/L	2022-05-30	
Solids, Total Suspended	6.4 ± 1.0		2.0	mg/L	2022-05-30	

Sample Qualifiers:

PRES Sample has been preserved for Phos in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22E3413
2022-06-01 15:17

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	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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mg/L	Milligrams per litre
MPN/100 mL	Most Probable Number per 100 millilitres
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22F0323
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-06-01 15:00 / 5.8°C 2022-06-08 15:22
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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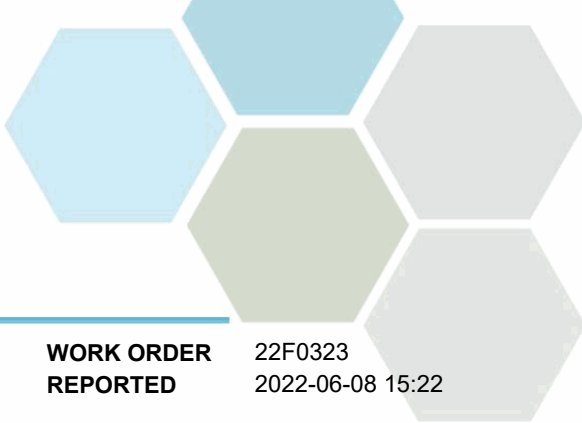
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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22F0323
2022-06-08 15:22

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22F0323-01) | Matrix: Wastewater | Sampled: 2022-06-01 07:00

Microbiological Parameters

Coliforms, Total (Q-Tray)	2		1	MPN/100 mL	2022-06-02	HT1
Coliforms, Fecal (Q-Tray)	2		1	MPN/100 mL	2022-06-02	HT1
E. coli (Q-Tray)	2		1	MPN/100 mL	2022-06-02	HT1

Effluent 24 hr Comp.- WT# 3813A (E105000) (22F0323-02) | Matrix: Wastewater | Sampled: 2022-06-01 07:00

PRES

Anions

Nitrate (as N)	2.83 ± 0.18		0.010	mg/L	2022-06-04	
Nitrite (as N)	0.188 ± 0.019		0.010	mg/L	2022-06-04	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-06-04	

Calculated Parameters

Nitrate+Nitrite (as N)	3.01		0.0100	mg/L	N/A	
Nitrogen, Total	4.63		0.0500	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	0.194 ± 0.027		0.050	mg/L	2022-06-02	
BOD, 5-day	< 7.0		2.0	mg/L	2022-06-08	
Chemical Oxygen Demand	21 ± 18		20	mg/L	2022-06-04	
Nitrogen, Total Kjeldahl	1.61 ± 0.20		0.050	mg/L	2022-06-08	
Phosphorus, Total (as P)	0.0925 ± 0.0103		0.0050	mg/L	2022-06-07	

Upstream of O/F- WT# 3812F (0500050) (22F0323-03) | Matrix: Fresh Water | Sampled: 2022-06-01 06:45

Anions

Chloride	5.53 ± 0.31		0.10	mg/L	2022-06-04	
Nitrate (as N)	< 0.010		0.010	mg/L	2022-06-04	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-06-04	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-06-04	

Calculated Parameters

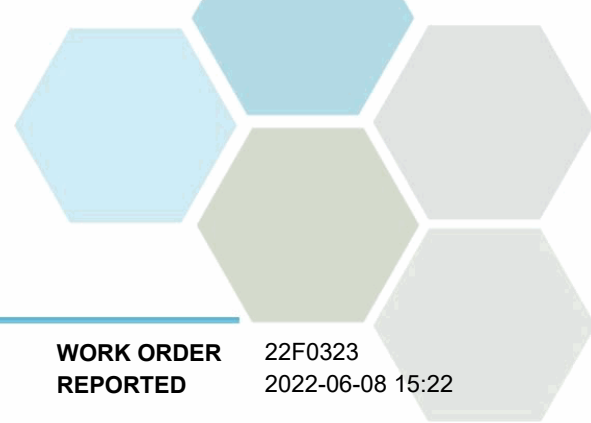
Hardness, Total (as CaCO3)	114		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	< 0.0100		0.0100	mg/L	N/A	
Nitrogen, Total	0.535		0.0500	mg/L	N/A	

General Parameters

Nitrogen, Total Kjeldahl	0.535 ± 0.080		0.050	mg/L	2022-06-08	
Phosphorus, Total (as P)	0.0097 ± 0.0015		0.0050	mg/L	2022-06-07	
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-06-06	

Microbiological Parameters

Coliforms, Total (Q-Tray)	17		1	MPN/100 mL	2022-06-02	HT1
E. coli (Q-Tray)	3		1	MPN/100 mL	2022-06-02	HT1



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

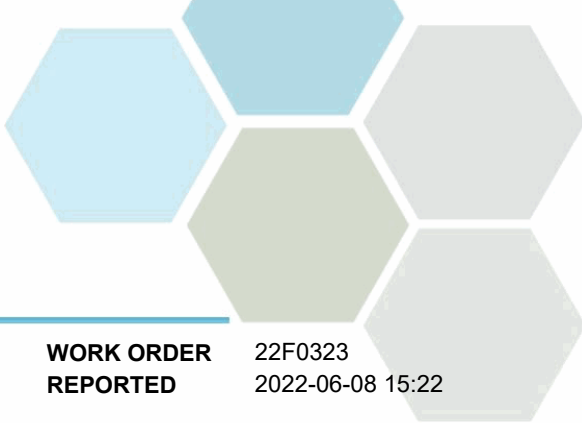
WORK ORDER REPORTED 22F0323 2022-06-08 15:22

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Upstream of O/F- WT# 3812F (0500050) (22F0323-03) Matrix: Fresh Water Sampled: 2022-06-01 06:45, Continued						
Total Metals						
Aluminum, total	0.0207	± 0.0044	0.0050	mg/L	2022-06-05	
Antimony, total	< 0.00020		0.00020	mg/L	2022-06-05	
Arsenic, total	< 0.00050		0.00050	mg/L	2022-06-05	
Barium, total	0.0209	± 0.0027	0.0050	mg/L	2022-06-05	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-06-05	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-06-05	
Boron, total	< 0.0500		0.0500	mg/L	2022-06-05	
Cadmium, total	< 0.000010		0.000010	mg/L	2022-06-05	
Calcium, total	30.8	± 4.4	0.20	mg/L	2022-06-05	
Chromium, total	< 0.00050		0.00050	mg/L	2022-06-05	
Cobalt, total	< 0.00010		0.00010	mg/L	2022-06-05	
Copper, total	0.00122	± 0.00020	0.00040	mg/L	2022-06-05	
Iron, total	0.032	± 0.007	0.010	mg/L	2022-06-05	
Lead, total	< 0.00020		0.00020	mg/L	2022-06-05	
Lithium, total	0.00304	± 0.00054	0.00010	mg/L	2022-06-05	
Magnesium, total	8.91	± 1.25	0.010	mg/L	2022-06-05	
Manganese, total	0.00351	± 0.00312	0.00020	mg/L	2022-06-05	
Molybdenum, total	0.00319	± 0.00046	0.00010	mg/L	2022-06-05	
Nickel, total	0.00046	± 0.00012	0.00040	mg/L	2022-06-05	
Phosphorus, total	< 0.050		0.050	mg/L	2022-06-05	
Potassium, total	2.34	± 0.37	0.10	mg/L	2022-06-05	
Selenium, total	< 0.00050		0.00050	mg/L	2022-06-05	
Silicon, total	3.4	± 0.7	1.0	mg/L	2022-06-05	
Silver, total	< 0.000050		0.000050	mg/L	2022-06-05	
Sodium, total	11.4	± 2.1	0.10	mg/L	2022-06-05	
Strontium, total	0.265	± 0.032	0.0010	mg/L	2022-06-05	
Sulfur, total	9.2	± 2.3	3.0	mg/L	2022-06-05	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-06-05	
Thallium, total	< 0.000020		0.000020	mg/L	2022-06-05	
Thorium, total	< 0.00010		0.00010	mg/L	2022-06-05	
Tin, total	< 0.00020		0.00020	mg/L	2022-06-05	
Titanium, total	< 0.0050		0.0050	mg/L	2022-06-05	
Tungsten, total	< 0.0002		0.0002	mg/L	2022-06-05	
Uranium, total	0.00215	± 0.00026	0.000020	mg/L	2022-06-05	
Vanadium, total	< 0.0050		0.0050	mg/L	2022-06-05	
Zinc, total	< 0.0040		0.0040	mg/L	2022-06-05	
Zirconium, total	< 0.00010		0.00010	mg/L	2022-06-05	

Downstream of O/F- WT# 38130 (E221464) (22F0323-04) | Matrix: Fresh Water | Sampled: 2022-06-01 07:30

Anions

Chloride	5.79	± 0.32	0.10	mg/L	2022-06-04	
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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22F0323 2022-06-08 15:22

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Downstream of O/F- WT# 38130 (E221464) (22F0323-04) | Matrix: Fresh Water | Sampled: 2022-06-01 07:30, Continued

Anions, Continued

Nitrate (as N)	0.021	± 0.004	0.010	mg/L	2022-06-04	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-06-04	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-06-04	

Calculated Parameters

Hardness, Total (as CaCO3)	113		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0208		0.0100	mg/L	N/A	
Nitrogen, Total	0.246		0.0500	mg/L	N/A	

General Parameters

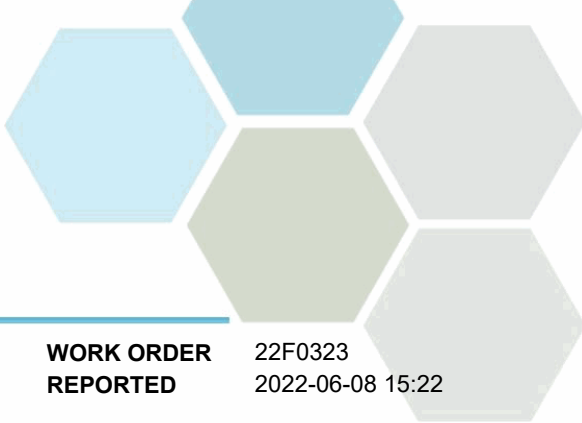
Nitrogen, Total Kjeldahl	0.225	± 0.054	0.050	mg/L	2022-06-08	
Phosphorus, Total (as P)	0.0103	± 0.0015	0.0050	mg/L	2022-06-07	
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-06-06	

Microbiological Parameters

Coliforms, Total (Q-Tray)	179		1	MPN/100 mL	2022-06-02	HT1
E. coli (Q-Tray)	16		1	MPN/100 mL	2022-06-02	HT1

Total Metals

Aluminum, total	0.0357	± 0.0072	0.0050	mg/L	2022-06-05	
Antimony, total	< 0.00020		0.00020	mg/L	2022-06-05	
Arsenic, total	< 0.00050		0.00050	mg/L	2022-06-05	
Barium, total	0.0218	± 0.0028	0.0050	mg/L	2022-06-05	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-06-05	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-06-05	
Boron, total	< 0.0500		0.0500	mg/L	2022-06-05	
Cadmium, total	< 0.000010		0.000010	mg/L	2022-06-05	
Calcium, total	30.5	± 4.3	0.20	mg/L	2022-06-05	
Chromium, total	< 0.00050		0.00050	mg/L	2022-06-05	
Cobalt, total	< 0.00010		0.00010	mg/L	2022-06-05	
Copper, total	0.00090	± 0.00015	0.00040	mg/L	2022-06-05	
Iron, total	0.047	± 0.010	0.010	mg/L	2022-06-05	
Lead, total	< 0.00020		0.00020	mg/L	2022-06-05	
Lithium, total	0.00302	± 0.00054	0.00010	mg/L	2022-06-05	
Magnesium, total	8.92	± 1.25	0.010	mg/L	2022-06-05	
Manganese, total	0.00551	± 0.00489	0.00020	mg/L	2022-06-05	
Molybdenum, total	0.00318	± 0.00046	0.00010	mg/L	2022-06-05	
Nickel, total	0.00053	± 0.00013	0.00040	mg/L	2022-06-05	
Phosphorus, total	< 0.050		0.050	mg/L	2022-06-05	
Potassium, total	2.38	± 0.37	0.10	mg/L	2022-06-05	
Selenium, total	< 0.00050		0.00050	mg/L	2022-06-05	
Silicon, total	3.4	± 0.7	1.0	mg/L	2022-06-05	
Silver, total	< 0.000050		0.000050	mg/L	2022-06-05	
Sodium, total	11.8	± 2.2	0.10	mg/L	2022-06-05	



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22F0323 2022-06-08 15:22

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Downstream of O/F- WT# 38130 (E221464) (22F0323-04) | Matrix: Fresh Water | Sampled: 2022-06-01 07:30, Continued

Total Metals, Continued

Strontium, total	0.269	± 0.033	0.0010	mg/L	2022-06-05	
Sulfur, total	9.2	± 2.3	3.0	mg/L	2022-06-05	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-06-05	
Thallium, total	< 0.000020		0.000020	mg/L	2022-06-05	
Thorium, total	< 0.00010		0.00010	mg/L	2022-06-05	
Tin, total	< 0.00020		0.00020	mg/L	2022-06-05	
Titanium, total	< 0.0050		0.0050	mg/L	2022-06-05	
Tungsten, total	< 0.0002		0.0002	mg/L	2022-06-05	
Uranium, total	0.00213	± 0.00026	0.000020	mg/L	2022-06-05	
Vanadium, total	< 0.0050		0.0050	mg/L	2022-06-05	
Zinc, total	< 0.0040		0.0040	mg/L	2022-06-05	
Zirconium, total	< 0.00010		0.00010	mg/L	2022-06-05	

Influent- WT# 38131 (0500232) (22F0323-05) | Matrix: Wastewater | Sampled: 2022-06-01 07:00

Anions

Nitrate (as N)	< 0.010		0.010	mg/L	2022-06-04	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-06-04	
Phosphate (as P)	4.62	± 0.80	0.0050	mg/L	2022-06-04	

Calculated Parameters

Nitrate+Nitrite (as N)	< 0.0100		0.0100	mg/L	N/A	
Nitrogen, Total	103		2.00	mg/L	N/A	

General Parameters

Nitrogen, Total Kjeldahl	103	± 13	0.050	mg/L	2022-06-08	
Phosphorus, Total (as P)	10.2	± 1.1	0.0050	mg/L	2022-06-07	

Reclaimed Water - North WT# 3813C (E221689) (22F0323-06) | Matrix: Wastewater | Sampled: 2022-06-01 07:15

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-06-02	HT1
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-06-02	HT1

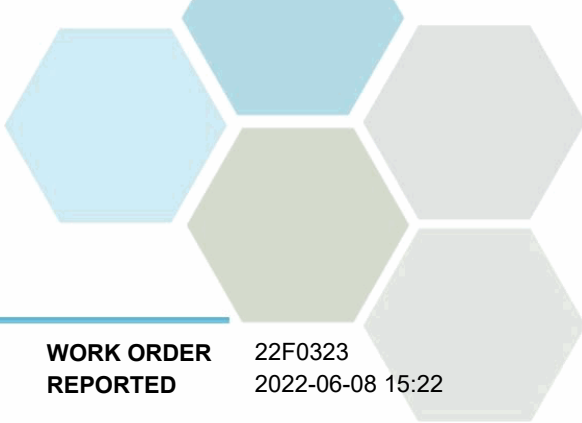
Effluent 7 Day Composite- WT# 3813A (E105000) (22F0323-07) | Matrix: Wastewater | Sampled: 2022-06-01

PRESa

Anions

Nitrate (as N)	2.88	± 0.18	0.010	mg/L	2022-06-04	
Nitrite (as N)	0.173	± 0.018	0.010	mg/L	2022-06-04	

Calculated Parameters



TEST RESULTS

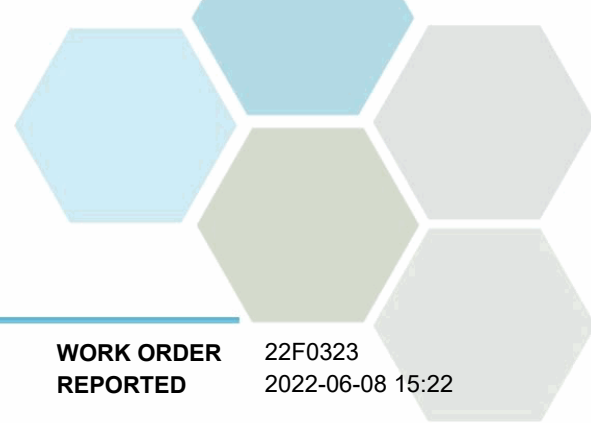
REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22F0323
2022-06-08 15:22

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Effluent 7 Day Composite- WT# 3813A (E105000) (22F0323-07) Matrix: Wastewater Sampled: 2022-06-01, Continued						PRESa
Calculated Parameters, Continued						
Nitrate+Nitrite (as N)	3.05		0.0100	mg/L	N/A	
Nitrogen, Total	4.74		0.0500	mg/L	N/A	
General Parameters						
Nitrogen, Total Kjeldahl	1.69	± 0.21	0.050	mg/L	2022-06-08	
Phosphorus, Total (as P)	0.109	± 0.012	0.0050	mg/L	2022-06-07	
Solids, Total Suspended	7.0	± 1.1	2.0	mg/L	2022-06-06	

Sample Qualifiers:

- HT1 The sample was prepared and/or analyzed past the recommended holding time.
- PRES Sample has been preserved for NH3, TKN, TP in the laboratory and the holding time has been extended.
- PRESa Sample has been preserved for TKN in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22F0323 2022-06-08 15:22

Analysis Description	Method Ref.	Technique	Accredited	Location
Ammonia, Total in Water	SM 4500-NH3 G* (2017)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Chemical Oxygen Demand in Water	SM 5220 D* (2017)	Closed Reflux, Colorimetry	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Coliforms, Total in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Hardness in Water	SM 2340 B* (2017)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

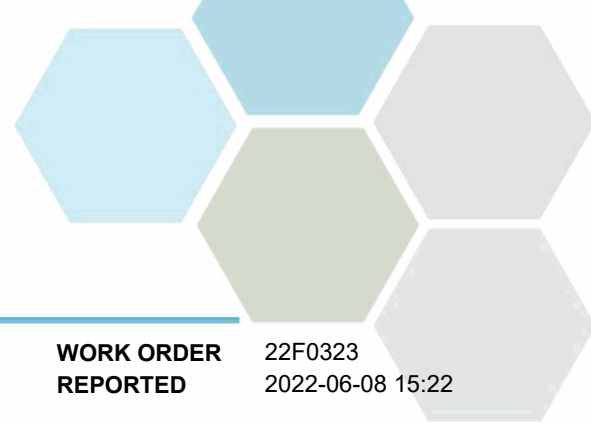
Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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
MPN/100 mL	Most Probable Number per 100 millilitres
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Penticton, City of - DW & STP
PROJECT Wastewater - PE12212

WORK ORDER 22F0323
REPORTED 2022-06-08 15:22

General Comments:

The results in this report apply to the 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. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing. The quality control (QC) data is available upon request

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.



CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22F1275
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-06-08 12:30 / 6.2°C 2022-06-15 10:07
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

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.

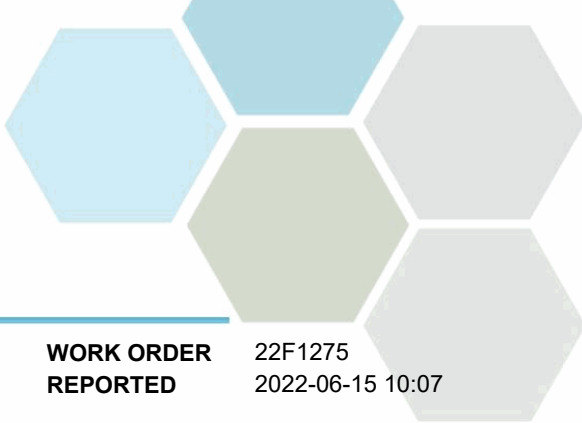
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

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



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22F1275
2022-06-15 10:07

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22F1275-01) | Matrix: Wastewater | Sampled: 2022-06-08 07:30

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-06-09	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-06-09	

Reclaimed Water - North WT# 3813C (E221689) (22F1275-02) | Matrix: Wastewater | Sampled: 2022-06-08 06:45

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-06-09	HT1
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-06-09	HT1

Effluent 7 Day Composite- WT# 3813A (E105000) (22F1275-03) | Matrix: Wastewater | Sampled: 2022-06-02 00:00 To 2022-06-08 00:00

PRES

Anions

Nitrate (as N)	2.94 ± 0.18		0.010	mg/L	2022-06-11	
Nitrite (as N)	0.118 ± 0.012		0.010	mg/L	2022-06-11	

Calculated Parameters

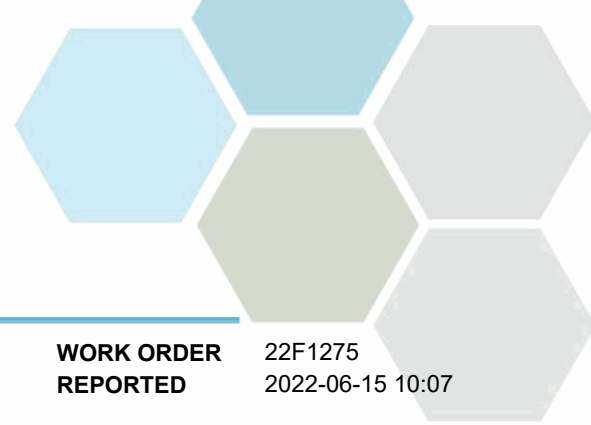
Nitrate+Nitrite (as N)	3.06		0.0100	mg/L		N/A
Nitrogen, Total	4.67		0.0500	mg/L		N/A

General Parameters

BOD, 5-day	< 7.1		2.0	mg/L	2022-06-14	
Nitrogen, Total Kjeldahl	1.61 ± 0.20		0.050	mg/L	2022-06-14	
Phosphorus, Total (as P)	0.102 ± 0.011		0.0050	mg/L	2022-06-14	
Solids, Total Suspended	10.7 ± 1.7		2.0	mg/L	2022-06-12	

Sample Qualifiers:

- HT1 The sample was prepared and/or analyzed past the recommended holding time.
- PRES Sample has been preserved for TKN, TP in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22F1275
2022-06-15 10:07

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	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)
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mg/L	Milligrams per litre
MPN/100 mL	Most Probable Number per 100 millilitres
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.

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CERTIFICATE OF ANALYSIS

REPORTED TO Penticton, City of - DW & STP
171 Main Street
PENTICTON, BC V2A 5A9

ATTENTION Joel Mertz

PO NUMBER

PROJECT Wastewater - PE12212

PROJECT INFO 0554-04

WORK ORDER 22F2402

RECEIVED / TEMP 2022-06-15 12:30 / 5.7°C

REPORTED 2022-06-22 15:46

COC NUMBER No Number

Introduction:

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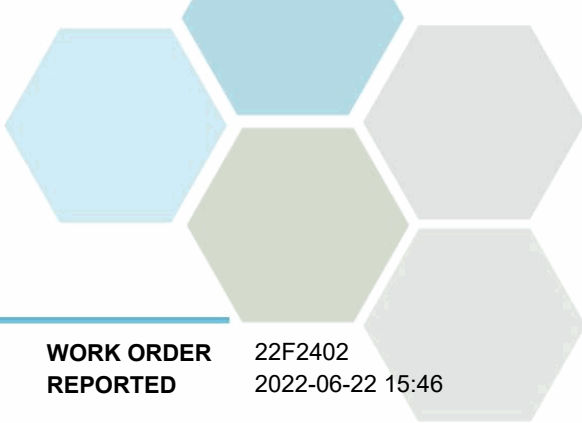
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22F2402 2022-06-22 15:46

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22F2402-01) | Matrix: Wastewater | Sampled: 2022-06-15 06:30

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-06-16	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-06-16	

Reclaimed Water - North WT# 3813C (E221689) (22F2402-02) | Matrix: Wastewater | Sampled: 2022-06-15 07:30

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-06-16	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-06-16	

Effluent 7 Day Composite- WT# 3813A (E105000) (22F2402-03) | Matrix: Wastewater | Sampled: 2022-06-09 00:00 To 2022-06-15 00:00

PRES

Anions

Nitrate (as N)	3.58 ± 0.22		0.010	mg/L	2022-06-17	
Nitrite (as N)	0.164 ± 0.017		0.010	mg/L	2022-06-17	

Calculated Parameters

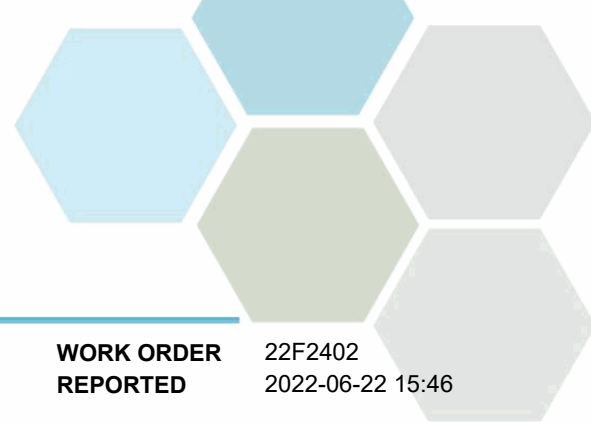
Nitrate+Nitrite (as N)	3.74		0.0100	mg/L	N/A	
Nitrogen, Total	5.34		0.0500	mg/L	N/A	

General Parameters

BOD, 5-day	< 7.1		2.0	mg/L	2022-06-21	
Nitrogen, Total Kjeldahl	1.60 ± 0.20		0.050	mg/L	2022-06-21	
Phosphorus, Total (as P)	0.0822 ± 0.0092		0.0050	mg/L	2022-06-21	
Solids, Total Suspended	2.6 ± 0.9		2.0	mg/L	2022-06-21	

Sample Qualifiers:

PRES Sample has been preserved for Phos in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22F2402
2022-06-22 15:46

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna

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

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Uncertainty Derivation:

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CERTIFICATE OF ANALYSIS

REPORTED TO Penticton, City of - DW & STP
171 Main Street
PENTICTON, BC V2A 5A9

ATTENTION Joel Mertz

PO NUMBER

PROJECT Wastewater - PE12212

PROJECT INFO 0554-04

WORK ORDER 22F3386

RECEIVED / TEMP 2022-06-22 12:25 / 5.8°C

REPORTED 2022-06-29 09:38

COC NUMBER No Number

Introduction:

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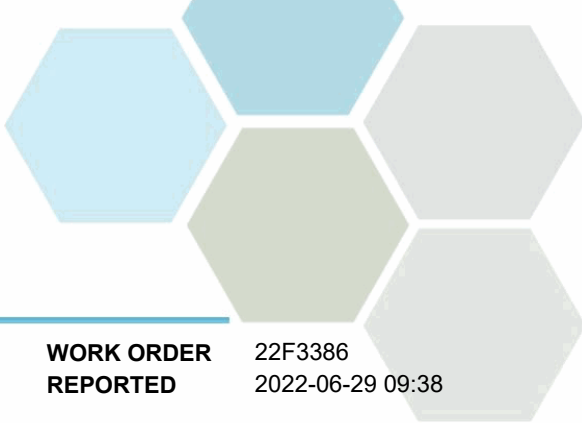
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Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22F3386 2022-06-29 09:38

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22F3386-01) | Matrix: Wastewater | Sampled: 2022-06-22 07:00

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	1		1	MPN/100 mL	2022-06-23	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-06-23	

Reclaimed Water - North WT# 3813C (E221689) (22F3386-02) | Matrix: Wastewater | Sampled: 2022-06-22 07:00

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-06-23	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-06-23	

Effluent 7 Day Composite- WT# 3813A (E105000) (22F3386-03) | Matrix: Wastewater | Sampled: 2022-06-16 00:00 To 2022-06-22 00:00

PRES

Anions

Nitrate (as N)	3.16 ± 0.20		0.010	mg/L	2022-06-23	
Nitrite (as N)	0.088 ± 0.009		0.010	mg/L	2022-06-23	

Calculated Parameters

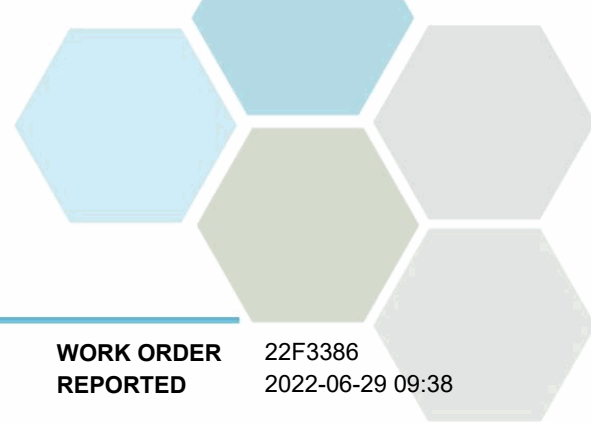
Nitrate+Nitrite (as N)	3.25		0.0100	mg/L	N/A	
Nitrogen, Total	4.78		0.0500	mg/L	N/A	

General Parameters

BOD, 5-day	< 7.1		2.0	mg/L	2022-06-28	
Nitrogen, Total Kjeldahl	1.53 ± 0.19		0.050	mg/L	2022-06-27	
Phosphorus, Total (as P)	0.0790 ± 0.0088		0.0050	mg/L	2022-06-27	
Solids, Total Suspended	< 5.0		2.0	mg/L	2022-06-28	

Sample Qualifiers:

PRES Sample has been preserved for Phos in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22F3386
2022-06-29 09:38

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	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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Uncertainty Derivation:

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22F4310
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-06-29 13:30 / 6.6°C 2022-07-06 12:58
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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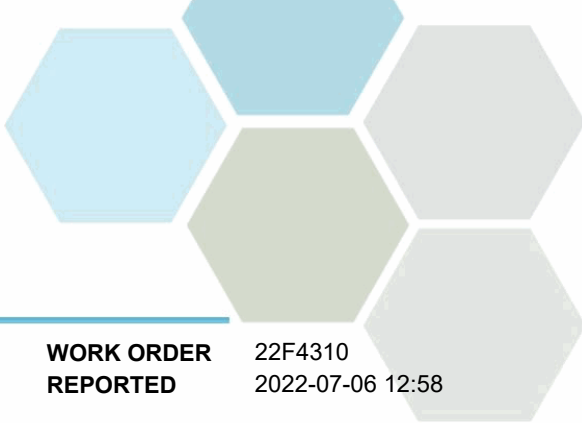
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Authorized By:

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Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22F4310
2022-07-06 12:58

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22F4310-01) | Matrix: Wastewater | Sampled: 2022-06-29 07:30

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	1		1	MPN/100 mL	2022-06-29	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-06-29	

Reclaimed Water - North WT# 3813C (E221689) (22F4310-02) | Matrix: Wastewater | Sampled: 2022-06-29 07:30

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-06-29	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-06-29	

Effluent 7 Day Composite- WT# 3813A (E105000) (22F4310-03) | Matrix: Wastewater | Sampled: 2022-06-23 00:00 To 2022-06-29 00:00

PRES

Anions

Nitrate (as N)	3.14 ± 0.20		0.010	mg/L	2022-07-01	
Nitrite (as N)	0.047 ± 0.005		0.010	mg/L	2022-07-01	

Calculated Parameters

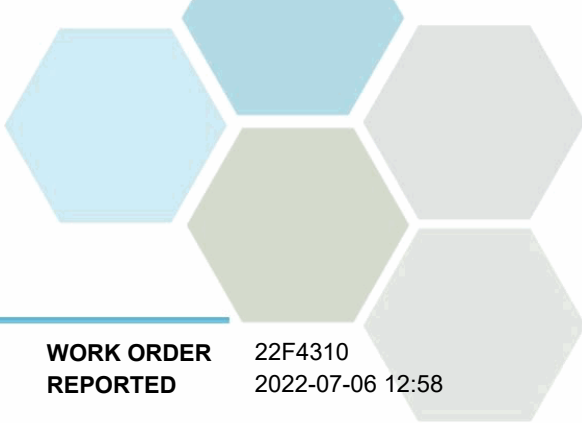
Nitrate+Nitrite (as N)	3.19		0.0100	mg/L	N/A	
Nitrogen, Total	4.62		0.0500	mg/L	N/A	

General Parameters

BOD, 5-day	< 6.6		2.0	mg/L	2022-07-05	
Nitrogen, Total Kjeldahl	1.43 ± 0.18		0.050	mg/L	2022-07-06	
Phosphorus, Total (as P)	0.0593 ± 0.0067		0.0050	mg/L	2022-07-05	
Solids, Total Suspended	2.0 ± 0.9		2.0	mg/L	2022-07-05	

Sample Qualifiers:

PRES Sample has been preserved for Phos in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22F4310
2022-07-06 12:58

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna

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

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22G0590
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-07-06 14:30 / 9.8°C 2022-07-12 23:07
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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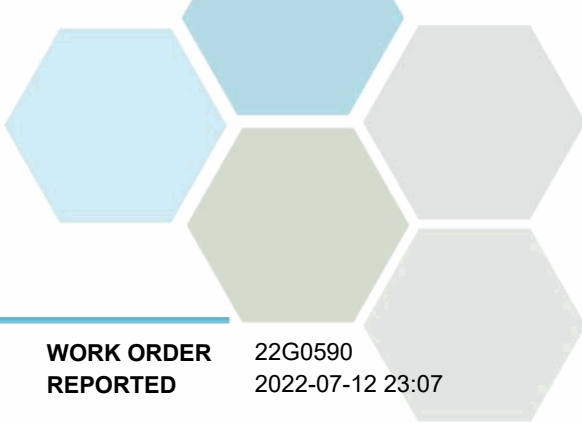
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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22G0590 2022-07-12 23:07

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22G0590-01) | Matrix: Wastewater | Sampled: 2022-07-06

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	1		1	MPN/100 mL	2022-07-07	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-07-07	

Effluent 24 hr Comp.- WT# 3813A (E105000) (22G0590-02) | Matrix: Wastewater | Sampled: 2022-07-05 00:00 To 2022-07-06 00:00

Anions

Nitrate (as N)	1.25 ± 0.08		0.010	mg/L	2022-07-08	
Nitrite (as N)	0.139 ± 0.014		0.010	mg/L	2022-07-08	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-07-08	

Calculated Parameters

Nitrate+Nitrite (as N)	1.39		0.0100	mg/L	N/A	
Nitrogen, Total	3.48		0.0500	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	0.876 ± 0.081		0.050	mg/L	2022-07-10	
BOD, 5-day	< 6.6		2.0	mg/L	2022-07-12	
Chemical Oxygen Demand	39 ± 18		20	mg/L	2022-07-10	
Nitrogen, Total Kjeldahl	2.09 ± 0.26		0.050	mg/L	2022-07-11	
Phosphorus, Total (as P)	0.0799 ± 0.0089		0.0050	mg/L	2022-07-08	

Upstream of O/F- WT# 3812F (0500050) (22G0590-03) | Matrix: Fresh Water | Sampled: 2022-07-06

Anions

Chloride	5.34 ± 0.30		0.10	mg/L	2022-07-08	
Nitrate (as N)	< 0.010		0.010	mg/L	2022-07-08	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-07-08	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-07-08	

Calculated Parameters

Hardness, Total (as CaCO3)	115		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	< 0.0100		0.0100	mg/L	N/A	
Nitrogen, Total	0.496		0.0500	mg/L	N/A	

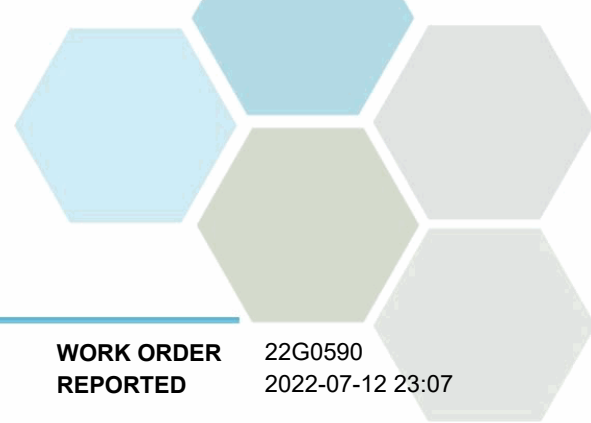
General Parameters

Nitrogen, Total Kjeldahl	0.496 ± 0.076		0.050	mg/L	2022-07-11	
Phosphorus, Total (as P)	0.0102 ± 0.0015		0.0050	mg/L	2022-07-08	
Solids, Total Suspended	2.2 ± 0.9		2.0	mg/L	2022-07-09	

Microbiological Parameters

Coliforms, Total (Q-Tray)	291		1	MPN/100 mL	2022-07-07	
E. coli (Q-Tray)	6		1	MPN/100 mL	2022-07-07	

Total Metals



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22G0590 2022-07-12 23:07

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Upstream of O/F- WT# 3812F (0500050) (22G0590-03) | Matrix: Fresh Water | Sampled: 2022-07-06, Continued

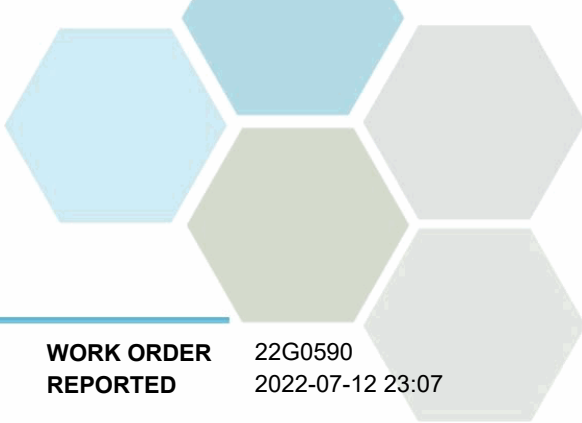
Total Metals, Continued

Aluminum, total	0.0222	± 0.0047	0.0050	mg/L	2022-07-08	
Antimony, total	< 0.00020		0.00020	mg/L	2022-07-08	
Arsenic, total	< 0.00050		0.00050	mg/L	2022-07-08	
Barium, total	0.0203	± 0.0026	0.0050	mg/L	2022-07-08	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-07-08	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-07-08	
Boron, total	< 0.0500		0.0500	mg/L	2022-07-08	
Cadmium, total	< 0.000010		0.000010	mg/L	2022-07-08	
Calcium, total	31.7	± 4.5	0.20	mg/L	2022-07-08	
Chromium, total	< 0.00050		0.00050	mg/L	2022-07-08	
Cobalt, total	< 0.00010		0.00010	mg/L	2022-07-08	
Copper, total	0.00070	± 0.00013	0.00040	mg/L	2022-07-08	
Iron, total	0.025	± 0.006	0.010	mg/L	2022-07-08	
Lead, total	< 0.00020		0.00020	mg/L	2022-07-08	
Lithium, total	0.00299	± 0.00053	0.00010	mg/L	2022-07-08	
Magnesium, total	8.64	± 1.21	0.010	mg/L	2022-07-08	
Manganese, total	0.00283	± 0.00251	0.00020	mg/L	2022-07-08	
Molybdenum, total	0.00305	± 0.00044	0.00010	mg/L	2022-07-08	
Nickel, total	< 0.00040		0.00040	mg/L	2022-07-08	
Phosphorus, total	< 0.050		0.050	mg/L	2022-07-08	
Potassium, total	2.30	± 0.36	0.10	mg/L	2022-07-08	
Selenium, total	< 0.00050		0.00050	mg/L	2022-07-08	
Silicon, total	3.3	± 0.7	1.0	mg/L	2022-07-08	
Silver, total	< 0.000050		0.000050	mg/L	2022-07-08	
Sodium, total	11.1	± 2.0	0.10	mg/L	2022-07-08	
Strontium, total	0.252	± 0.031	0.0010	mg/L	2022-07-08	
Sulfur, total	9.3	± 2.4	3.0	mg/L	2022-07-08	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-07-08	
Thallium, total	< 0.000020		0.000020	mg/L	2022-07-08	
Thorium, total	< 0.00010		0.00010	mg/L	2022-07-08	
Tin, total	< 0.00020		0.00020	mg/L	2022-07-08	
Titanium, total	< 0.0050		0.0050	mg/L	2022-07-08	
Tungsten, total	< 0.0002		0.0002	mg/L	2022-07-08	
Uranium, total	0.00229	± 0.00028	0.000020	mg/L	2022-07-08	
Vanadium, total	< 0.0050		0.0050	mg/L	2022-07-08	
Zinc, total	< 0.0040		0.0040	mg/L	2022-07-08	
Zirconium, total	0.00014	± 0.00006	0.00010	mg/L	2022-07-08	

Downstream of O/F- WT# 38130 (E221464) (22G0590-04) | Matrix: Fresh Water | Sampled: 2022-07-06

Anions

Chloride	5.35	± 0.30	0.10	mg/L	2022-07-08	
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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22G0590 2022-07-12 23:07

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Downstream of O/F- WT# 38130 (E221464) (22G0590-04) | Matrix: Fresh Water | Sampled: 2022-07-06, Continued

Anions, Continued

Nitrate (as N)	< 0.010		0.010	mg/L	2022-07-08	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-07-08	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-07-08	

Calculated Parameters

Hardness, Total (as CaCO3)	115		0.500	mg/L		N/A
Nitrate+Nitrite (as N)	< 0.0100		0.0100	mg/L		N/A
Nitrogen, Total	0.244		0.0500	mg/L		N/A

General Parameters

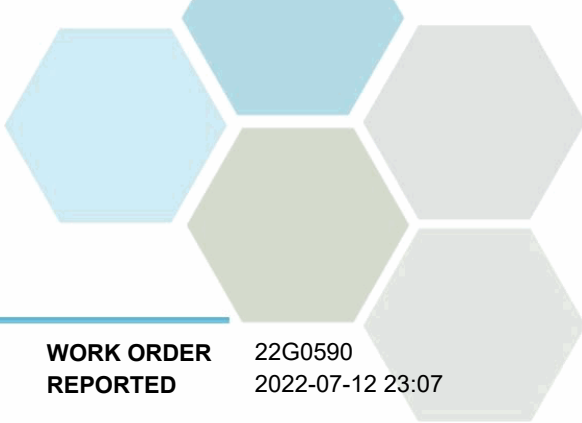
Nitrogen, Total Kjeldahl	0.244 ± 0.055		0.050	mg/L	2022-07-11	
Phosphorus, Total (as P)	0.0108 ± 0.0016		0.0050	mg/L	2022-07-08	
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-07-09	

Microbiological Parameters

Coliforms, Total (Q-Tray)	435		1	MPN/100 mL	2022-07-07	
E. coli (Q-Tray)	6		1	MPN/100 mL	2022-07-07	

Total Metals

Aluminum, total	0.0284 ± 0.0058		0.0050	mg/L	2022-07-08	
Antimony, total	< 0.00020		0.00020	mg/L	2022-07-08	
Arsenic, total	< 0.00050		0.00050	mg/L	2022-07-08	
Barium, total	0.0208 ± 0.0027		0.0050	mg/L	2022-07-08	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-07-08	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-07-08	
Boron, total	< 0.0500		0.0500	mg/L	2022-07-08	
Cadmium, total	< 0.000010		0.000010	mg/L	2022-07-08	
Calcium, total	31.8 ± 4.5		0.20	mg/L	2022-07-08	
Chromium, total	< 0.00050		0.00050	mg/L	2022-07-08	
Cobalt, total	< 0.00010		0.00010	mg/L	2022-07-08	
Copper, total	0.00076 ± 0.00013		0.00040	mg/L	2022-07-08	
Iron, total	0.028 ± 0.006		0.010	mg/L	2022-07-08	
Lead, total	< 0.00020		0.00020	mg/L	2022-07-08	
Lithium, total	0.00304 ± 0.00054		0.00010	mg/L	2022-07-08	
Magnesium, total	8.70 ± 1.22		0.010	mg/L	2022-07-08	
Manganese, total	0.00295 ± 0.00261		0.00020	mg/L	2022-07-08	
Molybdenum, total	0.00309 ± 0.00044		0.00010	mg/L	2022-07-08	
Nickel, total	0.00042 ± 0.00011		0.00040	mg/L	2022-07-08	
Phosphorus, total	< 0.050		0.050	mg/L	2022-07-08	
Potassium, total	2.33 ± 0.36		0.10	mg/L	2022-07-08	
Selenium, total	< 0.00050		0.00050	mg/L	2022-07-08	
Silicon, total	3.4 ± 0.7		1.0	mg/L	2022-07-08	
Silver, total	< 0.000050		0.000050	mg/L	2022-07-08	
Sodium, total	11.3 ± 2.1		0.10	mg/L	2022-07-08	



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22G0590 2022-07-12 23:07

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Downstream of O/F- WT# 38130 (E221464) (22G0590-04) | Matrix: Fresh Water | Sampled: 2022-07-06, Continued

Total Metals, Continued

Strontium, total	0.257	± 0.031	0.0010	mg/L	2022-07-08	
Sulfur, total	9.2	± 2.4	3.0	mg/L	2022-07-08	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-07-08	
Thallium, total	< 0.000020		0.000020	mg/L	2022-07-08	
Thorium, total	< 0.00010		0.00010	mg/L	2022-07-08	
Tin, total	< 0.00020		0.00020	mg/L	2022-07-08	
Titanium, total	< 0.0050		0.0050	mg/L	2022-07-08	
Tungsten, total	< 0.0002		0.0002	mg/L	2022-07-08	
Uranium, total	0.00227	± 0.00027	0.000020	mg/L	2022-07-08	
Vanadium, total	< 0.0050		0.0050	mg/L	2022-07-08	
Zinc, total	< 0.0040		0.0040	mg/L	2022-07-08	
Zirconium, total	0.00014	± 0.00005	0.00010	mg/L	2022-07-08	

Influent- WT# 38131 (0500232) (22G0590-05) | Matrix: Wastewater | Sampled: 2022-07-06

Anions

Nitrate (as N)	< 0.010		0.010	mg/L	2022-07-08	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-07-08	
Phosphate (as P)	1.94	± 0.34	0.0050	mg/L	2022-07-08	

Calculated Parameters

Nitrate+Nitrite (as N)	< 0.0100		0.0100	mg/L	N/A	
Nitrogen, Total	43.9		2.00	mg/L	N/A	

General Parameters

Nitrogen, Total Kjeldahl	43.9	± 5.7	0.050	mg/L	2022-07-11	
Phosphorus, Total (as P)	6.89	± 0.76	0.0050	mg/L	2022-07-08	

Reclaimed Water - North WT# 3813C (E221689) (22G0590-06) | Matrix: Wastewater | Sampled: 2022-07-06

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-07-07	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-07-07	

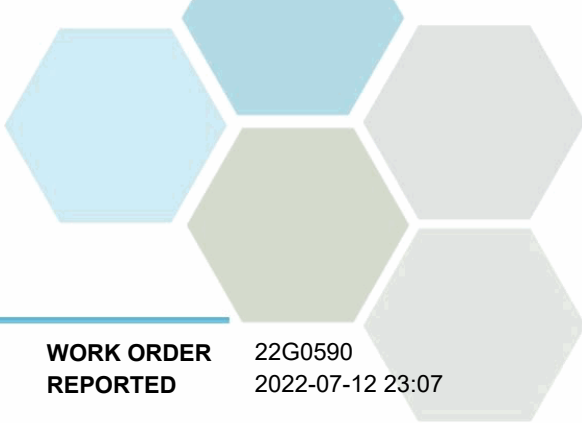
Effluent 7 Day Composite- WT# 3813A (E105000) (22G0590-07) | Matrix: Wastewater | Sampled: 2022-06-30 00:00 To 2022-07-06 00:00

PRES

Anions

Nitrate (as N)	2.24	± 0.14	0.010	mg/L	2022-07-08	
Nitrite (as N)	0.077	± 0.008	0.010	mg/L	2022-07-08	

Calculated Parameters



TEST RESULTS

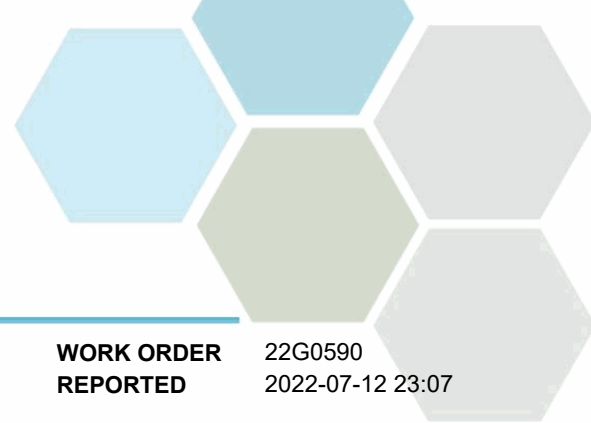
REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22G0590
2022-07-12 23:07

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Effluent 7 Day Composite- WT# 3813A (E105000) (22G0590-07) Matrix: Wastewater Sampled: 2022-06-30 00:00 To 2022-07-06 00:00, Continued						PRES
<i>Calculated Parameters, Continued</i>						
Nitrate+Nitrite (as N)	2.32		0.0100	mg/L	N/A	
Nitrogen, Total	4.05		0.0500	mg/L	N/A	
<i>General Parameters</i>						
BOD, 5-day	< 6.6		2.0	mg/L	2022-07-12	
Nitrogen, Total Kjeldahl	1.73	± 0.22	0.050	mg/L	2022-07-11	
Phosphorus, Total (as P)	0.0677	± 0.0076	0.0050	mg/L	2022-07-08	
Solids, Total Suspended	< 3.3		2.0	mg/L	2022-07-09	

Sample Qualifiers:

PRES Sample has been preserved for Phos in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22G0590 2022-07-12 23:07

Analysis Description	Method Ref.	Technique	Accredited	Location
Ammonia, Total in Water	SM 4500-NH3 G* (2017)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Chemical Oxygen Demand in Water	SM 5220 D* (2017)	Closed Reflux, Colorimetry	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Coliforms, Total in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Hardness in Water	SM 2340 B* (2017)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

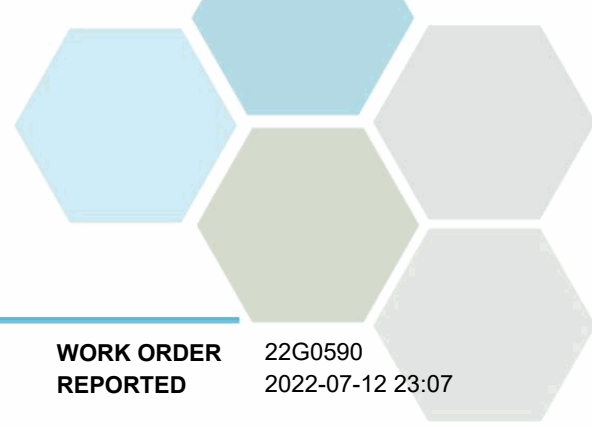
Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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
MPN/100 mL	Most Probable Number per 100 millilitres
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Penticton, City of - DW & STP
PROJECT Wastewater - PE12212

WORK ORDER 22G0590
REPORTED 2022-07-12 23:07

General Comments:

The results in this report apply to the 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. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing. The quality control (QC) data is available upon request

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.



CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22G1658
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-07-13 13:00 / 1.0°C 2022-07-20 10:20
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

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.

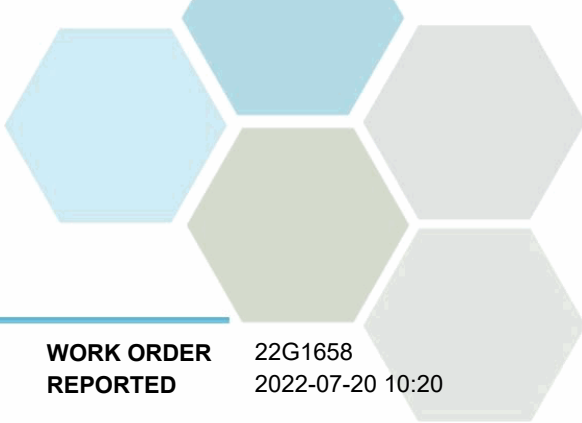
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

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



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22G1658
2022-07-20 10:20

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22G1658-01) | Matrix: Wastewater | Sampled: 2022-07-13 07:30

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	2		1	MPN/100 mL	2022-07-14	
E. coli (Q-Tray)	2		1	MPN/100 mL	2022-07-14	

Reclaimed Water - North WT# 3813C (E221689) (22G1658-02) | Matrix: Wastewater | Sampled: 2022-07-13 07:15

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-07-14	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-07-14	

Effluent 7 Day Composite- WT# 3813A (E105000) (22G1658-03) | Matrix: Wastewater | Sampled: 2022-07-07 00:00 To 2022-07-13 00:00

PRES

Anions

Nitrate (as N)	1.88 ± 0.12		0.010	mg/L	2022-07-14	
Nitrite (as N)	0.060 ± 0.006		0.010	mg/L	2022-07-14	

Calculated Parameters

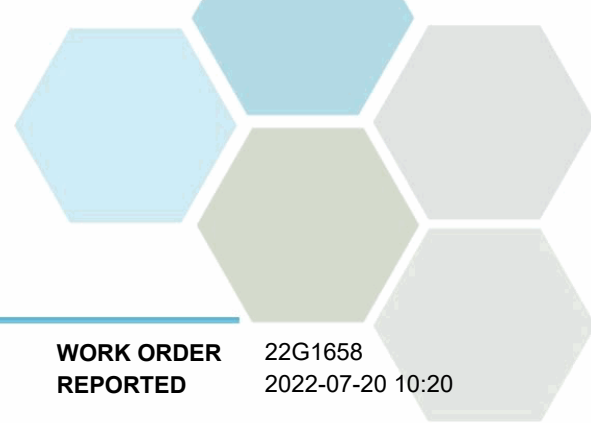
Nitrate+Nitrite (as N)	1.94		0.0100	mg/L	N/A	
Nitrogen, Total	3.41		0.0500	mg/L	N/A	

General Parameters

BOD, 5-day	< 6.2		2.0	mg/L	2022-07-19	
Nitrogen, Total Kjeldahl	1.46 ± 0.19		0.050	mg/L	2022-07-17	
Phosphorus, Total (as P)	0.0697 ± 0.0078		0.0050	mg/L	2022-07-15	
Solids, Total Suspended	2.2 ± 0.9		2.0	mg/L	2022-07-15	

Sample Qualifiers:

PRES Sample has been preserved for Phos in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22G1658
2022-07-20 10:20

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	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
MPN/100 mL	Most Probable Number per 100 millilitres
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

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CERTIFICATE OF ANALYSIS

REPORTED TO Penticton, City of - DW & STP
171 Main Street
PENTICTON, BC V2A 5A9

ATTENTION Joel Mertz

PO NUMBER

PROJECT Wastewater - PE12212

PROJECT INFO 0554-04

WORK ORDER 22G2691

RECEIVED / TEMP 2022-07-20 08:00 / 1.3°C

REPORTED 2022-07-27 14:56

COC NUMBER No #

Introduction:

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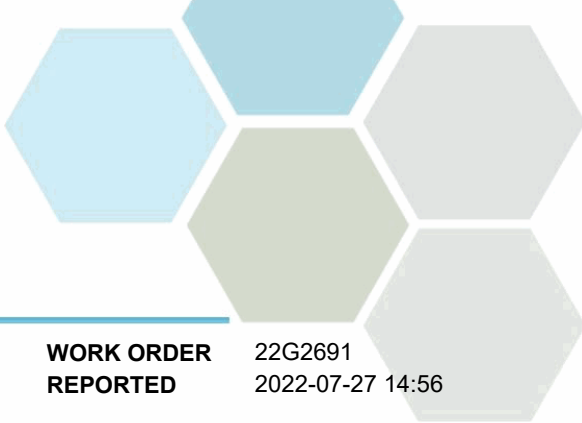
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22G2691
2022-07-27 14:56

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22G2691-01) | Matrix: Wastewater | Sampled: 2022-07-20 07:30

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	2		1	MPN/100 mL	2022-07-21	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-07-21	

Reclaimed Water - North WT# 3813C (E221689) (22G2691-02) | Matrix: Wastewater | Sampled: 2022-07-20 07:00

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-07-21	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-07-21	

Effluent 7 Day Composite- WT# 3813A (E105000) (22G2691-03) | Matrix: Wastewater | Sampled: 2022-07-14 00:00 To 2022-07-20 00:00

PRES

Anions

Nitrate (as N)	2.05 ± 0.13		0.010	mg/L	2022-07-23	
Nitrite (as N)	0.103 ± 0.011		0.010	mg/L	2022-07-23	

Calculated Parameters

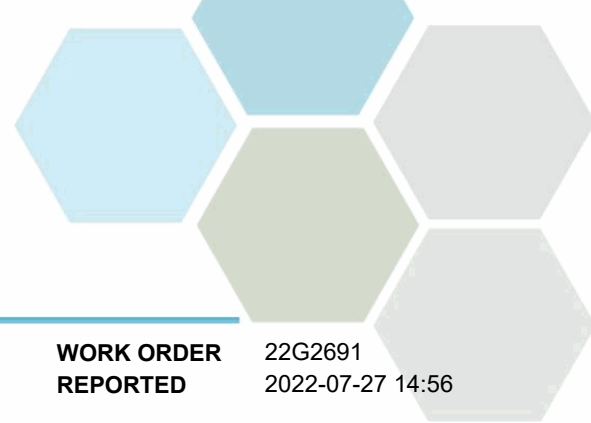
Nitrate+Nitrite (as N)	2.15		0.0100	mg/L	N/A	
Nitrogen, Total	3.84		0.0500	mg/L	N/A	

General Parameters

BOD, 5-day	< 6.4		2.0	mg/L	2022-07-27	
Nitrogen, Total Kjeldahl	1.69 ± 0.21		0.050	mg/L	2022-07-26	
Phosphorus, Total (as P)	0.0765 ± 0.0085		0.0050	mg/L	2022-07-25	
Solids, Total Suspended	< 4.0		2.0	mg/L	2022-07-27	

Sample Qualifiers:

PRES Sample has been preserved for TP + TKN in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22G2691
2022-07-27 14:56

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	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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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22G3760
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-07-27 08:20 / 0.8°C 2022-08-04 14:00
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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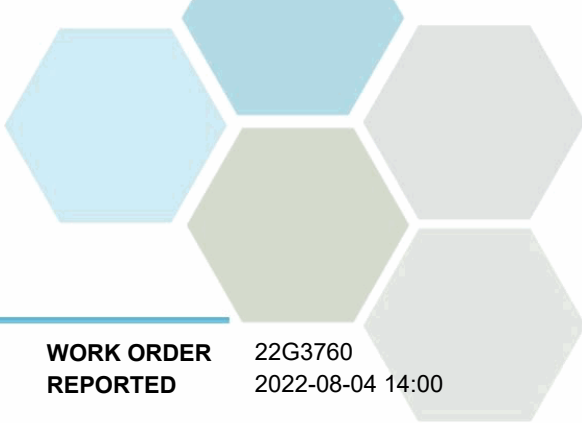
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Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22G3760 2022-08-04 14:00

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22G3760-01) | Matrix: Wastewater | Sampled: 2022-07-27 07:00

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-07-27	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-07-27	

Reclaimed Water - North WT# 3813C (E221689) (22G3760-02) | Matrix: Wastewater | Sampled: 2022-07-27 06:45

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-07-27	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-07-27	

Effluent 7 Day Composite- WT# 3813A (E105000) (22G3760-03) | Matrix: Wastewater | Sampled: 2022-07-21 00:00 To 2022-07-27 00:00

PRES

Anions

Nitrate (as N)	2.50 ± 0.16		0.010	mg/L	2022-07-29	
Nitrite (as N)	0.434 ± 0.045		0.010	mg/L	2022-07-29	

Calculated Parameters

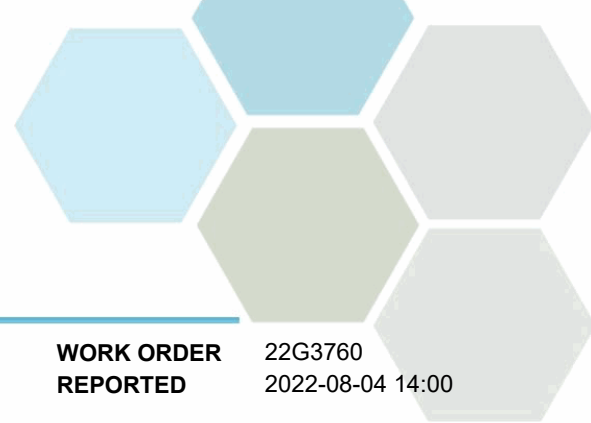
Nitrate+Nitrite (as N)	2.94		0.0100	mg/L		N/A
Nitrogen, Total	4.87		0.0500	mg/L		N/A

General Parameters

BOD, 5-day	< 7.0		2.0	mg/L	2022-08-02	
Nitrogen, Total Kjeldahl	1.94 ± 0.24		0.050	mg/L	2022-08-04	
Phosphorus, Total (as P)	0.0853 ± 0.0095		0.0050	mg/L	2022-08-03	
Solids, Total Suspended	2.0 ± 0.9		2.0	mg/L	2022-08-04	HT1

Sample Qualifiers:

- HT1 The sample was prepared and/or analyzed past the recommended holding time.
- PRES Sample has been preserved for TP, TKN in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22G3760
2022-08-04 14:00

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna

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

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Uncertainty Derivation:

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22H0452
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-08-03 12:15 / 3.0°C 2022-08-11 15:15
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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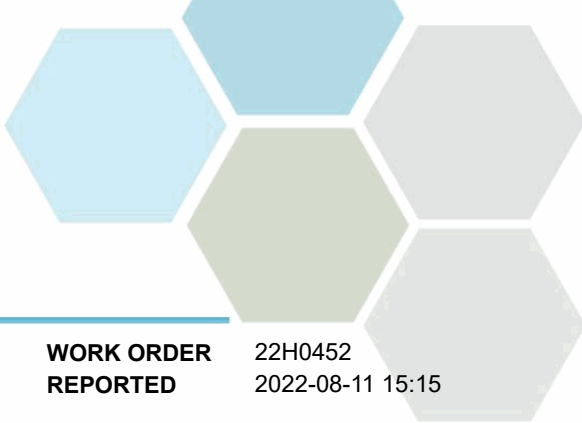
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TEST RESULTS

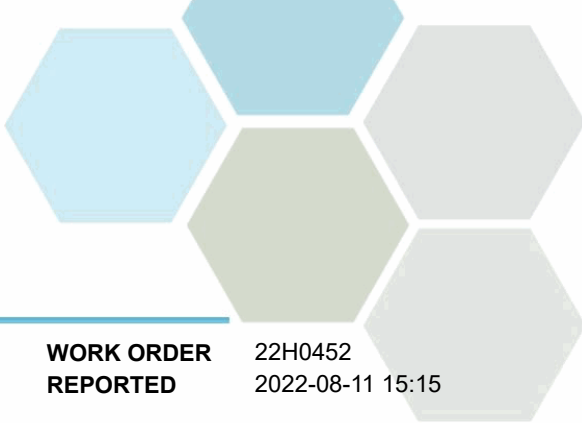
REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22H0452
2022-08-11 15:15

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Raw Biosolids (22H0452-01) Matrix: Soil Sampled: 2022-08-03 08:00						
<i>General Parameters</i>						
pH (1:2 H2O Solution)	5.70	± 0.03	0.10	pH units	2022-08-10	PH1
<i>Strong Acid Leachable Metals</i>						
Aluminum	36800	± 6890	40	mg/kg dry	2022-08-10	
Antimony	0.92	± 0.29	0.10	mg/kg dry	2022-08-10	
Arsenic	1.73	± 0.32	0.30	mg/kg dry	2022-08-10	
Barium	64.7	± 11.9	1.0	mg/kg dry	2022-08-10	
Beryllium	< 0.10		0.10	mg/kg dry	2022-08-10	
Boron	< 12.0		2.0	mg/kg dry	2022-08-10	RA3
Cadmium	0.390	± 0.097	0.040	mg/kg dry	2022-08-10	
Chromium	10.1	± 1.8	1.0	mg/kg dry	2022-08-10	
Cobalt	1.29	± 0.20	0.10	mg/kg dry	2022-08-10	
Copper	242	± 57	0.40	mg/kg dry	2022-08-10	
Iron	4050	± 478	20	mg/kg dry	2022-08-10	
Lead	6.37	± 2.00	0.20	mg/kg dry	2022-08-10	
Lithium	0.73	± 0.12	0.10	mg/kg dry	2022-08-10	
Manganese	71.6	± 8.3	0.40	mg/kg dry	2022-08-10	
Mercury	0.171	± 0.070	0.040	mg/kg dry	2022-08-10	
Molybdenum	5.05	± 1.17	0.10	mg/kg dry	2022-08-10	
Nickel	7.67	± 1.46	0.60	mg/kg dry	2022-08-10	
Selenium	2.17	± 0.28	0.20	mg/kg dry	2022-08-10	
Silver	0.93	± 0.19	0.10	mg/kg dry	2022-08-10	
Strontium	54.2	± 9.0	0.20	mg/kg dry	2022-08-10	
Thallium	< 0.10		0.10	mg/kg dry	2022-08-10	
Tin	9.45	± 4.03	0.20	mg/kg dry	2022-08-10	
Tungsten	0.94	± 0.27	0.20	mg/kg dry	2022-08-10	
Uranium	10.5	± 1.8	0.050	mg/kg dry	2022-08-10	
Vanadium	10.8	± 1.3	1.0	mg/kg dry	2022-08-10	
Zinc	380	± 69	2.0	mg/kg dry	2022-08-10	

Sample Qualifiers:

- PH1 The ratio of water to soil was greater than 2:1 due to limited sample volume or matrix
- RA3 The Reporting Limit has been raised due to comparable level detected in the blank(s).



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22H0452
2022-08-11 15:15

Analysis Description	Method Ref.	Technique	Accredited	Location
pH in Soil	Carter 16.2 / SM 4500-H+ B (2017)	1:2 Soil/Water Slurry / Electrometry	✓	Richmond
SALM in Soil	BCMOE SALM V.2 / EPA 6020B	HNO ₃ +HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

Glossary of Terms:

RL	Reporting Limit (default)
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mg/kg dry	Milligrams per kilogram (dry weight basis)
pH units	pH < 7 = acidic, pH > 7 = basic
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

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CERTIFICATE OF ANALYSIS

REPORTED TO Penticton, City of - DW & STP
171 Main Street
PENTICTON, BC V2A 5A9

ATTENTION Joel Mertz

PO NUMBER

PROJECT Wastewater - PE12212

PROJECT INFO 0554-04

WORK ORDER 22H1627

RECEIVED / TEMP 2022-08-10 13:00 / 0.8°C

REPORTED 2022-08-17 15:49

COC NUMBER Green

Introduction:

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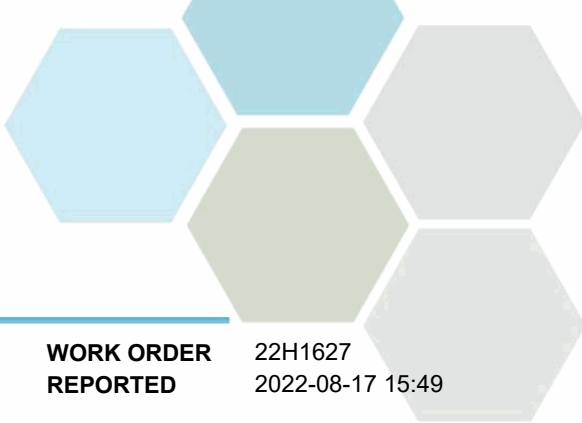
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Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22H1627
2022-08-17 15:49

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22H1627-01) | Matrix: Wastewater | Sampled: 2022-08-10 08:00

Microbiological Parameters

Coliforms, Total (Q-Tray)	18		1	MPN/100 mL	2022-08-11	
Coliforms, Fecal (Q-Tray)	1		1	MPN/100 mL	2022-08-11	
E. coli (Q-Tray)	1		1	MPN/100 mL	2022-08-11	

Reclaimed Water - North WT# 3813C (E221689) (22H1627-02) | Matrix: Wastewater | Sampled: 2022-08-10 07:00

Microbiological Parameters

Coliforms, Total (Q-Tray)	< 1		1	MPN/100 mL	2022-08-11	
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-08-11	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-08-11	

Effluent 7 Day Composite- WT# 3813A (E105000) (22H1627-03) | Matrix: Wastewater | Sampled: 2022-08-04 00:00 To 2022-08-10 00:00

PRES

Anions

Nitrate (as N)	2.00 ± 0.13		0.010	mg/L	2022-08-12	
Nitrite (as N)	0.344 ± 0.035		0.010	mg/L	2022-08-12	

Calculated Parameters

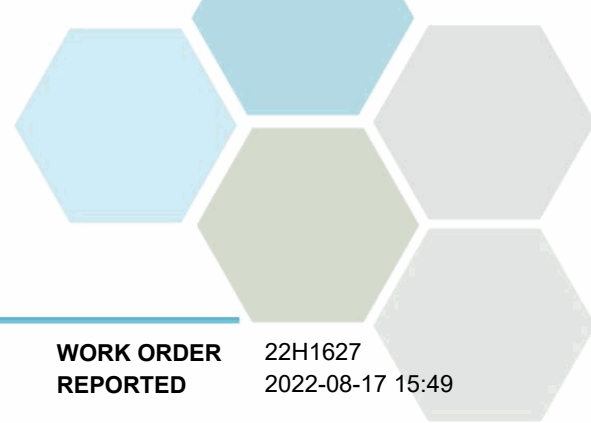
Nitrate+Nitrite (as N)	2.34		0.0100	mg/L	N/A	
Nitrogen, Total	4.17		0.0500	mg/L	N/A	

General Parameters

BOD, 5-day	< 7.0		2.0	mg/L	2022-08-16	
Nitrogen, Total Kjeldahl	1.82 ± 0.22		0.050	mg/L	2022-08-17	
Phosphorus, Total (as P)	0.0826 ± 0.0092		0.0050	mg/L	2022-08-16	
Solids, Total Suspended	5.7 ± 0.7		2.0	mg/L	2022-08-13	

Sample Qualifiers:

PRES Sample has been preserved for TKN,TP in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22H1627 2022-08-17 15:49

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Coliforms, Total in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	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
MPN/100 mL	Most Probable Number per 100 millilitres
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.

General Comments:

The results in this report apply to the 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. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing. The quality control (QC) data is available upon request

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.



CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22H0447
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-08-03 12:15 / 3.0°C 2022-08-19 08:53
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

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>

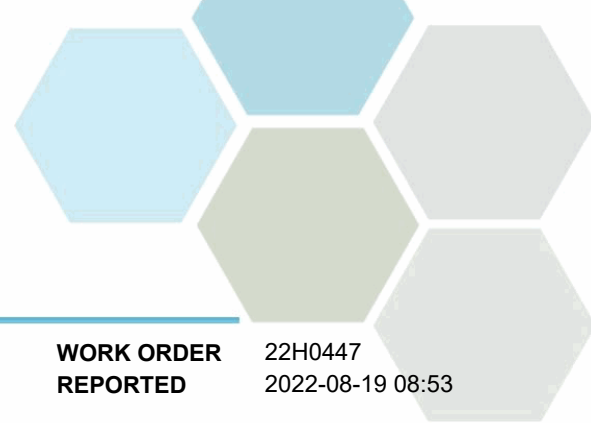
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22H0447
2022-08-19 08:53

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22H0447-01) | Matrix: Wastewater | Sampled: 2022-08-03 07:45

Microbiological Parameters

Coliforms, Total (Q-Tray)	5		1	MPN/100 mL	2022-08-04	
Coliforms, Fecal (Q-Tray)	1		1	MPN/100 mL	2022-08-04	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-08-04	

Effluent 24 hr Comp.- WT# 3813A (E105000) (22H0447-02) | Matrix: Wastewater | Sampled: 2022-08-02 07:45 To 2022-08-03 07:45

Anions

Nitrate (as N)	0.648 ± 0.041		0.010	mg/L	2022-08-04	
Nitrite (as N)	0.540 ± 0.056		0.010	mg/L	2022-08-04	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-08-04	

Calculated Parameters

Nitrate+Nitrite (as N)	1.19		0.0100	mg/L	N/A	
Nitrogen, Total	3.29		0.0500	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	0.833 ± 0.078		0.050	mg/L	2022-08-04	
BOD, 5-day	< 6.8		2.0	mg/L	2022-08-09	
Chemical Oxygen Demand	35 ± 18		20	mg/L	2022-08-07	
Nitrogen, Total Kjeldahl	2.11 ± 0.26		0.050	mg/L	2022-08-09	
Phosphorus, Total (as P)	0.135 ± 0.015		0.0050	mg/L	2022-08-08	

Upstream of O/F- WT# 3812F (0500050) (22H0447-03) | Matrix: Fresh Water | Sampled: 2022-08-03 06:45

Anions

Chloride	5.04 ± 0.28		0.10	mg/L	2022-08-04	
Nitrate (as N)	< 0.010		0.010	mg/L	2022-08-04	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-08-04	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-08-04	

Calculated Parameters

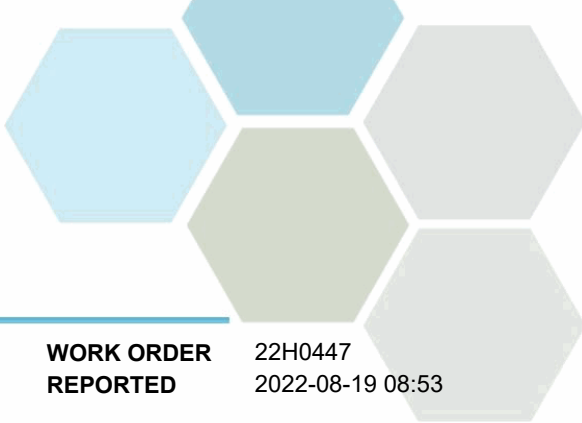
Hardness, Total (as CaCO3)	116		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	< 0.0100		0.0100	mg/L	N/A	
Nitrogen, Total	0.216		0.0500	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	< 0.050		0.050	mg/L	2022-08-04	
Nitrogen, Total Kjeldahl	0.216 ± 0.031		0.050	mg/L	2022-08-09	
Phosphorus, Total (as P)	0.0057 ± 0.0012		0.0050	mg/L	2022-08-08	
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-08-08	

Microbiological Parameters

Coliforms, Total (Q-Tray)	1550		1	MPN/100 mL	2022-08-04	
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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22H0447
2022-08-19 08:53

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Upstream of O/F- WT# 3812F (0500050) (22H0447-03) | Matrix: Fresh Water | Sampled: 2022-08-03 06:45, Continued

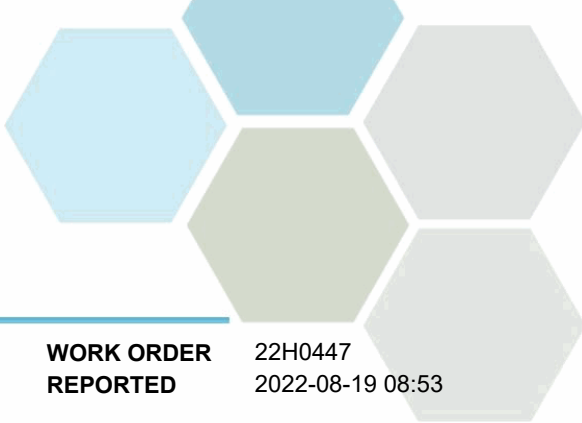
Microbiological Parameters, Continued

E. coli (Q-Tray)	3		1	MPN/100 mL	2022-08-04	
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Total Metals

Aluminum, total	0.0123	± 0.0025	0.0050	mg/L	2022-08-16	
Antimony, total	< 0.00020		0.00020	mg/L	2022-08-16	
Arsenic, total	< 0.00050		0.00050	mg/L	2022-08-16	
Barium, total	0.0212	± 0.0028	0.0050	mg/L	2022-08-16	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-08-16	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-08-16	
Boron, total	< 0.0500		0.0500	mg/L	2022-08-16	
Cadmium, total	< 0.000010		0.000010	mg/L	2022-08-16	
Calcium, total	31.8	± 4.5	0.20	mg/L	2022-08-16	
Chromium, total	< 0.00050		0.00050	mg/L	2022-08-16	
Cobalt, total	< 0.00010		0.00010	mg/L	2022-08-16	
Copper, total	0.00073	± 0.00012	0.00040	mg/L	2022-08-17	
Iron, total	0.016	± 0.003	0.010	mg/L	2022-08-16	
Lead, total	< 0.00020		0.00020	mg/L	2022-08-16	
Lithium, total	0.00340	± 0.00061	0.00010	mg/L	2022-08-16	
Magnesium, total	8.92	± 1.25	0.010	mg/L	2022-08-16	
Manganese, total	0.00210	± 0.00186	0.00020	mg/L	2022-08-16	
Molybdenum, total	0.00324	± 0.00046	0.00010	mg/L	2022-08-16	
Nickel, total	0.00041	± 0.00008	0.00040	mg/L	2022-08-16	
Phosphorus, total	< 0.050		0.050	mg/L	2022-08-16	
Potassium, total	2.27	± 0.35	0.10	mg/L	2022-08-16	
Selenium, total	< 0.00050		0.00050	mg/L	2022-08-16	
Silicon, total	3.4	± 0.7	1.0	mg/L	2022-08-16	
Silver, total	< 0.000050		0.000050	mg/L	2022-08-16	
Sodium, total	10.7	± 2.0	0.10	mg/L	2022-08-16	
Strontium, total	0.255	± 0.031	0.0010	mg/L	2022-08-16	
Sulfur, total	9.6	± 2.3	3.0	mg/L	2022-08-16	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-08-16	
Thallium, total	< 0.000020		0.000020	mg/L	2022-08-16	
Thorium, total	< 0.00010		0.00010	mg/L	2022-08-16	
Tin, total	< 0.00020		0.00020	mg/L	2022-08-16	
Titanium, total	< 0.0050		0.0050	mg/L	2022-08-16	
Tungsten, total	< 0.0002		0.0002	mg/L	2022-08-16	
Uranium, total	0.00247	± 0.00030	0.000020	mg/L	2022-08-16	
Vanadium, total	< 0.0050		0.0050	mg/L	2022-08-16	
Zinc, total	< 0.0040		0.0040	mg/L	2022-08-16	
Zirconium, total	< 0.00010		0.00010	mg/L	2022-08-16	

Downstream of O/F- WT# 38130 (E221464) (22H0447-04) | Matrix: Fresh Water | Sampled: 2022-08-03 07:15



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22H0447
2022-08-19 08:53

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Downstream of O/F- WT# 38130 (E221464) (22H0447-04) | Matrix: Fresh Water | Sampled: 2022-08-03 07:15, Continued

Anions

Chloride	5.12	± 0.29	0.10	mg/L	2022-08-04	
Nitrate (as N)	< 0.010		0.010	mg/L	2022-08-04	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-08-04	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-08-04	

Calculated Parameters

Hardness, Total (as CaCO3)	118		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	< 0.0100		0.0100	mg/L	N/A	
Nitrogen, Total	0.181		0.0500	mg/L	N/A	

General Parameters

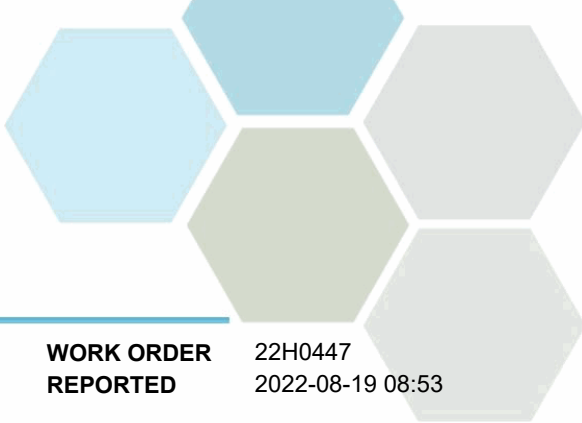
Ammonia, Total (as N)	< 0.050		0.050	mg/L	2022-08-04	
Nitrogen, Total Kjeldahl	0.181	± 0.028	0.050	mg/L	2022-08-09	
Phosphorus, Total (as P)	0.0060	± 0.0012	0.0050	mg/L	2022-08-08	
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-08-08	

Microbiological Parameters

Coliforms, Total (Q-Tray)	2420		1	MPN/100 mL	2022-08-04	
E. coli (Q-Tray)	5		1	MPN/100 mL	2022-08-04	

Total Metals

Aluminum, total	0.0150	± 0.0030	0.0050	mg/L	2022-08-14	
Antimony, total	< 0.00020		0.00020	mg/L	2022-08-14	
Arsenic, total	< 0.00050		0.00050	mg/L	2022-08-14	
Barium, total	0.0215	± 0.0028	0.0050	mg/L	2022-08-14	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-08-14	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-08-14	
Boron, total	< 0.0500		0.0500	mg/L	2022-08-14	
Cadmium, total	< 0.000010		0.000010	mg/L	2022-08-14	
Calcium, total	32.3	± 4.6	0.20	mg/L	2022-08-14	
Chromium, total	< 0.00050		0.00050	mg/L	2022-08-14	
Cobalt, total	< 0.00010		0.00010	mg/L	2022-08-14	
Copper, total	0.00080	± 0.00013	0.00040	mg/L	2022-08-14	
Iron, total	0.021	± 0.004	0.010	mg/L	2022-08-14	
Lead, total	< 0.00020		0.00020	mg/L	2022-08-14	
Lithium, total	0.00314	± 0.00056	0.00010	mg/L	2022-08-14	
Magnesium, total	9.09	± 1.27	0.010	mg/L	2022-08-14	
Manganese, total	0.00243	± 0.00216	0.00020	mg/L	2022-08-14	
Molybdenum, total	0.00339	± 0.00049	0.00010	mg/L	2022-08-14	
Nickel, total	0.00043	± 0.00009	0.00040	mg/L	2022-08-14	
Phosphorus, total	< 0.050		0.050	mg/L	2022-08-14	
Potassium, total	2.38	± 0.37	0.10	mg/L	2022-08-14	
Selenium, total	< 0.00050		0.00050	mg/L	2022-08-14	
Silicon, total	3.0	± 0.6	1.0	mg/L	2022-08-14	



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22H0447
2022-08-19 08:53

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Downstream of O/F- WT# 38130 (E221464) (22H0447-04) Matrix: Fresh Water Sampled: 2022-08-03 07:15, Continued						
<i>Total Metals, Continued</i>						
Silver, total	< 0.000050		0.000050	mg/L	2022-08-14	
Sodium, total	11.1	± 2.0	0.10	mg/L	2022-08-14	
Strontium, total	0.261	± 0.032	0.0010	mg/L	2022-08-14	
Sulfur, total	8.2	± 1.9	3.0	mg/L	2022-08-14	
Tellurium, total	< 0.000050		0.000050	mg/L	2022-08-14	
Thallium, total	< 0.000020		0.000020	mg/L	2022-08-14	
Thorium, total	< 0.00010		0.00010	mg/L	2022-08-14	
Tin, total	< 0.00020		0.00020	mg/L	2022-08-14	
Titanium, total	< 0.0050		0.0050	mg/L	2022-08-14	
Tungsten, total	< 0.0002		0.0002	mg/L	2022-08-14	
Uranium, total	0.00248	± 0.00030	0.000020	mg/L	2022-08-14	
Vanadium, total	< 0.0050		0.0050	mg/L	2022-08-14	
Zinc, total	< 0.0040		0.0040	mg/L	2022-08-14	
Zirconium, total	< 0.00010		0.00010	mg/L	2022-08-14	

Influent- WT# 38131 (0500232) (22H0447-05) | Matrix: Wastewater | Sampled: 2022-08-03

<i>Anions</i>						
Nitrate (as N)	< 0.010		0.010	mg/L	2022-08-04	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-08-04	
Phosphate (as P)	0.998	± 0.173	0.0050	mg/L	2022-08-04	
<i>Calculated Parameters</i>						
Nitrate+Nitrite (as N)	< 0.0100		0.0100	mg/L	N/A	
Nitrogen, Total	44.1		2.00	mg/L	N/A	
<i>General Parameters</i>						
Nitrogen, Total Kjeldahl	44.1	± 5.4	0.050	mg/L	2022-08-09	
Phosphorus, Total (as P)	6.29	± 0.70	0.0050	mg/L	2022-08-08	

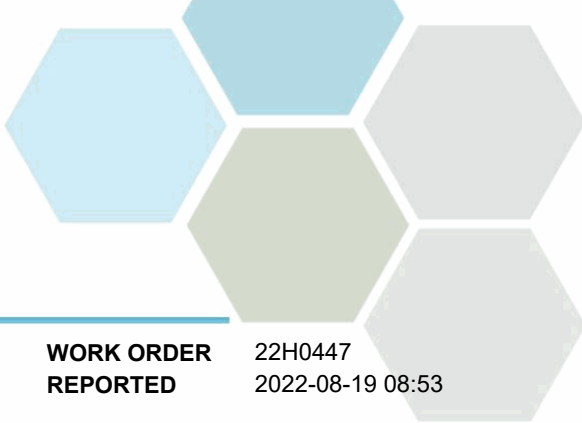
Reclaimed Water - North WT# 3813C (E221689) (22H0447-06) | Matrix: Wastewater | Sampled: 2022-08-03 07:00

<i>Microbiological Parameters</i>						
Coliforms, Total (Q-Tray)	< 1		1	MPN/100 mL	2022-08-04	
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-08-04	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-08-04	

Effluent 7 Day Composite- WT# 3813A (E105000) (22H0447-07) | Matrix: Wastewater | Sampled: 2022-07-28 00:00 To 2022-08-03 00:00

PRES

<i>Anions</i>						
Nitrate (as N)	2.50	± 0.16	0.010	mg/L	2022-08-05	



TEST RESULTS

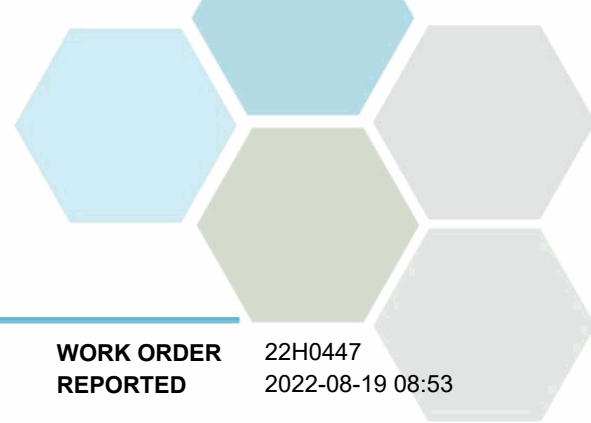
REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22H0447
2022-08-19 08:53

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Effluent 7 Day Composite- WT# 3813A (E105000) (22H0447-07) Matrix: Wastewater Sampled: 2022-07-28 00:00 To 2022-08-03 00:00, Continued						PRES
Anions, Continued						
Nitrite (as N)	0.379	± 0.039	0.010	mg/L	2022-08-05	
Calculated Parameters						
Nitrate+Nitrite (as N)	2.88		0.0100	mg/L	N/A	
Nitrogen, Total	4.46		0.0500	mg/L	N/A	
General Parameters						
Nitrogen, Total Kjeldahl	1.58	± 0.19	0.050	mg/L	2022-08-09	
Phosphorus, Total (as P)	0.0854	± 0.0095	0.0050	mg/L	2022-08-08	
Solids, Total Suspended	3.4	± 0.4	2.0	mg/L	2022-08-08	

Sample Qualifiers:

PRES Sample has been preserved for TP, TKN in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22H0447
2022-08-19 08:53

Analysis Description	Method Ref.	Technique	Accredited	Location
Ammonia, Total in Water	SM 4500-NH3 G* (2017)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Chemical Oxygen Demand in Water	SM 5220 D* (2017)	Closed Reflux, Colorimetry	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Coliforms, Total in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Hardness in Water	SM 2340 B* (2017)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

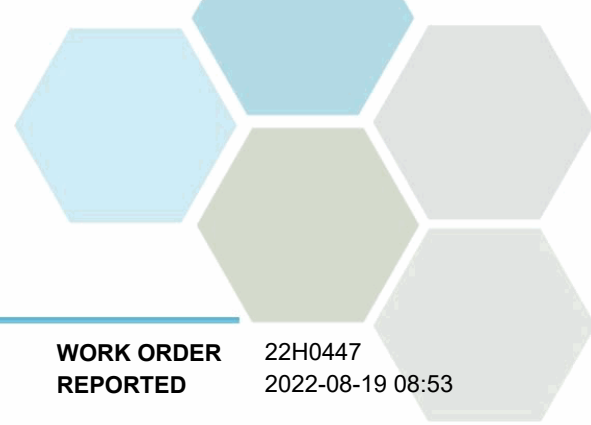
Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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
MPN/100 mL	Most Probable Number per 100 millilitres
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Penticton, City of - DW & STP
PROJECT Wastewater - PE12212

WORK ORDER 22H0447
REPORTED 2022-08-19 08:53

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22H2810
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-08-18 14:00 / 11.9°C 2022-08-25 11:47
PO NUMBER		COC NUMBER	Green
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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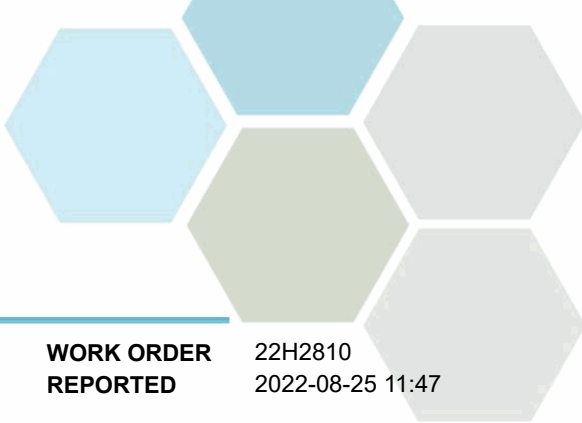
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22H2810
2022-08-25 11:47

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22H2810-01) | Matrix: Wastewater | Sampled: 2022-08-18 07:30

Microbiological Parameters

Coliforms, Total (Q-Tray)	158		1	MPN/100 mL	2022-08-19	
Coliforms, Fecal (Q-Tray)	2		1	MPN/100 mL	2022-08-19	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-08-19	

Reclaimed Water - North WT# 3813C (E221689) (22H2810-02) | Matrix: Wastewater | Sampled: 2022-08-18 07:00

Microbiological Parameters

Coliforms, Total (Q-Tray)	365		1	MPN/100 mL	2022-08-19	
Coliforms, Fecal (Q-Tray)	6		1	MPN/100 mL	2022-08-19	
E. coli (Q-Tray)	1		1	MPN/100 mL	2022-08-19	

Effluent 7 Day Composite- WT# 3813A (E105000) (22H2810-03) | Matrix: Wastewater | Sampled: 2022-08-11 00:00 To 2022-08-17 00:00

PRES

Anions

Nitrate (as N)	2.81 ± 0.18		0.010	mg/L	2022-08-22	HT1
Nitrite (as N)	0.165 ± 0.017		0.010	mg/L	2022-08-22	HT1

Calculated Parameters

Nitrate+Nitrite (as N)	2.97		0.0100	mg/L	N/A	
Nitrogen, Total	4.27		0.0500	mg/L	N/A	

General Parameters

BOD, 5-day	< 4.8		2.0	mg/L	2022-08-24	
Nitrogen, Total Kjeldahl	1.30 ± 0.16		0.050	mg/L	2022-08-24	
Phosphorus, Total (as P)	0.0691 ± 0.0077		0.0050	mg/L	2022-08-24	
Solids, Total Suspended	6.8 ± 0.6		2.0	mg/L	2022-08-24	

Sample Qualifiers:

- HT1 The sample was prepared and/or analyzed past the recommended holding time.
- PRES Sample has been preserved for TKN, TN in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22H2810
2022-08-25 11:47

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Coliforms, Total in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna

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

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SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22H3638
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-08-24 13:00 / 2.1°C 2022-08-31 15:21
PO NUMBER		COC NUMBER	Green
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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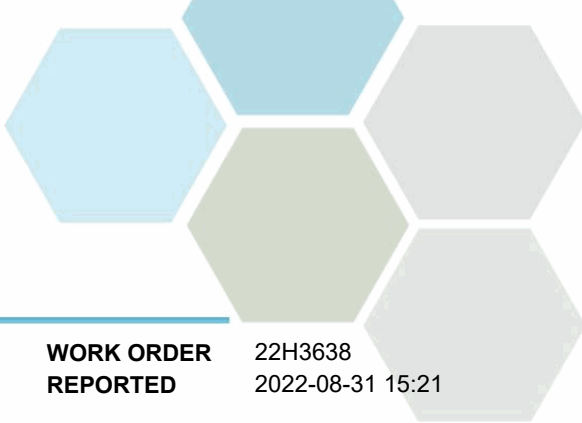
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Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22H3638
2022-08-31 15:21

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab (22H3638-01) | Matrix: Wastewater | Sampled: 2022-08-24 06:30

Microbiological Parameters

Coliforms, Total (Q-Tray)	17		1	MPN/100 mL	2022-08-25	
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-08-25	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-08-25	

Reclaimed Water - (North or South) (22H3638-02) | Matrix: Wastewater | Sampled: 2022-08-24 07:30

Microbiological Parameters

Coliforms, Total (Q-Tray)	< 1		1	MPN/100 mL	2022-08-25	
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-08-25	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-08-25	

Effluent 7 Day Composite (22H3638-03) | Matrix: Wastewater | Sampled: 2022-08-18 00:00 To 2022-08-24 00:00

PRES

Anions

Nitrate (as N)	3.03 ± 0.19		0.010	mg/L	2022-08-26	
Nitrite (as N)	0.038 ± 0.004		0.010	mg/L	2022-08-26	

Calculated Parameters

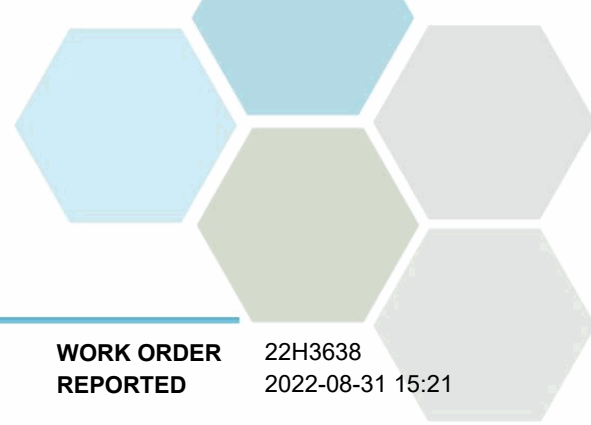
Nitrate+Nitrite (as N)	3.07		0.0100	mg/L	N/A	
Nitrogen, Total	4.34		0.0500	mg/L	N/A	

General Parameters

BOD, 5-day	< 6.1		2.0	mg/L	2022-08-30	
Nitrogen, Total Kjeldahl	1.27 ± 0.16		0.050	mg/L	2022-08-30	
Phosphorus, Total (as P)	0.0625 ± 0.0069		0.0050	mg/L	2022-08-29	
Solids, Total Suspended	9.4 ± 0.8		2.0	mg/L	2022-08-28	

Sample Qualifiers:

PRES Sample has been preserved for TKN,TN in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22H3638 2022-08-31 15:21

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Coliforms, Total in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna

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

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Uncertainty Derivation:

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22H4550
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-08-31 13:30 / 3.3°C 2022-09-08 13:46
PO NUMBER		COC NUMBER	Green
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

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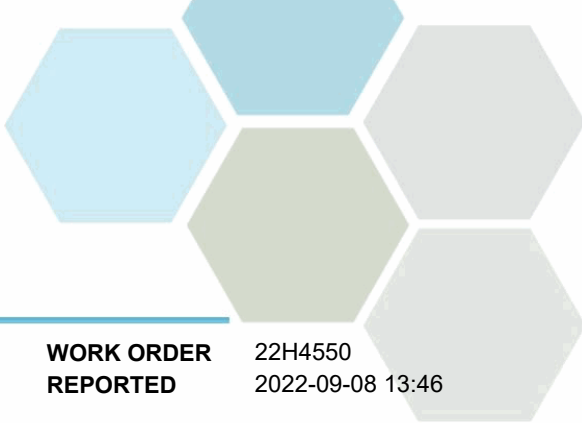
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Brent Whitehead
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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22H4550
2022-09-08 13:46

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab (22H4550-01) | Matrix: Wastewater | Sampled: 2022-08-31 08:00

Microbiological Parameters

Coliforms, Total (Q-Tray)	24		1	MPN/100 mL	2022-09-01	
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-09-01	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-09-01	

Reclaimed Water - North WT# 3813C (E221689) (22H4550-02) | Matrix: Wastewater | Sampled: 2022-08-31 07:00

Microbiological Parameters

Coliforms, Total (Q-Tray)	< 1		1	MPN/100 mL	2022-09-01	
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-09-01	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-09-01	

Effluent 7 Day Composite (22H4550-03) | Matrix: Wastewater | Sampled: 2022-08-25 00:00 To 2022-08-31 00:00

Anions

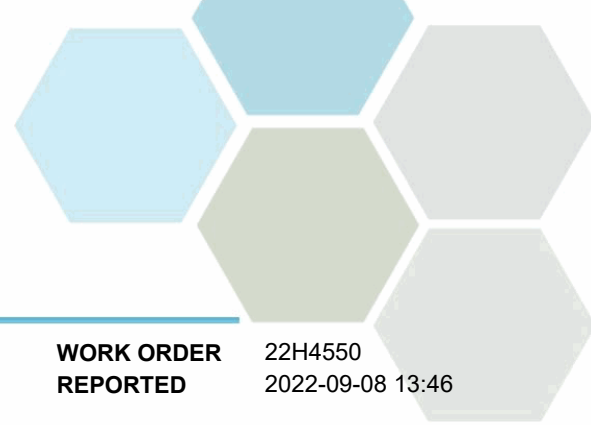
Nitrate (as N)	2.45 ± 0.15		0.010	mg/L	2022-09-01	
Nitrite (as N)	0.043 ± 0.004		0.010	mg/L	2022-09-01	

Calculated Parameters

Nitrate+Nitrite (as N)	2.50		0.0100	mg/L	N/A	
Nitrogen, Total	3.77		0.0500	mg/L	N/A	

General Parameters

BOD, 5-day	< 6.2		2.0	mg/L	2022-09-06	
Nitrogen, Total Kjeldahl	1.27 ± 0.16		0.050	mg/L	2022-09-06	
Phosphorus, Total (as P)	0.0606 ± 0.0067		0.0050	mg/L	2022-09-07	
Solids, Total Suspended	3.2 ± 0.4		2.0	mg/L	2022-09-08	



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22H4550
2022-09-08 13:46

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Coliforms, Total in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna

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

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	2210804
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-09-07 12:50 / 11.3°C 2022-09-14 11:47
PO NUMBER		COC NUMBER	Red
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

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.

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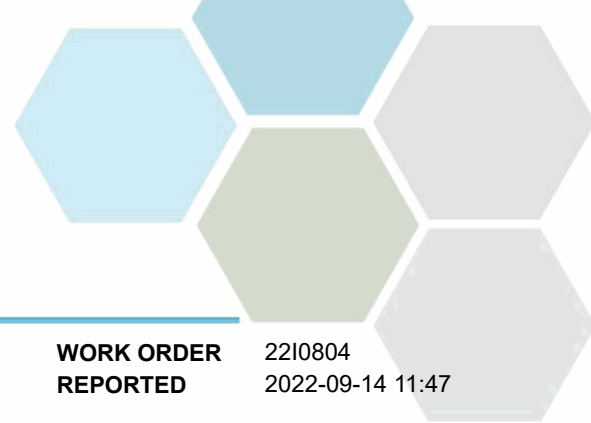
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 2210804
2022-09-14 11:47

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab (2210804-01) | Matrix: Wastewater | Sampled: 2022-09-07 07:00

Microbiological Parameters

Coliforms, Total (Q-Tray)	8		1	MPN/100 mL	2022-09-08	
Coliforms, Fecal (Q-Tray)	1		1	MPN/100 mL	2022-09-08	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-09-08	

Effluent 24 hr Comp.- WT# 3813A (E105000) (2210804-02) | Matrix: Wastewater | Sampled: 2022-09-07 07:00

Anions

Nitrate (as N)	2.11 ± 0.13		0.010	mg/L	2022-09-09	
Nitrite (as N)	0.020 ± 0.002		0.010	mg/L	2022-09-09	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-09-09	

Calculated Parameters

Nitrate+Nitrite (as N)	2.13		0.0100	mg/L		N/A
Nitrogen, Total	3.40		0.0500	mg/L		N/A

General Parameters

Ammonia, Total (as N)	0.075 ± 0.010		0.050	mg/L	2022-09-08	
BOD, 5-day	< 7.4		2.0	mg/L	2022-09-14	
Chemical Oxygen Demand	33 ± 7		20	mg/L	2022-09-11	
Nitrogen, Total Kjeldahl	1.27 ± 0.16		0.050	mg/L	2022-09-12	
Phosphorus, Total (as P)	0.0674 ± 0.0075		0.0050	mg/L	2022-09-09	

Upstream of O/F- WT# 3812F (0500050) (2210804-03) | Matrix: Fresh Water | Sampled: 2022-09-07 07:15

Anions

Chloride	5.74 ± 0.32		0.10	mg/L	2022-09-09	
Nitrate (as N)	< 0.010		0.010	mg/L	2022-09-09	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-09-09	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-09-09	

Calculated Parameters

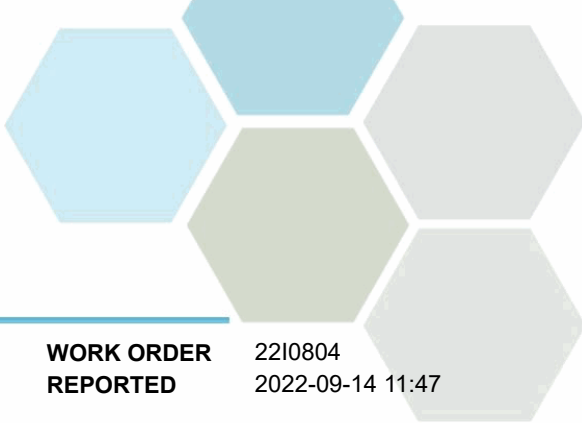
Hardness, Total (as CaCO3)	116		0.500	mg/L		N/A
Nitrate+Nitrite (as N)	< 0.0100		0.0100	mg/L		N/A
Nitrogen, Total	0.247		0.0500	mg/L		N/A

General Parameters

Ammonia, Total (as N)	< 0.050		0.050	mg/L	2022-09-08	
Nitrogen, Total Kjeldahl	0.247 ± 0.034		0.050	mg/L	2022-09-12	
Phosphorus, Total (as P)	0.0091 ± 0.0011		0.0050	mg/L	2022-09-09	
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-09-13	

Microbiological Parameters

Coliforms, Total (Q-Tray)	1300		1	MPN/100 mL	2022-09-08	
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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 2210804
2022-09-14 11:47

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Upstream of O/F- WT# 3812F (0500050) (2210804-03) | Matrix: Fresh Water | Sampled: 2022-09-07 07:15, Continued

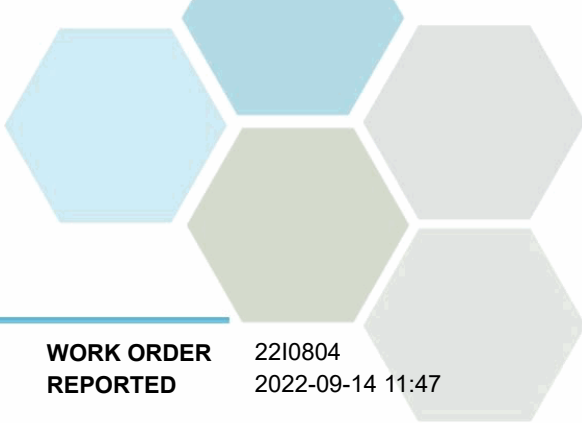
Microbiological Parameters, Continued

E. coli (Q-Tray)	16		1	MPN/100 mL	2022-09-08	
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Total Metals

Aluminum, total	0.0087 ± 0.0018		0.0050	mg/L	2022-09-11	
Antimony, total	< 0.00020		0.00020	mg/L	2022-09-11	
Arsenic, total	< 0.00050		0.00050	mg/L	2022-09-11	
Barium, total	0.0215 ± 0.0028		0.0050	mg/L	2022-09-11	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-09-11	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-09-11	
Boron, total	< 0.0500		0.0500	mg/L	2022-09-11	
Cadmium, total	< 0.000010		0.000010	mg/L	2022-09-11	
Calcium, total	32.4 ± 4.6		0.20	mg/L	2022-09-11	
Chromium, total	< 0.00050		0.00050	mg/L	2022-09-11	
Cobalt, total	< 0.00010		0.00010	mg/L	2022-09-11	
Copper, total	0.00068 ± 0.00011		0.00040	mg/L	2022-09-11	
Iron, total	0.015 ± 0.003		0.010	mg/L	2022-09-11	
Lead, total	< 0.00020		0.00020	mg/L	2022-09-11	
Lithium, total	0.00295 ± 0.00053		0.00010	mg/L	2022-09-11	
Magnesium, total	8.55 ± 1.20		0.010	mg/L	2022-09-11	
Manganese, total	0.00168 ± 0.00149		0.00020	mg/L	2022-09-11	
Molybdenum, total	0.00330 ± 0.00047		0.00010	mg/L	2022-09-11	
Nickel, total	< 0.00040		0.00040	mg/L	2022-09-11	
Phosphorus, total	< 0.050		0.050	mg/L	2022-09-11	
Potassium, total	2.10 ± 0.33		0.10	mg/L	2022-09-11	
Selenium, total	< 0.00050		0.00050	mg/L	2022-09-11	
Silicon, total	3.2 ± 0.6		1.0	mg/L	2022-09-11	
Silver, total	< 0.000050		0.000050	mg/L	2022-09-11	
Sodium, total	10.5 ± 1.9		0.10	mg/L	2022-09-11	
Strontium, total	0.258 ± 0.031		0.0010	mg/L	2022-09-11	
Sulfur, total	9.2 ± 2.2		3.0	mg/L	2022-09-11	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-09-11	
Thallium, total	< 0.000020		0.000020	mg/L	2022-09-11	
Thorium, total	< 0.00010		0.00010	mg/L	2022-09-11	
Tin, total	< 0.00020		0.00020	mg/L	2022-09-11	
Titanium, total	< 0.0050		0.0050	mg/L	2022-09-11	
Tungsten, total	< 0.0002		0.0002	mg/L	2022-09-11	
Uranium, total	0.00217 ± 0.00026		0.000020	mg/L	2022-09-11	
Vanadium, total	< 0.0050		0.0050	mg/L	2022-09-11	
Zinc, total	< 0.0040		0.0040	mg/L	2022-09-11	
Zirconium, total	< 0.00010		0.00010	mg/L	2022-09-11	

Downstream of O/F- WT# 38130 (E221464) (2210804-04) | Matrix: Fresh Water | Sampled: 2022-09-07 07:45



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 2210804
2022-09-14 11:47

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Downstream of O/F- WT# 38130 (E221464) (2210804-04) | Matrix: Fresh Water | Sampled: 2022-09-07 07:45, Continued

Anions

Chloride	5.79	± 0.32	0.10	mg/L	2022-09-09	
Nitrate (as N)	< 0.010		0.010	mg/L	2022-09-09	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-09-09	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-09-09	

Calculated Parameters

Hardness, Total (as CaCO3)	118		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	< 0.0100		0.0100	mg/L	N/A	
Nitrogen, Total	0.252		0.0500	mg/L	N/A	

General Parameters

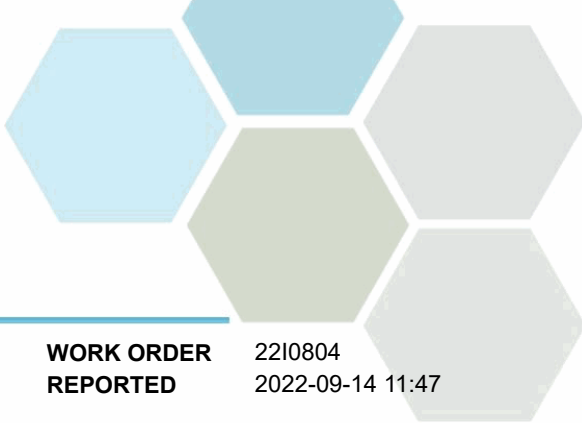
Ammonia, Total (as N)	< 0.050		0.050	mg/L	2022-09-08	
Nitrogen, Total Kjeldahl	0.252	± 0.035	0.050	mg/L	2022-09-12	
Phosphorus, Total (as P)	0.0081	± 0.0010	0.0050	mg/L	2022-09-09	
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-09-13	

Microbiological Parameters

Coliforms, Total (Q-Tray)	3610		1	MPN/100 mL	2022-09-08	
E. coli (Q-Tray)	20		1	MPN/100 mL	2022-09-08	

Total Metals

Aluminum, total	0.0109	± 0.0022	0.0050	mg/L	2022-09-11	
Antimony, total	< 0.00020		0.00020	mg/L	2022-09-11	
Arsenic, total	< 0.00050		0.00050	mg/L	2022-09-11	
Barium, total	0.0220	± 0.0029	0.0050	mg/L	2022-09-11	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-09-11	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-09-11	
Boron, total	< 0.0500		0.0500	mg/L	2022-09-11	
Cadmium, total	< 0.000010		0.000010	mg/L	2022-09-11	
Calcium, total	32.7	± 4.7	0.20	mg/L	2022-09-11	
Chromium, total	< 0.00050		0.00050	mg/L	2022-09-11	
Cobalt, total	< 0.00010		0.00010	mg/L	2022-09-11	
Copper, total	0.00070	± 0.00011	0.00040	mg/L	2022-09-11	
Iron, total	0.020	± 0.004	0.010	mg/L	2022-09-11	
Lead, total	< 0.00020		0.00020	mg/L	2022-09-11	
Lithium, total	0.00301	± 0.00054	0.00010	mg/L	2022-09-11	
Magnesium, total	8.87	± 1.24	0.010	mg/L	2022-09-11	
Manganese, total	0.00277	± 0.00246	0.00020	mg/L	2022-09-11	
Molybdenum, total	0.00326	± 0.00047	0.00010	mg/L	2022-09-11	
Nickel, total	0.00044	± 0.00009	0.00040	mg/L	2022-09-11	
Phosphorus, total	< 0.050		0.050	mg/L	2022-09-11	
Potassium, total	2.15	± 0.34	0.10	mg/L	2022-09-11	
Selenium, total	< 0.00050		0.00050	mg/L	2022-09-11	
Silicon, total	3.3	± 0.6	1.0	mg/L	2022-09-11	



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 2210804
2022-09-14 11:47

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Downstream of O/F- WT# 38130 (E221464) (2210804-04) | Matrix: Fresh Water | Sampled: 2022-09-07 07:45, Continued

Total Metals, Continued

Silver, total	< 0.000050		0.000050	mg/L	2022-09-11	
Sodium, total	10.9 ± 2.0		0.10	mg/L	2022-09-11	
Strontium, total	0.263 ± 0.032		0.0010	mg/L	2022-09-11	
Sulfur, total	9.2 ± 2.2		3.0	mg/L	2022-09-11	
Tellurium, total	< 0.000050		0.000050	mg/L	2022-09-11	
Thallium, total	< 0.000020		0.000020	mg/L	2022-09-11	
Thorium, total	< 0.00010		0.00010	mg/L	2022-09-11	
Tin, total	< 0.00020		0.00020	mg/L	2022-09-11	
Titanium, total	< 0.0050		0.0050	mg/L	2022-09-11	
Tungsten, total	< 0.0002		0.0002	mg/L	2022-09-11	
Uranium, total	0.00212 ± 0.00026		0.000020	mg/L	2022-09-11	
Vanadium, total	< 0.0050		0.0050	mg/L	2022-09-11	
Zinc, total	< 0.0040		0.0040	mg/L	2022-09-11	
Zirconium, total	< 0.00010		0.00010	mg/L	2022-09-11	

Influent- WT# 38131 (0500232) (2210804-05) | Matrix: Wastewater | Sampled: 2022-09-07 07:00

Anions

Nitrate (as N)	< 0.010		0.010	mg/L	2022-09-09	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-09-09	
Phosphate (as P)	1.07 ± 0.19		0.0050	mg/L	2022-09-09	

Calculated Parameters

Nitrate+Nitrite (as N)	< 0.0100		0.0100	mg/L	N/A	
Nitrogen, Total	45.7		2.00	mg/L	N/A	

General Parameters

Nitrogen, Total Kjeldahl	45.7 ± 5.6		0.050	mg/L	2022-09-12	
Phosphorus, Total (as P)	6.35 ± 0.70		0.0050	mg/L	2022-09-09	

Reclaimed Water - North WT# 3813C (E221689) (2210804-06) | Matrix: Wastewater | Sampled: 2022-09-07 07:30

Microbiological Parameters

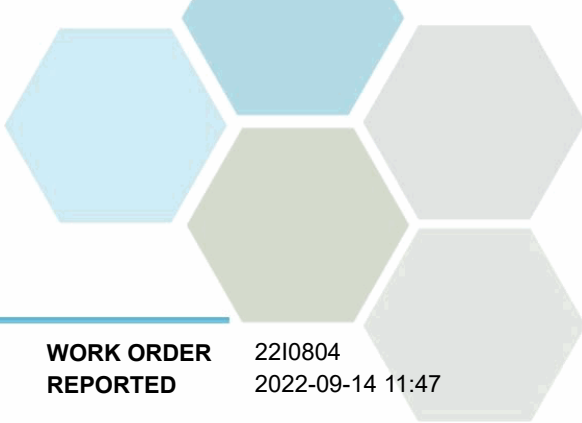
Coliforms, Total (Q-Tray)	< 1		1	MPN/100 mL	2022-09-08	
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-09-08	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-09-08	

Effluent 7 Day Composite (2210804-07) | Matrix: Wastewater | Sampled: 2022-09-01

PRES

Anions

Nitrate (as N)	1.95 ± 0.12		0.010	mg/L	2022-09-09	HT1
Nitrite (as N)	0.024 ± 0.003		0.010	mg/L	2022-09-09	HT1



TEST RESULTS

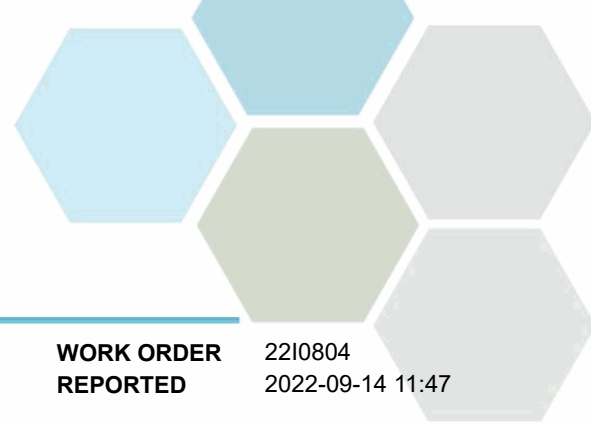
REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 2210804
2022-09-14 11:47

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Effluent 7 Day Composite (2210804-07) Matrix: Wastewater Sampled: 2022-09-01, Continued						PRES
<i>Calculated Parameters</i>						
Nitrate+Nitrite (as N)	1.98		0.0100	mg/L	N/A	
Nitrogen, Total	3.30		0.0500	mg/L	N/A	
<i>General Parameters</i>						
Nitrogen, Total Kjeldahl	1.32	± 0.16	0.050	mg/L	2022-09-12	
Phosphorus, Total (as P)	0.0697	± 0.0077	0.0050	mg/L	2022-09-09	
Solids, Total Suspended	12.6	± 1.1	2.0	mg/L	2022-09-09	

Sample Qualifiers:

- HT1 The sample was prepared and/or analyzed past the recommended holding time.
- PRES Sample has been preserved for TKN, TN in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 2210804
2022-09-14 11:47

Analysis Description	Method Ref.	Technique	Accredited	Location
Ammonia, Total in Water	SM 4500-NH3 G* (2017)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Chemical Oxygen Demand in Water	SM 5220 D* (2017)	Closed Reflux, Colorimetry	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Coliforms, Total in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Hardness in Water	SM 2340 B* (2017)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

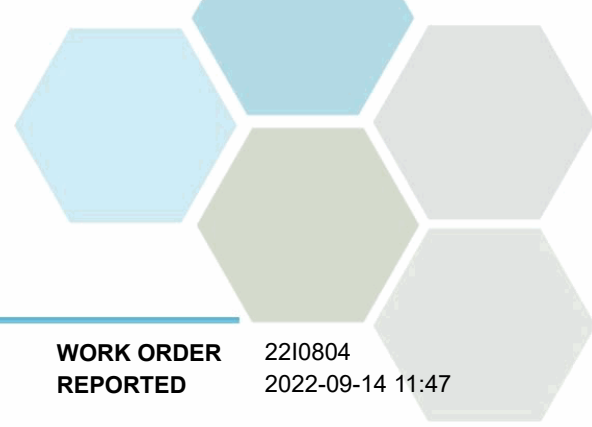
Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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
MPN/100 mL	Most Probable Number per 100 millilitres
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Penticton, City of - DW & STP
PROJECT Wastewater - PE12212

WORK ORDER 2210804
REPORTED 2022-09-14 11:47

General Comments:

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	2211879
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-09-14 12:30 / 7.2°C 2022-09-21 15:38
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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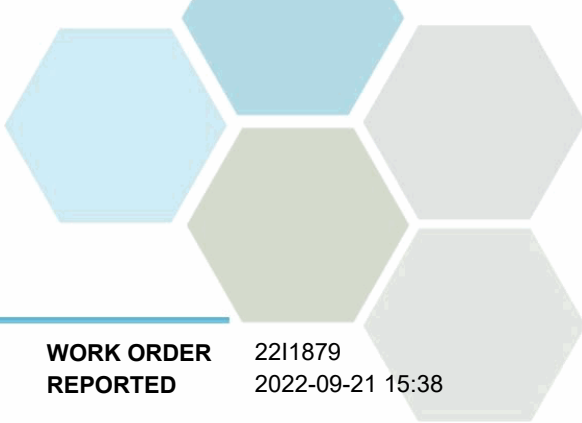
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 2211879 2022-09-21 15:38

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (2211879-01) | Matrix: Wastewater | Sampled: 2022-09-14 07:30

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	2		1	MPN/100 mL	2022-09-15	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-09-15	

Reclaimed Water - North WT# 3813C (E221689) (2211879-02) | Matrix: Wastewater | Sampled: 2022-09-14 07:00

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-09-15	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-09-15	

Effluent 7 Day Composite- WT# 3813A (E105000) (2211879-03) | Matrix: Wastewater | Sampled: 2022-09-08 00:00 To 2022-09-14 00:00

PRES

Anions

Nitrate (as N)	2.07 ± 0.13		0.010	mg/L	2022-09-15	
Nitrite (as N)	0.026 ± 0.003		0.010	mg/L	2022-09-15	

Calculated Parameters

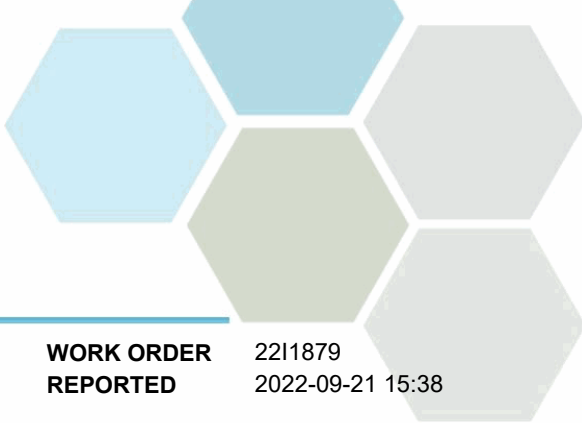
Nitrate+Nitrite (as N)	2.09		0.0100	mg/L	N/A	
Nitrogen, Total	3.43		0.0500	mg/L	N/A	

General Parameters

BOD, 5-day	< 6.3		2.0	mg/L	2022-09-20	
Nitrogen, Total Kjeldahl	1.34 ± 0.16		0.050	mg/L	2022-09-16	
Phosphorus, Total (as P)	0.0988 ± 0.0110		0.0050	mg/L	2022-09-19	
Solids, Total Suspended	2.4 ± 0.4		2.0	mg/L	2022-09-19	

Sample Qualifiers:

PRES Sample has been preserved for TKN, TP in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 2211879
2022-09-21 15:38

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	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
MPN/100 mL	Most Probable Number per 100 millilitres
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.

General Comments:

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	2212792
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-09-21 12:30 / 1.1°C 2022-09-27 15:37
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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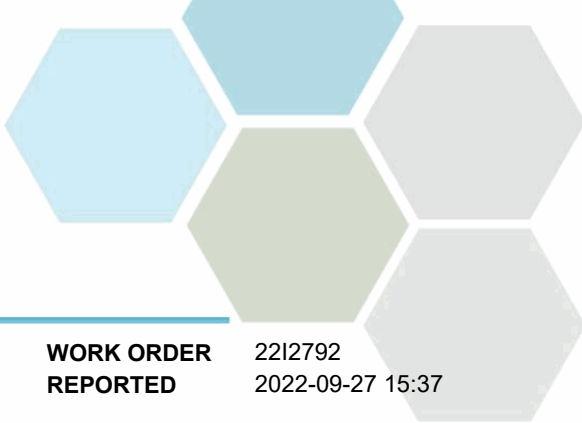
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Brent Whitehead
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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 2212792
2022-09-27 15:37

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (2212792-01) | Matrix: Wastewater | Sampled: 2022-09-21 07:00

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-09-22	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-09-22	

Reclaimed Water - North WT# 3813C (E221689) (2212792-02) | Matrix: Wastewater | Sampled: 2022-09-21 06:45

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-09-22	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-09-22	

Effluent 7 Day Composite- WT# 3813A (E105000) (2212792-03) | Matrix: Wastewater | Sampled: 2022-09-15 00:00 To 2022-09-21 00:00

PRES

Anions

Nitrate (as N)	1.40 ± 0.09		0.010	mg/L	2022-09-24	
Nitrite (as N)	0.064 ± 0.007		0.010	mg/L	2022-09-24	

Calculated Parameters

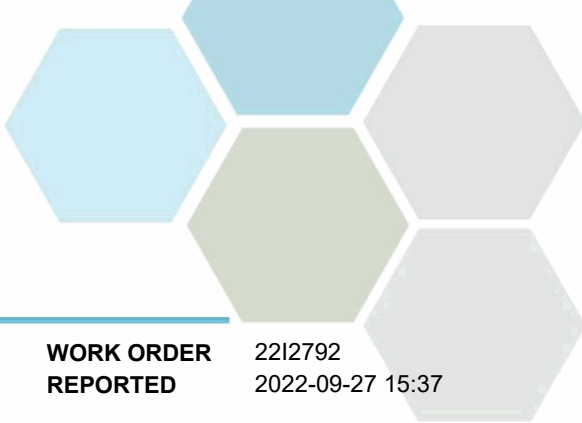
Nitrate+Nitrite (as N)	1.47		0.0100	mg/L	N/A	
Nitrogen, Total	2.89		0.0500	mg/L	N/A	

General Parameters

BOD, 5-day	< 6.8		2.0	mg/L	2022-09-27	
Nitrogen, Total Kjeldahl	1.42 ± 0.18		0.050	mg/L	2022-09-27	
Phosphorus, Total (as P)	0.101 ± 0.011		0.0050	mg/L	2022-09-26	
Solids, Total Suspended	8.6 ± 0.7		2.0	mg/L	2022-09-26	

Sample Qualifiers:

PRES Sample has been preserved for TP, TKN in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 2212792
2022-09-27 15:37

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	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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SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	2213819
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-09-28 08:30 / 5.3°C 2022-10-05 13:46
PO NUMBER		COC NUMBER	Green
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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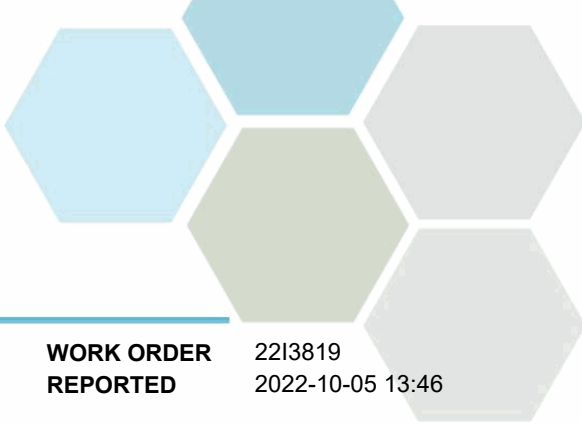
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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 2213819 2022-10-05 13:46

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab (2213819-01) | Matrix: Wastewater | Sampled: 2022-09-28

Microbiological Parameters

Coliforms, Total (Q-Tray)	2		1	MPN/100 mL	2022-09-29	
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-09-29	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-09-29	

Reclaimed Water - (North or South) (2213819-02) | Matrix: Wastewater | Sampled: 2022-09-28

Microbiological Parameters

Coliforms, Total (Q-Tray)	< 1		1	MPN/100 mL	2022-09-29	
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-09-29	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-09-29	

Effluent 7 Day Composite (2213819-03) | Matrix: Wastewater | Sampled: 2022-09-22

PRES

Anions

Nitrate (as N)	1.76 ± 0.11		0.010	mg/L	2022-10-03	HT1
Nitrite (as N)	0.087 ± 0.009		0.010	mg/L	2022-10-03	HT1

Calculated Parameters

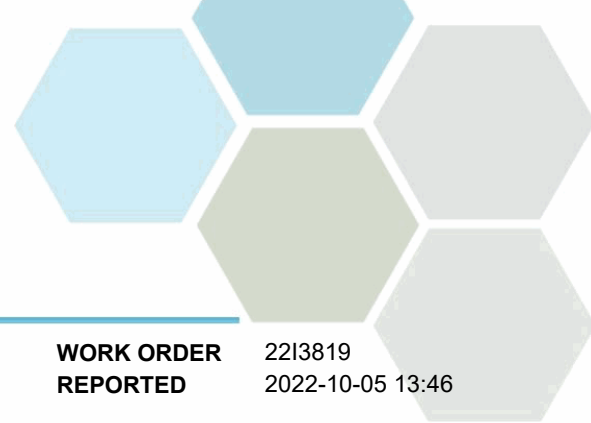
Nitrate+Nitrite (as N)	1.84		0.0100	mg/L	N/A	
Nitrogen, Total	3.18		0.0500	mg/L	N/A	

General Parameters

BOD, 5-day	< 6.7		2.0	mg/L	2022-10-04	HT1
Nitrogen, Total Kjeldahl	1.33 ± 0.16		0.050	mg/L	2022-10-05	
Phosphorus, Total (as P)	0.103 ± 0.011		0.0050	mg/L	2022-10-03	
Solids, Total Suspended	8.2 ± 0.7		2.0	mg/L	2022-09-30	HT2

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.
- PRES Sample has been preserved for tkn in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 2213819
2022-10-05 13:46

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Coliforms, Total in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	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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Uncertainty Derivation:

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22J0683
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-10-05 12:10 / 6.3°C 2022-10-13 15:41
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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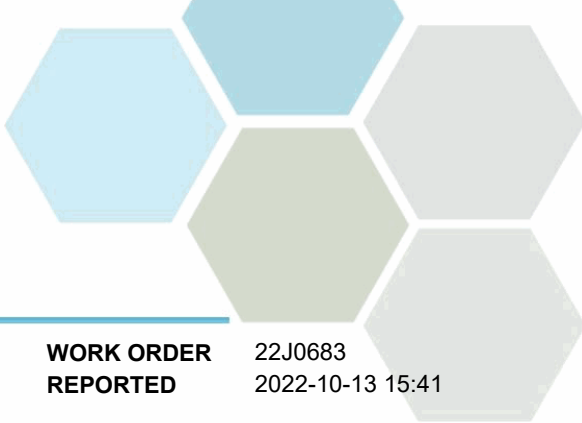
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Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22J0683 2022-10-13 15:41

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22J0683-01) | Matrix: Wastewater | Sampled: 2022-10-05 07:00

Microbiological Parameters

Coliforms, Total (Q-Tray)	5		1	MPN/100 mL	2022-10-06	HT1
Coliforms, Fecal (Q-Tray)	1		1	MPN/100 mL	2022-10-06	HT1
E. coli (Q-Tray)	1		1	MPN/100 mL	2022-10-06	HT1

Effluent 24 hr Comp.- WT# 3813A (E105000) (22J0683-02) | Matrix: Wastewater | Sampled: 2022-10-04 07:00 To 2022-10-05 07:00

Anions

Nitrate (as N)	1.26 ± 0.08		0.010	mg/L	2022-10-09	HT1
Nitrite (as N)	0.110 ± 0.011		0.010	mg/L	2022-10-09	HT1
Phosphate (as P)	0.0055 ± 0.0013		0.0050	mg/L	2022-10-09	HT1

Calculated Parameters

Nitrate+Nitrite (as N)	1.37		0.0100	mg/L	N/A	
Nitrogen, Total	2.83		0.0500	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	0.194 ± 0.019		0.050	mg/L	2022-10-11	
BOD, 5-day	< 7.1		2.0	mg/L	2022-10-12	
Chemical Oxygen Demand	37 ± 7		20	mg/L	2022-10-10	
Nitrogen, Total Kjeldahl	1.46 ± 0.18		0.050	mg/L	2022-10-12	
Phosphorus, Total (as P)	0.132 ± 0.015		0.0050	mg/L	2022-10-11	

Upstream of O/F- WT# 3812F (0500050) (22J0683-03) | Matrix: Fresh Water | Sampled: 2022-10-05 07:00

Anions

Chloride	5.99 ± 0.33		0.10	mg/L	2022-10-09	
Nitrate (as N)	< 0.010		0.010	mg/L	2022-10-09	HT1
Nitrite (as N)	< 0.010		0.010	mg/L	2022-10-09	HT1
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-10-09	HT1

Calculated Parameters

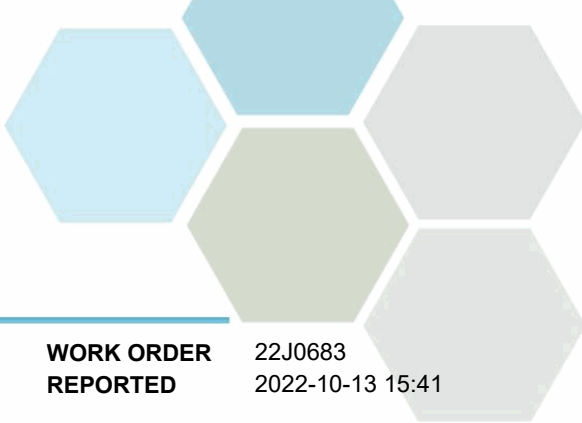
Hardness, Total (as CaCO3)	125		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	< 0.0100		0.0100	mg/L	N/A	
Nitrogen, Total	0.178		0.0500	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	< 0.050		0.050	mg/L	2022-10-11	
Nitrogen, Total Kjeldahl	0.178 ± 0.027		0.050	mg/L	2022-10-12	
Phosphorus, Total (as P)	0.0111 ± 0.0013		0.0050	mg/L	2022-10-11	
Solids, Total Suspended	< 9.4		2.0	mg/L	2022-10-12	

Microbiological Parameters

Coliforms, Total (Q-Tray)	1410		1	MPN/100 mL	2022-10-06	HT1
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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22J0683 2022-10-13 15:41

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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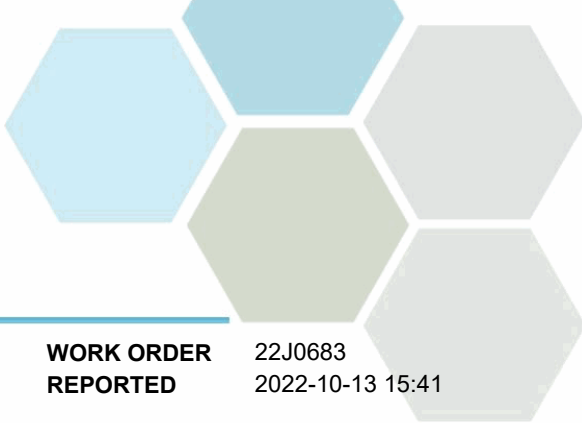
Upstream of O/F- WT# 3812F (0500050) (22J0683-03) | Matrix: Fresh Water | Sampled: 2022-10-05 07:00, Continued

Microbiological Parameters, Continued

Coliforms, Fecal (Q-Tray)	18		1	MPN/100 mL	2022-10-06	HT1
E. coli (Q-Tray)	18		1	MPN/100 mL	2022-10-06	HT1

Total Metals

Aluminum, total	0.0104 ± 0.0021			0.0050 mg/L	2022-10-13	
Antimony, total	< 0.00020			0.00020 mg/L	2022-10-13	
Arsenic, total	< 0.00050			0.00050 mg/L	2022-10-13	
Barium, total	0.0225 ± 0.0029			0.0050 mg/L	2022-10-13	
Beryllium, total	< 0.00010			0.00010 mg/L	2022-10-13	
Bismuth, total	< 0.00010			0.00010 mg/L	2022-10-13	
Boron, total	< 0.0500			0.0500 mg/L	2022-10-13	
Cadmium, total	< 0.000010			0.000010 mg/L	2022-10-13	
Calcium, total	33.9 ± 4.8			0.20 mg/L	2022-10-13	
Chromium, total	< 0.00050			0.00050 mg/L	2022-10-13	
Cobalt, total	< 0.00010			0.00010 mg/L	2022-10-13	
Copper, total	0.00077 ± 0.00012			0.00040 mg/L	2022-10-13	
Iron, total	0.024 ± 0.005			0.010 mg/L	2022-10-13	
Lead, total	< 0.00020			0.00020 mg/L	2022-10-13	
Lithium, total	0.00328 ± 0.00059			0.00010 mg/L	2022-10-13	
Magnesium, total	9.84 ± 1.38			0.010 mg/L	2022-10-13	
Manganese, total	0.00235 ± 0.00209			0.00020 mg/L	2022-10-13	
Molybdenum, total	0.00350 ± 0.00050			0.00010 mg/L	2022-10-13	
Nickel, total	0.00045 ± 0.00009			0.00040 mg/L	2022-10-13	
Phosphorus, total	< 0.050			0.050 mg/L	2022-10-13	
Potassium, total	2.45 ± 0.38			0.10 mg/L	2022-10-13	
Selenium, total	< 0.00050			0.00050 mg/L	2022-10-13	
Silicon, total	3.5 ± 0.7			1.0 mg/L	2022-10-13	
Silver, total	< 0.000050			0.000050 mg/L	2022-10-13	
Sodium, total	11.2 ± 2.1			0.10 mg/L	2022-10-13	
Strontium, total	0.268 ± 0.033			0.0010 mg/L	2022-10-13	
Sulfur, total	9.8 ± 2.3			3.0 mg/L	2022-10-13	
Tellurium, total	< 0.00050			0.00050 mg/L	2022-10-13	
Thallium, total	< 0.000020			0.000020 mg/L	2022-10-13	
Thorium, total	< 0.00010			0.00010 mg/L	2022-10-13	
Tin, total	0.00030 ± 0.00005			0.00020 mg/L	2022-10-13	
Titanium, total	< 0.0050			0.0050 mg/L	2022-10-13	
Tungsten, total	< 0.0002			0.0002 mg/L	2022-10-13	
Uranium, total	0.00232 ± 0.00028			0.000020 mg/L	2022-10-13	
Vanadium, total	< 0.0050			0.0050 mg/L	2022-10-13	
Zinc, total	< 0.0040			0.0040 mg/L	2022-10-13	
Zirconium, total	< 0.00010			0.00010 mg/L	2022-10-13	



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22J0683 2022-10-13 15:41

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Downstream of O/F- WT# 38130 (E221464) (22J0683-04) | Matrix: Fresh Water | Sampled: 2022-10-05 07:00

Anions

Chloride	6.50	± 0.36	0.10	mg/L	2022-10-09	
Nitrate (as N)	< 0.010		0.010	mg/L	2022-10-09	HT1
Nitrite (as N)	< 0.010		0.010	mg/L	2022-10-09	HT1
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-10-09	HT1

Calculated Parameters

Hardness, Total (as CaCO3)	120		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	< 0.0100		0.0100	mg/L	N/A	
Nitrogen, Total	0.223		0.0500	mg/L	N/A	

General Parameters

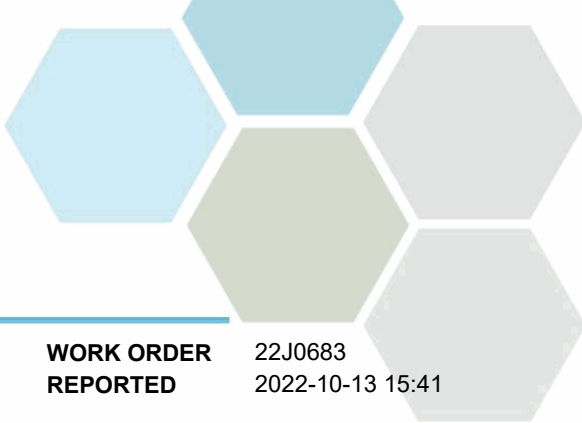
Ammonia, Total (as N)	< 0.050		0.050	mg/L	2022-10-11	
Nitrogen, Total Kjeldahl	0.223	± 0.032	0.050	mg/L	2022-10-12	
Phosphorus, Total (as P)	0.0086	± 0.0010	0.0050	mg/L	2022-10-11	
Solids, Total Suspended	< 9.8		2.0	mg/L	2022-10-12	

Microbiological Parameters

Coliforms, Total (Q-Tray)	1060		1	MPN/100 mL	2022-10-06	HT1
Coliforms, Fecal (Q-Tray)	16		1	MPN/100 mL	2022-10-06	HT1
E. coli (Q-Tray)	10		1	MPN/100 mL	2022-10-06	HT1

Total Metals

Aluminum, total	0.0078	± 0.0016	0.0050	mg/L	2022-10-13	
Antimony, total	< 0.00020		0.00020	mg/L	2022-10-13	
Arsenic, total	< 0.00050		0.00050	mg/L	2022-10-13	
Barium, total	0.0223	± 0.0029	0.0050	mg/L	2022-10-13	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-10-13	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-10-13	
Boron, total	< 0.0500		0.0500	mg/L	2022-10-13	
Cadmium, total	< 0.000010		0.000010	mg/L	2022-10-13	
Calcium, total	32.8	± 4.7	0.20	mg/L	2022-10-13	
Chromium, total	< 0.00050		0.00050	mg/L	2022-10-13	
Cobalt, total	< 0.00010		0.00010	mg/L	2022-10-13	
Copper, total	0.00074	± 0.00012	0.00040	mg/L	2022-10-13	
Iron, total	0.041	± 0.008	0.010	mg/L	2022-10-13	
Lead, total	< 0.00020		0.00020	mg/L	2022-10-13	
Lithium, total	0.00323	± 0.00058	0.00010	mg/L	2022-10-13	
Magnesium, total	9.29	± 1.30	0.010	mg/L	2022-10-13	
Manganese, total	0.00533	± 0.00473	0.00020	mg/L	2022-10-13	
Molybdenum, total	0.00332	± 0.00048	0.00010	mg/L	2022-10-13	
Nickel, total	< 0.00040		0.00040	mg/L	2022-10-13	
Phosphorus, total	< 0.050		0.050	mg/L	2022-10-13	
Potassium, total	2.40	± 0.37	0.10	mg/L	2022-10-13	
Selenium, total	< 0.00050		0.00050	mg/L	2022-10-13	



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22J0683
2022-10-13 15:41

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Downstream of O/F- WT# 38130 (E221464) (22J0683-04) | Matrix: Fresh Water | Sampled: 2022-10-05 07:00, Continued

Total Metals, Continued

Silicon, total	3.4	± 0.7	1.0	mg/L	2022-10-13	
Silver, total	< 0.000050		0.000050	mg/L	2022-10-13	
Sodium, total	11.1	± 2.0	0.10	mg/L	2022-10-13	
Strontium, total	0.261	± 0.032	0.0010	mg/L	2022-10-13	
Sulfur, total	9.3	± 2.2	3.0	mg/L	2022-10-13	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-10-13	
Thallium, total	< 0.000020		0.000020	mg/L	2022-10-13	
Thorium, total	< 0.00010		0.00010	mg/L	2022-10-13	
Tin, total	< 0.00020		0.00020	mg/L	2022-10-13	
Titanium, total	< 0.0050		0.0050	mg/L	2022-10-13	
Tungsten, total	< 0.0002		0.0002	mg/L	2022-10-13	
Uranium, total	0.00219	± 0.00026	0.000020	mg/L	2022-10-13	
Vanadium, total	< 0.0050		0.0050	mg/L	2022-10-13	
Zinc, total	< 0.0040		0.0040	mg/L	2022-10-13	
Zirconium, total	< 0.00010		0.00010	mg/L	2022-10-13	

Influent- WT# 38131 (0500232) (22J0683-05) | Matrix: Wastewater | Sampled: 2022-10-05 07:00

Anions

Nitrate (as N)	< 0.010		0.010	mg/L	2022-10-09	HT1
Nitrite (as N)	< 0.010		0.010	mg/L	2022-10-09	HT1
Phosphate (as P)	4.68	± 0.81	0.0050	mg/L	2022-10-09	HT1

Calculated Parameters

Nitrate+Nitrite (as N)	< 0.0100		0.0100	mg/L	N/A	
Nitrogen, Total	61.7		2.00	mg/L	N/A	

General Parameters

Nitrogen, Total Kjeldahl	61.7	± 7.6	0.050	mg/L	2022-10-12	
Phosphorus, Total (as P)	12.1	± 1.3	0.0050	mg/L	2022-10-11	

Reclaimed Water - North WT# 3813C (E221689) (22J0683-06) | Matrix: Wastewater | Sampled: 2022-10-05 07:00

Microbiological Parameters

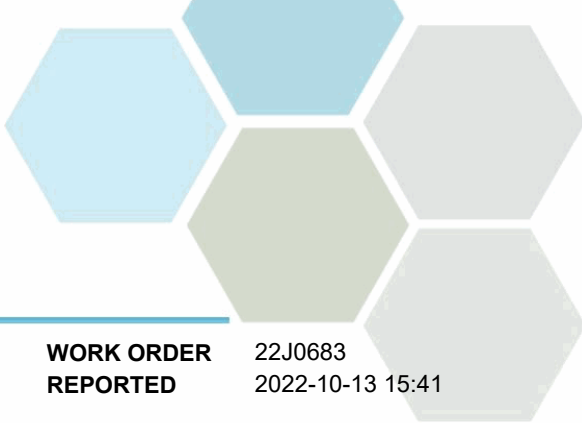
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-10-06	HT1
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-10-06	HT1

Effluent 7 Day Composite- WT# 3813A (E105000) (22J0683-07) | Matrix: Wastewater | Sampled: 2022-09-29 00:00 To 2022-10-05 00:00

PRES

Anions

Nitrate (as N)	1.40	± 0.09	0.010	mg/L	2022-10-09	HT1
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TEST RESULTS

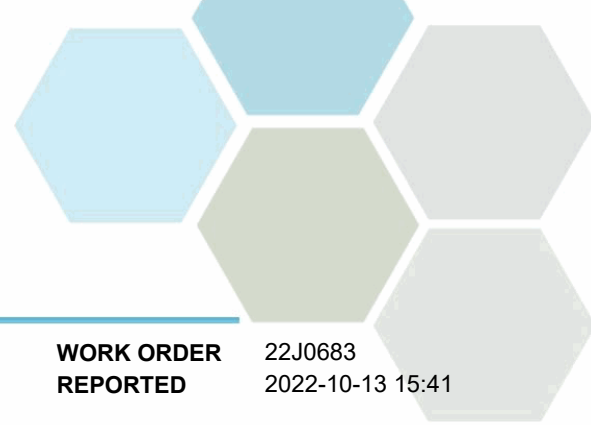
REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22J0683
2022-10-13 15:41

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Effluent 7 Day Composite- WT# 3813A (E105000) (22J0683-07) Matrix: Wastewater Sampled: 2022-09-29 00:00 To 2022-10-05 00:00, Continued						PRES
Anions, Continued						
Nitrite (as N)	0.097	± 0.010	0.010	mg/L	2022-10-09	HT1
Calculated Parameters						
Nitrate+Nitrite (as N)	1.50		0.0100	mg/L	N/A	
Nitrogen, Total	2.95		0.0500	mg/L	N/A	
General Parameters						
Nitrogen, Total Kjeldahl	1.46	± 0.18	0.050	mg/L	2022-10-12	
Phosphorus, Total (as P)	0.122	± 0.014	0.0050	mg/L	2022-10-11	
Solids, Total Suspended	11.2	± 0.9	2.0	mg/L	2022-10-12	

Sample Qualifiers:

- HT1 The sample was prepared and/or analyzed past the recommended holding time.
- PRES Sample has been preserved for TKN, TP in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22J0683
2022-10-13 15:41

Analysis Description	Method Ref.	Technique	Accredited	Location
Ammonia, Total in Water	SM 4500-NH3 G* (2017)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Chemical Oxygen Demand in Water	SM 5220 D* (2017)	Closed Reflux, Colorimetry	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Coliforms, Total in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Hardness in Water	SM 2340 B* (2017)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

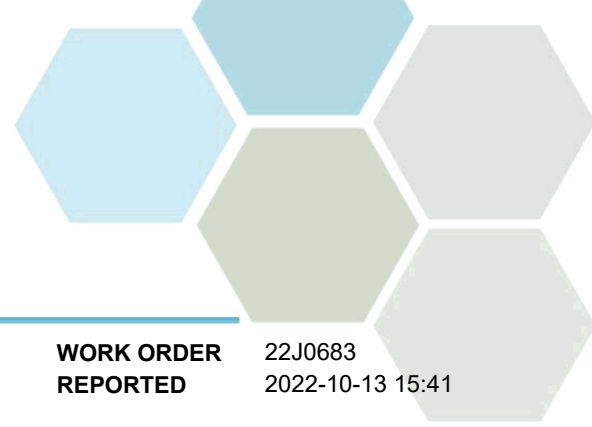
Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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
MPN/100 mL	Most Probable Number per 100 millilitres
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Penticton, City of - DW & STP
PROJECT Wastewater - PE12212

WORK ORDER 22J0683
REPORTED 2022-10-13 15:41

General Comments:

The results in this report apply to the 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. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing. The quality control (QC) data is available upon request

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.



CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22J1491
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-10-12 12:15 / 7.1°C 2022-10-19 10:26
PO NUMBER		COC NUMBER	Green
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

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>

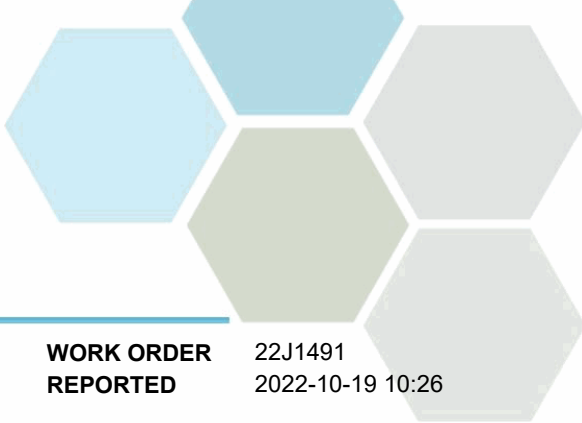
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22J1491
2022-10-19 10:26

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab (22J1491-01) | Matrix: Wastewater | Sampled: 2022-10-12

Microbiological Parameters

Coliforms, Total (Q-Tray)	6		1	MPN/100 mL	2022-10-13	
Coliforms, Fecal (Q-Tray)	2		1	MPN/100 mL	2022-10-13	
E. coli (Q-Tray)	2		1	MPN/100 mL	2022-10-13	

Reclaimed Water - North WT# 3813C (E221689) (22J1491-02) | Matrix: Wastewater | Sampled: 2022-10-12

Microbiological Parameters

Coliforms, Total (Q-Tray)	< 1		1	MPN/100 mL	2022-10-13	
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-10-13	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-10-13	

Effluent 7 Day Composite (22J1491-03) | Matrix: Wastewater | Sampled: 2022-10-06

Anions

Nitrate (as N)	1.38 ± 0.09		0.010	mg/L	2022-10-15	HT1
Nitrite (as N)	0.103 ± 0.011		0.010	mg/L	2022-10-15	HT1

Calculated Parameters

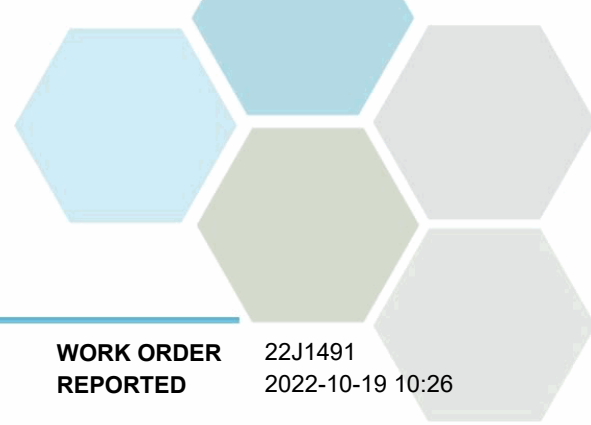
Nitrate+Nitrite (as N)	1.48		0.0100	mg/L	N/A	
Nitrogen, Total	3.28		0.0500	mg/L	N/A	

General Parameters

BOD, 5-day	< 7.0		2.0	mg/L	2022-10-18	HT1
Nitrogen, Total Kjeldahl	1.80 ± 0.22		0.050	mg/L	2022-10-19	
Phosphorus, Total (as P)	0.148 ± 0.016		0.0050	mg/L	2022-10-17	
Solids, Total Suspended	9.4 ± 0.9		2.0	mg/L	2022-10-16	HT1

Sample Qualifiers:

HT1 The sample was prepared and/or analyzed past the recommended holding time.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22J1491 2022-10-19 10:26

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Coliforms, Total in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	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
MPN/100 mL	Most Probable Number per 100 millilitres
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.

General Comments:

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22J2487
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-10-19 12:00 / 8.9°C 2022-10-26 10:37
PO NUMBER		COC NUMBER	Green
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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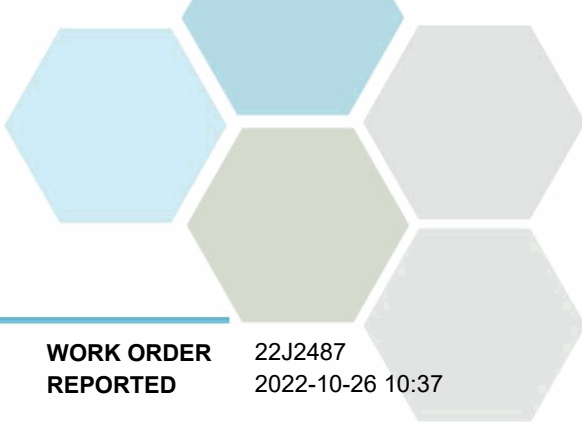
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22J2487
2022-10-26 10:37

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab (22J2487-01) | Matrix: Wastewater | Sampled: 2022-10-19 08:00

Microbiological Parameters

Coliforms, Total (Q-Tray)	5		1	MPN/100 mL	2022-10-19	
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-10-19	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-10-19	

Reclaimed Water - North WT# 3813C (E221689) (22J2487-02) | Matrix: Wastewater | Sampled: 2022-10-18 07:00

Microbiological Parameters

Coliforms, Total (Q-Tray)	< 1		1	MPN/100 mL	2022-10-19	HT1
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-10-19	HT1
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-10-19	HT1

Effluent 7 Day Composite (22J2487-03) | Matrix: Wastewater | Sampled: 2022-10-13

Anions

Nitrate (as N)	1.84 ± 0.12		0.010	mg/L	2022-10-21	HT1
Nitrite (as N)	0.066 ± 0.007		0.010	mg/L	2022-10-21	HT1

Calculated Parameters

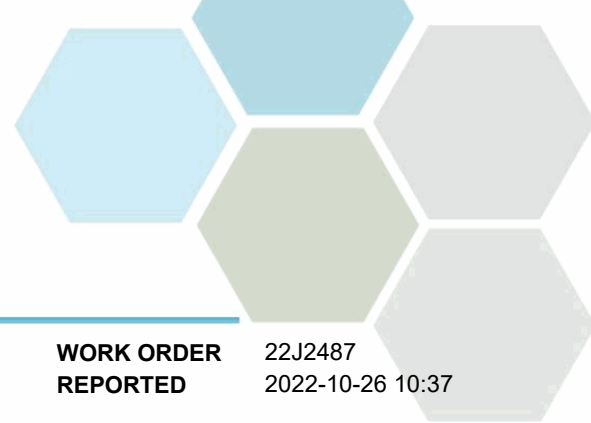
Nitrate+Nitrite (as N)	1.91		0.0100	mg/L	N/A	
Nitrogen, Total	3.53		0.0500	mg/L	N/A	

General Parameters

BOD, 5-day	< 5.7		2.0	mg/L	2022-10-25	HT1
Nitrogen, Total Kjeldahl	1.63 ± 0.20		0.050	mg/L	2022-10-24	
Phosphorus, Total (as P)	0.167 ± 0.019		0.0050	mg/L	2022-10-24	
Solids, Total Suspended	13.7 ± 1.1		2.0	mg/L	2022-10-24	HT1

Sample Qualifiers:

HT1 The sample was prepared and/or analyzed past the recommended holding time.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22J2487 2022-10-26 10:37

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Coliforms, Total in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	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
MPN/100 mL	Most Probable Number per 100 millilitres
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.

General Comments:

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22J3422
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-10-26 12:30 / 1.3°C 2022-11-02 10:32
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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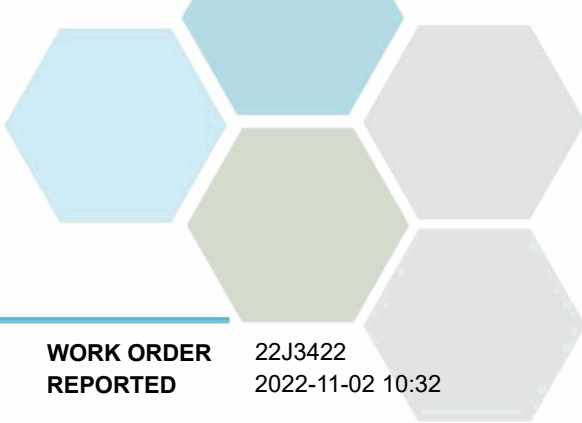
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Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

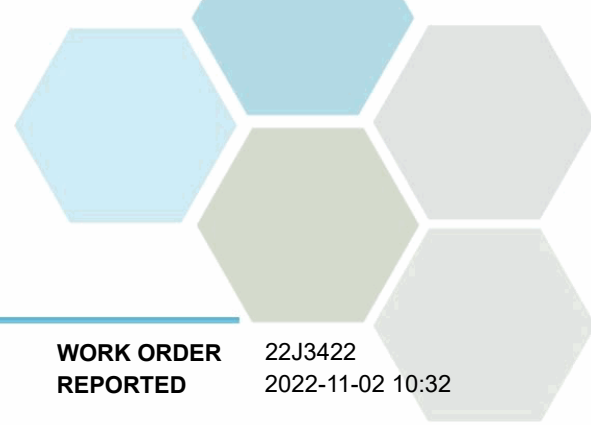
REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22J3422
2022-11-02 10:32

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Effluent Grab- WT# 3813A (E105000) (22J3422-01) Matrix: Wastewater Sampled: 2022-10-26 08:00						
<i>Microbiological Parameters</i>						
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-10-27	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-10-27	
Effluent 7 Day Composite- WT# 3813A (E105000) (22J3422-02) Matrix: Wastewater Sampled: 2022-10-20 00:00 To 2022-10-26 00:00						PRES
<i>Anions</i>						
Nitrate (as N)	1.84	± 0.12		0.010 mg/L	2022-10-27	
Nitrite (as N)	0.077	± 0.008		0.010 mg/L	2022-10-27	
<i>Calculated Parameters</i>						
Nitrate+Nitrite (as N)	1.91			0.0100 mg/L		N/A
Nitrogen, Total	3.66			0.0500 mg/L		N/A
<i>General Parameters</i>						
BOD, 5-day	< 7.1			2.0 mg/L	2022-11-01	
Nitrogen, Total Kjeldahl	1.75	± 0.22		0.050 mg/L	2022-11-02	
Phosphorus, Total (as P)	0.120	± 0.013		0.0050 mg/L	2022-10-31	
Solids, Total Suspended	8.8	± 0.7		2.0 mg/L	2022-10-30	

Sample Qualifiers:

PRES Sample has been preserved for TP, TKN in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22J3422
2022-11-02 10:32

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	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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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22K0360
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-11-02 14:30 / 3.9°C 2022-11-10 14:33
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

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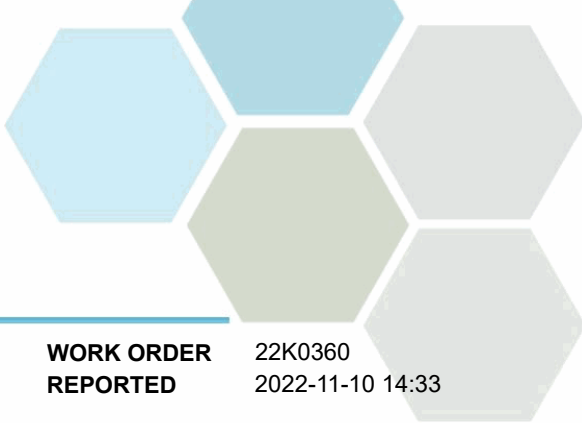
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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22K0360 2022-11-10 14:33

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22K0360-01) | Matrix: Wastewater | Sampled: 2022-11-02 07:00

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-11-03	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-11-03	

Effluent 24 hr Comp.- WT# 3813A (E105000) (22K0360-02) | Matrix: Wastewater | Sampled: 2022-11-02 07:00

Anions

Nitrate (as N)	1.29 ± 0.08		0.010	mg/L	2022-11-04	
Nitrite (as N)	0.105 ± 0.011		0.010	mg/L	2022-11-04	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-11-04	

Calculated Parameters

Nitrate+Nitrite (as N)	1.40		0.0100	mg/L	N/A	
Nitrogen, Total	3.01		0.0500	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	0.299 ± 0.028		0.050	mg/L	2022-11-03	
BOD, 5-day	< 6.5		2.0	mg/L	2022-11-10	
Chemical Oxygen Demand	< 20		20	mg/L	2022-11-05	
Nitrogen, Total Kjeldahl	1.61 ± 0.20		0.050	mg/L	2022-11-06	
Phosphorus, Total (as P)	0.136 ± 0.015		0.0050	mg/L	2022-11-07	
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-11-07	

Upstream of O/F- WT# 3812F (0500050) (22K0360-03) | Matrix: Fresh Water | Sampled: 2022-11-02 08:15

Anions

Chloride	5.98 ± 0.33		0.10	mg/L	2022-11-04	
Nitrate (as N)	0.072 ± 0.005		0.010	mg/L	2022-11-04	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-11-04	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-11-04	

Calculated Parameters

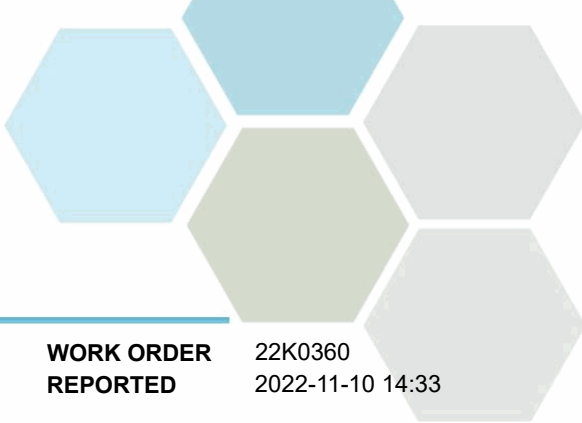
Hardness, Total (as CaCO3)	123		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0715		0.0100	mg/L	N/A	
Nitrogen, Total	1.17		0.0500	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	0.913 ± 0.082		0.050	mg/L	2022-11-03	RE2
Nitrogen, Total Kjeldahl	1.10 ± 0.14		0.050	mg/L	2022-11-06	
Phosphorus, Total (as P)	0.0105 ± 0.0012		0.0050	mg/L	2022-11-07	
Solids, Total Suspended	< 8.3		2.0	mg/L	2022-11-09	

Microbiological Parameters

Coliforms, Total (Q-Tray)	210		1	MPN/100 mL	2022-11-03	
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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22K0360 2022-11-10 14:33

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Upstream of O/F- WT# 3812F (0500050) (22K0360-03) | Matrix: Fresh Water | Sampled: 2022-11-02 08:15, Continued

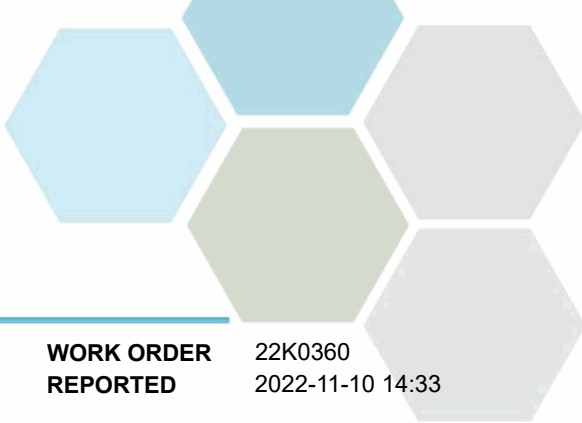
Microbiological Parameters, Continued

E. coli (Q-Tray)	12		1	MPN/100 mL	2022-11-03	
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Total Metals

Aluminum, total	0.0078 ± 0.0016		0.0050	mg/L	2022-11-08	
Antimony, total	< 0.00020		0.00020	mg/L	2022-11-08	
Arsenic, total	0.00050 ± 0.00007		0.00050	mg/L	2022-11-08	
Barium, total	0.0219 ± 0.0029		0.0050	mg/L	2022-11-08	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-11-08	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-11-08	
Boron, total	< 0.0500		0.0500	mg/L	2022-11-08	
Cadmium, total	< 0.000010		0.000010	mg/L	2022-11-08	
Calcium, total	33.8 ± 4.8		0.20	mg/L	2022-11-08	
Chromium, total	< 0.00050		0.00050	mg/L	2022-11-08	
Cobalt, total	< 0.00010		0.00010	mg/L	2022-11-08	
Copper, total	0.00071 ± 0.00011		0.00040	mg/L	2022-11-08	
Iron, total	0.012 ± 0.002		0.010	mg/L	2022-11-08	
Lead, total	< 0.00020		0.00020	mg/L	2022-11-08	
Lithium, total	0.00326 ± 0.00058		0.00010	mg/L	2022-11-08	
Magnesium, total	9.32 ± 1.30		0.010	mg/L	2022-11-08	
Manganese, total	0.00107 ± 0.00095		0.00020	mg/L	2022-11-08	
Molybdenum, total	0.00344 ± 0.00049		0.00010	mg/L	2022-11-08	
Nickel, total	0.00042 ± 0.00008		0.00040	mg/L	2022-11-08	
Phosphorus, total	< 0.050		0.050	mg/L	2022-11-08	
Potassium, total	2.45 ± 0.38		0.10	mg/L	2022-11-08	
Selenium, total	< 0.00050		0.00050	mg/L	2022-11-08	
Silicon, total	3.7 ± 0.7		1.0	mg/L	2022-11-08	
Silver, total	< 0.000050		0.000050	mg/L	2022-11-08	
Sodium, total	11.9 ± 2.2		0.10	mg/L	2022-11-08	
Strontium, total	0.297 ± 0.036		0.0010	mg/L	2022-11-08	
Sulfur, total	10.4 ± 2.4		3.0	mg/L	2022-11-08	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-11-08	
Thallium, total	< 0.000020		0.000020	mg/L	2022-11-08	
Thorium, total	< 0.00010		0.00010	mg/L	2022-11-08	
Tin, total	< 0.00020		0.00020	mg/L	2022-11-08	
Titanium, total	< 0.0050		0.0050	mg/L	2022-11-08	
Tungsten, total	< 0.0002		0.0002	mg/L	2022-11-08	
Uranium, total	0.00242 ± 0.00029		0.000020	mg/L	2022-11-08	
Vanadium, total	< 0.0050		0.0050	mg/L	2022-11-08	
Zinc, total	< 0.0040		0.0040	mg/L	2022-11-08	
Zirconium, total	< 0.00010		0.00010	mg/L	2022-11-08	

Downstream of O/F- WT# 38130 (E221464) (22K0360-04) | Matrix: Fresh Water | Sampled: 2022-11-02 08:00



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22K0360 2022-11-10 14:33

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Downstream of O/F- WT# 38130 (E221464) (22K0360-04) | Matrix: Fresh Water | Sampled: 2022-11-02 08:00, Continued

Anions

Chloride	6.43	± 0.35	0.10	mg/L	2022-11-04	
Nitrate (as N)	0.077	± 0.005	0.010	mg/L	2022-11-04	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-11-04	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-11-04	

Calculated Parameters

Hardness, Total (as CaCO3)	125		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0769		0.0100	mg/L	N/A	
Nitrogen, Total	0.736		0.0500	mg/L	N/A	

General Parameters

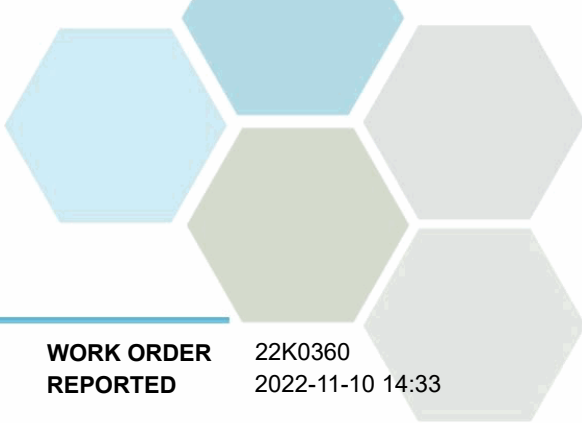
Ammonia, Total (as N)	0.510	± 0.046	0.050	mg/L	2022-11-03	RE2
Nitrogen, Total Kjeldahl	0.659	± 0.082	0.050	mg/L	2022-11-06	
Phosphorus, Total (as P)	0.0152	± 0.0017	0.0050	mg/L	2022-11-07	
Solids, Total Suspended	< 8.3		2.0	mg/L	2022-11-09	

Microbiological Parameters

Coliforms, Total (Q-Tray)	517		1	MPN/100 mL	2022-11-03	
E. coli (Q-Tray)	23		1	MPN/100 mL	2022-11-03	

Total Metals

Aluminum, total	0.0074	± 0.0016	0.0050	mg/L	2022-11-08	
Antimony, total	< 0.00020		0.00020	mg/L	2022-11-08	
Arsenic, total	< 0.00050		0.00050	mg/L	2022-11-08	
Barium, total	0.0226	± 0.0029	0.0050	mg/L	2022-11-08	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-11-08	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-11-08	
Boron, total	< 0.0500		0.0500	mg/L	2022-11-08	
Cadmium, total	< 0.000010		0.000010	mg/L	2022-11-08	
Calcium, total	34.3	± 4.9	0.20	mg/L	2022-11-08	
Chromium, total	0.00055	± 0.00012	0.00050	mg/L	2022-11-08	
Cobalt, total	< 0.00010		0.00010	mg/L	2022-11-08	
Copper, total	0.00072	± 0.00011	0.00040	mg/L	2022-11-08	
Iron, total	0.050	± 0.010	0.010	mg/L	2022-11-08	
Lead, total	< 0.00020		0.00020	mg/L	2022-11-08	
Lithium, total	0.00333	± 0.00059	0.00010	mg/L	2022-11-08	
Magnesium, total	9.52	± 1.33	0.010	mg/L	2022-11-08	
Manganese, total	0.00630	± 0.00559	0.00020	mg/L	2022-11-08	
Molybdenum, total	0.00334	± 0.00048	0.00010	mg/L	2022-11-08	
Nickel, total	0.00064	± 0.00012	0.00040	mg/L	2022-11-08	
Phosphorus, total	< 0.050		0.050	mg/L	2022-11-08	
Potassium, total	2.53	± 0.40	0.10	mg/L	2022-11-08	
Selenium, total	< 0.00050		0.00050	mg/L	2022-11-08	
Silicon, total	3.8	± 0.7	1.0	mg/L	2022-11-08	



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22K0360 2022-11-10 14:33

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Downstream of O/F- WT# 38130 (E221464) (22K0360-04) Matrix: Fresh Water Sampled: 2022-11-02 08:00, Continued						
<i>Total Metals, Continued</i>						
Silver, total	< 0.000050		0.000050	mg/L	2022-11-08	
Sodium, total	12.3	± 2.2	0.10	mg/L	2022-11-08	
Strontium, total	0.311	± 0.038	0.0010	mg/L	2022-11-08	
Sulfur, total	10.3	± 2.4	3.0	mg/L	2022-11-08	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-11-08	
Thallium, total	< 0.000020		0.000020	mg/L	2022-11-08	
Thorium, total	< 0.00010		0.00010	mg/L	2022-11-08	
Tin, total	< 0.00020		0.00020	mg/L	2022-11-08	
Titanium, total	< 0.0050		0.0050	mg/L	2022-11-08	
Tungsten, total	< 0.0002		0.0002	mg/L	2022-11-08	
Uranium, total	0.00235	± 0.00028	0.000020	mg/L	2022-11-08	
Vanadium, total	< 0.0050		0.0050	mg/L	2022-11-08	
Zinc, total	< 0.0040		0.0040	mg/L	2022-11-08	
Zirconium, total	< 0.00010		0.00010	mg/L	2022-11-08	

Influent- WT# 38131 (0500232) (22K0360-05) | Matrix: Wastewater | Sampled: 2022-11-02 07:00

<i>Anions</i>						
Nitrate (as N)	0.012	± 0.002	0.010	mg/L	2022-11-04	
Nitrite (as N)	0.154	± 0.016	0.010	mg/L	2022-11-04	
Phosphate (as P)	3.19	± 0.55	0.0050	mg/L	2022-11-04	

Calculated Parameters

Nitrate+Nitrite (as N)	0.167		0.0100	mg/L	N/A	
Nitrogen, Total	38.3		2.00	mg/L	N/A	

General Parameters

BOD, 5-day	130	± 28	2.0	mg/L	2022-11-10	
Nitrogen, Total Kjeldahl	38.2	± 4.7	0.050	mg/L	2022-11-06	
Phosphorus, Total (as P)	5.07	± 0.56	0.0050	mg/L	2022-11-07	

Effluent 7 Day Composite- WT# 3813A (E105000) (22K0360-06) | Matrix: Wastewater | Sampled: 2022-10-27 00:00 To 2022-11-02 00:00

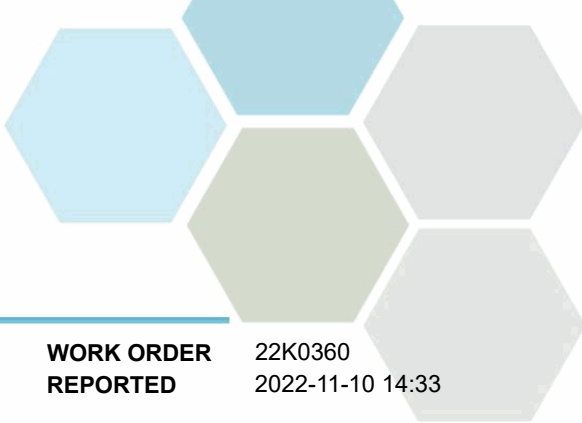
PRES

<i>Anions</i>						
Nitrate (as N)	1.54	± 0.10	0.010	mg/L	2022-11-04	
Nitrite (as N)	0.110	± 0.011	0.010	mg/L	2022-11-04	

Calculated Parameters

Nitrate+Nitrite (as N)	1.65		0.0100	mg/L	N/A	
Nitrogen, Total	3.36		0.0500	mg/L	N/A	

General Parameters



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22K0360
2022-11-10 14:33

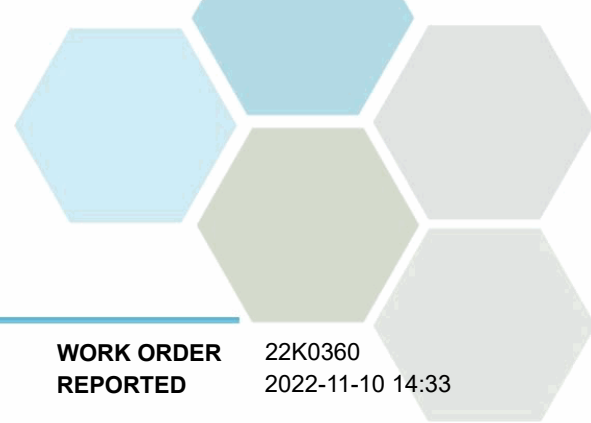
Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Effluent 7 Day Composite- WT# 3813A (E105000) (22K0360-06) Matrix: Wastewater Sampled: 2022-10-27 00:00 To 2022-11-02 00:00, Continued						PRES

General Parameters, Continued

Nitrogen, Total Kjeldahl	1.71	± 0.21	0.050	mg/L	2022-11-06	
Phosphorus, Total (as P)	0.138	± 0.015	0.0050	mg/L	2022-11-07	

Sample Qualifiers:

PRES Sample has been preserved for TP, TKN in the laboratory and the holding time has been extended.
RE2 Result was confirmed by re-analysis prior to reporting.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22K0360 2022-11-10 14:33

Analysis Description	Method Ref.	Technique	Accredited	Location
Ammonia, Total in Water	SM 4500-NH3 G* (2017)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Chemical Oxygen Demand in Water	SM 5220 D* (2017)	Closed Reflux, Colorimetry	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Coliforms, Total in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Hardness in Water	SM 2340 B* (2017)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

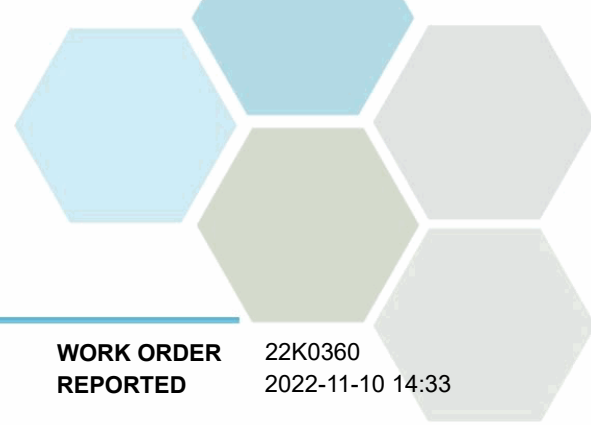
Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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
MPN/100 mL	Most Probable Number per 100 millilitres
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Penticton, City of - DW & STP
PROJECT Wastewater - PE12212

WORK ORDER 22K0360
REPORTED 2022-11-10 14:33

General Comments:

The results in this report apply to the 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. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing. The quality control (QC) data is available upon request

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.



CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22K1305
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-11-09 12:00 / 5.6°C 2022-11-17 15:06
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

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.

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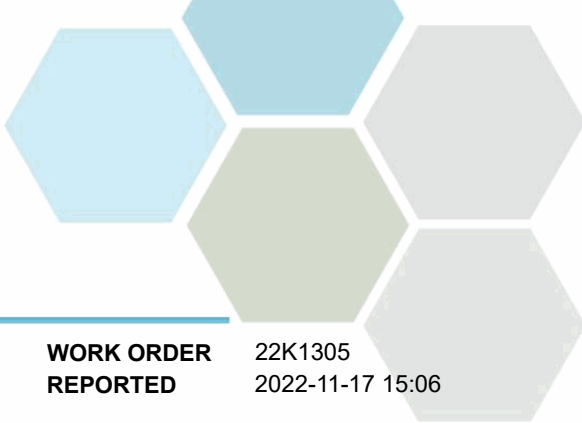
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22K1305
2022-11-17 15:06

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22K1305-01) | Matrix: Wastewater | Sampled: 2022-11-09 07:30

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	5		1	MPN/100 mL	2022-11-10	
E. coli (Q-Tray)	2		1	MPN/100 mL	2022-11-10	

Reclaimed Water - North WT# 3813C (E221689) (22K1305-02) | Matrix: Wastewater | Sampled: 2022-11-09 08:00

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	50		1	MPN/100 mL	2022-11-10	
E. coli (Q-Tray)	33		1	MPN/100 mL	2022-11-10	

Effluent 7 Day Composite- WT# 3813A (E105000) (22K1305-03) | Matrix: Wastewater | Sampled: 2022-11-03 00:00 To 2022-11-09 00:00

PRES

Anions

Nitrate (as N)	1.08 ± 0.07		0.010	mg/L	2022-11-11	
Nitrite (as N)	0.059 ± 0.006		0.010	mg/L	2022-11-11	

Calculated Parameters

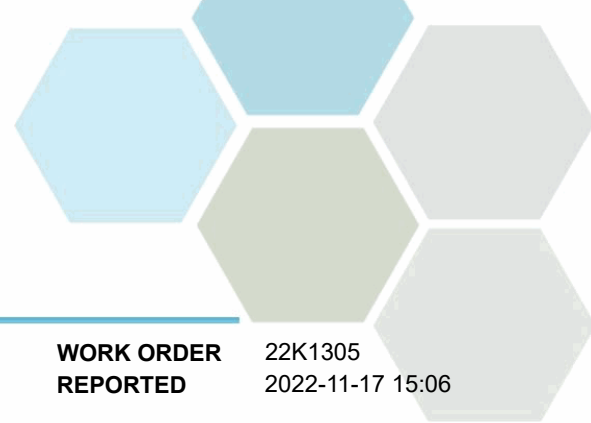
Nitrate+Nitrite (as N)	1.14		0.0100	mg/L	N/A	
Nitrogen, Total	2.50		0.0500	mg/L	N/A	

General Parameters

BOD, 5-day	< 5.0		2.0	mg/L	2022-11-16	
Nitrogen, Total Kjeldahl	1.37 ± 0.17		0.050	mg/L	2022-11-15	
Phosphorus, Total (as P)	0.116 ± 0.013		0.0050	mg/L	2022-11-16	
Solids, Total Suspended	5.0 ± 0.5		2.0	mg/L	2022-11-15	

Sample Qualifiers:

PRES Sample has been preserved for TP, TKN in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22K1305
2022-11-17 15:06

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	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
MPN/100 mL	Most Probable Number per 100 millilitres
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.

General Comments:

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22K1993
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-11-16 12:30 / 1.9°C 2022-11-23 10:52
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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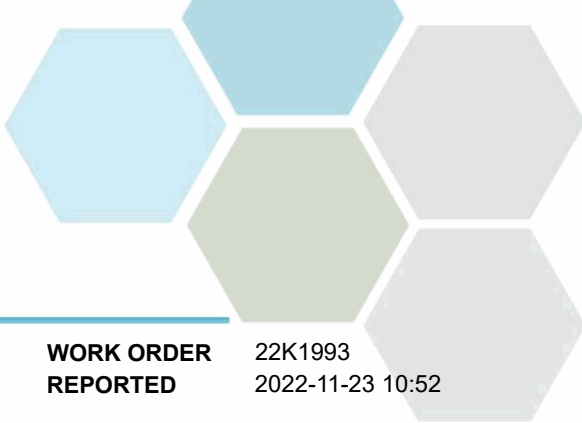
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22K1993
2022-11-23 10:52

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab (22K1993-01) | Matrix: Wastewater | Sampled: 2022-11-16 07:20

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-11-17	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-11-17	

Effluent 7 Day Composite (22K1993-02) | Matrix: Wastewater | Sampled: 2022-11-10 07:30 To 2022-11-16 07:30

Anions

Nitrate (as N)	1.29 ± 0.08		0.010	mg/L	2022-11-17	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-11-17	

Calculated Parameters

Nitrate+Nitrite (as N)	1.29		0.0100	mg/L	N/A	
Nitrogen, Total	2.66		0.0500	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	0.392 ± 0.036		0.050	mg/L	2022-11-18	
BOD, 5-day	< 6.0		2.0	mg/L	2022-11-22	
Nitrogen, Total Kjeldahl	1.37 ± 0.17		0.050	mg/L	2022-11-23	
Phosphorus, Total (as P)	0.112 ± 0.012		0.0050	mg/L	2022-11-18	
Solids, Total Suspended	9.3 ± 0.9		2.0	mg/L	2022-11-19	

Filter #1 Effluent (22K1993-03) | Matrix: Wastewater | Sampled: 2022-11-10 07:30 To 2022-11-16 07:30

General Parameters

Solids, Total Suspended	< 2.0		2.0	mg/L	2022-11-19	
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Filter #3 Effluent (22K1993-04) | Matrix: Wastewater | Sampled: 2022-11-10 07:30 To 2022-11-16 07:30

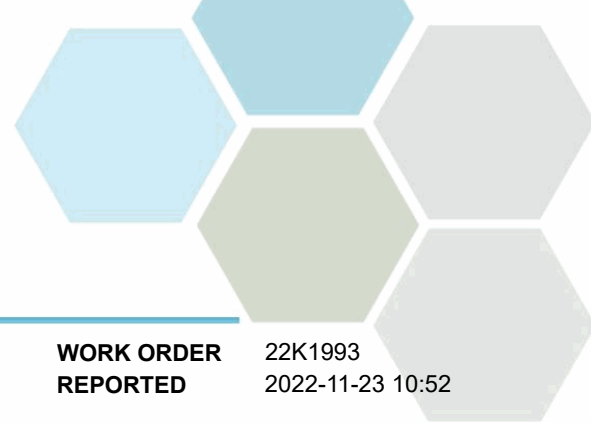
General Parameters

Solids, Total Suspended	< 2.0		2.0	mg/L	2022-11-19	
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Filter #4 Effluent (22K1993-05) | Matrix: Wastewater | Sampled: 2022-11-10 07:30 To 2022-11-16 07:30

General Parameters

Solids, Total Suspended	< 2.0		2.0	mg/L	2022-11-19	
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APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22K1993 2022-11-23 10:52

Analysis Description	Method Ref.	Technique	Accredited	Location
Ammonia, Total in Water	SM 4500-NH3 G* (2017)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna

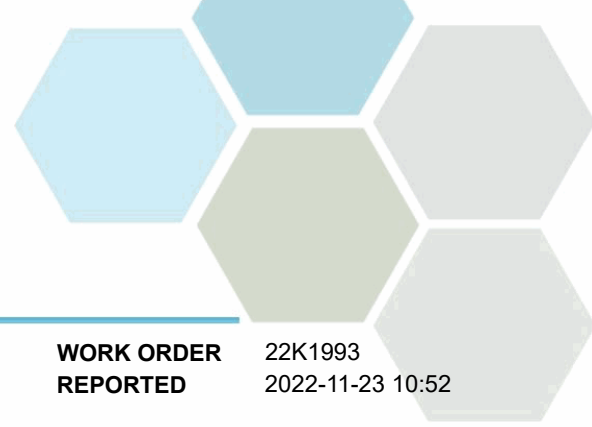
Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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
MPN/100 mL	Most Probable Number per 100 millilitres
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Penticton, City of - DW & STP
PROJECT Wastewater - PE12212

WORK ORDER 22K1993
REPORTED 2022-11-23 10:52

General Comments:

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22K2787
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-11-23 14:30 / - 0.4°C 2022-11-29 12:06
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

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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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



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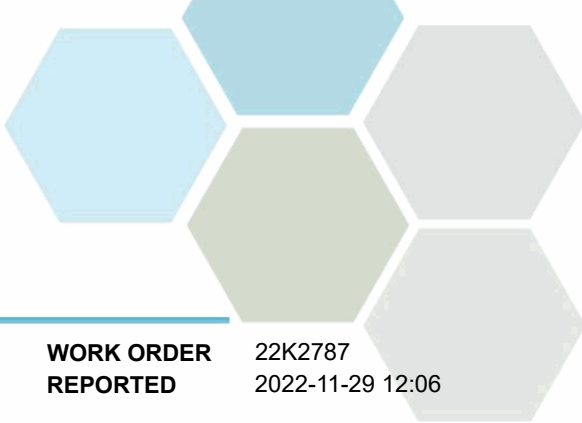
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22K2787
2022-11-29 12:06

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22K2787-01) | Matrix: Wastewater | Sampled: 2022-11-23 07:00

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-11-24	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-11-24	

Effluent 7 Day Composite- WT# 3813A (E105000) (22K2787-02) | Matrix: Wastewater | Sampled: 2022-11-17 00:00 To 2022-11-23 00:00

PRES

Anions

Nitrate (as N)	1.56 ± 0.10		0.010	mg/L	2022-11-24	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-11-24	

Calculated Parameters

Nitrate+Nitrite (as N)	1.56		0.0100	mg/L	N/A	
Nitrogen, Total	3.77		0.0500	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	1.07 ± 0.06		0.050	mg/L	2022-11-29	
BOD, 5-day	< 5.1		2.0	mg/L	2022-11-29	
Nitrogen, Total Kjeldahl	2.22 ± 0.27		0.050	mg/L	2022-11-27	
Phosphorus, Total (as P)	0.112 ± 0.012		0.0050	mg/L	2022-11-25	
Solids, Total Suspended	15.8 ± 1.3		2.0	mg/L	2022-11-25	

Filter #1 Effluent (22K2787-03) | Matrix: Wastewater | Sampled: 2022-11-17 00:00 To 2022-11-23 00:00

General Parameters

Solids, Total Suspended	20.7 ± 1.7		2.0	mg/L	2022-11-25	
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Filter #3 Effluent (22K2787-04) | Matrix: Wastewater | Sampled: 2022-11-17 00:00 To 2022-11-23 00:00

General Parameters

Solids, Total Suspended	21.3 ± 1.7		2.0	mg/L	2022-11-25	
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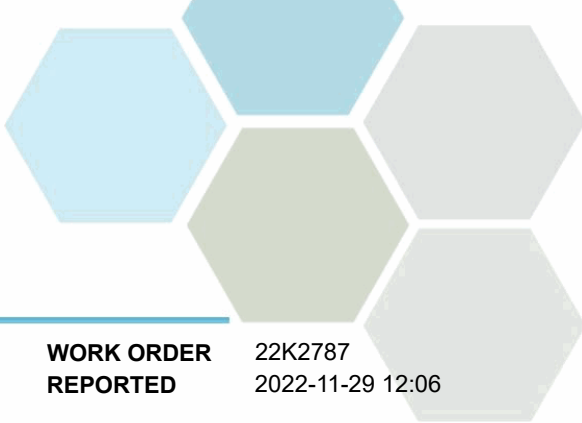
Filter #4 Effluent (22K2787-05) | Matrix: Wastewater | Sampled: 2022-11-17 00:00 To 2022-11-23 00:00

General Parameters

Solids, Total Suspended	16.4 ± 1.4		2.0	mg/L	2022-11-25	
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Sample Qualifiers:

PRES Sample has been preserved for TP, TKN, NH3 in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22K2787
2022-11-29 12:06

Analysis Description	Method Ref.	Technique	Accredited	Location
Ammonia, Total in Water	SM 4500-NH3 D* (2017)	Ion Selective Electrode	✓	Edmonton
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna

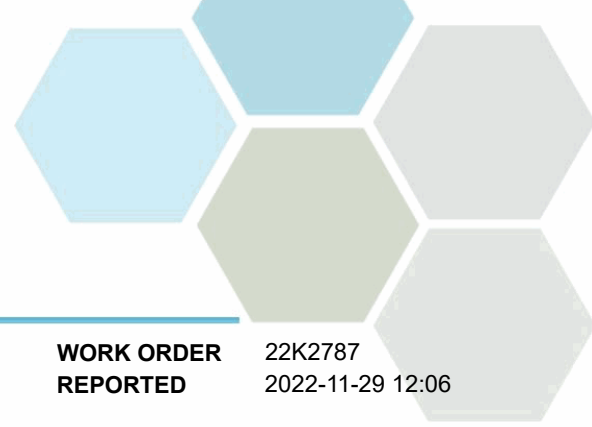
Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

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MPN/100 mL	Most Probable Number per 100 millilitres
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

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APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Penticton, City of - DW & STP
PROJECT Wastewater - PE12212

WORK ORDER 22K2787
REPORTED 2022-11-29 12:06

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CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22K3564
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-11-30 12:45 / 2.2°C 2022-12-07 13:24
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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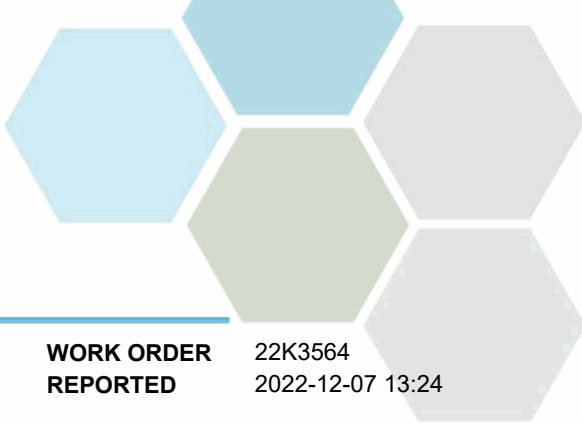
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22K3564 2022-12-07 13:24

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab (22K3564-01) | Matrix: Wastewater | Sampled: 2022-11-30 07:30

General Parameters

Solids, Total Suspended	< 2.0		2.0	mg/L	2022-12-04	
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Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-12-01	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-12-01	

Effluent 7 Day Composite (22K3564-02) | Matrix: Wastewater | Sampled: 2022-11-24 00:00 To 2022-11-30 07:30

PRES

Anions

Nitrate (as N)	2.14 ± 0.13		0.010	mg/L	2022-12-03	
Nitrite (as N)	0.064 ± 0.007		0.010	mg/L	2022-12-03	

Calculated Parameters

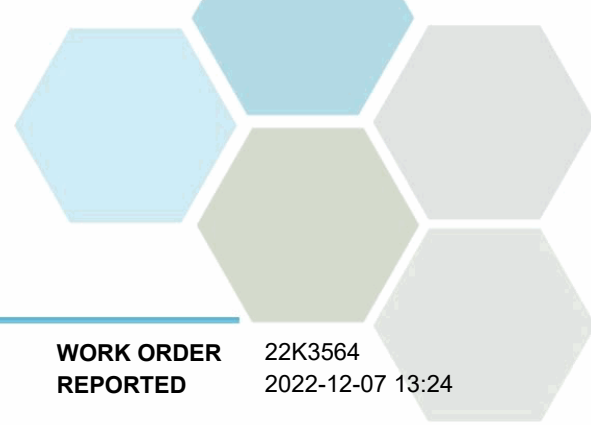
Nitrate+Nitrite (as N)	2.21		0.0100	mg/L	N/A	
Nitrogen, Total	3.39		0.0500	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	0.299 ± 0.028		0.050	mg/L	2022-12-06	
BOD, 5-day	< 5.4		2.0	mg/L	2022-12-07	
Nitrogen, Total Kjeldahl	1.19 ± 0.15		0.050	mg/L	2022-12-05	
Phosphorus, Total (as P)	0.0808 ± 0.0090		0.0050	mg/L	2022-12-05	
Solids, Total Suspended	23.6 ± 1.9		2.0	mg/L	2022-12-04	

Sample Qualifiers:

PRES Sample has been preserved for TP, NH3, TN in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22K3564
2022-12-07 13:24

Analysis Description	Method Ref.	Technique	Accredited	Location
Ammonia, Total in Water	SM 4500-NH3 G* (2017)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna

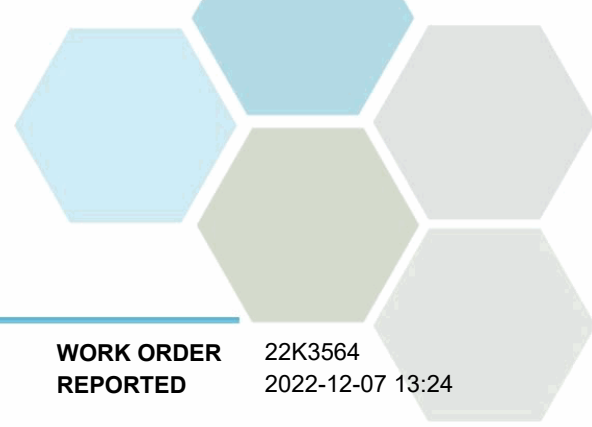
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Glossary of Terms:

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SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

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APPENDIX 1: SUPPORTING INFORMATION

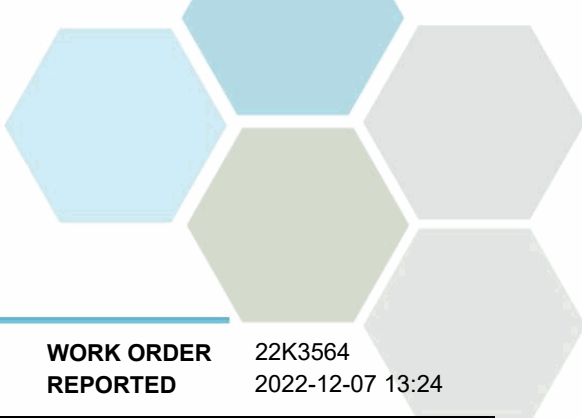
REPORTED TO Penticton, City of - DW & STP
PROJECT Wastewater - PE12212

WORK ORDER 22K3564
REPORTED 2022-12-07 13:24

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APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22K3564
2022-12-07 13:24

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.
- **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.

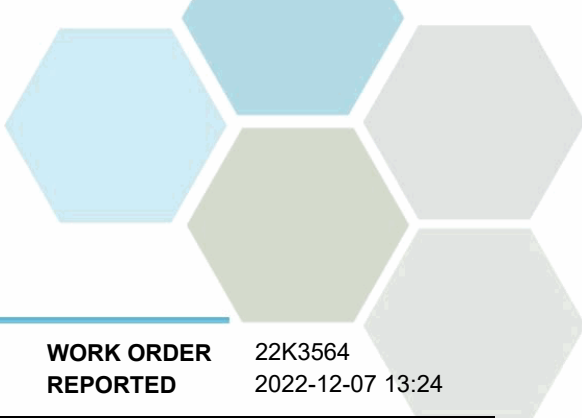
Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B2L0228									
Blank (B2L0228-BLK1)			Prepared: 2022-12-03, Analyzed: 2022-12-03						
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
Blank (B2L0228-BLK2)			Prepared: 2022-12-04, Analyzed: 2022-12-04						
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
LCS (B2L0228-BS1)			Prepared: 2022-12-03, Analyzed: 2022-12-03						
Nitrate (as N)	4.17	0.010 mg/L	4.00		104	90-110			
Nitrite (as N)	1.91	0.010 mg/L	2.00		96	85-115			
LCS (B2L0228-BS2)			Prepared: 2022-12-04, Analyzed: 2022-12-04						
Nitrate (as N)	4.20	0.010 mg/L	4.00		105	90-110			
Nitrite (as N)	1.80	0.010 mg/L	2.00		90	85-115			

General Parameters, Batch B2L0195

Blank (B2L0195-BLK1)			Prepared: 2022-12-02, Analyzed: 2022-12-07						
BOD, 5-day	< 2.0	2.0 mg/L							
LCS (B2L0195-BS1)			Prepared: 2022-12-02, Analyzed: 2022-12-07						
BOD, 5-day	189	45.2 mg/L	198		96	85-115			
Duplicate (B2L0195-DUP1)			Source: 22K3564-02 Prepared: 2022-12-02, Analyzed: 2022-12-07						
BOD, 5-day	< 5.4	2.0 mg/L		< 5.4					22

General Parameters, Batch B2L0330

Blank (B2L0330-BLK1)			Prepared: 2022-12-04, Analyzed: 2022-12-05						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
Blank (B2L0330-BLK2)			Prepared: 2022-12-04, Analyzed: 2022-12-05						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
LCS (B2L0330-BS1)			Prepared: 2022-12-04, Analyzed: 2022-12-05						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L	1.00			85-115			



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22K3564 2022-12-07 13:24

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B2L0330, Continued									
LCS (B2L0330-BS2)			Prepared: 2022-12-04, Analyzed: 2022-12-05						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L	1.00			85-115			
Duplicate (B2L0330-DUP2)			Source: 22K3564-02 Prepared: 2022-12-04, Analyzed: 2022-12-05						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L		1.19				15	
Matrix Spike (B2L0330-MS2)			Source: 22K3564-02 Prepared: 2022-12-04, Analyzed: 2022-12-05						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L	1.00	1.19	NR	65-135			
General Parameters, Batch B2L0334									
Blank (B2L0334-BLK1)			Prepared: 2022-12-04, Analyzed: 2022-12-04						
Solids, Total Suspended	< 2.0	2.0 mg/L							
LCS (B2L0334-BS1)			Prepared: 2022-12-04, Analyzed: 2022-12-04						
Solids, Total Suspended	94.0	10.0 mg/L	100		94	85-115			
General Parameters, Batch B2L0360									
Blank (B2L0360-BLK1)			Prepared: 2022-12-05, Analyzed: 2022-12-05						
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							
LCS (B2L0360-BS1)			Prepared: 2022-12-05, Analyzed: 2022-12-05						
Phosphorus, Total (as P)	0.105	0.0050 mg/L	0.100		105	85-115			
Duplicate (B2L0360-DUP1)			Source: 22K3564-02 Prepared: 2022-12-05, Analyzed: 2022-12-05						
Phosphorus, Total (as P)	0.0809	0.0050 mg/L		0.0808			< 1	15	
Matrix Spike (B2L0360-MS1)			Source: 22K3564-02 Prepared: 2022-12-05, Analyzed: 2022-12-05						
Phosphorus, Total (as P)	0.192	0.0050 mg/L	0.102	0.0808	109	70-125			
General Parameters, Batch B2L0495									
Blank (B2L0495-BLK1)			Prepared: 2022-12-06, Analyzed: 2022-12-06						
Ammonia, Total (as N)	0.041	0.020 mg/L							
Blank (B2L0495-BLK2)			Prepared: 2022-12-06, Analyzed: 2022-12-06						
Ammonia, Total (as N)	< 0.020	0.020 mg/L							
LCS (B2L0495-BS2)			Prepared: 2022-12-06, Analyzed: 2022-12-06						
Ammonia, Total (as N)	1.02	0.020 mg/L	1.00		102	90-115			
Microbiological Parameters, Batch B2L0037									
Blank (B2L0037-BLK1)			Prepared: 2022-12-01, Analyzed: 2022-12-01						
E. coli (Q-Tray)	< 1	1 MPN/100 mL							
Blank (B2L0037-BLK2)			Prepared: 2022-12-01, Analyzed: 2022-12-01						
Coliforms, Fecal (Q-Tray)	< 1	1 MPN/100 mL							
E. coli (Q-Tray)	< 1	1 MPN/100 mL							
Duplicate (B2L0037-DUP1)			Source: 22K3564-01 Prepared: 2022-12-01, Analyzed: 2022-12-01						
Coliforms, Fecal (Q-Tray)	< 1	1 MPN/100 mL		< 1				80	
E. coli (Q-Tray)	< 1	1 MPN/100 mL		< 1				80	



CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22L0763
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-12-07 14:30 / 6.7°C 2022-12-14 11:24
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

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.

Work Order Comments:

This is a revised report; please refer to Appendix 3 for details.

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

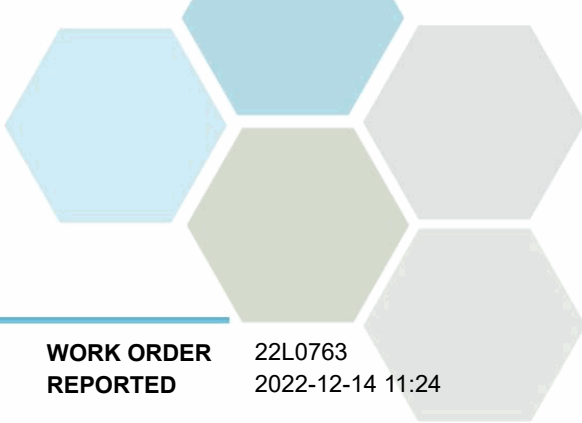
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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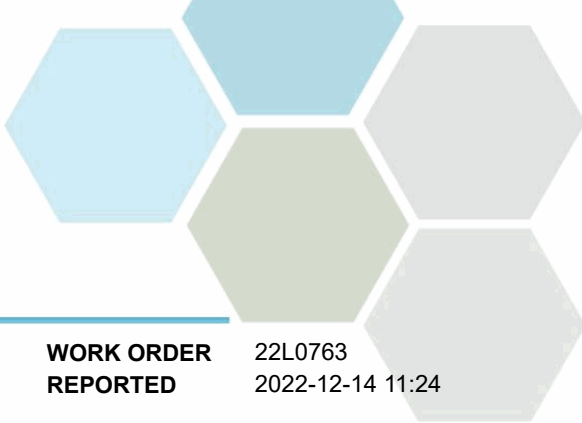


TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22L0763
2022-12-14 11:24

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Filter Effluent #1 (22L0763-01) Matrix: Water Sampled: 2022-12-01 07:00						
<i>General Parameters</i>						
Solids, Total Suspended	15.2	± 1.2	2.0	mg/L	2022-12-08	
Filter Effluent #3 (22L0763-02) Matrix: Water Sampled: 2022-12-01 07:00						
<i>General Parameters</i>						
Solids, Total Suspended	19.8	± 1.5	2.0	mg/L	2022-12-08	
Filter Effluent #4 (22L0763-03) Matrix: Water Sampled: 2022-12-01 07:00						
<i>General Parameters</i>						
Solids, Total Suspended	17.6	± 1.4	2.0	mg/L	2022-12-08	
Filter Effluent #1 (22L0763-04) Matrix: Water Sampled: 2022-12-04 11:30						
<i>General Parameters</i>						
Solids, Total Suspended	8.4	± 0.7	2.0	mg/L	2022-12-08	
Filter Effluent #3 (22L0763-05) Matrix: Water Sampled: 2022-12-04 11:30						
<i>General Parameters</i>						
Solids, Total Suspended	12.0	± 1.1	2.0	mg/L	2022-12-08	
Filter Effluent #4 (22L0763-06) Matrix: Water Sampled: 2022-12-04 11:30						
<i>General Parameters</i>						
Solids, Total Suspended	10.8	± 0.9	2.0	mg/L	2022-12-08	
Filter Effluent #1 (22L0763-07) Matrix: Water Sampled: 2022-12-05 13:30						
<i>General Parameters</i>						
Solids, Total Suspended	4.0	± 0.6	2.0	mg/L	2022-12-08	
Filter Effluent #3 (22L0763-08) Matrix: Water Sampled: 2022-12-05 13:30						
<i>General Parameters</i>						
Solids, Total Suspended	< 3.3		2.0	mg/L	2022-12-08	
Filter Effluent #4 (22L0763-09) Matrix: Water Sampled: 2022-12-05 13:30						
<i>General Parameters</i>						
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-12-08	

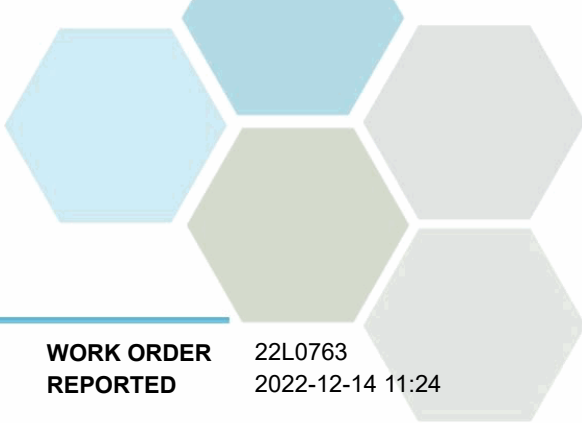


TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22L0763
2022-12-14 11:24

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Filter Effluent #1 (22L0763-10) Matrix: Water Sampled: 2022-12-06 11:00						
<i>General Parameters</i>						
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-12-08	
Filter Effluent #3 (22L0763-11) Matrix: Water Sampled: 2022-12-06 11:00						
<i>General Parameters</i>						
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-12-08	
Filter Effluent #4 (22L0763-12) Matrix: Water Sampled: 2022-12-06 11:00						
<i>General Parameters</i>						
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-12-08	
Filter Effluent #1 (22L0763-13) Matrix: Water Sampled: 2022-12-07 07:30						
<i>General Parameters</i>						
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-12-08	
Filter Effluent #3 (22L0763-14) Matrix: Water Sampled: 2022-12-07 07:30						
<i>General Parameters</i>						
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-12-08	
Filter Effluent #4 (22L0763-15) Matrix: Water Sampled: 2022-12-07 07:30						
<i>General Parameters</i>						
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-12-08	



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22L0763
2022-12-14 11:24

Analysis Description	Method Ref.	Technique	Accredited	Location
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	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

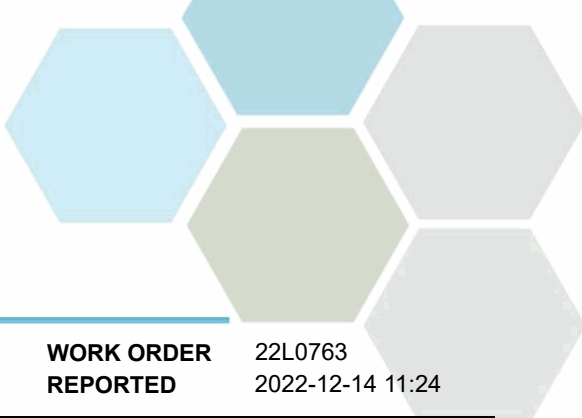
Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.

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. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing.

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.



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

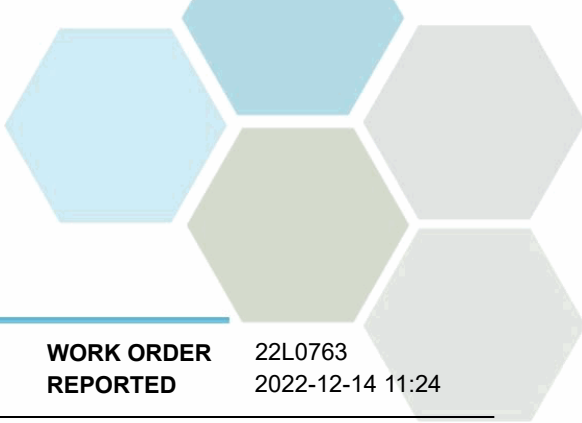
WORK ORDER REPORTED 22L0763
2022-12-14 11:24

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.
- **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 B2L0878									
Blank (B2L0878-BLK1)			Prepared: 2022-12-08, Analyzed: 2022-12-08						
Solids, Total Suspended	< 2.0	2.0 mg/L							
LCS (B2L0878-BS1)			Prepared: 2022-12-08, Analyzed: 2022-12-08						
Solids, Total Suspended	93.0	10.0 mg/L	100		93	85-115			



APPENDIX 3: REVISION HISTORY

REPORTED TO PROJECT		Penticton, City of - DW & STP Wastewater - PE12212			WORK ORDER REPORTED		22L0763 2022-12-14 11:24	
Sample ID	Changed	Change	Analysis	Analyte(s)				
22L0763-04	2022-12-14	Date Sampled	N/A	N/A				
22L0763-05	2022-12-14	Date Sampled	N/A	N/A				
22L0763-06	2022-12-14	Date Sampled	N/A	N/A				
22L0763-07	2022-12-14	Date Sampled	N/A	N/A				
22L0763-08	2022-12-14	Date Sampled	N/A	N/A				
22L0763-09	2022-12-14	Date Sampled	N/A	N/A				
22L0763-10	2022-12-14	Date Sampled	N/A	N/A				
22L0763-11	2022-12-14	Date Sampled	N/A	N/A				
22L0763-12	2022-12-14	Date Sampled	N/A	N/A				
22L0763-13	2022-12-14	Date Sampled	N/A	N/A				
22L0763-14	2022-12-14	Date Sampled	N/A	N/A				
22L0763-15	2022-12-14	Date Sampled	N/A	N/A				



CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22L0714
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-12-07 08:15 / 2.4°C 2022-12-14 13:42
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

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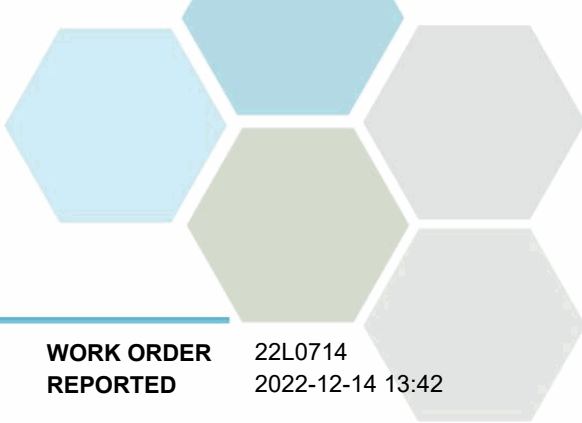
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22L0714
2022-12-14 13:42

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22L0714-01) | Matrix: Wastewater | Sampled: 2022-12-07 07:00

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-12-08	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-12-08	

Effluent 24 hr Comp.- WT# 3813A (E105000) (22L0714-02) | Matrix: Wastewater | Sampled: 2022-12-06 00:00 To 2022-12-07 07:00

Anions

Nitrate (as N)	2.58 ± 0.16		0.010	mg/L	2022-12-09	
Nitrite (as N)	0.135 ± 0.014		0.010	mg/L	2022-12-09	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-12-09	

Calculated Parameters

Nitrate+Nitrite (as N)	2.72		0.0100	mg/L	N/A	
Nitrogen, Total	4.62		0.0500	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	1.41 ± 0.13		0.050	mg/L	2022-12-09	
BOD, 5-day	< 8.2		2.0	mg/L	2022-12-13	
Chemical Oxygen Demand	45 ± 7		20	mg/L	2022-12-12	
Nitrogen, Total Kjeldahl	1.90 ± 0.23		0.050	mg/L	2022-12-12	
Phosphorus, Total (as P)	0.110 ± 0.012		0.0050	mg/L	2022-12-09	
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-12-13	

Upstream of O/F- WT# 3812F (0500050) (22L0714-03) | Matrix: Fresh Water | Sampled: 2022-12-07 06:45

Anions

Chloride	6.13 ± 0.34		0.10	mg/L	2022-12-09	
Nitrate (as N)	0.036 ± 0.003		0.010	mg/L	2022-12-09	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-12-09	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-12-09	

Calculated Parameters

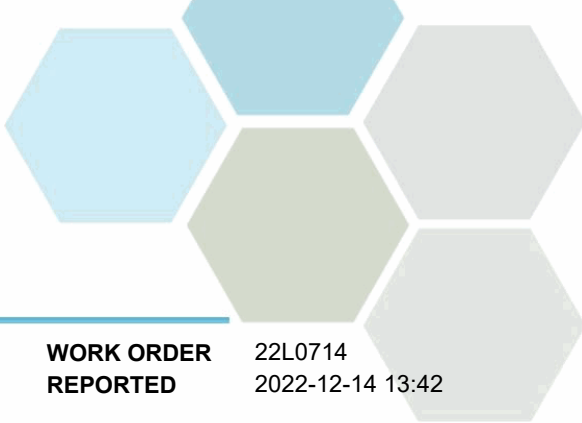
Hardness, Total (as CaCO3)	121		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0359		0.0100	mg/L	N/A	
Nitrogen, Total	0.792		0.0500	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	0.696 ± 0.063		0.050	mg/L	2022-12-09	
Nitrogen, Total Kjeldahl	0.756 ± 0.094		0.050	mg/L	2022-12-12	
Phosphorus, Total (as P)	0.0089 ± 0.0010		0.0050	mg/L	2022-12-09	
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-12-13	

Microbiological Parameters

Coliforms, Total (Q-Tray)	162		1	MPN/100 mL	2022-12-08	
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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22L0714 2022-12-14 13:42

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Upstream of O/F- WT# 3812F (0500050) (22L0714-03) | Matrix: Fresh Water | Sampled: 2022-12-07 06:45, Continued

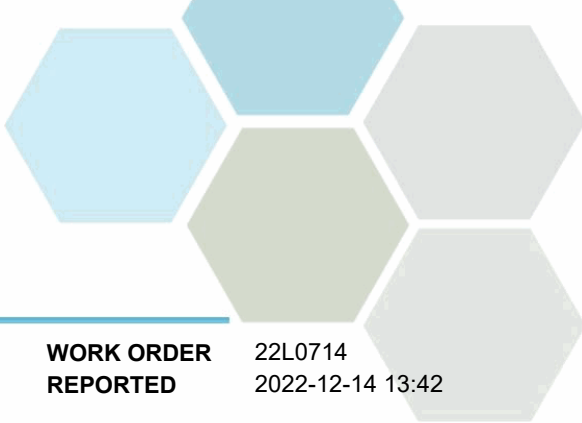
Microbiological Parameters, Continued

E. coli (Q-Tray)	50		1	MPN/100 mL	2022-12-08	
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Total Metals

Aluminum, total	0.0058 ± 0.0013		0.0050	mg/L	2022-12-13	
Antimony, total	< 0.00020		0.00020	mg/L	2022-12-13	
Arsenic, total	< 0.00050		0.00050	mg/L	2022-12-13	
Barium, total	0.0219 ± 0.0028		0.0050	mg/L	2022-12-13	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-12-13	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-12-13	
Boron, total	< 0.0500		0.0500	mg/L	2022-12-13	
Cadmium, total	< 0.000010		0.000010	mg/L	2022-12-13	
Calcium, total	32.7 ± 4.7		0.20	mg/L	2022-12-13	
Chromium, total	< 0.00050		0.00050	mg/L	2022-12-13	
Cobalt, total	< 0.00010		0.00010	mg/L	2022-12-13	
Copper, total	0.00075 ± 0.00012		0.00040	mg/L	2022-12-13	
Iron, total	0.038 ± 0.007		0.010	mg/L	2022-12-13	
Lead, total	< 0.00020		0.00020	mg/L	2022-12-13	
Lithium, total	0.00317 ± 0.00056		0.00010	mg/L	2022-12-13	
Magnesium, total	9.52 ± 1.33		0.010	mg/L	2022-12-13	
Manganese, total	0.00323 ± 0.00287		0.00020	mg/L	2022-12-13	
Molybdenum, total	0.00339 ± 0.00049		0.00010	mg/L	2022-12-13	
Nickel, total	0.00043 ± 0.00009		0.00040	mg/L	2022-12-13	
Phosphorus, total	< 0.050		0.050	mg/L	2022-12-13	
Potassium, total	2.45 ± 0.38		0.10	mg/L	2022-12-13	
Selenium, total	< 0.00050		0.00050	mg/L	2022-12-13	
Silicon, total	3.6 ± 0.7		1.0	mg/L	2022-12-13	
Silver, total	< 0.000050		0.000050	mg/L	2022-12-13	
Sodium, total	12.0 ± 2.2		0.10	mg/L	2022-12-13	
Strontium, total	0.286 ± 0.035		0.0010	mg/L	2022-12-13	
Sulfur, total	10.0 ± 2.4		3.0	mg/L	2022-12-13	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-12-13	
Thallium, total	< 0.000020		0.000020	mg/L	2022-12-13	
Thorium, total	< 0.00010		0.00010	mg/L	2022-12-13	
Tin, total	< 0.00020		0.00020	mg/L	2022-12-13	
Titanium, total	< 0.0050		0.0050	mg/L	2022-12-13	
Tungsten, total	< 0.0010		0.0010	mg/L	2022-12-13	
Uranium, total	0.00256 ± 0.00031		0.000020	mg/L	2022-12-13	
Vanadium, total	< 0.0050		0.0050	mg/L	2022-12-13	
Zinc, total	< 0.0040		0.0040	mg/L	2022-12-13	
Zirconium, total	< 0.00010		0.00010	mg/L	2022-12-13	

Downstream of O/F- WT# 38130 (E221464) (22L0714-04) | Matrix: Fresh Water | Sampled: 2022-12-07 07:00



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22L0714 2022-12-14 13:42

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Downstream of O/F- WT# 38130 (E221464) (22L0714-04) | Matrix: Fresh Water | Sampled: 2022-12-07 07:00, Continued

Anions

Chloride	6.64	± 0.37	0.10	mg/L	2022-12-09	
Nitrate (as N)	0.072	± 0.005	0.010	mg/L	2022-12-09	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-12-09	
Phosphate (as P)	< 0.0050		0.0050	mg/L	2022-12-09	

Calculated Parameters

Hardness, Total (as CaCO3)	121		0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0720		0.0100	mg/L	N/A	
Nitrogen, Total	0.832		0.0500	mg/L	N/A	

General Parameters

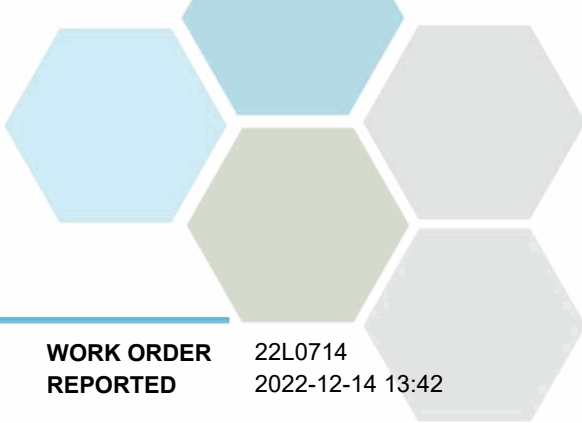
Ammonia, Total (as N)	0.519	± 0.047	0.050	mg/L	2022-12-09	
Nitrogen, Total Kjeldahl	0.760	± 0.095	0.050	mg/L	2022-12-12	
Phosphorus, Total (as P)	0.0141	± 0.0016	0.0050	mg/L	2022-12-09	
Solids, Total Suspended	< 2.0		2.0	mg/L	2022-12-13	

Microbiological Parameters

Coliforms, Total (Q-Tray)	1990		1	MPN/100 mL	2022-12-08	
E. coli (Q-Tray)	1120		1	MPN/100 mL	2022-12-08	

Total Metals

Aluminum, total	0.0099	± 0.0020	0.0050	mg/L	2022-12-13	
Antimony, total	< 0.00020		0.00020	mg/L	2022-12-13	
Arsenic, total	< 0.00050		0.00050	mg/L	2022-12-13	
Barium, total	0.0228	± 0.0030	0.0050	mg/L	2022-12-13	
Beryllium, total	< 0.00010		0.00010	mg/L	2022-12-13	
Bismuth, total	< 0.00010		0.00010	mg/L	2022-12-13	
Boron, total	< 0.0500		0.0500	mg/L	2022-12-13	
Cadmium, total	< 0.000010		0.000010	mg/L	2022-12-13	
Calcium, total	32.5	± 4.6	0.20	mg/L	2022-12-13	
Chromium, total	< 0.00050		0.00050	mg/L	2022-12-13	
Cobalt, total	< 0.00010		0.00010	mg/L	2022-12-13	
Copper, total	0.00079	± 0.00013	0.00040	mg/L	2022-12-13	
Iron, total	0.061	± 0.012	0.010	mg/L	2022-12-13	
Lead, total	< 0.00020		0.00020	mg/L	2022-12-13	
Lithium, total	0.00319	± 0.00057	0.00010	mg/L	2022-12-13	
Magnesium, total	9.76	± 1.36	0.010	mg/L	2022-12-13	
Manganese, total	0.00877	± 0.00778	0.00020	mg/L	2022-12-13	
Molybdenum, total	0.00343	± 0.00049	0.00010	mg/L	2022-12-13	
Nickel, total	0.00047	± 0.00009	0.00040	mg/L	2022-12-13	
Phosphorus, total	< 0.050		0.050	mg/L	2022-12-13	
Potassium, total	2.58	± 0.40	0.10	mg/L	2022-12-13	
Selenium, total	< 0.00050		0.00050	mg/L	2022-12-13	
Silicon, total	3.7	± 0.7	1.0	mg/L	2022-12-13	



TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22L0714 2022-12-14 13:42

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Downstream of O/F- WT# 38130 (E221464) (22L0714-04) Matrix: Fresh Water Sampled: 2022-12-07 07:00, Continued						
<i>Total Metals, Continued</i>						
Silver, total	< 0.000050		0.000050	mg/L	2022-12-13	
Sodium, total	12.9	± 2.4	0.10	mg/L	2022-12-13	
Strontium, total	0.293	± 0.036	0.0010	mg/L	2022-12-13	
Sulfur, total	9.7	± 2.3	3.0	mg/L	2022-12-13	
Tellurium, total	< 0.00050		0.00050	mg/L	2022-12-13	
Thallium, total	< 0.000020		0.000020	mg/L	2022-12-13	
Thorium, total	< 0.00010		0.00010	mg/L	2022-12-13	
Tin, total	< 0.00020		0.00020	mg/L	2022-12-13	
Titanium, total	< 0.0050		0.0050	mg/L	2022-12-13	
Tungsten, total	< 0.0010		0.0010	mg/L	2022-12-13	
Uranium, total	0.00248	± 0.00030	0.000020	mg/L	2022-12-13	
Vanadium, total	< 0.0050		0.0050	mg/L	2022-12-13	
Zinc, total	< 0.0040		0.0040	mg/L	2022-12-13	
Zirconium, total	< 0.00010		0.00010	mg/L	2022-12-13	

Influent- WT# 38131 (0500232) (22L0714-05) | Matrix: Wastewater | Sampled: 2022-12-07 07:05

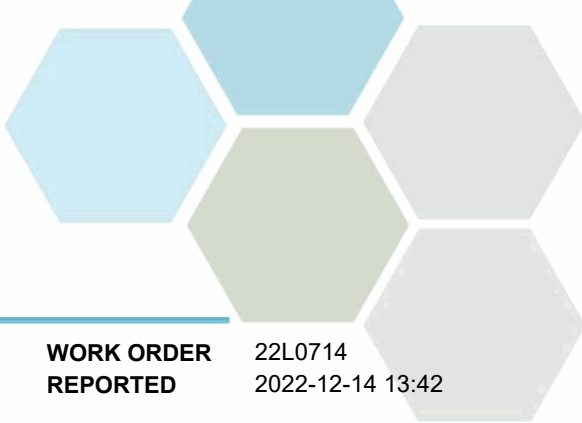
<i>Anions</i>						
Nitrate (as N)	< 0.010		0.010	mg/L	2022-12-09	
Nitrite (as N)	< 0.010		0.010	mg/L	2022-12-09	
Phosphate (as P)	3.00	± 0.52	0.0050	mg/L	2022-12-09	
<i>Calculated Parameters</i>						
Nitrate+Nitrite (as N)	< 0.0100		0.0100	mg/L	N/A	
Nitrogen, Total	38.6		2.00	mg/L	N/A	
<i>General Parameters</i>						
BOD, 5-day	151	± 33	2.0	mg/L	2022-12-13	
Nitrogen, Total Kjeldahl	38.6	± 4.8	0.050	mg/L	2022-12-12	
Phosphorus, Total (as P)	5.50	± 0.61	0.0050	mg/L	2022-12-09	

Effluent 7 Day Composite- WT# 3813A (E105000) (22L0714-06) | Matrix: Wastewater | Sampled: 2022-12-01 00:00 To 2022-12-07 00:00

PRES

<i>Anions</i>						
Nitrate (as N)	2.42	± 0.15	0.010	mg/L	2022-12-09	
Nitrite (as N)	0.115	± 0.012	0.010	mg/L	2022-12-09	
<i>Calculated Parameters</i>						
Nitrate+Nitrite (as N)	2.53		0.0100	mg/L	N/A	
Nitrogen, Total	4.04		0.0500	mg/L	N/A	

General Parameters



TEST RESULTS

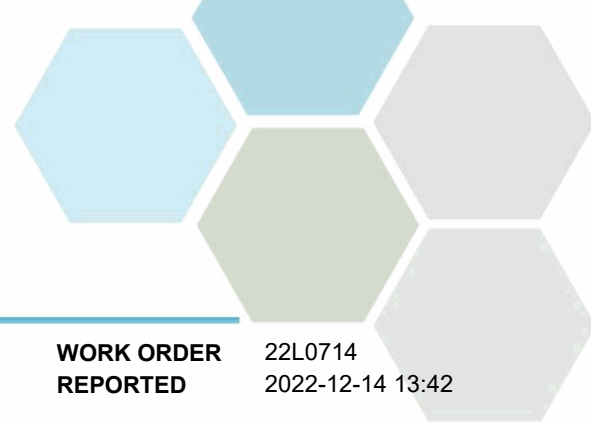
REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22L0714
2022-12-14 13:42

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Effluent 7 Day Composite- WT# 3813A (E105000) (22L0714-06) Matrix: Wastewater Sampled: 2022-12-01 00:00 To 2022-12-07 00:00, Continued						PRES
<i>General Parameters, Continued</i>						
Nitrogen, Total Kjeldahl	1.51	± 0.19	0.050	mg/L	2022-12-12	
Phosphorus, Total (as P)	0.0675	± 0.0075	0.0050	mg/L	2022-12-09	
Solids, Total Suspended	16.6	± 1.3	2.0	mg/L	2022-12-13	

Sample Qualifiers:

PRES Sample has been preserved for TP, TKN in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22L0714 2022-12-14 13:42

Analysis Description	Method Ref.	Technique	Accredited	Location
Ammonia, Total in Water	SM 4500-NH3 G* (2017)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2017)	Dissolved Oxygen Meter	✓	Kelowna
Chemical Oxygen Demand in Water	SM 5220 D* (2017)	Closed Reflux, Colorimetry	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Coliforms, Total in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Hardness in Water	SM 2340 B* (2017)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

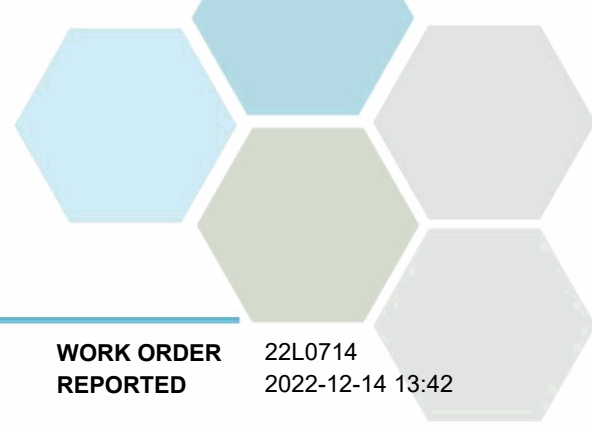
Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

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
MPN/100 mL	Most Probable Number per 100 millilitres
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.



APPENDIX 1: SUPPORTING INFORMATION

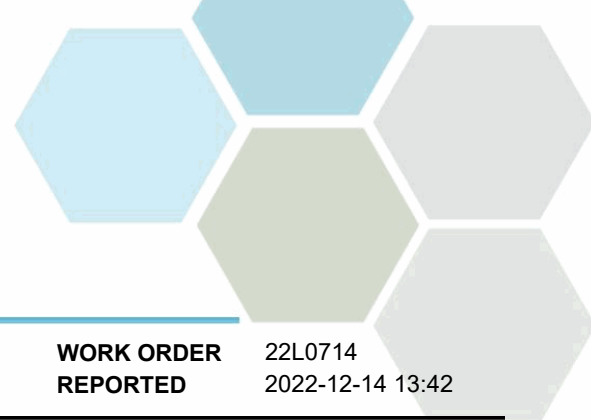
REPORTED TO Penticton, City of - DW & STP
PROJECT Wastewater - PE12212

WORK ORDER 22L0714
REPORTED 2022-12-14 13:42

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. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing.

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.



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22L0714
2022-12-14 13:42

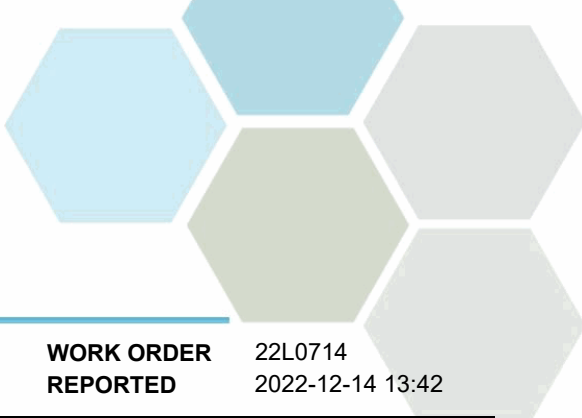
The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **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 B2L0744									
Blank (B2L0744-BLK1)			Prepared: 2022-12-08, Analyzed: 2022-12-08						
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							
Phosphate (as P)	< 0.0050	0.0050 mg/L							
Blank (B2L0744-BLK2)			Prepared: 2022-12-09, Analyzed: 2022-12-09						
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							
Phosphate (as P)	< 0.0050	0.0050 mg/L							
Blank (B2L0744-BLK3)			Prepared: 2022-12-09, Analyzed: 2022-12-09						
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							
Phosphate (as P)	< 0.0050	0.0050 mg/L							
LCS (B2L0744-BS1)			Prepared: 2022-12-08, Analyzed: 2022-12-08						
Chloride	15.5	0.10 mg/L	16.0		97	90-110			
Nitrate (as N)	4.16	0.010 mg/L	4.00		104	90-110			
Nitrite (as N)	1.80	0.010 mg/L	2.00		90	85-115			
Phosphate (as P)	1.00	0.0050 mg/L	1.00		100	80-120			
LCS (B2L0744-BS2)			Prepared: 2022-12-09, Analyzed: 2022-12-09						
Chloride	15.5	0.10 mg/L	16.0		97	90-110			
Nitrate (as N)	4.18	0.010 mg/L	4.00		105	90-110			
Nitrite (as N)	1.81	0.010 mg/L	2.00		90	85-115			
Phosphate (as P)	1.06	0.0050 mg/L	1.00		106	80-120			
LCS (B2L0744-BS3)			Prepared: 2022-12-09, Analyzed: 2022-12-09						
Chloride	15.5	0.10 mg/L	16.0		97	90-110			
Nitrate (as N)	4.22	0.010 mg/L	4.00		105	90-110			
Nitrite (as N)	1.79	0.010 mg/L	2.00		89	85-115			
Phosphate (as P)	1.04	0.0050 mg/L	1.00		104	80-120			

General Parameters, Batch B2L0817

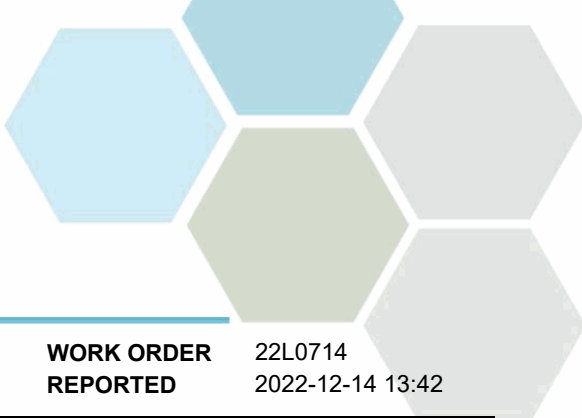


APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22L0714
2022-12-14 13:42

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B2L0817, Continued									
Blank (B2L0817-BLK1)			Prepared: 2022-12-08, Analyzed: 2022-12-13						
BOD, 5-day	< 2.0	2.0 mg/L							
LCS (B2L0817-BS1)			Prepared: 2022-12-08, Analyzed: 2022-12-13						
BOD, 5-day	193	45.9 mg/L	198		97	85-115			
General Parameters, Batch B2L0882									
Blank (B2L0882-BLK2)			Prepared: 2022-12-08, Analyzed: 2022-12-09						
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							
Blank (B2L0882-BLK3)			Prepared: 2022-12-08, Analyzed: 2022-12-09						
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							
LCS (B2L0882-BS2)			Prepared: 2022-12-08, Analyzed: 2022-12-09						
Phosphorus, Total (as P)	0.107	0.0050 mg/L	0.100		107	85-115			
LCS (B2L0882-BS3)			Prepared: 2022-12-08, Analyzed: 2022-12-09						
Phosphorus, Total (as P)	0.106	0.0050 mg/L	0.100		106	85-115			
Duplicate (B2L0882-DUP3)			Source: 22L0714-03		Prepared: 2022-12-08, Analyzed: 2022-12-09				
Phosphorus, Total (as P)	0.0082	0.0050 mg/L		0.0089				15	
Matrix Spike (B2L0882-MS3)			Source: 22L0714-03		Prepared: 2022-12-08, Analyzed: 2022-12-09				
Phosphorus, Total (as P)	0.116	0.0050 mg/L	0.102	0.0089	105	70-125			
General Parameters, Batch B2L0974									
Blank (B2L0974-BLK1)			Prepared: 2022-12-09, Analyzed: 2022-12-09						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
Blank (B2L0974-BLK2)			Prepared: 2022-12-09, Analyzed: 2022-12-09						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
Blank (B2L0974-BLK3)			Prepared: 2022-12-09, Analyzed: 2022-12-09						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
Blank (B2L0974-BLK4)			Prepared: 2022-12-09, Analyzed: 2022-12-09						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
LCS (B2L0974-BS1)			Prepared: 2022-12-09, Analyzed: 2022-12-09						
Ammonia, Total (as N)	1.04	0.050 mg/L	1.00		104	90-115			
LCS (B2L0974-BS2)			Prepared: 2022-12-09, Analyzed: 2022-12-09						
Ammonia, Total (as N)	1.03	0.050 mg/L	1.00		103	90-115			
LCS (B2L0974-BS3)			Prepared: 2022-12-09, Analyzed: 2022-12-09						
Ammonia, Total (as N)	1.01	0.050 mg/L	1.00		101	90-115			
LCS (B2L0974-BS4)			Prepared: 2022-12-09, Analyzed: 2022-12-09						
Ammonia, Total (as N)	1.04	0.050 mg/L	1.00		104	90-115			
General Parameters, Batch B2L0996									
Blank (B2L0996-BLK1)			Prepared: 2022-12-09, Analyzed: 2022-12-12						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							



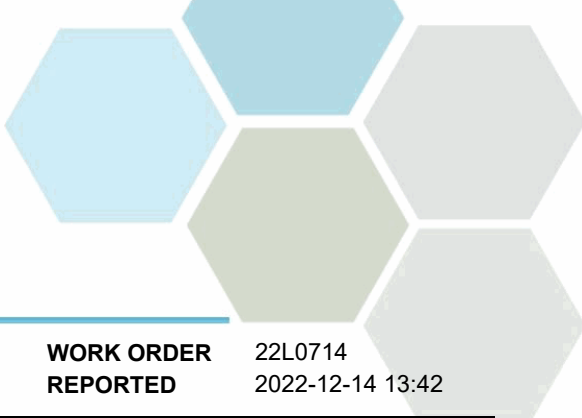
APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22L0714
2022-12-14 13:42

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B2L0996, Continued									
Blank (B2L0996-BLK2)			Prepared: 2022-12-09, Analyzed: 2022-12-12						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
LCS (B2L0996-BS1)			Prepared: 2022-12-09, Analyzed: 2022-12-12						
Nitrogen, Total Kjeldahl	1.00	0.050 mg/L	1.00		100	85-115			
LCS (B2L0996-BS2)			Prepared: 2022-12-09, Analyzed: 2022-12-12						
Nitrogen, Total Kjeldahl	0.978	0.050 mg/L	1.00		98	85-115			
Duplicate (B2L0996-DUP1)			Source: 22L0714-02		Prepared: 2022-12-09, Analyzed: 2022-12-12				
Nitrogen, Total Kjeldahl	2.06	0.050 mg/L		1.90			8	15	
Matrix Spike (B2L0996-MS1)			Source: 22L0714-02		Prepared: 2022-12-09, Analyzed: 2022-12-12				
Nitrogen, Total Kjeldahl	2.72	0.050 mg/L	1.00	1.90	82	65-135			
General Parameters, Batch B2L1183									
Blank (B2L1183-BLK1)			Prepared: 2022-12-12, Analyzed: 2022-12-12						
Chemical Oxygen Demand	< 20	20 mg/L							
LCS (B2L1183-BS1)			Prepared: 2022-12-12, Analyzed: 2022-12-12						
Chemical Oxygen Demand	531	20 mg/L	500		106	89-115			
General Parameters, Batch B2L1342									
Blank (B2L1342-BLK1)			Prepared: 2022-12-13, Analyzed: 2022-12-13						
Solids, Total Suspended	< 2.0	2.0 mg/L							
LCS (B2L1342-BS1)			Prepared: 2022-12-13, Analyzed: 2022-12-13						
Solids, Total Suspended	95.0	10.0 mg/L	100		95	85-115			
Microbiological Parameters, Batch B2L0856									
Blank (B2L0856-BLK1)			Prepared: 2022-12-08, Analyzed: 2022-12-08						
Coliforms, Fecal (Q-Tray)	< 1	1 MPN/100 mL							
E. coli (Q-Tray)	< 1	1 MPN/100 mL							
Blank (B2L0856-BLK2)			Prepared: 2022-12-08, Analyzed: 2022-12-08						
Coliforms, Total (Q-Tray)	< 1	1 MPN/100 mL							
E. coli (Q-Tray)	< 1	1 MPN/100 mL							
Blank (B2L0856-BLK3)			Prepared: 2022-12-08, Analyzed: 2022-12-08						
Coliforms, Total (Q-Tray)	< 1	1 MPN/100 mL							
E. coli (Q-Tray)	< 1	1 MPN/100 mL							
Duplicate (B2L0856-DUP1)			Source: 22L0714-01		Prepared: 2022-12-08, Analyzed: 2022-12-08				
Coliforms, Fecal (Q-Tray)	< 1	1 MPN/100 mL		< 1				80	
E. coli (Q-Tray)	< 1	1 MPN/100 mL		< 1				80	
Duplicate (B2L0856-DUP2)			Source: 22L0714-03		Prepared: 2022-12-08, Analyzed: 2022-12-08				
Coliforms, Total (Q-Tray)	135	1 MPN/100 mL		162			18	80	
E. coli (Q-Tray)	44	1 MPN/100 mL		50			15	80	

Total Metals, Batch B2L1288



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22L0714
2022-12-14 13:42

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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Total Metals, Batch B2L1288, Continued

Blank (B2L1288-BLK1)

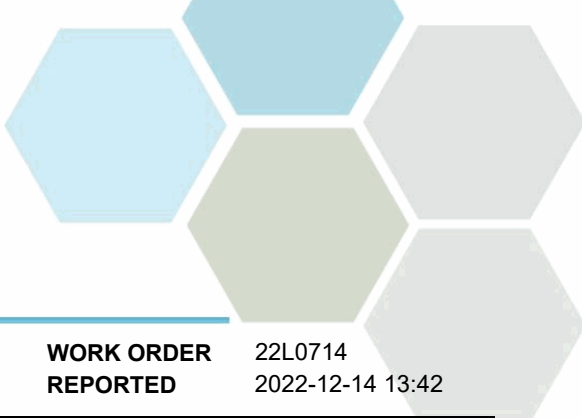
Prepared: 2022-12-13, Analyzed: 2022-12-13

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							
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 (B2L1288-BS1)

Prepared: 2022-12-13, Analyzed: 2022-12-13

Aluminum, total	3.89	0.0050 mg/L	4.00	97	80-120
Antimony, total	0.0393	0.00020 mg/L	0.0400	98	80-120
Arsenic, total	0.391	0.00050 mg/L	0.400	98	80-120
Barium, total	0.0372	0.0050 mg/L	0.0400	93	80-120
Beryllium, total	0.0384	0.00010 mg/L	0.0400	96	80-120
Bismuth, total	0.0387	0.00010 mg/L	0.0400	97	80-120
Boron, total	0.391	0.0500 mg/L	0.400	98	80-120
Cadmium, total	0.0385	0.000010 mg/L	0.0400	96	80-120
Calcium, total	4.01	0.20 mg/L	4.00	100	80-120
Chromium, total	0.0402	0.00050 mg/L	0.0400	101	80-120
Cobalt, total	0.0395	0.00010 mg/L	0.0400	99	80-120
Copper, total	0.0388	0.00040 mg/L	0.0400	97	80-120
Iron, total	4.00	0.010 mg/L	4.00	100	80-120
Lead, total	0.0385	0.00020 mg/L	0.0400	96	80-120
Lithium, total	0.0381	0.00010 mg/L	0.0400	95	80-120
Magnesium, total	4.07	0.010 mg/L	4.00	102	80-120
Manganese, total	0.0396	0.00020 mg/L	0.0400	99	80-120



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22L0714
2022-12-14 13:42

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B2L1288, Continued									
LCS (B2L1288-BS1), Continued					Prepared: 2022-12-13, Analyzed: 2022-12-13				
Molybdenum, total	0.0379	0.00010 mg/L	0.0400		95	80-120			
Nickel, total	0.0408	0.00040 mg/L	0.0400		102	80-120			
Phosphorus, total	3.99	0.050 mg/L	4.00		100	80-120			
Potassium, total	4.03	0.10 mg/L	4.00		101	80-120			
Selenium, total	0.383	0.00050 mg/L	0.400		96	80-120			
Silicon, total	4.1	1.0 mg/L	4.00		104	80-120			
Silver, total	0.0392	0.000050 mg/L	0.0400		98	80-120			
Sodium, total	4.05	0.10 mg/L	4.00		101	80-120			
Strontium, total	0.0400	0.0010 mg/L	0.0400		100	80-120			
Sulfur, total	39.8	3.0 mg/L	40.0		99	80-120			
Tellurium, total	0.0370	0.00050 mg/L	0.0400		93	80-120			
Thallium, total	0.0380	0.000020 mg/L	0.0400		95	80-120			
Thorium, total	0.0394	0.00010 mg/L	0.0400		99	80-120			
Tin, total	0.0403	0.00020 mg/L	0.0400		101	80-120			
Titanium, total	0.0399	0.0050 mg/L	0.0400		100	80-120			
Tungsten, total	0.0396	0.0010 mg/L	0.0400		99	80-120			
Uranium, total	0.0395	0.000020 mg/L	0.0400		99	80-120			
Vanadium, total	0.0396	0.0050 mg/L	0.0400		99	80-120			
Zinc, total	0.383	0.0040 mg/L	0.400		96	80-120			
Zirconium, total	0.0405	0.00010 mg/L	0.0400		101	80-120			



CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22L1572
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-12-14 12:30 / 5.6°C 2022-12-21 11:00
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

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>

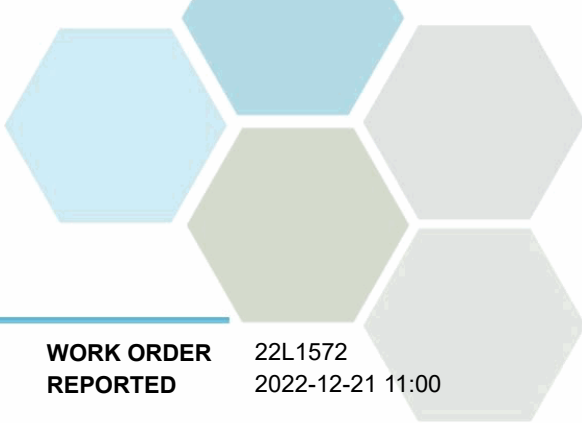
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22L1572
2022-12-21 11:00

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
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Effluent Grab- WT# 3813A (E105000) (22L1572-01) | Matrix: Wastewater | Sampled: 2022-12-14 07:00

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	1		1	MPN/100 mL	2022-12-15	
E. coli (Q-Tray)	1		1	MPN/100 mL	2022-12-15	

Effluent 7 Day Composite- WT# 3813A (E105000) (22L1572-02) | Matrix: Wastewater | Sampled: 2022-12-08 00:00 To 2022-12-14 00:00

PRES

Anions

Nitrate (as N)	2.70 ± 0.17		0.010	mg/L	2022-12-16	
Nitrite (as N)	0.078 ± 0.008		0.010	mg/L	2022-12-16	

Calculated Parameters

Nitrate+Nitrite (as N)	2.78		0.0100	mg/L	N/A	
Nitrogen, Total	4.27		0.0500	mg/L	N/A	

General Parameters

Nitrogen, Total Kjeldahl	1.49 ± 0.18		0.050	mg/L	2022-12-20	
Phosphorus, Total (as P)	0.114 ± 0.013		0.0050	mg/L	2022-12-16	
Solids, Total Suspended	11.4 ± 0.9		2.0	mg/L	2022-12-17	

Secondary Clarifier 1 (22L1572-03) | Matrix: Water | Sampled: 2022-12-14

General Parameters

Solids, Total Suspended	3.0 ± 0.4		2.0	mg/L	2022-12-17	
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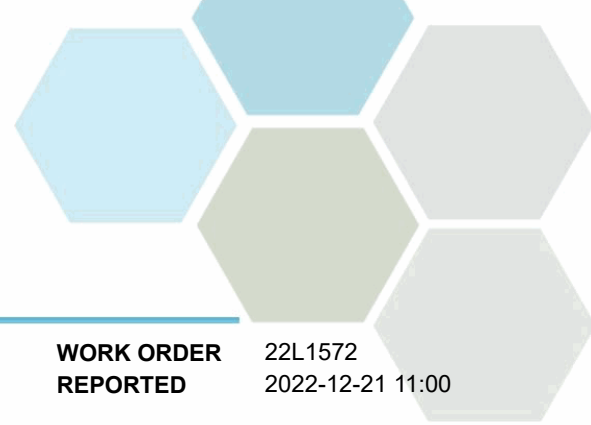
Secondary Clarifier 2 (22L1572-04) | Matrix: Water | Sampled: 2022-12-14

General Parameters

Solids, Total Suspended	2.6 ± 0.4		2.0	mg/L	2022-12-17	
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Sample Qualifiers:

PRES Sample has been preserved for Phos in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22L1572
2022-12-21 11:00

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	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)
mg/L	Milligrams per litre
MPN/100 mL	Most Probable Number per 100 millilitres
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

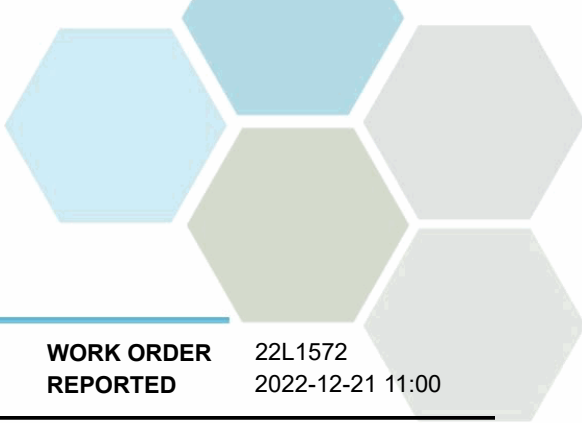
Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.

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. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing.

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.



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22L1572
2022-12-21 11:00

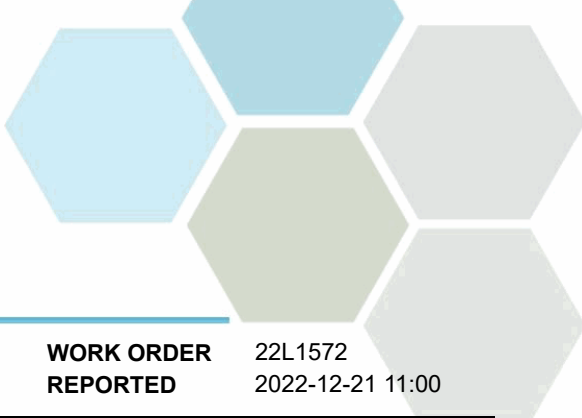
The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **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 B2L1572									
Blank (B2L1572-BLK1)			Prepared: 2022-12-15, Analyzed: 2022-12-15						
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
Blank (B2L1572-BLK2)			Prepared: 2022-12-15, Analyzed: 2022-12-15						
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
LCS (B2L1572-BS1)			Prepared: 2022-12-15, Analyzed: 2022-12-15						
Nitrate (as N)	4.18	0.010 mg/L	4.00		105	90-110			
Nitrite (as N)	1.98	0.010 mg/L	2.00		99	85-115			
LCS (B2L1572-BS2)			Prepared: 2022-12-15, Analyzed: 2022-12-15						
Nitrate (as N)	4.15	0.010 mg/L	4.00		104	90-110			
Nitrite (as N)	1.98	0.010 mg/L	2.00		99	85-115			
General Parameters, Batch B2L1744									
Blank (B2L1744-BLK2)			Prepared: 2022-12-15, Analyzed: 2022-12-16						
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							
Blank (B2L1744-BLK3)			Prepared: 2022-12-15, Analyzed: 2022-12-16						
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							
LCS (B2L1744-BS2)			Prepared: 2022-12-15, Analyzed: 2022-12-16						
Phosphorus, Total (as P)	0.0952	0.0050 mg/L	0.100		95	85-115			
LCS (B2L1744-BS3)			Prepared: 2022-12-15, Analyzed: 2022-12-16						
Phosphorus, Total (as P)	0.0957	0.0050 mg/L	0.100		96	85-115			
Duplicate (B2L1744-DUP3)			Source: 22L1572-02		Prepared: 2022-12-15, Analyzed: 2022-12-16				
Phosphorus, Total (as P)	0.114	0.0050 mg/L		0.114			< 1	15	
Matrix Spike (B2L1744-MS3)			Source: 22L1572-02		Prepared: 2022-12-15, Analyzed: 2022-12-16				
Phosphorus, Total (as P)	0.218	0.0050 mg/L	0.102	0.114	101	70-125			

General Parameters, Batch B2L1923



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22L1572
2022-12-21 11:00

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B2L1923, Continued									
Blank (B2L1923-BLK1)			Prepared: 2022-12-17, Analyzed: 2022-12-17						
Solids, Total Suspended	< 2.0	2.0 mg/L							
Blank (B2L1923-BLK2)			Prepared: 2022-12-17, Analyzed: 2022-12-17						
Solids, Total Suspended	< 2.0	2.0 mg/L							
LCS (B2L1923-BS1)			Prepared: 2022-12-17, Analyzed: 2022-12-17						
Solids, Total Suspended	89.0	10.0 mg/L	100		89	85-115			
LCS (B2L1923-BS2)			Prepared: 2022-12-17, Analyzed: 2022-12-17						
Solids, Total Suspended	95.0	10.0 mg/L	100		95	85-115			
General Parameters, Batch B2L1998									
Blank (B2L1998-BLK1)			Prepared: 2022-12-19, Analyzed: 2022-12-20						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
Blank (B2L1998-BLK2)			Prepared: 2022-12-19, Analyzed: 2022-12-20						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
LCS (B2L1998-BS1)			Prepared: 2022-12-19, Analyzed: 2022-12-20						
Nitrogen, Total Kjeldahl	1.01	0.050 mg/L	1.00		101	85-115			
LCS (B2L1998-BS2)			Prepared: 2022-12-19, Analyzed: 2022-12-20						
Nitrogen, Total Kjeldahl	0.994	0.050 mg/L	1.00		99	85-115			
Microbiological Parameters, Batch B2L1649									
Blank (B2L1649-BLK1)			Prepared: 2022-12-15, Analyzed: 2022-12-15						
E. coli (Q-Tray)	< 1	1 MPN/100 mL							
Blank (B2L1649-BLK2)			Prepared: 2022-12-15, Analyzed: 2022-12-15						
Coliforms, Fecal (Q-Tray)	< 1	1 MPN/100 mL							
E. coli (Q-Tray)	< 1	1 MPN/100 mL							
Blank (B2L1649-BLK3)			Prepared: 2022-12-15, Analyzed: 2022-12-15						
E. coli (Q-Tray)	< 1	1 MPN/100 mL							
Blank (B2L1649-BLK4)			Prepared: 2022-12-15, Analyzed: 2022-12-15						
Coliforms, Fecal (Q-Tray)	< 1	1 MPN/100 mL							
E. coli (Q-Tray)	< 1	1 MPN/100 mL							
Duplicate (B2L1649-DUP1)			Source: 22L1572-01		Prepared: 2022-12-15, Analyzed: 2022-12-15				
Coliforms, Fecal (Q-Tray)	< 1	1 MPN/100 mL		1			80		MIC29
E. coli (Q-Tray)	< 1	1 MPN/100 mL		1			80		MIC29

QC Qualifiers:

MIC29 The difference in logs is less than the R value.



CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22L2322
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-12-21 13:00 / 4.3°C 2022-12-28 11:57
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

Introduction:

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Big Picture Sidekicks



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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.

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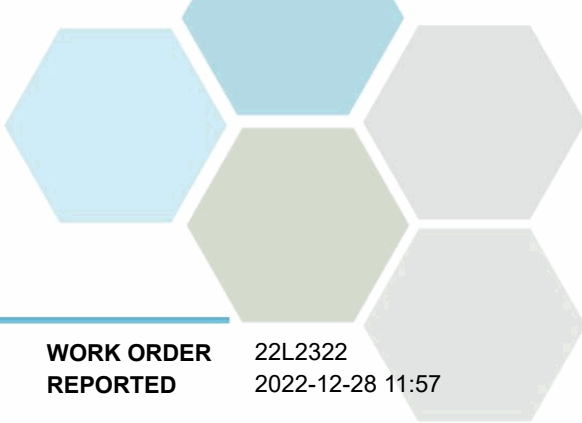
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

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TEST RESULTS

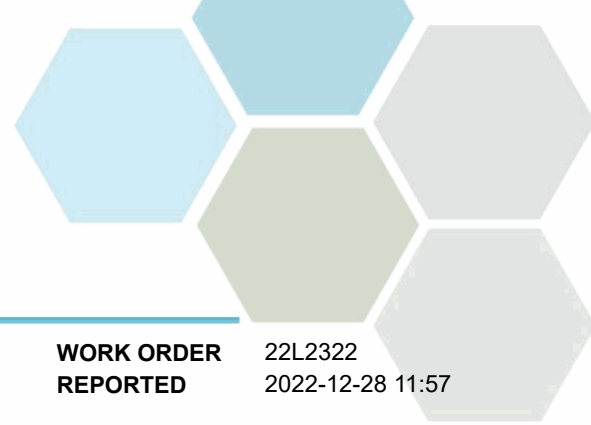
REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22L2322
2022-12-28 11:57

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Effluent Grab- WT# 3813A (E105000) (22L2322-01) Matrix: Wastewater Sampled: 2022-12-21 08:15						
<i>Microbiological Parameters</i>						
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-12-21	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-12-21	
Effluent 7 Day Composite- WT# 3813A (E105000) (22L2322-02) Matrix: Wastewater Sampled: 2022-12-15 00:00 To 2022-12-21 00:00						PRES
<i>Anions</i>						
Nitrate (as N)	2.59	± 0.16		0.010 mg/L	2022-12-22	
Nitrite (as N)	0.049	± 0.005		0.010 mg/L	2022-12-22	
<i>Calculated Parameters</i>						
Nitrate+Nitrite (as N)	2.63			0.0100 mg/L		N/A
Nitrogen, Total	4.01			0.0500 mg/L		N/A
<i>General Parameters</i>						
Nitrogen, Total Kjeldahl	1.38	± 0.17		0.050 mg/L	2022-12-28	
Phosphorus, Total (as P)	0.0885	± 0.0098		0.0050 mg/L	2022-12-28	
Solids, Total Suspended	22.0	± 1.7		2.0 mg/L	2022-12-22	

Sample Qualifiers:

PRES Sample has been preserved for Phos in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22L2322 2022-12-28 11:57

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	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
MPN/100 mL	Most Probable Number per 100 millilitres
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

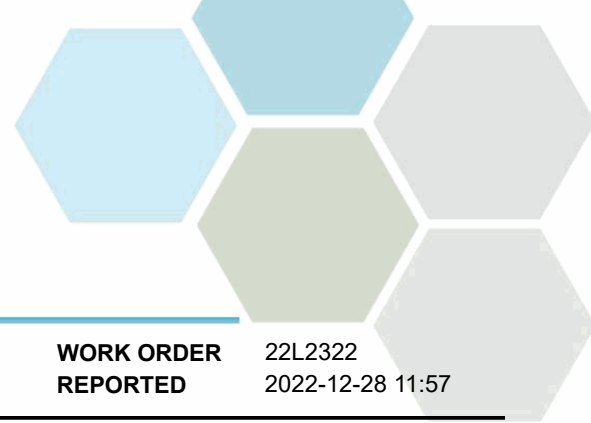
Uncertainty Derivation:

CARO employs the Type A approach for estimation of measurement uncertainty associated with environmental testing. This approach uses method validation data, duplicates for precision, spikes and/or reference materials for accuracy, and method blanks (where applicable) for results near the detection limit. For more information, refer to CALA P19.

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. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing.

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.



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

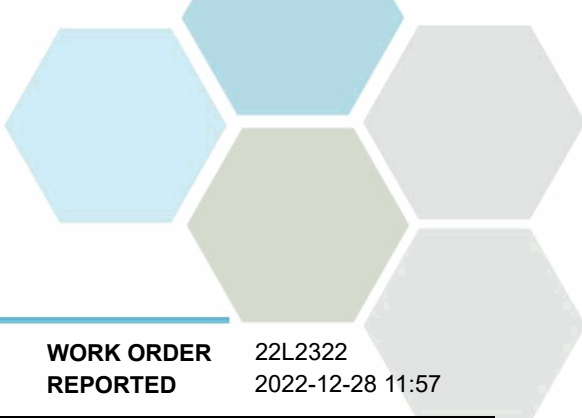
WORK ORDER REPORTED 22L2322 2022-12-28 11:57

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 B2L2293									
Blank (B2L2293-BLK1)			Prepared: 2022-12-22, Analyzed: 2022-12-22						
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
LCS (B2L2293-BS1)			Prepared: 2022-12-22, Analyzed: 2022-12-22						
Nitrate (as N)	4.26	0.010 mg/L	4.00		106	90-110			
Nitrite (as N)	1.96	0.010 mg/L	2.00		98	85-115			
General Parameters, Batch B2L2348									
Blank (B2L2348-BLK1)			Prepared: 2022-12-22, Analyzed: 2022-12-22						
Solids, Total Suspended	< 2.0	2.0 mg/L							
LCS (B2L2348-BS1)			Prepared: 2022-12-22, Analyzed: 2022-12-22						
Solids, Total Suspended	86.0	10.0 mg/L	100		86	85-115			
General Parameters, Batch B2L2541									
Blank (B2L2541-BLK1)			Prepared: 2022-12-27, Analyzed: 2022-12-28						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
Blank (B2L2541-BLK2)			Prepared: 2022-12-27, Analyzed: 2022-12-28						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
LCS (B2L2541-BS1)			Prepared: 2022-12-27, Analyzed: 2022-12-28						
Nitrogen, Total Kjeldahl	1.02	0.050 mg/L	1.00		102	85-115			
LCS (B2L2541-BS2)			Prepared: 2022-12-27, Analyzed: 2022-12-28						
Nitrogen, Total Kjeldahl	1.00	0.050 mg/L	1.00		100	85-115			
Duplicate (B2L2541-DUP1)			Source: 22L2322-02		Prepared: 2022-12-27, Analyzed: 2022-12-28				
Nitrogen, Total Kjeldahl	1.36	0.050 mg/L		1.38			1	15	
Matrix Spike (B2L2541-MS1)			Source: 22L2322-02		Prepared: 2022-12-27, Analyzed: 2022-12-28				
Nitrogen, Total Kjeldahl	2.13	0.050 mg/L	1.00	1.38	75	65-135			



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22L2322
2022-12-28 11:57

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B2L2606									
Blank (B2L2606-BLK1)					Prepared: 2022-12-28, Analyzed: 2022-12-28				
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							
LCS (B2L2606-BS1)					Prepared: 2022-12-28, Analyzed: 2022-12-28				
Phosphorus, Total (as P)	0.0990	0.0050 mg/L	0.100		99	85-115			
Microbiological Parameters, Batch B2L2230									
Blank (B2L2230-BLK1)					Prepared: 2022-12-21, Analyzed: 2022-12-21				
E. coli (Q-Tray)	< 1	1 MPN/100 mL							
Blank (B2L2230-BLK2)					Prepared: 2022-12-21, Analyzed: 2022-12-21				
Coliforms, Fecal (Q-Tray)	< 1	1 MPN/100 mL							
E. coli (Q-Tray)	< 1	1 MPN/100 mL							
Blank (B2L2230-BLK3)					Prepared: 2022-12-21, Analyzed: 2022-12-21				
E. coli (Q-Tray)	< 1	1 MPN/100 mL							



CERTIFICATE OF ANALYSIS

REPORTED TO	Penticton, City of - DW & STP 171 Main Street PENTICTON, BC V2A 5A9	WORK ORDER	22L2571
ATTENTION	Joel Mertz	RECEIVED / TEMP REPORTED	2022-12-28 12:40 / 9.3°C 2023-01-03 14:50
PO NUMBER		COC NUMBER	No Number
PROJECT	Wastewater - PE12212		
PROJECT INFO	0554-04		

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>

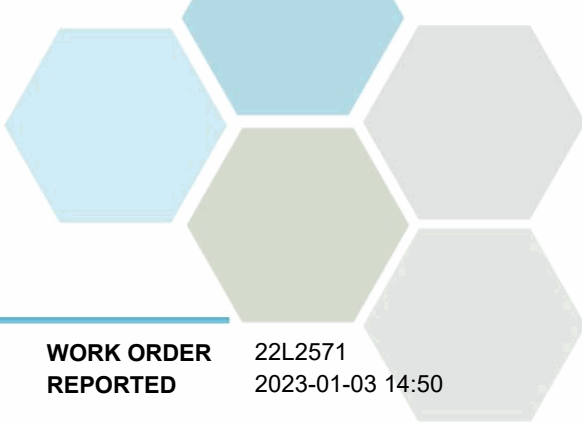
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

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



TEST RESULTS

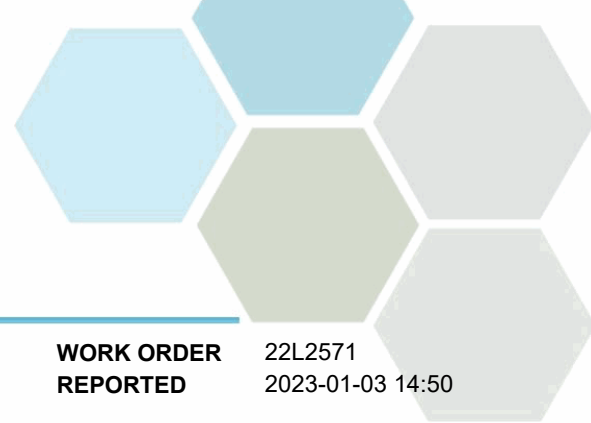
REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22L2571
2023-01-03 14:50

Analyte	Result	Uncertainty	RL	Units	Analyzed	Qualifier
Effluent Grab- WT# 3813A (E105000) (22L2571-01) Matrix: Wastewater Sampled: 2022-12-28						
<i>Microbiological Parameters</i>						
Coliforms, Fecal (Q-Tray)	< 1		1	MPN/100 mL	2022-12-28	
E. coli (Q-Tray)	< 1		1	MPN/100 mL	2022-12-28	
Effluent 7 Day Composite- WT# 3813A (E105000) (22L2571-02) Matrix: Wastewater Sampled: 2022-12-22 00:00 To 2022-12-28 00:00						PRES
<i>Anions</i>						
Nitrate (as N)	1.92	± 0.12	0.010	mg/L	2022-12-29	
Nitrite (as N)	0.068	± 0.007	0.010	mg/L	2022-12-29	
<i>Calculated Parameters</i>						
Nitrate+Nitrite (as N)	1.99		0.0100	mg/L	N/A	
Nitrogen, Total	4.00		0.0500	mg/L	N/A	
<i>General Parameters</i>						
Nitrogen, Total Kjeldahl	2.02	± 0.25	0.050	mg/L	2022-12-30	
Phosphorus, Total (as P)	0.114	± 0.013	0.0050	mg/L	2023-01-03	
Solids, Total Suspended	9.2	± 0.8	2.0	mg/L	2022-12-30	

Sample Qualifiers:

PRES Sample has been preserved for Phos in the laboratory and the holding time has been extended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Penticton, City of - DW & STP Wastewater - PE12212

WORK ORDER REPORTED 22L2571 2023-01-03 14:50

Analysis Description	Method Ref.	Technique	Accredited	Location
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Coliforms, Fecal in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
E. coli in Water	NA / SM 9223 (2017)	Quanti-Tray / Enzyme Substrate Endo Agar	✓	Kelowna
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2017)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2017)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	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
MPN/100 mL	Most Probable Number per 100 millilitres
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

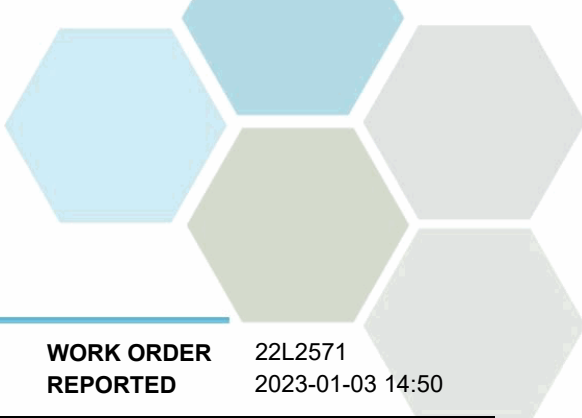
Uncertainty Derivation:

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General Comments:

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APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

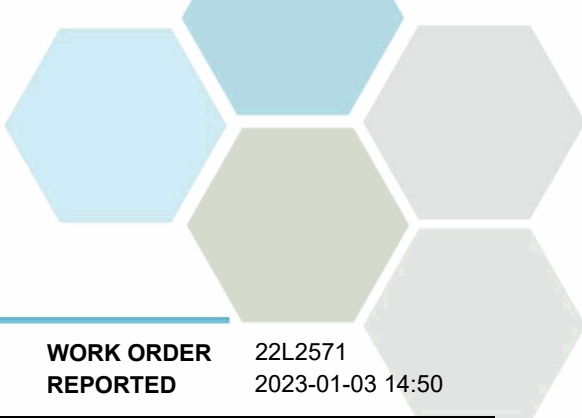
WORK ORDER REPORTED 22L2571
2023-01-03 14:50

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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 B2L2668									
Blank (B2L2668-BLK1)			Prepared: 2022-12-28, Analyzed: 2022-12-28						
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
LCS (B2L2668-BS1)			Prepared: 2022-12-28, Analyzed: 2022-12-28						
Nitrate (as N)	4.29	0.010 mg/L	4.00		107	90-110			
Nitrite (as N)	2.16	0.010 mg/L	2.00		108	85-115			
General Parameters, Batch B2L2761									
Blank (B2L2761-BLK1)			Prepared: 2022-12-29, Analyzed: 2022-12-30						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
Blank (B2L2761-BLK2)			Prepared: 2022-12-29, Analyzed: 2022-12-30						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
LCS (B2L2761-BS1)			Prepared: 2022-12-29, Analyzed: 2022-12-30						
Nitrogen, Total Kjeldahl	1.02	0.050 mg/L	1.00		102	85-115			
LCS (B2L2761-BS2)			Prepared: 2022-12-29, Analyzed: 2022-12-30						
Nitrogen, Total Kjeldahl	0.994	0.050 mg/L	1.00		99	85-115			
Duplicate (B2L2761-DUP2)			Source: 22L2571-02		Prepared: 2022-12-29, Analyzed: 2022-12-30				
Nitrogen, Total Kjeldahl	1.91	0.050 mg/L		2.02			6	15	
Matrix Spike (B2L2761-MS2)			Source: 22L2571-02		Prepared: 2022-12-29, Analyzed: 2022-12-30				
Nitrogen, Total Kjeldahl	2.62	0.050 mg/L	1.00	2.02	61	65-135			MS2
General Parameters, Batch B2L2847									
Blank (B2L2847-BLK1)			Prepared: 2022-12-30, Analyzed: 2022-12-30						
Solids, Total Suspended	< 2.0	2.0 mg/L							
LCS (B2L2847-BS1)			Prepared: 2022-12-30, Analyzed: 2022-12-30						
Solids, Total Suspended	87.0	10.0 mg/L	100		87	85-115			



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Penticton, City of - DW & STP
Wastewater - PE12212

WORK ORDER REPORTED 22L2571
2023-01-03 14:50

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B3A0029									
Blank (B3A0029-BLK1)			Prepared: 2023-01-03, Analyzed: 2023-01-03						
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							
LCS (B3A0029-BS1)			Prepared: 2023-01-03, Analyzed: 2023-01-03						
Phosphorus, Total (as P)	0.100	0.0050 mg/L	0.100		100	85-115			
Microbiological Parameters, Batch B2L2659									
Blank (B2L2659-BLK1)			Prepared: 2022-12-28, Analyzed: 2022-12-28						
Coliforms, Fecal (Q-Tray)	< 1	1 MPN/100 mL							
E. coli (Q-Tray)	< 1	1 MPN/100 mL							
Blank (B2L2659-BLK2)			Prepared: 2022-12-28, Analyzed: 2022-12-28						
E. coli (Q-Tray)	< 1	1 MPN/100 mL							

QC Qualifiers:

MS2 The native sample concentration is greater than the spike concentration hence the matrix spike limits do not apply.



July 5, 2010

Tracking Number: 27185
Authorization Number: 12212

REGISTERED MAIL

THE CORPORATION OF THE CITY OF PENTICTON
171 MAIN ST
PENTICTON, BC
V2A 5A9

Dear Operational Certificate Holder:

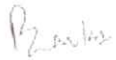
Enclosed is Amended Operational Certificate 12212 issued under the provisions of the *Environmental Management Act*. Your attention is respectfully directed to the terms and conditions outlined in the operational certificate. An annual fee will be determined according to the Permit Fees Regulation.

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.

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 Okanagan Region. Plans, data and reports pertinent to the operational certificate are to be submitted to the Director, Environmental Protection, at Ministry of Environment, Regional Operations, Okanagan Region, 102 Industrial Pl., Penticton, BC V2A 7C8.

Yours truly,



Sajid A Barlas, Ph.D. , P.Ag.
for Director, *Environmental Management Act*
Okanagan Region

Enclosure

cc: Environment Canada



MINISTRY OF
ENVIRONMENT

OPERATIONAL CERTIFICATE

12212

*Under the Provisions of the Environmental Management Act and in accordance with the
City of Penticton approved Liquid Waste Management Plan*

THE CORPORATION OF THE CITY OF PENTICTON

**171 MAIN ST
PENTICTON, BC
V2A 5A9**

is authorized to discharge effluent from a municipal wastewater collection and treatment system located in Penticton, British Columbia, to the Okanagan River channel, and reclaimed wastewater to the ground by irrigation, and is further authorized to discharge sludge from this same system to an authorized compost facility, subject to the conditions listed below. Contravention of any of these conditions is a violation of the *Environmental Management Act* and may result in prosecution.

This Operational Certificate (OC) supersedes and amends all previous versions of Operational Certificate 12212 issued under the *Waste Management Act*.

1. **AUTHORIZED DISCHARGES**

1.1 **Authorized source**

This section applies to the discharge of effluent from the **PENTICTON ADVANCED WASTEWATER TREATMENT FACILITY (AWWTP)**. The site reference number for this discharge is E105000.

Date issued: March 20, 1995
Date amended: July 5, 2010
(most recent)

Sajid A Barlas, Ph.D. , P.Ag.
for Director, *Environmental Management Act*
Okanagan Region
Operational Certificate Number: 12212

1.1.1 The estimated maximum and average daily rate of effluent discharged from the wastewater treatment plant averaged on an annual basis to the Okanagan River channel is as follows:

Year	Annual Average Daily flow (m ³ day)	Maximum Daily Flow (m ³ day)
2009	16,500	21,500
2010	17,400	22,700
2011	17,860	23,200
2012	18,800	24,400
2013	19,200	25,000
2014	19,700	25,600
2015	20,200	26,200
2016	20,600	26,800
2017	21,100	27,500
2018	21,600	28,100
2019	22,100	28,770
2020	22,700	29,500
2021	23,200	30,200
2022	23,700	30,900
2023*	25,300	32,800
2024*	25,800	33,600
2025*	26,400	34,400
2026*	27,100	35,200
2027*	27,700	36,000

*See Sec 3.12 regarding channel dilution.

For the purposes of Permit fee calculations, the permit fees for the nominal year that begins on the anniversary date of the Operational Certificate shall use the estimated flow value for that calendar year.

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

Biochemical Oxygen Demand:	Maximum:	10 mg/L
Total Suspended Solids:	Maximum:	10 mg/L
Total Phosphorus:		
Maximum Annual Average:		0.2 mg/L
Maximum Daily Concentration		2.0 mg/L
Total Annual Discharge Not to exceed:		1500 kg/yr
Level to strive for:		0.01 mg/L

Date issued: March 20, 1995
Date amended: July 5, 2010
(most recent)



Sajid A Barlas, Ph.D. , P.Ag.
for Director, *Environmental Management Act*
Okanagan Region
Operational Certificate Number: 12212

The Level to strive for is the Okanagan Lake background level.

Total Nitrogen:

Maximum daily limit: less than 10.0 mg/L

Annual Average: 6.0 mg/L

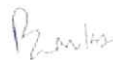
- 1.1.3 The authorized works are a wastewater collection system, a biological nutrient removal tertiary treatment plant with backup chemical phosphorus removal facilities, fermentation units, anaerobic digesters, effluent storage reservoirs, disinfection facilities, sludge dewatering facilities, septage receiving facility, reclaimed wastewater irrigation facilities, an effluent outfall to Okanagan River channel and related appurtenances approximately located as shown on Site Plan A.
- 1.1.4 The City shall manage its liquid waste management actions to ensure Skaha Lake water quality objectives are met. The interim management target for Skaha Lake spring total phosphorus objective is 15 ug/L. The Director may adjust the maximum annual total phosphorus loading limit if it is necessary to protect the lake water quality and/or to accommodate a request from the City for additional discharge to the Lake. Such a request must be supported by sufficient additional monitoring data/information to help the Director thoroughly assess potential impacts of such an adjustment on the receiving environment.
- 1.1.5 The location of the wastewater treatment plant is legally described as Lot 1, District Lot 1 Group 7, District Lot 5 Group 7, District Lots 286S and 367, Similkameen Division Yale (Formerly Yale-Lytton) District Plan 27543.
- 1.1.6 The location of the discharge to Okanagan River channel is legally described as the Plan of Statutory Right of Way over unsurveyed Crown Land (being the bed of Okanagan River to the West of RPA-1189, Lot 13, S.D.Y. D.) approximately as shown on Site Plan A.

1.2 **Authorized source**

This section applies to the discharge of effluent from a RECLAIMED WASTEWATER IRRIGATION SYSTEM. The site reference number for this discharge is E221689.

- 1.2.1 There is no maximum authorized rate of reclaimed wastewater discharge for beneficial use as irrigation water. Reclaimed water may be irrigated at

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agricultural rates in a manner to prevent effluent surfacing, overland flow and groundwater breakout.

- 1.2.2 The characteristics of the reclaimed wastewater are to meet compliance with the Municipal Sewage Regulation.
- 1.2.3 The authorized works are reclaimed water irrigation facilities and related appurtenances.
- 1.2.4 The location of the area where reclaimed wastewater may be irrigated is described generally as the Penticton area. Actual authorization for a specific parcel of land to be irrigated is contingent upon the submission of a "Plan of Irrigation", prepared by a suitably qualified person, of that particular parcel to the Director and his approval obtained in writing. Reclaimed wastewater may be irrigated on the fenced area of the wastewater treatment plant grounds. Annual report to indicate areas under Irrigation.

2. GENERAL REQUIREMENTS

2.1 Maintenance of Works and Emergency Procedures

The City of Penticton shall inspect the authorized works regularly and maintain them in good working order. In the event of an emergency or condition beyond the control of the City of Penticton which prevents effective operation of the authorized works or leads to unauthorized discharge, the City shall comply with all applicable statutory requirements, immediately notify the Director, Environmental Protection, and take appropriate remedial action for the prevention or mitigation of pollution. The Director may reduce or suspend operations to protect the environment until the authorized works have been restored and/or corrective steps have been taken to prevent unauthorized discharges.

2.2 Bypasses

The discharge of effluent which has bypassed the authorized treatment works is prohibited unless the prior approval of the Director is obtained and confirmed in writing.

2.3 Process Modifications

The Director, Environmental Protection shall be notified prior to implementing changes to any process that may adversely affect the quality and/or quantity of the discharge.

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2.4 Plans - New Works

- 2.4.1 Plans of modifications and/or extensions to the existing works shall be signed and sealed by a Professional Engineer licensed to practice in the Province of British Columbia.
- 2.4.2 Plans for modifications of and/or extensions to the existing Reclaimed Wastewater Irrigation System shall be signed and sealed by a Professional Engineer or Professional Agrologist suitably qualified and licensed to practice in the Province of British Columbia, or as otherwise acceptable to the Director.
- 2.4.3 Plans and specifications of any proposed modifications or additions to works authorized in this Operational Certificate, with the exception of the wastewater collection system, shall be submitted to the Director, and his written consent obtained before construction commences. The works shall be constructed in accordance with such plans.
- 2.4.4 Retain a copy of all "as built", plans of modifications and/or extensions to the wastewater collection system for perusal by the Director, or his designate, upon request.
- 2.4.5 Design and construct the irrigation works in accordance with best current agricultural best management practices and the "Code of Practice for Use of Reclaimed Water - a companion document to the Municipal Sewage Regulation".

2.5 Qualified Professionals

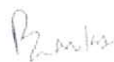
All facilities and information, including works, plans, assessments, investigations, surveys, programs and reports, must be certified by qualified professionals.

3. GENERAL REQUIREMENTS - ALL DISCHARGES

3.1 Operation and Maintenance

- 3.1.1 Develop and maintain both an Operational and Maintenance Manual for the wastewater collection, wastewater treatment, reclaimed wastewater utilization and wastewater disposal works. A copy of the Operational and Maintenance Manuals shall be retained at the treatment plant for inspection, by the Director or his designate.

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- 3.1.2 Operate and maintain a system of preventative maintenance for the wastewater collection, wastewater treatment, effluent utilization and effluent disposal.

3.2 **Facility Classification and Operator Certification**

- 3.2.1 The City of Penticton shall operate staff and maintain the existing plant as an Environmental Operator Certification Program (EOCP) Level IV facility and have at least one designated chief operator. The chief operator(s) must maintain a class IV EOCP certification. Should there be any changes in the Chief Operator(s) the City shall notify the Director within 3 business days of the change.
- 3.2.2 With respect to the present 2010 plant expansion, the City shall submit a facility update to the EOCP program to confirm the expanded facility and operator classification requirements within 90 days of the issuance of this OC. That submission should be copied to the Director and include a specific request for a written response from the EOCP. Within 60 days of receiving the EOCP's written response, the City shall provide a copy to the Director along with a submission documenting compliance or a plan to achieve compliance.
- 3.2.3 The City shall log changes in certification levels of the other operating staff on an ongoing basis and submit an annual comparison of staff certification relative to EOCP requirements as part of the annual reporting requirements.

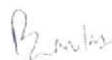
3.3 **Water Management and Conservation**

Establish a water management and conservation program to encourage a reduction in the volume of domestic, industrial and commercial wastewaters discharged to the wastewater collection system.

3.4 **Wastewater Collection System - Infiltration, Inflow and Cross Connections**

Inspect and maintain the Wastewater Collection System works so as to minimize the possibility of cross connections between the storm sewer and the sanitary sewer systems, to minimize infiltration of groundwater, to minimize inflow of water from basement sump pumps and roof drains, and minimize exfiltration of the collected wastewater from the collection system to the ground.

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3.5 Sanitary Sewer Bylaw

Subject to being declared a Sewage Control Area under Section 23 of the *Environmental Management Act*, and in order to minimize the potential effect of heavy metals or other toxic materials in the effluent and/or sludge, the City shall prepare, or review and if necessary update, and implement a Sanitary Sewer Bylaw to regulate the input of such wastes to the wastewater collection. The installation of devices to process household putrescible waste for disposal to the wastewater collection system should be prohibited. The City is responsible for enacting a suitable sampling and monitoring program in support of this bylaw.

The City is strongly advised to seek the active cooperation of the public through a proactive public education program.

3.6 Contingency Plan

Prepare a Contingency Plan that will address the appropriate course of action to be taken in any particular preconceived emergency situation. The plan shall include 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 public safety and the protection of the environment. The plan is to be continually updated as necessary to reflect the current operation. A copy of the Contingency Plan shall be forwarded to the Director.

3.7 Sludge Management

The management of sludge produced by the subject operation at a site remote from the treatment plant site is to operate in accordance with the Organic Matter Recycling Regulation (OMRR). Sludge sampling shall comply with the OMRR.

3.8 Odours

Within 30 days of the final installation of the fibreglass covers for the primary clarifiers and equalization tanks, the biotrickling filter and biofilter to treat foul air emissions from various processes, and the carbon scrubber for the screening room exhaust, the City shall notify Environmental Protection Staff that the above works are installed and operational.

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Should any future aspects of the operation give rise to objectionable odours in the opinion of the Director, appropriate remedial measures or a further Odour Management plan may be required by the Director at that time.

3.9 **Fencing**

The City shall erect and maintain a fence around the wastewater treatment plant and such other areas as required by the Director. The height and type of fencing shall meet the approval of the Director.

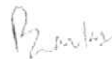
3.10 **Signage**

The City shall erect signage to meet the criteria in the Municipal Sewage Regulation (MSR).

3.11 **Disinfection-Outfall**

- 3.11.1 Fecal coliform and E. Coli levels in the treated and disinfected effluent are not to exceed 50 MPN/100ml in any given sample before discharge to the channel outfall during the winter season. During the summer season i.e.; April 15 to October 15 of any calendar year, the level of Fecal coliforms and E. Coli in any given sample of treated effluent intended for discharge to the channel or irrigation reuse shall not exceed 14 MPN/100 ml. Excedances of either of these seasonal limits including those detected by in- house E.coli monitoring shall be reported to the Director within 5 business days of the occurrence. The City will strive to consistently comply with effluent fecal coliform and E.Coli levels of 2.2 MPN or less per 100 ml.
- 3.11.2 If chlorination is used for disinfection, maintain a total chlorine residual of 0.5 mg/L immediately prior to dechlorination. Operate the dechlorination facilities such that there is a total chlorine residual of 0.0 mg/L after dechlorination and prior to the discharge of the effluent to the Okanagan River Channel.
- 3.11.3 The City shall erect a sign along the alignment of the outfall diffuser, above high water mark advising of the presence of an underwater pipe. The sign shall have lettering at least 100 millimetres high and be clearly visible.

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3.12 Dilution in Okanagan River

The City should consider initiating a Liquid Waste Management Plan amendment if, in any given calendar year, the average daily discharge to the channel is 25,000 m³/d or greater. This will allow review of the health risks and associated public perception concerns when the dilution of effluent approaches 10:1. The Okanagan Basin Implementation Plan has established minimum flows for the river channel. These are 3.0 m³/sec during all months of the year. Extended periods when the dilution is greater than 10:1 are to be avoided.

3.13 Effluent Irrigation

Effluent discharged to ground by irrigation are to comply with all requirements of the Municipal Sewage Regulations.

4. MONITORING REQUIREMENTS

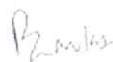
4.1 Sampling and Analytical Procedures

- 4.1.1 Proper care should be taken in sampling, storing and transporting the samples to adequately control temperature and avoid contamination, breakage, etc. Sampling shall be carried out 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", or by suitable alternative procedures as authorized by the Director.

A copy of the above manual may be purchased from the Queen's Printer Publications Centre, P. O. Box 9452, Stn. Prov. Gov't. Victoria, British Columbia, V8W 9V7 (1-800-663-6105 or (250) 387-6409). A copy of the manual is also available for inspection at all Environmental Protection offices.

- 4.1.2 Analyses shall be carried out in accordance with procedures described in the most recent edition of the "British Columbia Environmental Laboratory Methods Manual for the Analysis of Water, Wastewater, Sediment, Biological Materials and Discrete Ambient Air Samples", or by

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suitable alternative procedures as authorized by the Director.

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<http://www.publications.gov.bc.ca/>

- 4.1.3 The City is required to follow the terms and conditions of the Quality Assurance Regulation (EDQA). Ten percent of the samples collected shall be duplicated to provide data quality assurance. Quality control information generated by the City's lab while analyzing parameters required by this Operational Certificate shall also be provided with the data required to be reported.

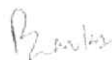
4.2 Influent Sampling Program

- 4.2.1 Install and maintain a suitable sampling facility and obtain a grab sample of the plant influent once each month for check analysis of nutrient levels (a proportional continuous sampler may be used). Proper care should be taken in sampling, storing and transporting the samples to adequately control temperature and avoid contamination, breakage, etc.
- 4.2.2 Obtain analyses of the influent sample for the following:
- total phosphorus and ortho phosphorus, expressed as P in mg/L;
 - total nitrogen expressed as N in mg/L;
 - pH.

4.3 Effluent Sampling Program

- 4.3.1 Install and maintain a suitable sampling facility and obtain a grab sample of the effluent once daily during the period of maximum daily flow for subsequent in-house analysis, once each month for check analysis of nutrient levels by a suitably accredited independent laboratory, (a proportional continuous sampler may be used). Proper care should be taken in sampling, storing and transporting the samples to adequately control temperature and avoid contamination, breakage, etc.
- 4.3.2 Obtain analyses of the effluent sample for the following:
- Total suspended solids (non-filterable residue), (monthly analysis),

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mg/L;

- 5-day Biochemical Oxygen Demand (B.O.D.), (monthly analysis), mg/L;
- Chemical Oxygen Demand (C.O.D.), (weekly analysis), mg/L;
- Total phosphorus (weekly), ortho phosphorus, (daily analysis), all expressed as mg/L P;
- Total nitrogen, ammonia nitrogen, nitrate nitrogen, (weekly analysis), all expressed as mg/L N;
- pH, (daily analysis); and
- Fecal coliform and E. Coli (weekly analysis accredited lab), E. Coli (daily in-house lab from April 15 to October 15)

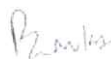
Monitoring for Fecal Coliform or E. Coli using an accredited lab shall be conducted:

- On a weekly basis provided
 - 1) the individual results for any two consecutive E-coli results (either in-house or accredited lab samples) do not exceed 2.2 MPN/100 ml or
 - 2) the individual results of any Fecal Coliform or E. Coli sample does not exceed 14 MPN/100 ml.

Should two consecutive results exceed 2.2 MPN/100 ml or any single test exceed 14 MPN/100 ml for either Fecal Coliforms or E.Coli, daily testing for both coliforms is required using an accredited lab for a minimum of 2 days, or until the individual results of 2 consecutive daily tests are all less than 2.2 MPN/100 ml.

- 4.3.3 Occasional full chemical analysis of the main cations and anions and other characteristics may be required by the Director.
- 4.3.4 The City shall provide and maintain a suitable flow measuring device and record once per day the effluent volume discharged to the Okanagan River and the volume utilized for irrigation over a 24-hour period. Record the flows for each calendar month and for each calendar year.
- 4.3.5 Utilizing Okanagan River flow data available on the internet, record daily Okanagan River flows measured at Penticton in order to identify flows and calculate the degree of dilution available. Flow data should be downloaded not less than once per week.

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4.4 **Surface Water Impact Monitoring Program**

The City is required to undertake Okanagan River sampling and monitoring as specified below.

4.4.1 A surface water impact monitoring program is required on the Okanagan River and associated storm-drainages from the city. The monitoring program, as a minimum, shall consist of one set of samples taken monthly at hydrologically appropriate locations upstream of the effluent outfall diffuser and downstream of the effluent outfall diffuser. Site locations and sampling procedures are to be approved in writing, by the Director.

4.4.2 Obtain analyses of the surface water sample for the following:

- Total suspended solids (non-filterable residue), mg/L;
- Total and e coli coliforms, M.P.N./100 ml (weekly during May, June, July August and September);
- Total phosphorus, and ortho phosphorus, expressed as mg/L P;
- Total nitrogen, ammonia nitrogen, nitrate nitrogen, all expressed as mg/L N;
- Chloride, temperature, dissolved oxygen and pH.
- Total metals full suite (storm-drain only)

4.4.3 Occasional full chemical, biological or other analyses of water, sediment or biota of the receiving environment may be periodically required by the Director.

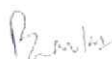
4.5 **Ground water and Spray Irrigation Monitoring Program**

The City shall have a Qualified Professional assess and develop an irrigation plan for any and all sites that utilize treated effluent for irrigation purposes. The irrigation plan shall clearly document appropriate agronomic loading rates for each site. Each site and irrigation plan should be reassessed every 5 years or whenever major changes to the site occur and must include auditing of irrigation duration and application rates. The first such evaluation is required within 2 years of the issuance of this Operational Certificate.

4.6 **Basin-wide Collaborative Lake Monitoring Program**

The City will participate in the development, funding and implementation of any basin-wide collaborative lake monitoring initiative, as required by the Director, which would help track lake water quality, set water quality objectives and lead to better determination of nutrient loading limits. Funding mechanisms and scope of work will be developed collaboratively with all appropriate stakeholders.

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5. REPORTING

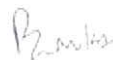
5.1 General Reporting

- 5.1.1 Maintain the monitoring data required in Section 4 for inspection.
- 5.1.2 The influent/effluent water quality analyses and flow data is to be submitted to the Director such that they are received by the Director within 30 days of the results being completed in-house or being sent out by the testing agency.
- 5.1.3 Monitoring data shall be submitted in an electronic and printed format satisfactory to the Director. All monitoring data must be entered into the Environmental Monitoring System (EMS) electronically within sixty days of the end of a calendar year for the year's monitoring. Electronic Data Transfer information is available at http://www.env.gov.bc.ca/epd/ems_edt.html and further information is available at http://www.env.gov.bc.ca/air/wamr/labsys/ems_wr/index.html.

5.2 Annual Reporting

- 5.2.1 Submit an annual printed and electronic report which includes a summary of the results of all monitoring programs as specified in this Operational Certificate, data interpretation and trend analyses. Monitoring data shall be referenced to the Skaha Lake spring total phosphorus interim objective of 15 ug/L.
- 5.2.2 This report is to be in a format which is suitable for review by the public and/or other government agencies.
- 5.2.3 The first report is due on or before within 120 days of the end of a calendar year for that year's monitoring. Raw data are to be attached as appendices to the report.
- 5.2.4 Maintain and submit records of the following as a part of the annual report:
 - 5.2.4.1 Records of effluent water balance, which would include the plant

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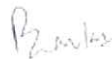


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influent flow, the volume of effluent discharged to the Okanagan River Channel, Okanagan River discharge data, other volumetric information and the volume of effluent utilized for irrigation.

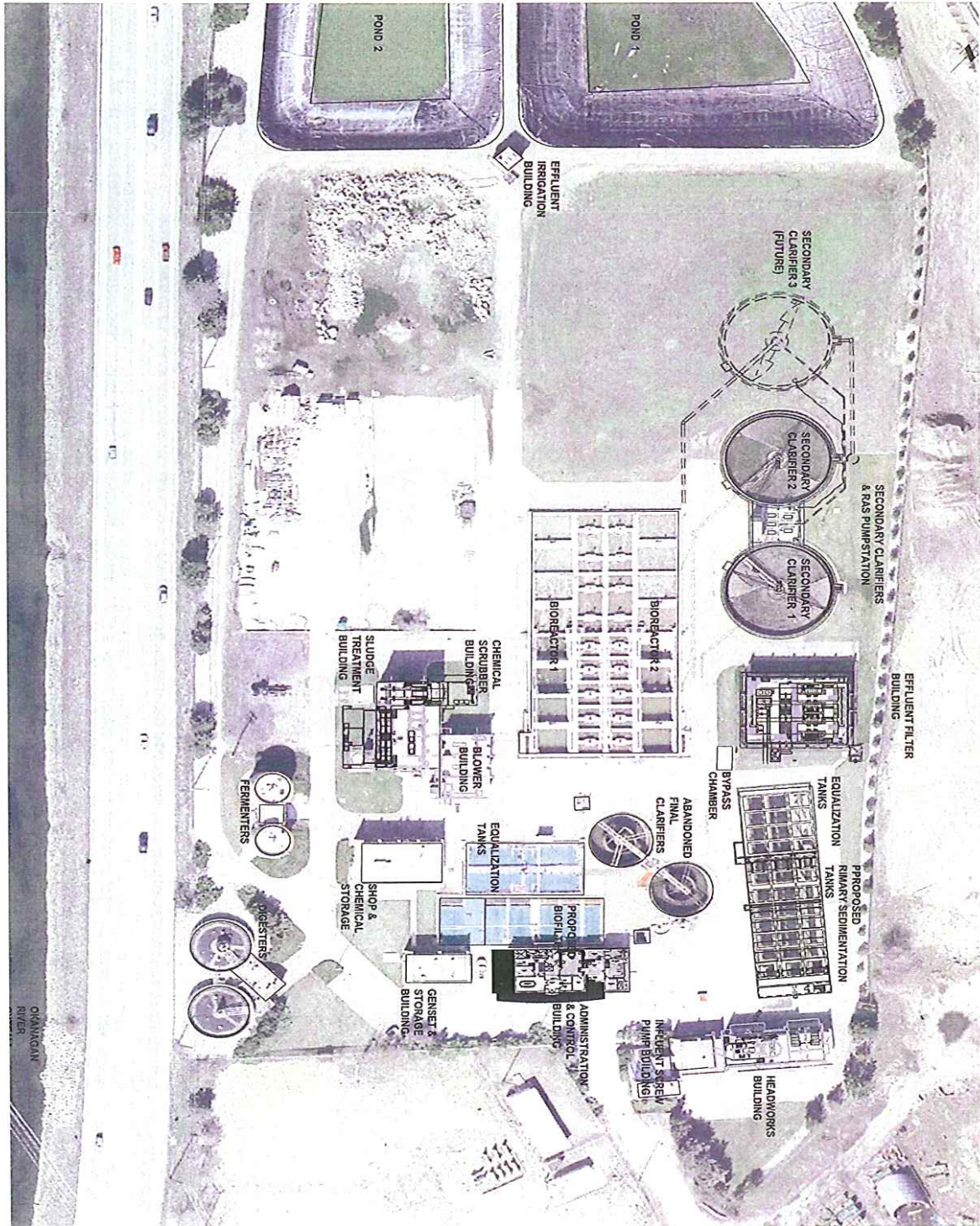
- 5.2.4.2 Records of the duration, intensity, acreage, location and type of reclaimed wastewater irrigation.
- 5.2.4.3 Records of efforts to reduce infiltration, inflow and cross connections.
- 5.2.4.4 Records of efforts to administer the Sanitary Sewer and Storm Sewer by-law(s). Include as an attachment, any amendments to the influent wastes by-law(s) that have been made during the past year.
- 5.2.4.5 Records of withdrawal of sludge from the wastewater treatment plant, records of analyses and the location(s) used for disposal and/or utilization.
- 5.2.4.6 Records of total phosphorus (expressed as total P in kilograms) discharged to Skaha Lake monthly and during the last calendar year.

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