

Water Treatment Plant Annual Report 2020



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This report was completed in February 2021 in accordance with the requirements of the Ministry of Health Services and the Interior Health Authority.

1.0 Water Treatment History

In 1986 the City of Penticton experienced an outbreak of Giardia that was determined to have originated from the Penticton Creek water source. Engineering studies were conducted in 1987-1988 and a dual source, water treatment plant was determined to be the best solution for the future of Penticton. The plant was commissioned in the spring of 1996 and is located at the East end of Penticton Avenue next to Penticton Creek. In January of 1997 the City placed its new water treatment facility online and the Penticton Creek source was returned to service. Since 1997 the City has used only Okanagan Lake and Penticton Creek for its domestic water usage. The two sources are used in variable proportions from year to year. This is determined by source water quality, quantity and plant operational considerations. The Warren Avenue well has been removed from active service and is now a dedicated emergency water source.

In 2005 the City awarded a contract to Earth Tech Engineering Consultants to review the current water system and address any anticipated issues likely to arise over the next 5-year, 10-year and 15-year terms. A preliminary recommendation of this study was that Penticton Creek could be used as an alternate summer peak demand water source. Pilot studies were completed in the fall of 2007 and a high rate dissolved aeration process was identified as the preferred option to meet increased summer demands. Final design was completed in early 2008 and construction began in the fall of 2008. The project was completed in November 2009 and has allowed the City to operate a dual source variable conventional water plant. Recent changes has been the conversion from Chlorine Gas with Sodium Hypochlorite and SO₂ replaced with Vitamin C.

2.0 Water Supply System

Penticton's water supply system was initially designed in the 1920's to use water from Penticton Creek. Okanagan Lake water was pumped into the system during the spring freshet due to high colour and organics in the creek water. Water currently is supplied to the treatment plant from two sources – Penticton Creek, through a gravity system, and Okanagan Lake, by means of pumps and a dedicated raw water main.

Penticton Creek

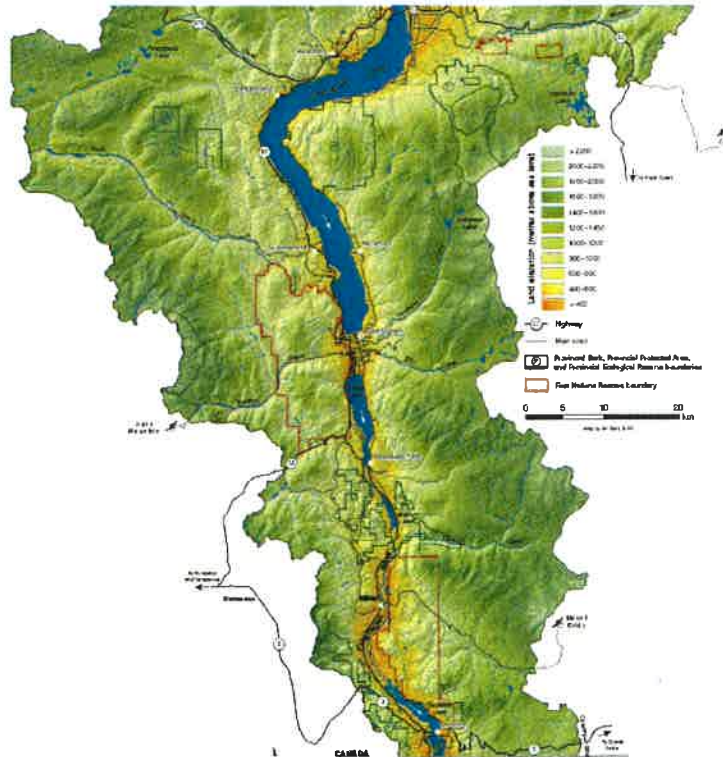
Penticton Creek originates from Greyback Mountain Dam approximately 10 km east of Penticton at an elevation of 1,649 meters. Many small tributaries and creeks also feed Penticton Creek, which allows water to be used at times without depleting storage. The City of Penticton maintains Greyback Lake and Dam, which has a maximum storage volume of 10,000-acre feet, or 12.3 million cubic meters. The dam was built in 1967 under the A.R.D.A. (Agricultural Rural Development Act) program. Untreated water is diverted from Penticton Creek at the Campbell Mountain Diversion for the North agricultural irrigation system. Penticton Creek continues west towards the Water Treatment Plant where there is a dam, small reservoir and intake

located just east of the plant. Without the untreated Penticton Creek irrigation system, the Water Treatment Plant would have been twice the capacity and costlier to construct. This feature has served the citizens of Penticton well.

Okanagan Lake

Okanagan Lake is situated in south central British Columbia. It has a catchment area of over 6,000 km² and is the largest of the five main and interconnected lakes in the Okanagan valley. The Okanagan valley is U-shaped with mountains rising on both sides to 1,000-2,500 m. Okanagan Lake in general is a deep, nutrient deficient water body with two shallower reaches with poorer water circulation, higher nutrient levels, and greater plankton abundance. The lake in profile is composed of three basins, a large north basin, mid basin and a southern basin. It is joined to Kalamalka Lake in the north by Vernon Creek and at the south end to Skaha Lake by the Okanagan River. This river flows south through Skaha Lake, Vaseux Lake and Osoyoos Lake; it joins the Columbia River near Brewster, Washington. Three major population centres are located along lake Okanagan shores: Vernon at the north end, Kelowna at the mid-point and Penticton at the south end. The major industrial development in the valley is associated with agriculture and forestry. Tourism is also a major economic factor in the local economy. These facts coupled with the arid nature of the region have resulted in a very high economic value being given to water quality and quantity.

Figure 1: Okanagan Lake Water Shed Schematic



Warren Avenue Well

Warren Avenue Well was installed by the City of Penticton in 1982, and is 92.9 m deep, completed in a confined and flowing artesian aquifer encountered at a depth between 52.1 and 87.5 m. The City of Penticton maintains the Warren Avenue Well as a backup source that can provide 12 mega liters per day if required in an emergency.

At present this source of water is used strictly as an emergency source and has not been called into use since 1995. In 2020, no water from the Warren Avenue Well was pumped into the distribution system.

Raw Water Use

In 2020 the City of Penticton pumped 5.6 billion liters from the Okanagan Lake Pump Station to the Penticton Water Treatment Plant. 887 Million Litres of creek water was also treated at the Water Treatment Plant in 2020. The total intake into the treatment plant was 6.44 billion liters during 2020, a decrease of 0.04 billion liters from 2019.

3.0 Water Treatment

The City of Penticton’s Water Treatment Plant is an 88 million liters per day plant that uses a multi-barrier system designed to treat water in a single or blended format from two sources; Okanagan Lake and Penticton Creek. The water quality of the two sources is distinctly different and requires different protocols for successful treatment. The objectives of

treatment for the two sources are to meet Guidelines for Canadian Drinking Water Quality on a consistent basis. The Water Treatment Plant was commissioned in 1996 and upgraded in 2008 which included the installation of the following processes; high rate dissolved air flotation, new pump station and dedicated main for the Ridgedale Reservoir system, incline plate thickeners for the residuals process and increased clear well storage.

Penticton Creek

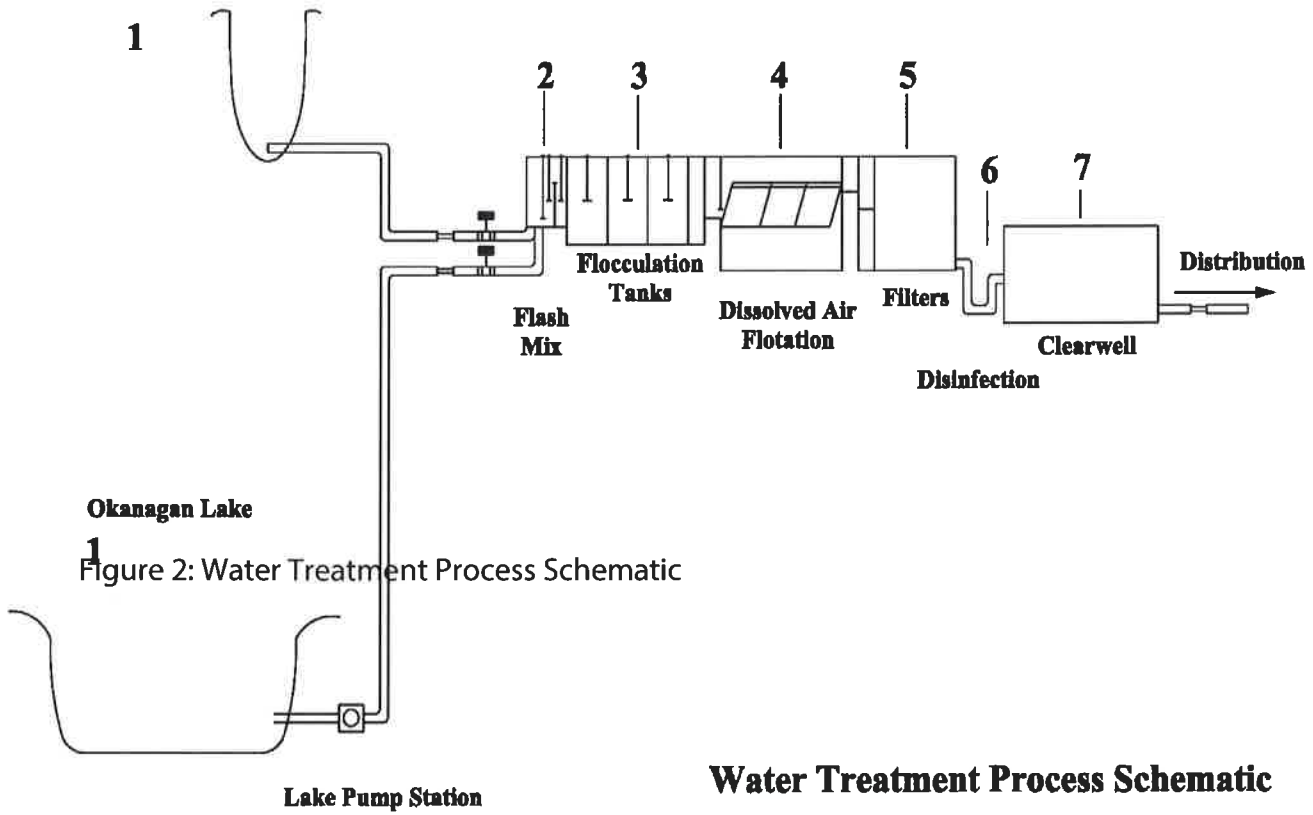


Figure 2: Water Treatment Process Schematic

Water Treatment Process Schematic

Okanagan Lake Pump Station and Penticton Creek Dam 2 Intake

Large objects are screened out as the water is drawn to the treatment plant from Penticton Creek by gravity or pumped from Okanagan Lake. Penticton Creek water is fed to the treatment plant from Penticton Creek Dam #2, located behind the water treatment plant. Okanagan Lake water is pumped to the treatment plant from the lakeshore pump station via a dedicated main.

Figure 3: Okanagan Lake Pump Station



Figure 4: Penticton Creek Dam 2



Blend Chamber

The water arrives at the treatment plant into the blend chamber, water from a single source or from both sources in the desired percentage is blended together and coagulants (chemicals that cause fine particles to clump together, forming “floc”) are added. This mixing disperses the coagulants throughout the water and starts the coagulation process.

Figure 5: Water Treatment Plant Blend Chamber



Coagulation & Flocculation

Water passes through the flocculation tanks where it is gently mixed. Tapered energy mixing is employed in the flocculation process. The particles will come in contact with each other and form larger floc. It is in this stage of the process that the majority of the impurities and harmful bacteria are captured within the floc particles and will later be captured in the DAF float or the filter.

Chart 1: Monthly Chemical Record 2020

Month	In Flow	Out Flow	PAX 18	Floc Aid	Mid Poly
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2020	Million Litres	Million Litres	mg/L	mg/L	mg/l
January	344.3	355.7	8.6	2.75	0.07
February	304.0	315.4	22.7	2.42	0.13
March	330.1	336.4	23.6	2.25	0.15
April	433.8	431.6	24.3	2.52	0.20
May	633.5	631.7	28.6	2.08	0.08
June	628.3	630.4	17.1	2.35	0.14
July	913.1	907.3	29.1	2.65	0.23
August	996.1	984.1	24.8	2.25	0.19
September	751.7	749.6	20.3	2.25	0.18
October	441.0	437.8	26.4	2.27	0.21
November	331.0	329.3	28.5	2.39	0.25
December	334.6	334.4	27.4	2.02	0.25
Average	536.78	536.97	23.5	2.35	0.2
Total	6441.34	6443.69			

- Poly aluminum chloride (PAC), floc aid and mid poly amounts are calculated using an average of the lake and creek dosages when separate water sources are being treated.
- Average poly-aluminum chloride (PAX-18) dosage for the year 23.50 mg/L
- Average floc aid polymer dosage for the year 2.35 mg/L
- Average mid poly dosage for the year 0.20 mg/L

Figure 6: Flocculation Tank Mixers



Dissolved Air Flotation

The water enters the dissolve air flotation basin where a saturated dissolved air/water stream is mixed with the process stream allowing the floc particles that have formed in the previous process to rise. The float rises to the top of the basin removing impurities from the water. This float is processed by the onsite centrifuge or diverted to the sewer system to aid in the wastewater treatment process. The water then proceeds to the filtration stage.

Figure 7: Dissolved Air Flotation



Filtration

Six deep bed, mono medium filters are utilized at the Penticton Water Treatment Plant. The filter material used is anthracite coal at a depth of 1.80 meters. As the water passes through the filter, impurities are removed. The number of filter washes required is directly related to the amount of water processed through the filter and its quality. Filter backwashes are regulated by three different factors. They are; the time the filter has been online, turbidity or particle counts and head loss. The number of filter washes increases dramatically in the months of May - August. This is related to the amount of water processed during the increased summer water demands.

Figure 8: Anthracite Coal Filters



Residuals Handling

There were no unauthorized discharges to Penticton Creek during 2020. The City of Penticton is constantly evaluating and making improvements to its treatment of the backwash stream. Ministry of Environment permit # PE-13491 which monitored the discharge was cancelled in 2011 due to changes in regulations.

Capital upgrades to the residuals process were constructed in 2009 as part of the Water Treatment Capacity Upgrade. These upgrades consisted of a new pump station and two new gravity thickeners to process backwash residuals. In 2019 a Vitamin C dechlorination system replaced the SO₂ gas to remove the backwash water chlorine residual. Testing of the backwash water indicates that the improvements made to the backwash handling system have considerably improved the discharge quality in comparison to pre-upgrade results.

Figure 9: Residual Handling Building



Disinfection

Once impurities have been removed from the water, liquid sodium hypochlorite is added as a disinfectant. This ensures the water is safe and prevents bacteria from developing as it travels from the treatment plant to the customer. The water treatment plant has chlorinators that can inject chlorine at the post filtration stage, and post clear well. Average Chlorine dose of 3.33 mg/L includes approximately 0.5 – 0.7 mg/L of pre chlorination.

Chart 2: 2019 Chlorine Dose and Residual

Month	Flow	Chlorine	Hypochlorite	Chlorine Dose	Clearwell Average Residual
2020	Million Litres	Kg.	Litres	mg/L	mg/L
January	344.3	851		2.81	1.35
February	304.0	821		2.70	1.37
March	330.1	462	2155.0	2.86	1.31
April	433.8	96	9059.0	2.92	1.33
May	633.5	0	13286.8	2.98	1.34
June	628.3	0	15230.5	3.55	1.32

July	913.1	0	21540.6	3.37	1.34
August	996.1	0	23390.0	3.38	1.35
September	751.7	0	19214.0	3.74	1.31
October	441.0	0	14039.0	4.73	1.28
November	331.0	0	8461	3.60	1.33
December	334.6	0			
Average	536.78	185.83	14,041.77	3.33	1.33
Total	6,441.34	2,230.00	126,375.93		

- Average chlorine dosage for the year including pre chlorination is 3.33 mg/L
- Average distribution chlorine residual at the clear well discharge is 1.33 mg/L
- Chlorine Gas replaced with liquid 12% Sodium Hypochlorite in March 2020

4.0 Water Distribution System

The City of Penticton water system consists of six reservoirs, five pressure zones, two pump stations, three booster stations, 255.7 km of distribution mains, 1,070 fire hydrants and approximately 10,376 water service connections serving a population of 33,761 people.

These reservoirs establish different pressure zones to service a particular area of the distribution system. The reservoirs are filled during periods of decreased water usage and are used to buffer the system when water demands are high. Total reservoir capacity excluding the treatment plant clear well is 13.72 million litres and (22.22 million litres including water plant clear well). All reservoirs are remotely controlled via the SCADA system located at the Water Treatment Plant.

In 2014 an extension of the distribution system was constructed to supply domestic city water to the West Bench Irrigation System. This system is owned and operated by the Regional District and is supplied water by a bulk purchase water agreement. In 2020, 293.6 million liters of water was supplied to the West Bench Irrigation System.

Water System Pressure Zones

- **1420 zone.** The supply reservoir for this zone is the **Duncan Avenue Reservoir**, which has a capacity of 5.90 ML and the Water Treatment Plant clear well. Water to fill this reservoir and zone originates at the Treatment Plant and is controlled via a pressure reducing valve located near the reservoir. This zone supplies the lower areas of Penticton and Westbench.
- **1620 zone.** The supply reservoir for this zone is the **Evergreen Reservoir**, which has a capacity of 2.30 ML. This zone supplies the southern middle bench lands of Penticton. The water to fill this reservoir is gravity fed from the 1650 Ridgedale Reservoir via an automatic control valve.
- **1650 zone.** The supply for this zone is the **Ridgedale Reservoir**, which has a capacity of 2.35 ML. Water for this reservoir is pumped from the Penticton Avenue water treatment plant clear well. This zone supplies the middle bench lands of Penticton.
- **1820 zone.** The supply for this zone is the two **Carmi Reservoirs** and the **Gordon Avenue Reservoir**, which have a capacity of 1.14, 1.35 and 0.53 ML respectively. This zone supplies the upper level areas of Penticton and is supplied by the Ridgedale Reservoir and pump station.
- **2020 zone.** The supply for this zone is the **Sendero Reservoir**, which has a capacity of 1.5 ML. This zone supplies the new subdivision located in the upper Carmi region. Water to fill this reservoir is supplied from the Ridgedale Reservoir and pump station.

5.0 Water Plant Staffing

The water plant is staffed by Environmental Operators Certification Program (EOCP) certified operators seven days per week, 365 days per year. The current compliment of staff is:

Chart 3: 2020 Staff Compliment

Name	Position	Certification Level	Years of Experience
Micheal Firlotte	Water Quality Supervisor	EOCP IV	25
Don Mortimer	Water Plant Forman	EOCP III	15
Brian Edge	Operator III	EOCP IV	30
Robert Phillips	Operator III	EOCP III	11
Anika Engel	Operator II	EOCP IV	7
Matt Finlayson	Operator II	EOCP I	5

Jerod Hudson	Operations Electrician/Instrumentation	Journeyman	8
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All operators have been trained in sample collection, preservation and documentation via an assortment of training courses. Education has been provided by accredited water quality programs and training via the Environmental Operators Certification Program. All certified operators are mandated to receive annual 2.4 continuing education units of training to maintain their certified operator certification.

6.0 Water Quality Monitoring Program

The raw water quality program is designed to compare seasonal trends that may impact treatment parameters and economic outcomes of using the source. The program includes parameters that are easily tested and linked to changes such as turbidity, temperature, pH, conductivity and microbiological results. The source monitoring program is conducted daily for each water source at the water treatment laboratory.

In addition to the common laboratory tests conducted daily on each water source, the city samples both raw water sources weekly for Total Coliform and E. coli using the Colilert test method.

The City of Penticton maintains and operates Ten dedicated sample stations located within the distribution system. The treated water within each pressure zone is continuously monitored for chlorine residual by an online residual analyzer connected to the water treatment SCADA via our fibre optic or radio network. Chlorine dosage is adjusted at the treatment plant to maintain free chlorine residuals within the distribution system. The Works Department maintains two automatic flush systems at the system extremities to help keep residuals fresh.

Microbiological Testing

Four hundred forty-two microbiological tests were sampled for E. coli and Total Coliform in the treated water supply in 2020. Biological tests were collected from 45 different locations within the city distribution boundaries. The results from the bacteriological tests indicated that all samples were negative for bacteriological contamination.

In 2020, a commercial lab tested the treated water and source waters 3 times annually. These scans test for trihalomethane's, metals, nutrients, total organic carbon and other nutrients. Samples are collected at the PRV Station, Okanagan Lake sample tap, Penticton Creek sample tap, and treated water after filtration.

All commercial lab tests performed on the distribution water met the Guidelines for Canadian Drinking Water Quality and are available in **Appendix B**.

7.0 Water Use and Licenses

Domestic

The City of Penticton holds domestic water licenses for Penticton Creek, Ellis Creek and Okanagan Lake water sources for the purpose of Waterworks Local Authority.

Penticton Creek (license C014229), (license C005729)

Ellis Creek (license C005731), license (C005732), and license (C025234)

Okanagan Lake (license C116809), (C116810), (C116811), *(C130923),* (C130920)

* Westbench operations

The total yearly capacity of these licenses is 250.9 billion litres. In 2020 the City pumped or diverted 6.44 Billion litres from Okanagan Lake and Penticton Creek for domestic waterworks use.

Irrigation

The City of Penticton holds irrigation water licenses for Penticton Creek, Ellis Creek and Okanagan Lake water sources for the purpose of Irrigation.

Penticton Creek (license C035678), (license C005729)

Ellis Creek (license C0241819), license (C0241803)

Okanagan Lake (license C130923)

The total yearly capacity of these licenses is 90 billion litres. In 2020 the City diverted 1.30 Billion litres from the Ellis system for irrigation use.

These licenses are renewed each year and reviewed by the Water Stewardship Division within the Ministry of Environment.

Chart 4: 2020 Raw Water Diversion for Domestic and Irrigation

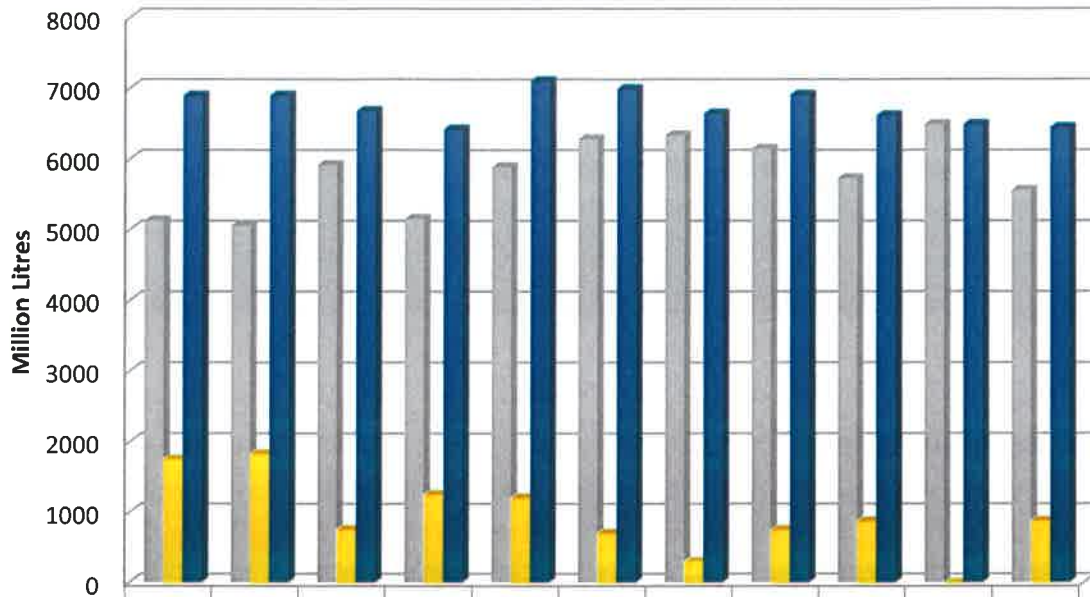
Month	Penticton Cr.	Ellis Cr.	Ok Lake	Total
2020	Million Litres	Million Litres	Million Litres	Million Litres
Domestic	886.8	0	5554.6	6441.3
Irrigation	1246.3	53.7	0.0	1299.9

8.0 Water Use Monitoring

The volume of water pumped from the Okanagan Lake Pump Station and Penticton Creek is continuously monitored by flow meters located at the Water Treatment Plant. Treated plant discharge water into the distribution system is also continuously monitored to determine peak days and unusual usage. Over the past ten years the City of Penticton’s water usage has actually decreased slightly. The population of Penticton has grown slightly over these years and consumption has decreased. This would indicate that the citizens of Penticton are practicing water conservation. In 2020, total distribution was 6.44 billion litres.

Chart 5: Raw Water Usage 2010 – 2020

Raw Water Usage 2010 - 2020



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Lake	5128	5054	5913	5153	5884	6278	6332	6142	5728	6485	5,555
Creek	1763	1840.8	761	1263	1215	709	306	761	884	0	887
Total	6891	6894.8	6674	6416	7099	6987	6638	6903	6612	6485	6441

Chart 6: Average Daily Demand 2010-2020

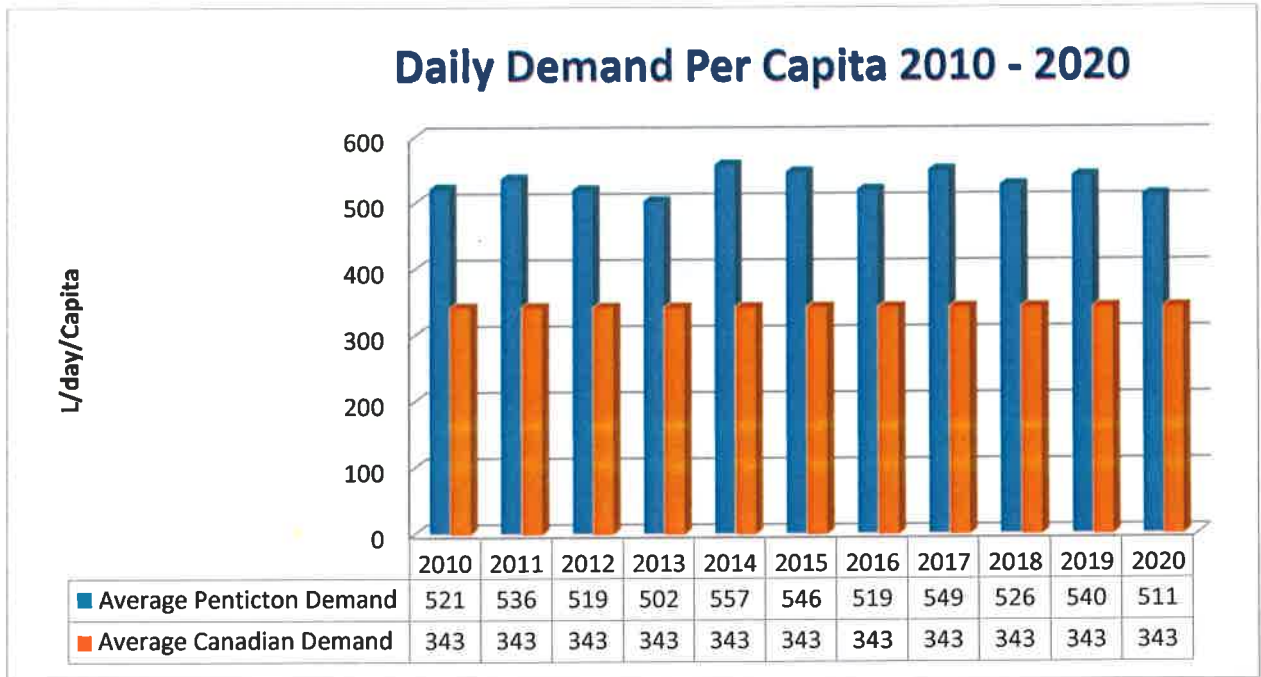


Chart 7: Maximum Daily Demand ML 2008-2019

Year	Population	Max Daily Demand		Date
		Liters/Day/Capita	Million Litres	
2010	33761	1130	39.6	July 26/10
2011	33761	1087	38.1	July 6/11
2012	33761	1041	36.4	Aug 20/12
2013	33761	1114	39.0	July 29/13
2014	33761	1200	42.3	July 14/14
2015	33761	1190	41.7	July 6/15
2016	33761	1063	37.2	June 6/16
2017	33761	1198	41.9	July 4/17
2018	33761	1177	41.2	July 25/18
2019	33761	1198	41.9	August 06/19
2020	33761	1083	36.6	August 18/20

based on the 2016 census 33,761 population

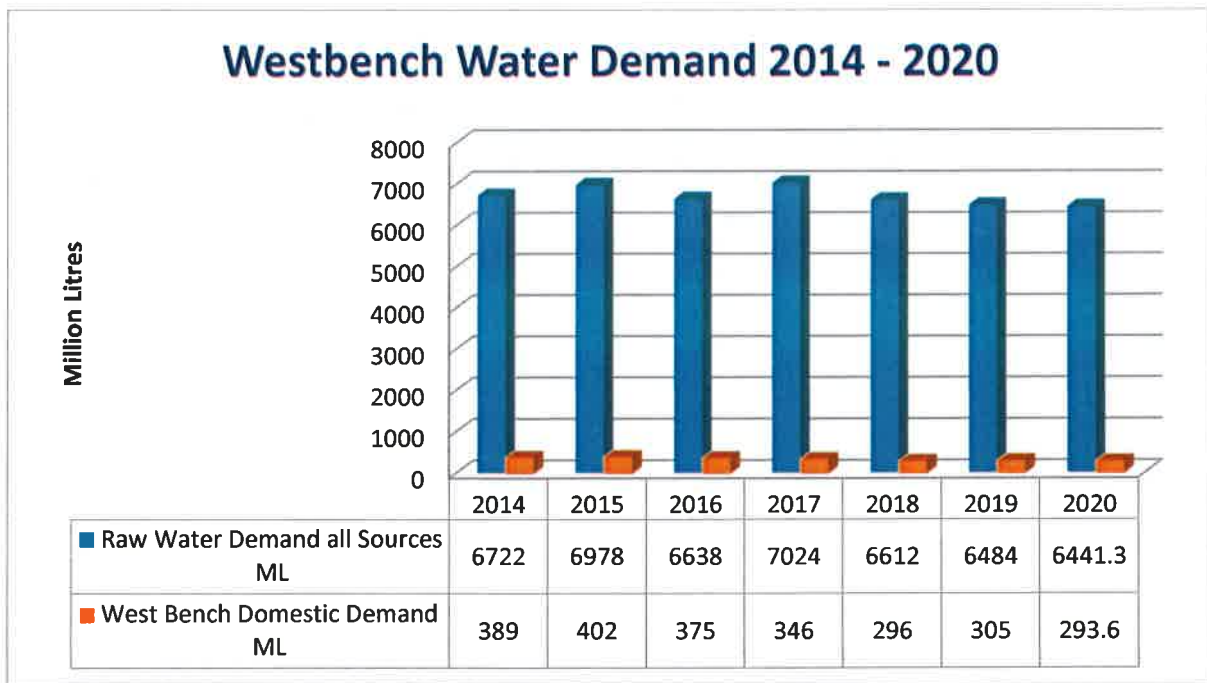
Chart 8: Water Consumption City of Penticton 2020

Month	Lake Supply	Creek Supply	Warren Ave Supply	Total Intake	Total Distribution
	Million Litres	Million Litres	Million Litres	Million Litres	Million Litres
2020					
January	341.0	3.3	0.0	344.3	333.9
February	228.7	75.3	0.0	304.0	299.9
March	264.7	65.3	0.0	330.1	322.1
April	333.1	100.7	0.0	433.8	372.1
May	629.9	3.6	0.0	633.5	698.1
June	592.1	36.2	0.0	628.3	801.1
July	790.3	122.8	0.0	913.1	959.4
August	884.2	112.0	0.0	996.1	951.0
September	667.7	84.0	0.0	751.7	647.0
October	351.8	89.2	0.0	441.0	401.2
November	234.2	96.7	0.0	331.0	322.5
December	236.8	97.7	0.0	334.6	313.8
Daily Average	15.4	2.5	0.0	17.9	17.8
Monthly Average	462.9	73.9	0.0	536.8	535.2
Total	5554.6	886.8	0.0	6441.3	6422.1
		Flow	Population	Per Capita Flow	
		Million Litres		Million Litres/Capital/Day	
Max Day 2020		41.2	33760.0	1177.14	Aug 18 2020
Min Day 2020		7.3	33760.0	209.71	Feb 08 2020

9.0 Water Demand and Water Conservation

In 2014 the City started to supply the West Bench water system under a bulk water purchase agreement. The West Bench Irrigation demand is included in the raw water demand and the plant domestic demand data.

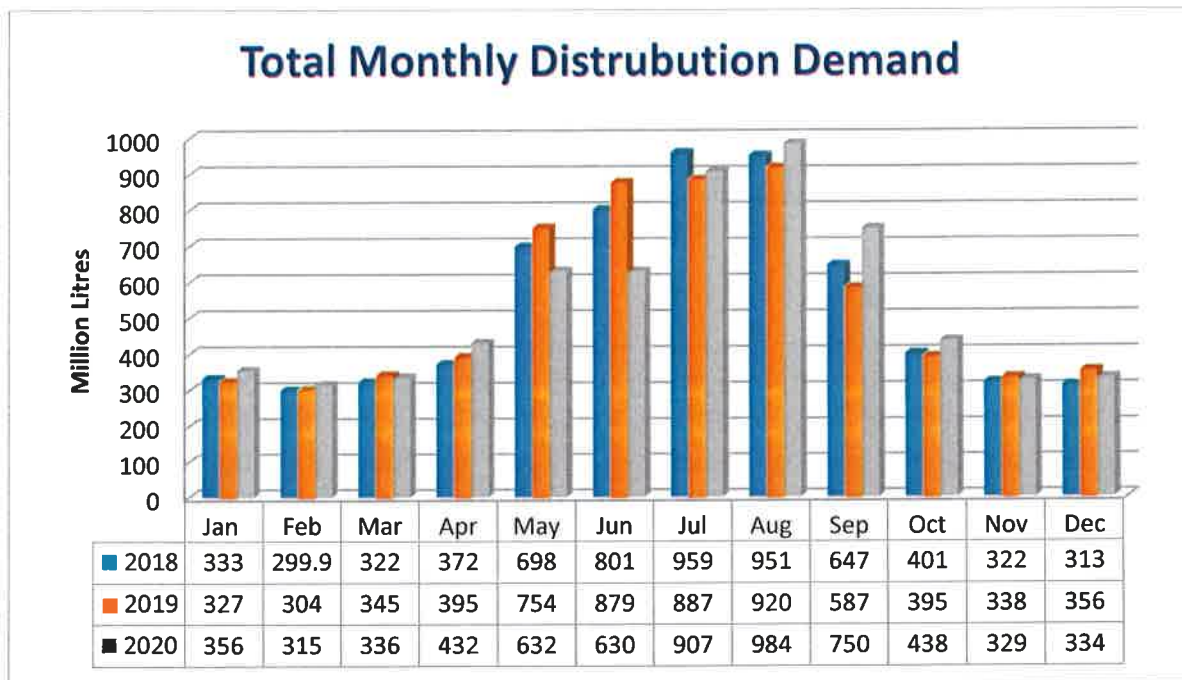
Chart 9: 2014 – 2020 Raw Water Demand / Including West Bench Irrigation District



Demand has a direct impact on existing water infrastructure as well as community planning. In 2020 peak day was 41.2 million litres which occurred on Aug 18, 2020. This includes water supply to the West Bench Irrigation System.

Average Yearly Daily Demand per person was 511 liters per capita per day based upon a population of 33,760. Demands are based on distribution flow meter records thereby excluding backwash and other operational uses of water within the treatment process.

Chart 10: Total Distribution Demand by Month 2018 – 2020



2020 Water Conservation Goal and Objectives

1. Reduce Peak Day Demand and Average Daily Demand.

Purpose – minimize the impact of our growing community on water resources. Effectively develop programs which aim at reducing Peak Day Demand and Average Daily Demand. We were successful in meeting this goal in 2020. Peak day demand was higher at 41.2 ML from the previous year of 36.6 ML.

2. Update Water Conservation Webpage

Purpose – provide relevant solutions to reducing water waste as well as timely information on water consumption in order to promote the cause and effect of turning off the tap. Every drop counts! The City web page has links to the Okanagan Basin Water Board and valley wide information supporting water conservation.

3. Promote Canadian Drinking Water Week and BC Drinking Water Week

Purpose – distribute posters and information regarding local activities including contests thru OBWB and BCWWA. Numerous posters and handout information was available for the public at city buildings. This material is developed and supplied by the Okanagan Basin Water Board Make Water Work Campaign.

10.0 Drought Management

In 2020 City completed work with a consulting engineer to develop a drought management plan. The purpose of the plan is to provide the city with a professional report that identifies our water supply and looks at water demands historically and for the future. The identified drought resilience for each source and the requirements to mitigate an extended drought. The report identifies trigger points and provide decision making guidelines for each level of drought.

Irrigation Systems

Two creeks within the City of Penticton boundaries are used as sources of water for irrigation systems. The South Okanagan Development Company initially developed the Penticton Creek irrigation system in 1906. Ellis Creek irrigation system was developed in the late 1960's. Penticton Creek Irrigation System is of high significance to the City as we also hold licenses for domestic water works on this source.

Penticton Creek Irrigation System

Records indicate that Penticton #1 Dam was built prior to 1921, although the exact year of construction is not known. It is located approximately 22 km northeast of Penticton. The dam has a live storage capacity of 1.48 million m³ and empties into the reservoir of Greyback Dam. A dam safety study identified seepage and stability issues and recommended the structure be updated or decommissioned. In September of 2006, upon final review of the Knight and Piesold dam study, Penticton #1 dam was breached and removed from service.

The Greyback Dam is located at the head of the Penticton Creek watershed, approximately 19-km northeast of Penticton. The dam is used by the City of Penticton to supply and control water for their domestic water and north irrigation system. The dam has a live storage capacity of approximately 12.33 million m³ Greyback Dam is a zoned earth fill embankment designed by the Canadian Department of Regional Economic Expansion with construction completed in 1967. The dam is approximately 35 meters in height and 610 meters in length. An emergency spillway is located on the east abutment. Greyback Reservoir covers an area of approximately 300 acres and empties into Penticton Creek flowing into Campbell Mountain Diversion Dam followed by Penticton #2 dam.

A.C. McEachern Ltd. of Vancouver constructed the Campbell Mountain Diversion Dam in 1966-1967. The purpose of this project was to divert water from Penticton Creek via a tunnel to the north irrigation system. The diversion dam has a storage capacity of 31,000 m³ of water. Method of construction is earth filled embankment with a side discharge concrete channel spillway and chute located on the right abutment. Previous to the construction of this diversion, irrigation water for farms and orchards located on the north bench was via flume and open ditch. Water that is not diverted flows into Penticton Creek and Penticton #2 dam.

Penticton # 2 Dam is a concrete arch dam originally constructed in about 1930 and raised by 3 meters in 1939. The current dam is approximately 16 meters in height and spans 22 meters between abutments. The dam has a storage capacity of 71,500 m³ of water. The flooded area behind the dam is approximately 5 acres. Current use of the dam is to supply water to the Water Treatment Plant located immediately downstream. The Knight and Piesold dam study indicated that this dam required significant upgrades.

Total daily City allotted capacity for irrigation from Penticton Creek is calculated to be 46.26 million litres per day. 2020 peak day for Penticton Creek irrigation system was 15.4 million litres recorded at the Randolph Rd flow meter on Aug 04th. Peak day demand for 2020 is calculated to be 33 % of allotted daily capacity. Total demand on Penticton Creek Irrigation system in 2020 was 1.25 billion litres.

Ellis Creek Irrigation System

The Ellis Creek Diversion dam was constructed in 1966 by Interior Contracting Ltd. of Penticton, and has been in operation since the spring of 1967. The diversion dam is a small earth fill embankment with a concrete channel weir that spills over the crest and downstream face of the dam. The dam has a relatively minor storage capacity of approximately 6,200 m³ of water. The flooded area behind the dam is less than 1 acre. The diversion dam receives water from the Ellis #2 and Ellis #4 dams. Maintenance of the diversion dam is the responsibility of the City Works Division.

Total daily city allotted capacity for irrigation from Ellis Creek is calculated to be 9.99 million litres per day. Peak day for Ellis Creek irrigation system occurred on July 17, 2020 when 11.5 million-liter demand was recorded by the Ellis Creek Irrigation flow meter. Peak day demand for 2020 is calculated to be 115% of allotted daily capacity. Total demand on Ellis Creek Irrigation system for 2020 was 294 million litres.

Chart 11: Irrigation Water Use 2010 -2020

Year	Penticton Creek Irrigation	Ellis Creek Irrigation
	Million Litres	Million Litres
2010	2908	496
2011	2755	215
2012	3126	330
2013	3015	263
2014	3208	297
2015	3228	397
2016	3113	754
2017	3340	886
2018	1318	764
2019	1252	690
2020	1246	294

11.0 Cross Connection Control

A cross connection refers to any actual or potential physical connection between a potable water line and any pipe, vessel or machine containing or possibly containing a non-potable fluid, gas or solid, such that it is possible for the contaminant to enter the water system by backflow.

The City of Penticton’s Cross Connection Control program has approximately 2,398 testable assemblies. These testable assemblies refer to Double Check Valve Assemblies and Reduced Pressure Backflow Assemblies isolating moderate and high hazards. The program is managed by the City of Penticton Building Department.

A secondary component of the Cross Connection Control Program entails performing site surveys which identify actual or potential cross connections and their remedies. In some cases, the solution incorporated a non-testable device such as a Hose Bib Vacuum Breaker, an approved air gap or the elimination of the backflow hazard altogether. And in other circumstances, testable assemblies isolated the hazard. These measures are in place as a means of providing safe drinking water and meeting one of the City of Penticton’s conditions on the Interior Health Permit to Operate.

12.0 Water Capital Improvements

Capital projects completed in 2020

1. "A" level services were completed as required. "B" level services were completed.
2. Hydrant spacing budget was eliminated due to Covid
3. Irrigation meter program was eliminated due to Covid
4. Ellis Dam #4 developing the redesign at this time with Cima+
5. Ok Lake pump station electrical upgrade – Ongoing
6. WTP Chlorine gas to liquid hypochlorite conversion – completed
7. WTP Filter valve and actuator replacement – Ongoing
8. Complete Drought Management Plan Phase II – completed

Capital projects anticipated for 2021

1. Hydrant maintenance program A and B services
2. Installation of 12 new hydrants as per spacing and development plans. (waiting on mapping from GIS for locations)
3. Irrigation Meter program. Secure buy in from Agricultural Committee. Secure fabricator to fabricate 25 kiosks. Pour concrete bases in house to provide additional work and avoid small load delivery charges for concrete pours elsewhere. Install 25 new kiosks.
4. Ellis #4 Pre-construction design and cost estimate. Begin permit process.
5. Develop leak detection program and train in house staff on new equipment.
6. Complete Dam Safety Review on all active dams
7. Ok Lake pump station electrical upgrade – Ongoing
8. WTP Filter valve and actuator replacement – Ongoing
9. Source water Protection Plan – Okangan Lake, Penticton Creek

For more information please contact the Water Treatment Plant at wtp2@penticton.ca

Appendix A Quick Facts 2020

CREEK 2020	Min	Max	Average	Units
Alkalinity	13.5	19.5	15.7	Mg/l CaCO ₃
Colour Apparent	46.1	75.4	61.4	Colour Units
Colour True	38.8	59.4	46.0	Colour Units
Hardness	10.4	18.4	12.7	Mg/l CaCO ₃
pH	6.8	7.4	7.1	pH Units
Turbidity	0.55	1.89	0.78	NTU
LAKE 2020	Min	Max	Average	Units
Alkalinity	112.0	117.8	113.5	Mg/l CaCO ₃
Colour Apparent	4.3	14.3	7.8	Colour Units
Colour True	1.7	6.8	10.9	Colour Units
Hardness	118.0	126.1	112.4	Mg/l CaCO ₃
pH	7.9	8.2	7.4	pH Units
Turbidity	0.19	0.83	0.29	NTU
BLEND 2020	Min	Max	Average	Units
Alkalinity	91.2	103.5	98.3	Mg/l CaCO ₃
Colour Apparent	10.5	19.1	13.9	Colour Units
Colour True	6.9	15.2	10.5	Colour Units
Hardness	96.8	111.4	105.1	Mg/l CaCO ₃
pH	7.8	8.0	7.3	pH Units
Turbidity	0.27	0.57	0.37	NTU

2020 Raw Source Water Volumes

Flows	Million Litres
Ellis Creek Irrigation	644.01
Penticton Creek Irrigation	1246.25
Penticton Creek Domestic	886.78
Okanagan Lake	5554.56
Warren Ave Well	0
Total Plant Intake	6441.34

2020 Distribution Quick Facts

2020 Parameter	Result	Unit	Date
Total Distribution	6443.7	ML	
Maximum Day	41.2	ML/d	Aug 18 2020
Minimum Day	7.3	ML/d	Feb 08 2020
Average Daily	17.9	ML/d	2020 Average
Average Daily / Capita	511.2	L/d/c	2020 Average
Maximum Daily / Capita	1177.1	L/d/c	Aug 18 2020
Minimum Daily / Capita	209.7	L/d/c	Feb 08 2020
Average Alkalinity	98.3	mg/l CaOH3	2020 Average
Chlorine Avg. @ Plant	1.33	mg/l	2020 Average
Hardness Average	105.1	mg/l CaOH3	2020 Average
pH Average	7.3	pH Units	2020 Average
Turbidity Avg.	0.37	NTU	2020 Average

Appendix B – Water Quality Lab Reports

- **Mar 10, 2020 – City Wide Sampling**
- **July 21, 2020 – City Wide Sampling**
- **Nov 18, 2020 – City Wide Sampling**





Analytical Report

Bill To: City of Penticton
616 Okanagan Avenue East
Penticton, BC, Canada
V2A 3K6
Attn: Accounts Payable
Sampled By: MF/RP
Company: City of Penticton

Project ID: PE 13491 + Quarterly
Project Name: City of Penticton
Project Location:
LSD:
P.O.: S20-0005
Proj. Acct. code:

Lot ID: **1464076**
Control Number:
Date Received: Dec 10, 2020
Date Reported: Dec 18, 2020
Report Number: 2579855

70% LAKE
30% Blend Creek.

Reference Number	1464076-1	1464076-2	1464076-8
Sample Date	Dec 09, 2020	Dec 09, 2020	Dec 09, 2020
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Smythe Drive / 5.8 °C	PRV Station / 5.8 °C	Randolph Rd. Station / 5.8 °C
Matrix	Water	Water	Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Trihalomethanes Screen - Water					
Chloroform	mg/L	0.049	0.034	0.052	0.001
Bromodichloromethane	mg/L	0.004	0.003	0.004	0.001
Dibromochloromethane	mg/L	<0.001	<0.001	<0.001	0.001
Bromoform	mg/L	<0.001	<0.001	<0.001	0.001
Total Trihalomethanes	mg/L	0.053	0.037	0.056	0.001
Trihalomethanes - Surrogate Recovery					
Dibromofluoromethane	EPA Surrogate %	100	104	104	50-140
Toluene-d8	EPA Surrogate %	98	100	98	50-140
Bromofluorobenzene	EPA Surrogate %	91	93	95	50-140
Haloacetic Acids - Water					
Monochloroacetic Acid	µg/L	2.4	2.5	3.1	2.0
Monobromoacetic Acid	µg/L	<2.0	<2.0	<2.0	2.0
Dichloroacetic Acid	µg/L	21.2	16.2	22.6	2.0
Trichloroacetic Acid	µg/L	26.9	17.6	30.7	2.0
Bromochloroacetic Acid	µg/L	<2.0	<2.0	<2.0	2.0
Dibromoacetic Acid	µg/L	<2.0	<2.0	<2.0	2.0
Total Haloacetic Acids (HAA6)	µg/L	50.5	36.3	56.5	12.0
2,3-Dibromopropionic acid	%	110	110	110	50-150



Analytical Report

Bill To: City of Penticton
 616 Okanagan Avenue East
 Penticton, BC, Canada
 V2A 3K6
 Attn: Accounts Payable
 Sampled By: MF/RP
 Company: City of Penticton

Project ID: PE 13491 + Quarterly
 Project Name: City of Penticton
 Project Location:
 LSD:
 P.O.: S20-0005
 Proj. Acct. code:

Lot ID: **1464076**
 Control Number:
 Date Received: Dec 10, 2020
 Date Reported: Dec 18, 2020
 Report Number: 2579855

	Reference Number	1464076-2	1464076-3	1464076-4	
	Sample Date	Dec 09, 2020	Dec 09, 2020	Dec 09, 2020	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	PRV Station / 5.8 °C	Filter #2 Post Filtration / 5.8 °C	Okanagan Lake Sample Tap / 5.8 °C	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Inorganic Nonmetallic Parameters					
Ammonium - N	mg/L	<0.025		<0.025	0.025
Ammonium/Ammonia Preservation		Yes		Yes	
Phosphorus Total - Low Level	mg/L	<0.005		<0.005	0.005
Orthophosphate-P Low Level	mg/L	<0.005		<0.005	0.005
Organic Carbon Total Nonpurgeable	mg/L	4.4	3.8	4.2	0.5
Cyanide Dissolved	mg/L	<0.002		<0.002	0.002



Analytical Report

Bill To: City of Pentiction 616 Okanagan Avenue East Pentiction, BC, Canada V2A 3K6	Project ID: PE 13491 + Quarterly Project Name: City of Pentiction Project Location: LSD: P.O.: S20-0005 Proj. Acct. code:	Lot ID: 1464076 Control Number: Date Received: Dec 10, 2020 Date Reported: Dec 18, 2020 Report Number: 2579855
Attn: Accounts Payable		
Sampled By: MF/RP		
Company: City of Pentiction		

		Reference Number	1464076-2	1464076-4	1464076-6	
		Sample Date	Dec 09, 2020	Dec 09, 2020	Dec 09, 2020	
		Sample Time	NA	NA	NA	
		Sample Location	PRV Station / 5.8 °C	Okanagan Lake Sample Tap / 5.8 °C	Pentiction Creek Upstream / 5.8 °C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Total						
Hardness	Total as CaCO3	mg/L	97	128	15	
Aluminum	Total	mg/L	0.030	<0.005	0.093	0.005
Antimony	Total	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Arsenic	Total	mg/L	0.00017	0.00050	0.00008	0.00005
Barium	Total	mg/L	0.0160	0.0208	0.0057	0.0005
Beryllium	Total	mg/L	<0.00005	<0.00005	<0.00005	0.00005
Bismuth	Total	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Boron	Total	mg/L	0.006	0.008	<0.002	0.002
Cadmium	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Calcium	Total	mg/L	25.4	34.9	4.34	0.05
Chromium	Total	mg/L	<0.0005	<0.0005	<0.0005	0.0005
Cobalt	Total	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Copper	Total	mg/L	0.0004	0.0075	0.0021	0.0001
Iron	Total	mg/L	0.007	0.004	0.211	0.002
Lead	Total	mg/L	<0.0001	0.0002	<0.0001	0.0001
Lithium	Total	mg/L	0.0024	0.0032	<0.0005	0.0005
Magnesium	Total	mg/L	6.88	9.45	1.13	0.04
Manganese	Total	mg/L	<0.0010	<0.0010	0.0042	0.001
Molybdenum	Total	mg/L	0.00262	0.00363	0.00054	0.00005
Nickel	Total	mg/L	0.0003	0.0005	0.0002	0.0002
Potassium	Total	mg/L	2.0	2.6	0.5	0.1
Selenium	Total	mg/L	0.0003	0.0004	<0.0001	0.0001
Silicon	Total	mg/L	3.99	3.70	5.83	0.02
Silver	Total	mg/L	<0.00005	<0.00005	<0.00005	0.00005
Sodium	Total	mg/L	11.7	12.3	2.3	0.1
Strontium	Total	mg/L	0.212	0.294	0.0486	0.0001
Thallium	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Thorium	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Tin	Total	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Titanium	Total	mg/L	<0.0005	<0.0005	0.0014	0.0005
Uranium	Total	mg/L	0.00078	0.00254	0.00052	0.00001
Vanadium	Total	mg/L	0.0005	0.0008	0.0004	0.0001
Zinc	Total	mg/L	0.0011	0.0062	0.0042	0.001
Zirconium	Total	mg/L	<0.0005	<0.0005	0.0005	0.0005
Physical and Aggregate Properties						
Colour	True	Colour units	<5	<5	27	5
Solids	Total Suspended	mg/L	<2	<2	<2	2
Solids	Total Dissolved	mg/L	140	180	76	5



Analytical Report

Bill To: City of Penticton
616 Okanagan Avenue East
Penticton, BC, Canada
V2A 3K6
Attn: Accounts Payable
Sampled By: MF/RP
Company: City of Penticton

Project ID: PE 13491 + Quarterly
Project Name: City of Penticton
Project Location:
LSD:
P.O.: S20-0005
Proj. Acct. code:

Lot ID: **1464076**
Control Number:
Date Received: Dec 10, 2020
Date Reported: Dec 18, 2020
Report Number: 2579855

	Reference Number	1464076-2	1464076-4	1464076-6	
	Sample Date	Dec 09, 2020	Dec 09, 2020	Dec 09, 2020	
	Sample Time	NA	NA	NA	
	Sample Location	PRV Station / 5.8 °C	Okanagan Lake Sample Tap / 5.8 °C	Penticton Creek Upstream / 5.8 °C	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Routine Water					
pH - Holding Time		Exceeded	Exceeded	Exceeded	
pH	at 25 °C	7.38	7.65	6.82	0.01
Electrical Conductivity	µS/cm at 25 °C	236	289	39	1
Bicarbonate	mg/L	97	137	21	5
Carbonate	mg/L	<6	<6	<6	6
Hydroxide	mg/L	<5	<5	<5	5
P-Alkalinity	as CaCO ₃	<5	<5	<5	5
T-Alkalinity	as CaCO ₃	79	113	17	5
Chloride	Dissolved	13.2	5.49	0.39	0.05
Fluoride	Dissolved	0.11	0.17	0.06	0.01
Nitrate - N	Dissolved	0.06	0.09	<0.01	0.01
Nitrite - N	Dissolved	<0.01	<0.01	<0.01	0.01
Sulfate (SO ₄)	Dissolved	20.8	29.1	1.4	0.1



Analytical Report

Bill To: City of Penticton
 616 Okanagan Avenue East
 Penticton, BC, Canada
 V2A 3K6
 Attn: Accounts Payable
 Sampled By: MF/RP
 Company: City of Penticton

Project ID: PE 13491 + Quarterly
 Project Name: City of Penticton
 Project Location:
 LSD:
 P.O.: S20-0005
 Proj. Acct. code:

Lot ID: **1464076**
 Control Number:
 Date Received: Dec 10, 2020
 Date Reported: Dec 18, 2020
 Report Number: 2579855

	Reference Number	1464076-2	1464076-5	1464076-6	
	Sample Date	Dec 09, 2020	Dec 09, 2020	Dec 09, 2020	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	PRV Station / 5.8 °C	Backwash Pond / 5.8 °C	Penticton Creek Upstream / 5.8 °C	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Metals Dissolved					
Aluminum	Dissolved	mg/L	0.028	0.039	0.002
Subsample			Lab Filtered	Lab Filtered	Lab Filtered



Analytical Report

Bill To: City of Penticton 616 Okanagan Avenue East Penticton, BC, Canada V2A 3K6	Project ID: PE 13491 + Quarterly Project Name: City of Penticton Project Location: LSD: P.O.: S20-0005 Proj. Acct. code:	Lot ID: 1464076 Control Number: Date Received: Dec 10, 2020 Date Reported: Dec 18, 2020 Report Number: 2579855
Attn: Accounts Payable Sampled By: MF/RP Company: City of Penticton		

Reference Number 1464076-6
 Sample Date Dec 09, 2020
 Sample Time NA
 Sample Location
 Sample Description Penticton Creek
 Upstream / 5.8 °C

Matrix Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Inorganic Nonmetallic Parameters					
Ammonium - N	mg/L	<0.025			0.025
Ammonium/Ammonia Preservation		Yes			
Phosphorus Total - Low Level	mg/L	<0.005			0.005
Orthophosphate-P Low Level	mg/L	<0.005			0.005
Organic Carbon Total Nonpurgeable	mg/L	5.8			0.5
Cyanide Dissolved	mg/L	<0.002			0.002



Analytical Report

Bill To: City of Penticton 616 Okanagan Avenue East Penticton, BC, Canada V2A 3K6	Project ID: PE 13491 + Quarterly Project Name: City of Penticton Project Location: LSD: P.O.: S20-0005 Proj. Acct. code:	Lot ID: 1464076 Control Number: Date Received: Dec 10, 2020 Date Reported: Dec 18, 2020 Report Number: 2579855
Attn: Accounts Payable Sampled By: MF/RP Company: City of Penticton		

Reference Number 1464076-7
 Sample Date Dec 09, 2020
 Sample Time NA
 Sample Location
 Sample Description Penticton Creek
 Downstream / 5.8 °C
 Matrix Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Metals Dissolved					
Aluminum	Dissolved	mg/L	0.070		0.002
Subsample			Lab Filtered		

Approved by: 
 Max Hewitt
 Operations Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).
 Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.



Methodology and Notes

Bill To: City of Pentiction 616 Okanagan Avenue East Pentiction, BC, Canada V2A 3K6	Project ID: PE 13491 + Quarterly Project Name: City of Pentiction Project Location: LSD: P.O.: S20-0005 Proj. Acct. code:	Lot ID: 1464076 Control Number: Date Received: Dec 10, 2020 Date Reported: Dec 18, 2020 Report Number: 2579855
Attn: Accounts Payable Sampled By: MF/RP Company: City of Pentiction		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alk, pH, EC, Turb in water (BC)	APHA	* Alkalinity - Titration Method, 2320 B	Dec 11, 2020	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* Conductivity, 2510 B	Dec 11, 2020	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* pH - Electrometric Method, 4500-H+ B	Dec 11, 2020	Element Vancouver
Ammonium-N in Water	APHA	* Automated Phenate Method, 4500-NH3 G	Dec 18, 2020	Element Edmonton - Roper Road
Anions by IEC in water (VAN)	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Dec 10, 2020	Element Vancouver
BC ICP-MS Total Metals in Water	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Dec 14, 2020	Element Edmonton - Roper Road
BC Trace Total Metals in Water	APHA	* Inductively Coupled Plasma (ICP) Method, 3120 B	Dec 14, 2020	Element Edmonton - Roper Road
Carbon Organic (Total) in water (TOC)	APHA	* High-Temperature Combustion Method, 5310 B	Dec 14, 2020	Element Edmonton - Roper Road
Cyanide (Dissolved) in water	Alta. Env. Method	* Cyanide, Simple Extractable (Automated Pyridine-Barbituric Acid Colorimetric Method), 06608L	Dec 17, 2020	Element Edmonton - Roper Road
Haloacetic Acids - Water	US EPA	* Determination of Haloacetic Acids and Dalapon in drinking water by liquid-liquid microextraction, derivatization, and gas chromatography with electron capture detection, 552.3	Dec 16, 2020	Element Calgary
Metals ICP-MS (Dissolved) in water	APHA/USEPA	* Metals By Inductively Coupled Plasma/Mass Spectrometry, APHA 3125 B / USEPA 200.2, 200.8	Dec 15, 2020	Element Edmonton - Roper Road
Metals ICP-MS (Dissolved) in water	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Dec 15, 2020	Element Edmonton - Roper Road
Metals Trace (Total) in water	APHA	Hardness by Calculation, 2340 B	Dec 15, 2020	Element Edmonton - Roper Road
Orthophosphate-P in Water	APHA	* Automated Ascorbic Acid Reduction Method, 4500-P F	Dec 15, 2020	Element Edmonton - Roper Road
Phosphorus - Total in Water	APHA	* Automated Ascorbic Acid Reduction Method, 4500-P F	Dec 14, 2020	Element Edmonton - Roper Road
Solids Dissolved (Total, Fixed and Volatile) - VAN	APHA	* Total Dissolved Solids Dried at 180 C, 2540 C	Dec 17, 2020	Element Vancouver
Solids Suspended (Total, Fixed and Volatile) - VAN	APHA	* Total Suspended Solids Dried at 103-105°C, 2540 D	Dec 16, 2020	Element Vancouver
THM - Water	US EPA	* Volatile Organic Compounds by GCMS / Purge and Trap for Aqueous Samples, 8260B/5030B	Dec 13, 2020	Element Calgary
True Color in water (VAN)	APHA	* Spectrophotometric - Single Wavelength Method, 2120 C	Dec 11, 2020	Element Vancouver

* Reference Method Modified

References

Alta. Env. Method	Alberta Environment Method
APHA	Standard Methods for the Examination of Water and Wastewater
APHA/USEPA	Standard Methods For Water/ Environmental Protection Agency



Methodology and Notes

Bill To:	City of Penticton 616 Okanagan Avenue East Penticton, BC, Canada V2A 3K6	Project ID:	PE 13491 + Quarterly	Lot ID:	1464076
Attn:	Accounts Payable	Project Name:	City of Penticton	Control Number:	
Sampled By:	MF/RP	Project Location:		Date Received:	Dec 10, 2020
Company:	City of Penticton	LSD:		Date Reported:	Dec 18, 2020
		P.O.:	S20-0005	Report Number:	2579855
		Proj. Acct. code:			

US EPA	US Environmental Protection Agency Test Methods
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Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.





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Report Transmission Cover Page

Bill To: City of Pentiction 616 Okanagan Avenue East Pentiction, BC, Canada V2A 3K6	Project ID: PE 13491 + Quarterly Project Name: City of Pentiction Project Location: LSD: P.O.: S20-0005 Proj. Acct. code:	Lot ID: 1464076 Control Number: Date Received: Dec 10, 2020 Date Reported: Dec 18, 2020 Report Number: 2579855
Attn: Accounts Payable Sampled By: MF/RP Company: City of Pentiction		

Contact	Company	Address
Accounts Payable	City of Pentiction	616 Okanagan Avenue East Pentiction, BC V2A 3K6 Phone: (250) 490-2476 Fax: (250) 490-2416 Email:

Delivery	Format	Deliverables
Post	PDF	Invoice

Mike Firlotte	City of Pentiction	Water Treatment Plant, 1900 Pentiction Avenue Pentiction, BC V2A 2N5 Phone: (250) 490-2560 Fax: (250) 490-2561 Email: wtp@pentiction.ca
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Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / Test Report
Email - Multiple Reports By Agreement	PDF	COA
Email - Single Report	PDF	COR
Email - Single Report	PDF	Invoice

Notes To Clients:

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Report Transmission Cover Page

Bill To: City of Penticton 616 Okanagan Avenue East Penticton, BC, Canada V2A 3K6	Project ID: PE 13491 + Quarterly Project Name: City of Penticton Project Location: LSD: P.O.: 520-0005 Proj. Acct. code:	Lot ID: 1412954 Control Number: Date Received: Mar 10, 2020 Date Reported: Mar 18, 2020 Report Number: 2498660
Attn: Accounts Payable Sampled By: DM/MF/AE Company: City of Penticton		

Contact	Company	Address
Accounts Payable	City of Penticton	616 Okanagan Avenue East Penticton, BC V2A 3K6 Phone: (250) 490-2476 Fax: (250) 490-2416 Email:

Delivery	Format	Deliverables
Post	PDF	Invoice
Mike Firlotte	City of Penticton	Water Treatment Plant, 1900 Penticton Avenue Penticton, BC V2A 2N5 Phone: (250) 490-2560 Fax: (250) 490-2561 Email: wtp@penticton.ca

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / Test Report
Email - Multiple Reports By Agreement	PDF	COA

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Analytical Report

Bill To: City of Penticton 616 Okanagan Avenue East Penticton, BC, Canada V2A 3K6	Project ID: PE 13491 + Quarterly Project Name: City of Penticton Project Location: LSD: P.O.: 520-0005 Proj. Acct. code:	Lot ID: 1412954 Control Number: Date Received: Mar 10, 2020 Date Reported: Mar 18, 2020 Report Number: 2498660
Attn: Accounts Payable Sampled By: DM/MF/AE Company: City of Penticton		

Reference Number	1412954-1	1412954-2	1412954-8
Sample Date	Mar 09, 2020	Mar 09, 2020	Mar 09, 2020
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Smythe Drive / 3.6 °C	PRV Station / 3.6 °C	Randolph Rd. Station / 3.6 °C
Matrix	Water	Water	Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Trihalomethanes Screen - Water					
Chloroform	mg/L	0.043	0.029	0.042	0.001
Bromodichloromethane	mg/L	0.004	0.002	0.004	0.001
Dibromochloromethane	mg/L	<0.001	<0.001	<0.001	0.001
Bromoform	mg/L	<0.001	<0.001	<0.001	0.001
Total Trihalomethanes	mg/L	0.047	0.031	0.046	0.001
Trihalomethanes - Surrogate Recovery					
Dibromofluoromethane	EPA Surrogate %	111	108	111	50-140
Toluene-d8	EPA Surrogate %	101	101	101	50-140
Bromofluorobenzene	EPA Surrogate %	109	104	108	50-140



Analytical Report

Bill To: City of Penticton 616 Okanagan Avenue East Penticton, BC, Canada V2A 3K6	Project ID: PE 13491 + Quarterly Project Name: City of Penticton Project Location: LSD: P.O.: 520-0005 Proj. Acct. code:	Lot ID: 1412954 Control Number: Date Received: Mar 10, 2020 Date Reported: Mar 18, 2020 Report Number: 2498660
Attn: Accounts Payable Sampled By: DM/MF/AE Company: City of Penticton		

Reference Number	1412954-2	1412954-3	1412954-4
Sample Date	Mar 09, 2020	Mar 09, 2020	Mar 09, 2020
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PRV Station / 3.6 °C	Filter #3 Post Filtration / 3.6 °C	Okanagan Lake Sample Tap / 3.6 °C

Analyte	Matrix	Units	Water	Water	Water	Nominal Detection Limit
			Results	Results	Results	
Inorganic Nonmetallic Parameters						
Organic Carbon	Total Nonpurgeable	mg/L	2.8	3.1	4.0	0.5
Cyanide	Dissolved	mg/L	<0.002		<0.002	0.002
Ammonia - N		mg/L	<0.01		0.01	0.01
Orthophosphate-P	Dissolved	mg/L	<0.002		<0.002	0.002
Phosphorus	Total	mg/L	0.004		0.003	0.003



Analytical Report

Bill To: City of Pentiction
616 Okanagan Avenue East
Pentiction, BC, Canada
V2A 3K6
Attn: Accounts Payable
Sampled By: DM/MF/AE
Company: City of Pentiction

Project ID: PE 13491 + Quarterly
Project Name: City of Pentiction
Project Location:
LSD:
P.O.: 520-0005
Proj. Acct. code:

Lot ID: **1412954**
Control Number:
Date Received: Mar 10, 2020
Date Reported: Mar 18, 2020
Report Number: 2498660

		Reference Number	1412954-2	1412954-4	1412954-6	
		Sample Date	Mar 09, 2020	Mar 09, 2020	Mar 09, 2020	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	PRV Station / 3.6 °C	Okanagan Lake Sample Tap / 3.6 °C	Pentiction Creek Upstream / 3.6 °C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Total						
Calcium	Total	mg/L	24	31	4.4	0.01
Magnesium	Total	mg/L	6.1	8.1	1.0	0.02
Potassium	Total	mg/L	1.6	2.1	0.46	0.04
Silicon	Total	mg/L	3.5	3.1	5.1	0.005
Sulfur	Total	mg/L	6.9	9.8	0.73	0.02
Sodium	Total	mg/L	8.4	11	2.3	0.1
Titanium	Total	mg/L	0.003	0.004	<0.002	0.002
Digestion	Preparation		Unpres, digest as	Unpres, digest as	Unpres, digest as	
			Total Hg	Total Hg	Total Hg	
Mercury	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00005
Physical and Aggregate Properties						
Colour	True	Colour units	<5	<5	21	5
Solids	Total Suspended	mg/L	<2	<2	<2	2
Solids	Total Dissolved	mg/L	170	160	96	5
Routine Water						
pH - Holding Time			Exceeded	Exceeded	Exceeded	
pH	at 25 °C		7.74	7.97	7.24	0.01
Electrical Conductivity		µS/cm at 25 °C	229	292	44	1
Bicarbonate		mg/L	94	140	25	5
Carbonate		mg/L	<6	<6	<6	6
Hydroxide		mg/L	<5	<5	<5	5
P-Alkalinity	as CaCO3	mg/L	<5	<5	<5	5
T-Alkalinity	as CaCO3	mg/L	77	115	20	5
Chloride	Dissolved	mg/L	11.0	5.36	0.51	0.05
Fluoride	Dissolved	mg/L	0.11	0.16	<0.01	0.01
Nitrate - N	Dissolved	mg/L	0.07	0.09	<0.01	0.01
Nitrite - N	Dissolved	mg/L	<0.01	<0.01	<0.01	0.01
Sulfate (SO4)	Dissolved	mg/L	21.3	29.6	2.0	0.1
Hardness	Total	mg CaCO3/L	85	111	15	1
Trace Metals Total						
Aluminum	Total	mg/L	0.032	0.002	0.073	0.001
Antimony	Total	mg/L	0.00005	0.00006	<0.00002	0.00002
Arsenic	Total	mg/L	0.0002	0.0005	<0.0001	0.0001
Barium	Total	mg/L	0.016	0.021	0.0060	0.0001
Beryllium	Total	mg/L	<0.00005	<0.00005	<0.00005	0.00005
Bismuth	Total	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Boron	Total	mg/L	0.008	0.008	<0.002	0.002
Cadmium	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001



Analytical Report

Bill To: City of Penticton
 616 Okanagan Avenue East
 Penticton, BC, Canada
 V2A 3K6
 Attn: Accounts Payable
 Sampled By: DM/MF/AE
 Company: City of Penticton

Project ID: PE 13491 + Quarterly
 Project Name: City of Penticton
 Project Location:
 LSD:
 P.O.: 520-0005
 Proj. Acct. code:

Lot ID: **1412954**
 Control Number:
 Date Received: Mar 10, 2020
 Date Reported: Mar 18, 2020
 Report Number: 2498660

Reference Number	1412954-2	1412954-4	1412954-6
Sample Date	Mar 09, 2020	Mar 09, 2020	Mar 09, 2020
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PRV Station / 3.6 °C	Okanagan Lake Sample Tap / 3.6 °C	Penticton Creek Upstream / 3.6 °C

Analyte	Matrix	Units	Water	Water	Water	Nominal Detection Limit
			Results	Results	Results	
Trace Metals Total - Continued						
Chromium	Total	mg/L	0.00008	0.00009	0.00014	0.00005
Cobalt	Total	mg/L	<0.00002	<0.00002	0.00004	0.00002
Copper	Total	mg/L	0.0003	0.0034	0.0011	0.0002
Iron	Total	mg/L	<0.002	0.002	0.26	0.002
Lead	Total	mg/L	<0.00001	0.00006	0.00004	0.00001
Lithium	Total	mg/L	0.0024	0.0031	0.0005	0.0005
Manganese	Total	mg/L	0.001	<0.001	0.006	0.001
Molybdenum	Total	mg/L	0.0025	0.0034	0.00059	0.00002
Nickel	Total	mg/L	0.0007	0.0006	0.0005	0.0002
Selenium	Total	mg/L	0.0002	0.0004	<0.0002	0.0002
Silver	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Strontium	Total	mg/L	0.21	0.27	0.053	0.0001
Tellurium	Total	mg/L	<0.00005	<0.00005	<0.00005	0.00005
Thallium	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Thorium	Total	mg/L	<0.00005	<0.00005	<0.00005	0.00005
Tin	Total	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Uranium	Total	mg/L	0.00086	0.0025	0.00059	0.00001
Vanadium	Total	mg/L	0.00011	0.00035	0.00047	0.00005
Zinc	Total	mg/L	0.0035	0.0058	0.0049	0.0005
Zirconium	Total	mg/L	<0.0001	<0.0001	0.0004	0.0001



Analytical Report

 Bill To: City of Penticton
 616 Okanagan Avenue East
 Penticton, BC, Canada
 V2A 3K6
 Attn: Accounts Payable
 Sampled By: DM/MF/AE
 Company: City of Penticton

 Project ID: PE 13491 + Quarterly
 Project Name: City of Penticton
 Project Location:
 LSD:
 P.O.: 520-0005
 Proj. Acct. code:

 Lot ID: **1412954**
 Control Number:
 Date Received: Mar 10, 2020
 Date Reported: Mar 18, 2020
 Report Number: 2498660

Reference Number	1412954-2	1412954-5	1412954-6
Sample Date	Mar 09, 2020	Mar 09, 2020	Mar 09, 2020
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PRV Station / 3.6 °C	Backwash Pond / 3.6 °C	Penticton Creek Upstream / 3.6 °C
Matrix	Water	Water	Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Trace Metals Dissolved					
Digestion	Dissolved	Field filtered and Pres Dissol	Field filtered and Pres Dissol	Field filtered and Pres Dissol	
Aluminum	Dissolved	mg/L	0.038	0.571	0.061
					0.001



Analytical Report

Bill To: City of Penticton 616 Okanagan Avenue East Penticton, BC, Canada V2A 3K6	Project ID: PE 13491 + Quarterly Project Name: City of Penticton Project Location: LSD: P.O.: 520-0005 Proj. Acct. code:	Lot ID: 1412954 Control Number: Date Received: Mar 10, 2020 Date Reported: Mar 18, 2020 Report Number: 2498660
Attn: Accounts Payable Sampled By: DM/MF/AE Company: City of Penticton		

Reference Number 1412954-6
Sample Date Mar 09, 2020
Sample Time NA
Sample Location
Sample Description Penticton Creek
 Upstream / 3.6 °C

Matrix Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Inorganic Nonmetallic Parameters					
Organic Carbon	Total Nonpurgeable	mg/L	4.7		0.5
Cyanide	Dissolved	mg/L	<0.002		0.002
Ammonia - N		mg/L	0.01		0.01
Orthophosphate-P	Dissolved	mg/L	<0.002		0.002
Phosphorus	Total	mg/L	0.008		0.003



Analytical Report

Bill To: City of Penticton
 616 Okanagan Avenue East
 Penticton, BC, Canada
 V2A 3K6
 Attn: Accounts Payable
 Sampled By: DM/MF/AE
 Company: City of Penticton

Project ID: PE 13491 + Quarterly
 Project Name: City of Penticton
 Project Location:
 LSD:
 P.O.: 520-0005
 Proj. Acct. code:

Lot ID: **1412954**
 Control Number:
 Date Received: Mar 10, 2020
 Date Reported: Mar 18, 2020
 Report Number: 2498660

Reference Number 1412954-7
 Sample Date Mar 09, 2020
 Sample Time NA
 Sample Location
 Sample Description Penticton Creek
 Downstream / 3.6 °C

Matrix Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Trace Metals Dissolved					
Digestion	Dissolved		Field filtered and Pres Dissol		
Aluminum	Dissolved	mg/L	0.112		0.001

Approved by:



Carol Nam, Dipl. T.
 Quality Officer

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).

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Methodology and Notes

Bill To: City of Penticton 616 Okanagan Avenue East Penticton, BC, Canada V2A 3K6	Project ID: PE 13491 + Quarterly Project Name: City of Penticton Project Location: LSD: P.O.: 520-0005 Proj. Acct. code:	Lot ID: 1412954 Control Number: Date Received: Mar 10, 2020 Date Reported: Mar 18, 2020 Report Number: 2498660
Attn: Accounts Payable Sampled By: DM/MF/AE Company: City of Penticton		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alk, pH, EC, Turb in water (BC)	APHA	* Alkalinity - Titration Method, 2320 B	Mar 13, 2020	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* Conductivity, 2510 B	Mar 13, 2020	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* pH - Electrometric Method, 4500-H+ B	Mar 13, 2020	Element Vancouver
Ammonia-N in Water (VAN)	APHA	* Flow Injection Analysis, 4500-NH3 H	Mar 13, 2020	Element Vancouver
Anions by IEC in water (VAN)	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Mar 11, 2020	Element Vancouver
Carbon Organic (Total) in water (TOC)	APHA	High-Temperature Combustion Method, 5310 B	Mar 12, 2020	Element Edmonton - Roper Road
Cyanide (Dissolved) in water	Alta. Env. Method	* Cyanide, Simple Extractable (Automated Pyridine-Barbituric Acid Colorimetric Method), 06608L	Mar 13, 2020	Element Edmonton - Roper Road
Mercury Low Level (Total) in water (VAN)	EPA	* Mercury in Water by Cold Vapor Atomic Fluorescence Spectrometry, 245.7	Mar 13, 2020	Element Vancouver
Metals SemiTrace (Total) in Water (VAN)	US EPA	* Metals & Trace Elements by ICP-AES, 6010C	Mar 12, 2020	Element Vancouver
Phosphorus - orthophosphate by Smartchem (VAN)	APHA	Ascorbic Acid Reduction Method, 4500-P E	Mar 11, 2020	Element Vancouver
Phosphorus - total by Smartchem (VAN)	APHA	* Persulfate digestion method, 4500-P B5	Mar 12, 2020	Element Vancouver
Solids Dissolved (Total, Fixed and Volatile) - VAN	APHA	* Total Dissolved Solids Dried at 180 C, 2540 C	Mar 16, 2020	Element Vancouver
Solids Suspended (Total, Fixed and Volatile) - VAN	APHA	* Total Suspended Solids Dried at 103-105°C, 2540 D	Mar 11, 2020	Element Vancouver
THM - Water	US EPA	* Volatile Organic Compounds by GCMS / Purge and Trap for Aqueous Samples, 8260B/5030B	Mar 16, 2020	Element Calgary
Trace Metals (dissolved) in Water (VAN)	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Mar 12, 2020	Element Vancouver
Trace Metals (Total) in Water (VAN)	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Mar 12, 2020	Element Vancouver
True Color in water (VAN)	APHA	* Spectrophotometric - Single Wavelength Method, 2120 C	Mar 11, 2020	Element Vancouver

* Reference Method Modified

References

Alta. Env. Method	Alberta Environment Method
APHA	Standard Methods for the Examination of Water and Wastewater
EPA	Environmental Protection Agency Test Methods - US
US EPA	US Environmental Protection Agency Test Methods



Methodology and Notes

Bill To: City of Penticton 616 Okanagan Avenue East Penticton, BC, Canada V2A 3K6	Project ID: PE 13491 + Quarterly	Lot ID: 1412954
Attn: Accounts Payable	Project Name: City of Penticton	Control Number:
Sampled By: DM/MF/AE	Project Location:	Date Received: Mar 10, 2020
Company: City of Penticton	LSD:	Date Reported: Mar 18, 2020
	P.O.: 520-0005}	Report Number: 2498660
	Proj. Acct. code:	

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Report Transmission Cover Page

Bill To: City of Penticton 616 Okanagan Avenue East Penticton, BC, Canada V2A 3K6	Project ID: PE 13491 + Quarterly Project Name: City of Penticton Project Location: LSD: P.O.: S20-0005 Proj. Acct. code:	Lot ID: 1435803 Control Number: B06879 Date Received: Jul 21, 2020 Date Reported: Jul 29, 2020 Report Number: 2532339
Attn: Accounts Payable Sampled By: DM/RP Company: City of Penticton		

Contact	Company	Address
Brent Edge	City of Penticton	Water Treatment Plant, 1900 Penticton Avenue Penticton, BC V2A 2N5 Phone: (250) 490-2560 Fax: (250) 490-2561 Email: wtp@penticton.ca

Delivery	Format	Deliverables
Email - Single Report	PDF	COR

Mike Firlotte	City of Penticton	Water Treatment Plant, 1900 Penticton Avenue Penticton, BC V2A 2N5 Phone: (250) 490-2560 Fax: (250) 490-2561 Email: wtp@penticton.ca
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Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / Test Report
Email - Multiple Reports By Agreement	PDF	COA

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Analytical Report

Bill To: City of Penticton 616 Okanagan Avenue East Penticton, BC, Canada V2A 3K6	Project ID: PE 13491 + Quarterly Project Name: City of Penticton Project Location: LSD: P.O.: S20-0005 Proj. Acct. code:	Lot ID: 1435803 Control Number: B06879 Date Received: Jul 21, 2020 Date Reported: Jul 29, 2020 Report Number: 2532339
Attn: Accounts Payable Sampled By: DM/RP Company: City of Penticton		

Reference Number	1435803-1	1435803-2	1435803-3
Sample Date	Jul 20, 2020	Jul 20, 2020	Jul 20, 2020
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Penticton Creek Upstream / 3.7 °C	Penticton Creek Downstream / 3.7 °C	PRV Station / 3.7 °C
Matrix	Water	Water	Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Trace Metals Dissolved					
Digestion	Dissolved	Field filtered and Pres Dissol	Field filtered and Pres Dissol	Field filtered and Pres Dissol	
Aluminum	Dissolved mg/L	0.17	0.11	0.041	0.001



Analytical Report

Bill To: City of Penticton
616 Okanagan Avenue East
Penticton, BC, Canada
V2A 3K6
Attn: Accounts Payable
Sampled By: DM/RP
Company: City of Penticton

Project ID: PE 13491 + Quarterly
Project Name: City of Penticton
Project Location:
LSD:
P.O.: S20-0005
Proj. Acct. code:

Lot ID: **1435803**
Control Number: B06879
Date Received: Jul 21, 2020
Date Reported: Jul 29, 2020
Report Number: 2532339

		Reference Number	1435803-1	1435803-3	1435803-4	
		Sample Date	Jul 20, 2020	Jul 20, 2020	Jul 20, 2020	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Penticton Creek Upstream / 3.7 °C	PRV Station / 3.7 °C	Okanagan Lake / 3.7 °C	
		Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Inorganic Nonmetallic Parameters						
Phosphorus	Total - Low Level	mg/L	0.007	<0.005	<0.005	0.005
Orthophosphate-P	Low Level	mg/L	<0.005	<0.005	<0.005	0.005
Organic Carbon	Total Nonpurgeable	mg/L	9.5	3.5	4.3	0.5
Cyanide	Dissolved	mg/L	<0.002	<0.002	<0.002	0.002
Ammonia - N		mg/L	0.01	<0.01	0.01	0.01
Metals Total						
Calcium	Total	mg/L	3.0	29	32	0.01
Magnesium	Total	mg/L	0.68	8.4	9.1	0.02
Potassium	Total	mg/L	0.45	2.2	2.3	0.04
Silicon	Total	mg/L	4.6	3.1	3.0	0.005
Sulfur	Total	mg/L	0.35	8.4	9.2	0.02
Sodium	Total	mg/L	1.6	12	11	0.1
Titanium	Total	mg/L	<0.002	0.003	0.003	0.002
Physical and Aggregate Properties						
Colour	True	Colour units	51	<5	<5	5
Solids	Total Suspended	mg/L	<2	<2	<2	2
Solids	Total Dissolved	mg/L	36	180	160	5
Routine Water						
pH - Holding Time			Exceeded	Exceeded	Exceeded	
pH	at 25 °C		7.03	7.76	7.97	0.01
Electrical Conductivity		µS/cm at 25 °C	28	288	297	1
Bicarbonate		mg/L	13	120	137	5
Carbonate		mg/L	<6	<6	<6	6
Hydroxide		mg/L	<5	<5	<5	5
P-Alkalinity	as CaCO3	mg/L	<5	<5	<5	5
T-Alkalinity	as CaCO3	mg/L	11	95	112	5
Chloride	Dissolved	mg/L	0.24	13.1	5.43	0.05
Fluoride	Dissolved	mg/L	0.06	0.16	0.22	0.01
Nitrate - N	Dissolved	mg/L	<0.01	0.07	0.09	0.01
Nitrite - N	Dissolved	mg/L	<0.01	<0.01	<0.01	0.01
Sulfate (SO4)	Dissolved	mg/L	0.8	26.0	28.9	0.1
Hardness	Total	mg CaCO3/L	10.3	108	117	1
Trace Metals Total						
Aluminum	Total	mg/L	0.17	0.071	0.027	0.001
Antimony	Total	mg/L	0.00002	0.00005	0.00006	0.00002
Arsenic	Total	mg/L	0.0001	0.0002	0.0005	0.0001
Barium	Total	mg/L	0.0068	0.019	0.021	0.0001
Beryllium	Total	mg/L	<0.00005	<0.00005	<0.00005	0.00005

Analytical Report

Bill To: City of Penticton
 616 Okanagan Avenue East
 Penticton, BC, Canada
 V2A 3K6
 Attn: Accounts Payable
 Sampled By: DM/RP
 Company: City of Penticton

Project ID: PE 13491 + Quarterly
 Project Name: City of Penticton
 Project Location:
 LSD:
 P.O.: S20-0005
 Proj. Acct. code:

Lot ID: **1435803**
 Control Number: B06879
 Date Received: Jul 21, 2020
 Date Reported: Jul 29, 2020
 Report Number: 2532339

		Reference Number	1435803-1	1435803-3	1435803-4		
		Sample Date	Jul 20, 2020	Jul 20, 2020	Jul 20, 2020		
		Sample Time	NA	NA	NA		
		Sample Location	Penticton Creek Upstream / 3.7 °C			PRV Station / 3.7 °C	Okanagan Lake / 3.7 °C
		Matrix	Water	Water	Water		
Analyte	Units	Results	Results	Results	Nominal Detection Limit		
Trace Metals Total - Continued							
Bismuth	Total	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
Boron	Total	mg/L	<0.002	0.010	0.011	0.002	
Cadmium	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001	
Chromium	Total	mg/L	0.00020	0.00010	0.00016	0.00005	
Cobalt	Total	mg/L	0.00019	0.00003	0.00004	0.00002	
Copper	Total	mg/L	0.0023	0.0004	0.0037	0.0002	
Iron	Total	mg/L	0.38	0.007	0.038	0.002	
Lead	Total	mg/L	0.00012	<0.00001	0.00008	0.00001	
Lithium	Total	mg/L	0.0006	0.0032	0.0034	0.0005	
Manganese	Total	mg/L	0.063	0.005	0.001	0.001	
Molybdenum	Total	mg/L	0.00040	0.0031	0.0034	0.00002	
Nickel	Total	mg/L	0.0005	0.0004	0.0008	0.0002	
Selenium	Total	mg/L	<0.0002	0.0004	0.0004	0.0002	
Silver	Total	mg/L	<0.00001	<0.00001	0.00002	0.00001	
Strontium	Total	mg/L	0.038	0.25	0.27	0.0001	
Tellurium	Total	mg/L	<0.00005	<0.00005	<0.00005	0.00005	
Thallium	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001	
Thorium	Total	mg/L	0.00009	<0.00005	<0.00005	0.00005	
Tin	Total	mg/L	<0.0001	<0.0001	<0.0001	0.0001	
Uranium	Total	mg/L	0.00037	0.0011	0.0025	0.00001	
Vanadium	Total	mg/L	0.0012	0.00024	0.00049	0.00005	
Zinc	Total	mg/L	0.0085	0.0015	0.0044	0.0005	
Zirconium	Total	mg/L	0.0009	<0.0001	0.0001	0.0001	



Analytical Report

Bill To: City of Penticton
616 Okanagan Avenue East
Penticton, BC, Canada
V2A 3K6
Attn: Accounts Payable
Sampled By: DM/RP
Company: City of Penticton

Project ID: PE 13491 + Quarterly
Project Name: City of Penticton
Project Location:
LSD:
P.O.: S20-0005
Proj. Acct. code:

Lot ID: **1435803**
Control Number: B06879
Date Received: Jul 21, 2020
Date Reported: Jul 29, 2020
Report Number: 2532339

Reference Number	1435803-3	1435803-6	1435803-7
Sample Date	Jul 20, 2020	Jul 20, 2020	Jul 20, 2020
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PRV Station / 3.7 °C	Randolph Rd. Station / 3.7 °C	Smythe Dr. Sample Stn. / 3.7 °C

Analyte	Matrix	Units	Results		Nominal Detection Limit
			Water	Water	
Trihalomethanes Screen - Water					
Chloroform		mg/L	0.027	0.041	0.001
Bromodichloromethane		mg/L	0.002	0.004	0.001
Dibromochloromethane		mg/L	<0.001	<0.001	0.001
Bromoform		mg/L	<0.001	<0.001	0.001
Total Trihalomethanes		mg/L	0.029	0.045	0.001
Trihalomethanes - Surrogate Recovery					
Dibromofluoromethane	EPA Surrogate	%	103	99	50-140
Toluene-d8	EPA Surrogate	%	98	97	50-140
Bromofluorobenzene	EPA Surrogate	%	103	100	50-140



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Project ID: PE 13491 + Quarterly
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Lot ID: **1435803**
 Control Number: B06879
 Date Received: Jul 21, 2020
 Date Reported: Jul 29, 2020
 Report Number: 2532339

Reference Number 1435803-5
Sample Date Jul 20, 2020
Sample Time NA
Sample Location
Sample Description Post Filter #6 / 3.7
 °C
Matrix Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Inorganic Nonmetallic Parameters					
Organic Carbon	Total Nonpurgeable	mg/L	3.4		0.5

Analytical Report

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Project ID: PE 13491 + Quarterly
 Project Name: City of Penticton
 Project Location:
 LSD:
 P.O.: S20-0005
 Proj. Acct. code:

Lot ID: **1435803**
 Control Number: B06879
 Date Received: Jul 21, 2020
 Date Reported: Jul 29, 2020
 Report Number: 2532339

Reference Number 1435803-8
 Sample Date Jul 20, 2020
 Sample Time NA
 Sample Location
 Sample Description Backwash Pond / 3.7
 °C

Matrix Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Trace Metals Dissolved					
Digestion	Dissolved		Field filtered and Pres Dissol		
Aluminum	Dissolved	mg/L	0.068		0.001

Approved by: 
 Max Hewitt
 Operations Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).
 Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

Methodology and Notes

Bill To: City of Penticton 616 Okanagan Avenue East Penticton, BC, Canada V2A 3K6	Project ID: PE 13491 + Quarterly Project Name: City of Penticton Project Location: LSD:	Lot ID: 1435803 Control Number: B06879 Date Received: Jul 21, 2020 Date Reported: Jul 29, 2020 Report Number: 2532339
Attn: Accounts Payable	P.O.: S20-0005	
Sampled By: DM/RP	Proj. Acct. code:	
Company: City of Penticton		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alk, pH, EC, Turb in water (BC)	APHA	* Alkalinity - Titration Method, 2320 B	Jul 22, 2020	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* Conductivity, 2510 B	Jul 22, 2020	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* pH - Electrometric Method, 4500-H+ B	Jul 22, 2020	Element Vancouver
Ammonia-N in Water (VAN)	APHA	* Flow Injection Analysis, 4500-NH3 H	Jul 22, 2020	Element Vancouver
Anions by IEC in water (VAN)	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Jul 22, 2020	Element Vancouver
Carbon Organic (Total) in water (TOC)	APHA	High-Temperature Combustion Method, 5310 B	Jul 23, 2020	Element Edmonton - Roper Road
Cyanide (Dissolved) in water	Alta. Env. Method	* Cyanide, Simple Extractable (Automated Pyridine-Barbituric Acid Colorimetric Method), 06608L	Jul 27, 2020	Element Edmonton - Roper Road
Metals SemiTrace (Total) in Water (VAN)	US EPA	* Metals & Trace Elements by ICP-AES, 6010C	Jul 22, 2020	Element Vancouver
Orthophosphate-P in Water	APHA	* Automated Ascorbic Acid Reduction Method, 4500-P F	Jul 24, 2020	Element Edmonton - Roper Road
Phosphorus - Total in Water	APHA	* Automated Ascorbic Acid Reduction Method, 4500-P F	Jul 23, 2020	Element Edmonton - Roper Road
Solids Dissolved (Total, Fixed and Volatile) - VAN	APHA	* Total Dissolved Solids Dried at 180 C, 2540 C	Jul 28, 2020	Element Vancouver
Solids Suspended (Total, Fixed and Volatile) - VAN	APHA	* Total Suspended Solids Dried at 103-105°C, 2540 D	Jul 23, 2020	Element Vancouver
THM - Water	US EPA	* Volatile Organic Compounds by GCMS / Purge and Trap for Aqueous Samples, 8260B/5030B	Jul 22, 2020	Element Calgary
Trace Metals (dissolved) in Water (VAN)	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Jul 22, 2020	Element Vancouver
Trace Metals (Total) in Water (VAN)	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Jul 22, 2020	Element Vancouver
True Color in water (VAN)	APHA	* Spectrophotometric - Single Wavelength Method, 2120 C	Jul 21, 2020	Element Vancouver

* Reference Method Modified

References

Alta. Env. Method	Alberta Environment Method
APHA	Standard Methods for the Examination of Water and Wastewater
US EPA	US Environmental Protection Agency Test Methods

Methodology and Notes

Bill To: City of Penticton	Project ID: PE 13491 + Quarterly	Lot ID: 1435803
616 Okanagan Avenue East	Project Name: City of Penticton	Control Number: B06879
Penticton, BC, Canada	Project Location:	Date Received: Jul 21, 2020
V2A 3K6	LSD:	Date Reported: Jul 29, 2020
Attn: Accounts Payable	P.O.: S20-0005	Report Number: 2532339
Sampled By: DM/RP	Proj. Acct. code:	
Company: City of Penticton		

Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

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