

Water Treatment Plant Annual Report 2019



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This report was completed in March 2020 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. New Installation of the replacement of Chlorine Gas with Sodium Hypochlorite started in 2019.

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 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

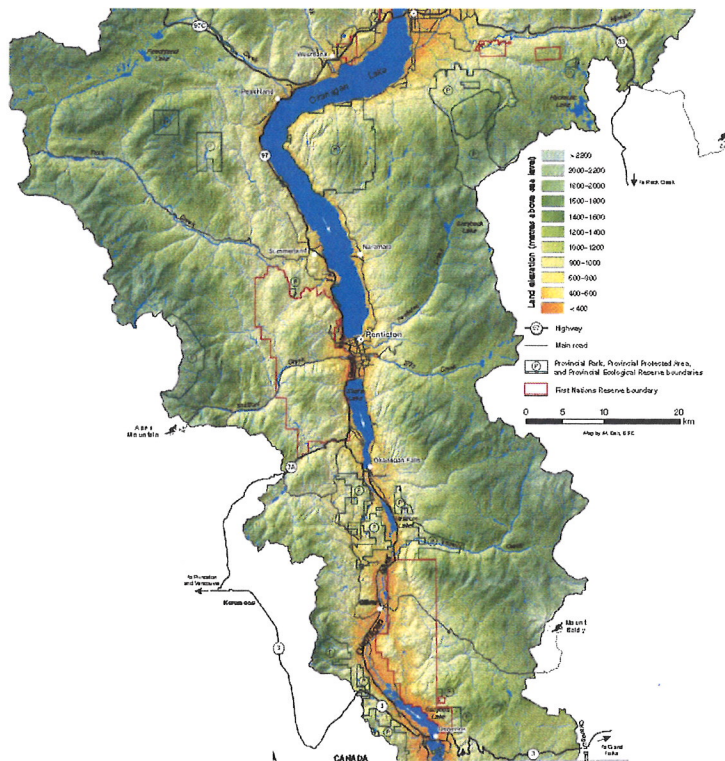
Penticton Creek originates from Greyback Mountain Dam approximately 10 km east of Penticton at an elevation of 1,649 meters. Many small tributaries and creeks also feed Penticton Creek, which allows water to be used at times without depleting storage. The City of Penticton maintains Greyback Lake and 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 2019, no water from the Warren Avenue Well was pumped into the distribution system.

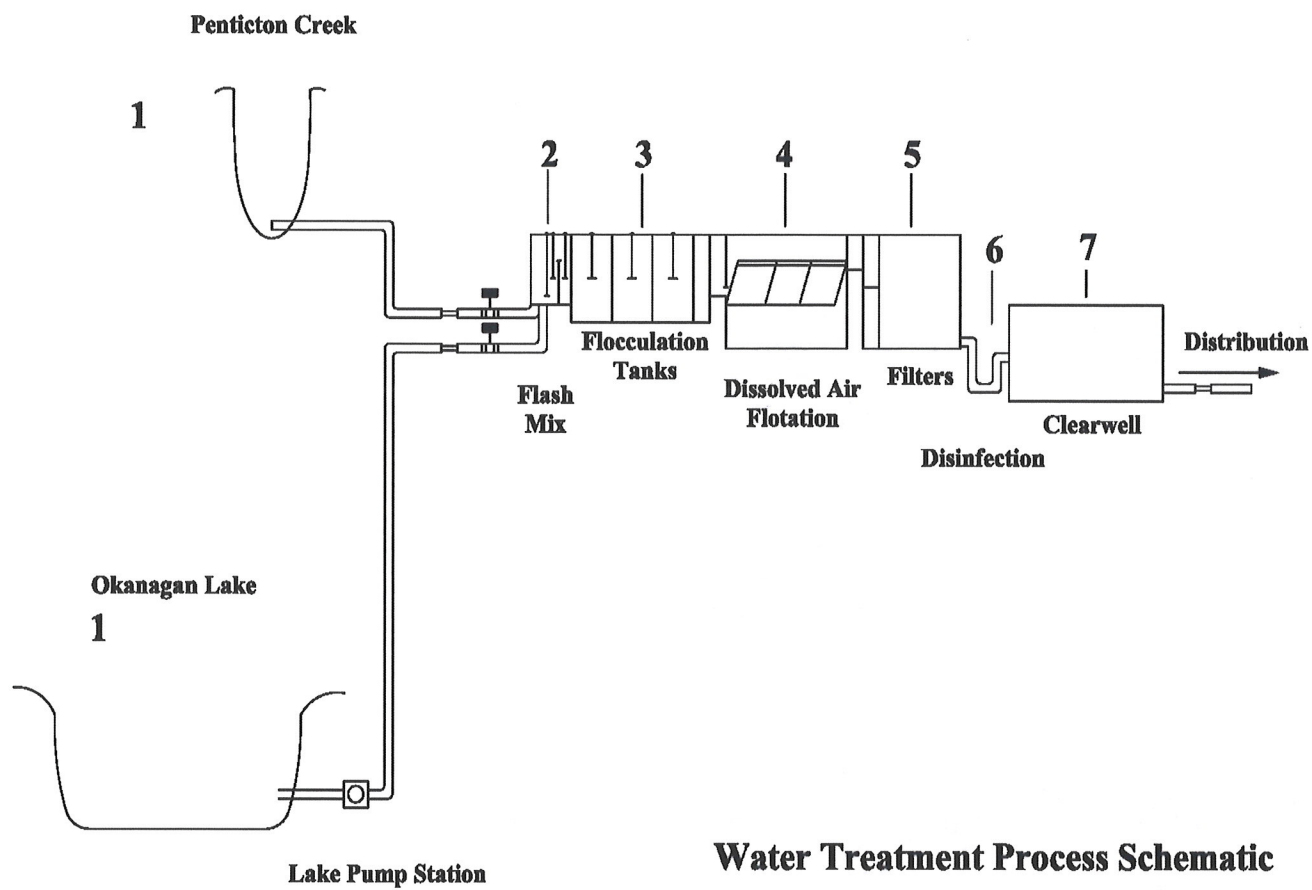
Raw Water Use

In 2019 the City of Penticton pumped 6.48 billion liters from the Okanagan Lake Pump Station to the Penticton Water Treatment Plant. No creek water was treated at the Water Treatment Plant in 2019. The total intake into the treatment plant was 6.48 billion liters during 2019, a decrease of 119 million liters from 2018.

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 1650 pressure zone, incline plate thickeners for the residuals process and increased clear well storage.

Figure 2: Water Treatment Process Schematic



Water Treatment Process Schematic

Okanagan Lake Pump Station and Penticton Creek Dam 2 Intake

Large objects such as logs and plants 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 a reservoir behind the 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 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 2019

Month	Monthly Flow	PAC	Floc Aid	Mid Poly
2019	Million Litres	mg/L	mg/L	mg/L
January	326.8	6.3	1.98	0.05
February	303.6	5.6	2.10	0.04
March	345.0	4.8	2.40	0.04
April	394.7	4.9	2.03	0.05
May	753.7	6.2	2.00	0.05
June	878.7	7.2	2.17	0.06
July	886.6	8.0	2.00	0.07
August	919.5	7.2	2.40	0.07
September	587.1	8.3	2.80	0.05
October	394.9	9.6	2.82	0.06
November	338.2	10.7	2.84	0.06
December	356.1	10.8	2.78	0.08
Average	540.40	7.45	2.36	0.06
Total	6484.79	89.42	28.32	0.68

- Poly aluminum chloride (PAC), floc aid and filter aid weights are calculated using an average of the lake and creek dosages when separate water sources are being treated.
- Average poly-aluminum chloride (PAC) dosage for the year 7.45 mg/L
- Average floc aid polymer dosage for the year 2.36 mg/L
- Average mid poly dosage for the year 0.06 mg/L

Figure 6: Flocculation Tank Mixers



Dissolved Air Floatation

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 Floatation



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 2019. 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. 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, chlorine 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. Chlorine dose of 2.0 mg/L includes approximately 0.5 – 0.7 mg/L of pre chlorination. Chlorine gas injection process will be removed and replaced with a liquid sodium hypochlorite system in 2020.

Chart 2: 2019 Chlorine Dose and Residual

Month	Distribution Flow	Chlorine	Chlorine Dose	Clear well Average Residual
2019	Million Litres	Kg.	mg/L	mg/L
January	326.8	863	3.50	1.36
February	303.6	784	3.47	1.34
March	345.0	918	2.77	1.33
April	394.7	1087	2.86	1.34
May	753.7	1964	2.66	1.36
June	878.7	2233	2.58	1.35
July	886.6	2262	2.59	1.36
August	919.5	2355	2.60	1.38
September	587.1	1524	2.66	1.32
October	394.9	1066	2.79	1.36
November	338.2	936	2.88	1.36
December	356.1	949	2.78	1.35
Average	540.40	1412	2.85	1.35
Total	6484.8	16941		

- Average chlorine dosage for the year including pre chlorination is 2.85 mg/L
- Average distribution chlorine residual at the clear well discharge is 1.35 mg/L
-

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 km of distribution mains, 1,058 fire hydrants and approximately 9,812 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 2019, 305 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 5.9 ML and the Water Treatment Plant clear well. Water to fill this reservoir originates at the Treatment Plant and is controlled via automatic 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 2.3 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 1.135, 1.35 and 0.53 ML respectively. This zone supplies the upper level areas of Penticton and is aided by the addition of two pumping stations, one supplied by the Carmi Reservoir and the other supplied by the Gordon Avenue Reservoir.
- **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 via two 125 Hp vertical turbine pumps.

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: 2019 Staff Compliment

Name	Position	Certification Level	Years of Experience
Micheal Firlotte	Water Quality Supervisor	EOCP IV	24
Don Mortimer	Water Plant Forman	EOCP III	14
Brian Edge	Operator III	EOCP IV	29
Robert Phillips	Operator III	EOCP III	10
Anika Engel	Operator II	EOCP III	6
Matt Finlayson	Operator II	EOCP I	4
Alf Wewetzer	Operations Electrician/Instrumentation	Journeyman	32

All operators have been trained in sample collection, preservation and documentation via an assortment of training courses. Education has been provided by accredited engineering programs and training via EOCP accredited courses. 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

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. An extensive evaluation via Element Labs is performed three times a year. All source water analysis results from Element Labs for 2019 are included in Appendix B.

The treated water quality program is designed to evaluate and compare water quality of the distribution water related to operational and source variances, ensuring that guidelines are consistently met. The City of Penticton maintains and operates four 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 the distribution system and performs an annual flushing and service program.

Microbiological Testing

Four hundred forty-six microbiological tests were sampled for E. coli and Total Coliform in the treated water supply in 2019. 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 2019, 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 2019 the City pumped or diverted 5.98 Billion litres 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 2019 the City diverted 1.94 Billion litres for irrigation use.

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

Chart 4: 2019 Raw Water Diversion for Domestic and Irrigation

Column1	Penticton Cr.	Ellis Cr.	Ok Lake	Total
2019	Million Litres	Million Litres	Million Litres	Billion Litres
Domestic	0.0	0	6485	6.48
Irrigation	1252.2	690.2	0.0	1.94

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 remained fairly consistent. The population of Penticton has grown slightly over these years and consumption has risen moderately. This would indicate that the citizens of Penticton are practicing water conservation. In 2019, total distribution was 6.48 billion litres.

Chart 5: Raw Water Usage 2008 – 2019

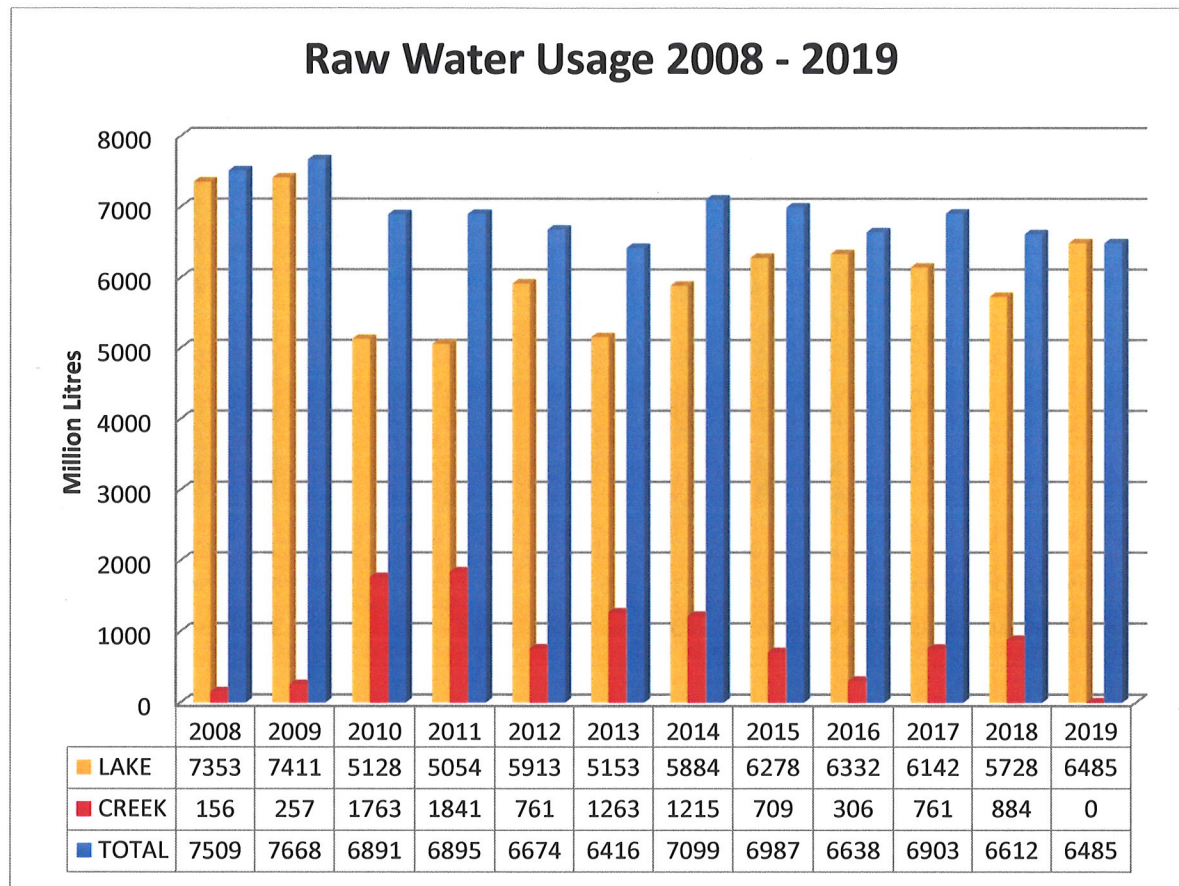


Chart 6: Average Daily Demand 2008-2019 based on the 2016 census 33,761 population

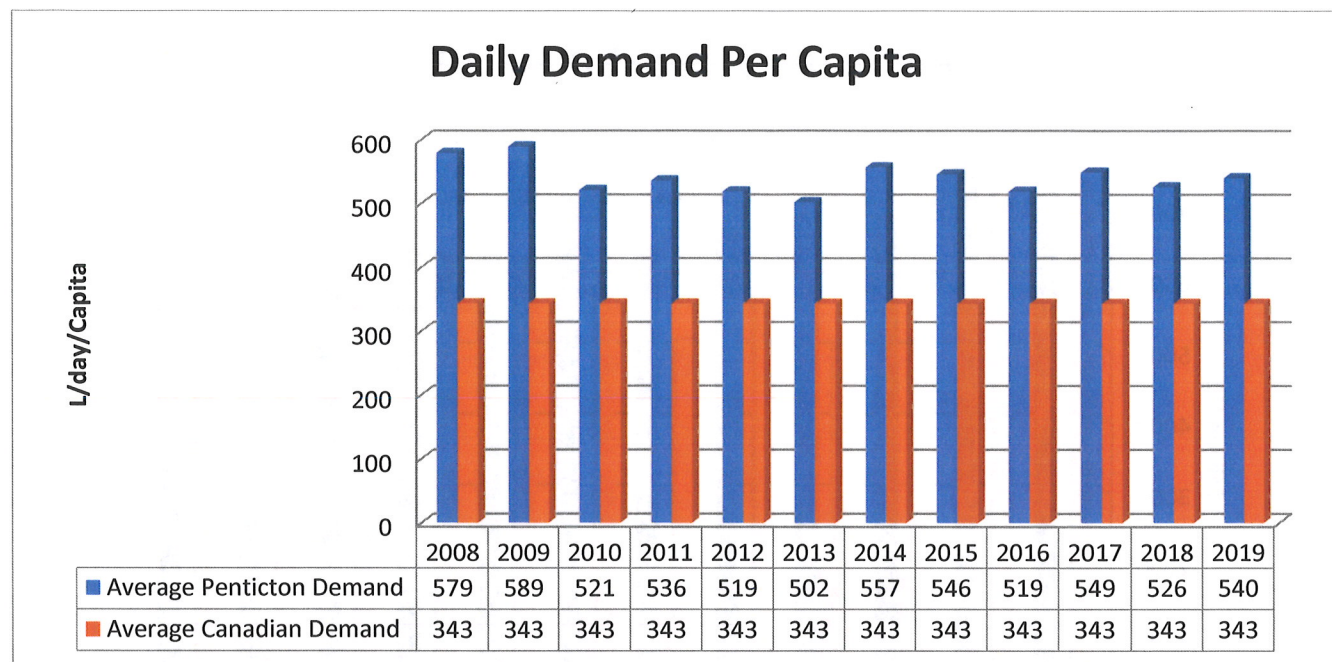


Chart 7: Maximum Daily Demand ML 2008-2019

Year	Population	Max Daily Demand	Max Day	Date
	2016 Census	Liters/Day/Capita	Million Litres	
2008	33761.0	1224	42.8	July 22/08
2009	33761.0	1176	41.2	July 23/09
2010	33761.0	1130	39.6	July 26/10
2011	33761.0	1087	38.1	July 6/11
2012	33761.0	1041	36.4	Aug 20/12
2013	33761.0	1114	39.0	July 29/13
2014	33761.0	1200	42.3	July 14/14
2015	33761.0	1190	41.7	July 6/15
2016	33761.0	1063	37.2	June 6/16
2017	33761.0	1198	41.9	July 4/17
2018	33761.0	1177	41.2	July 25/18
2019	33761.0	1083	36.6	August 06/19

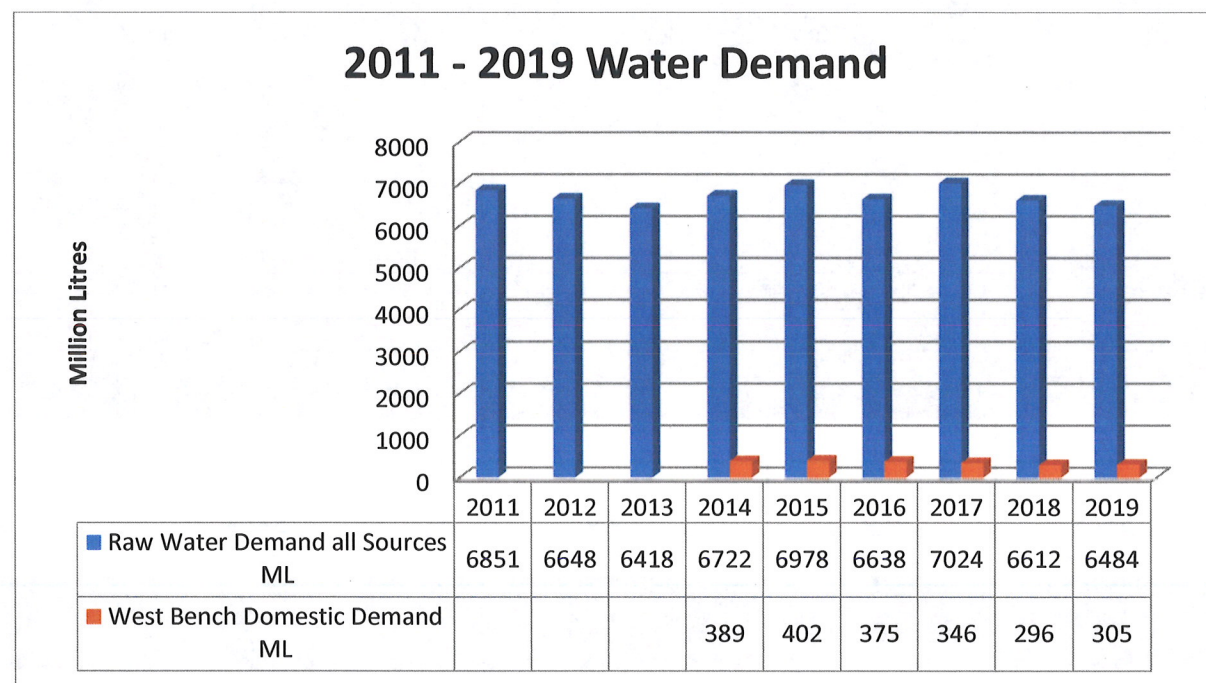
Chart 8: Water Consumption City of Penticton 2019

Month	Lake Supply	Creek Supply	Warren Ave Supply	Total Intake	Total Distribution
2019	Million Litres	Million Litres	Million Litres	Million Litres	Million Litres
January	310.4	0.0	0.0	310.4	326.8
February	292.3	0.0	0.0	292.3	303.6
March	330.9	0.0	0.0	330.9	345.0
April	379.2	0.0	0.0	380.4	394.7
May	741.0	0.0	0.0	741.0	753.7
June	868.0	0.0	0.0	868.0	878.7
July	874.3	0.0	0.0	874.3	886.6
August	905.6	0.0	0.0	905.6	919.5
September	573.2	0.0	0.0	573.2	587.1
October	382.3	0.0	0.0	382.3	394.9
November	325.2	0.0	0.0	325.2	338.2
December	341.8	0.0	0.0	341.8	356.1
Daily Average	17.6	0.0	0.0	17.6	18.0
Monthly Average	527.0	0.0	0.0	527.1	540.4
Total	6324.4	0.0	0.0	6325.6	6484.8
	Date	Flow	Population	Per Capita Flow	
		Million Litres		Million Litres/Capital/Day	
Max Day 2019		36.6	33761.0	1045.1	06-Aug-19
Min Day 2019		8.7	33761.0	248.0	16-Feb-19

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. Domestic volumes supplied to the West Bench water system are noted above. The West Bench Irrigation demand is included in the raw water demand and the plant domestic demand data.

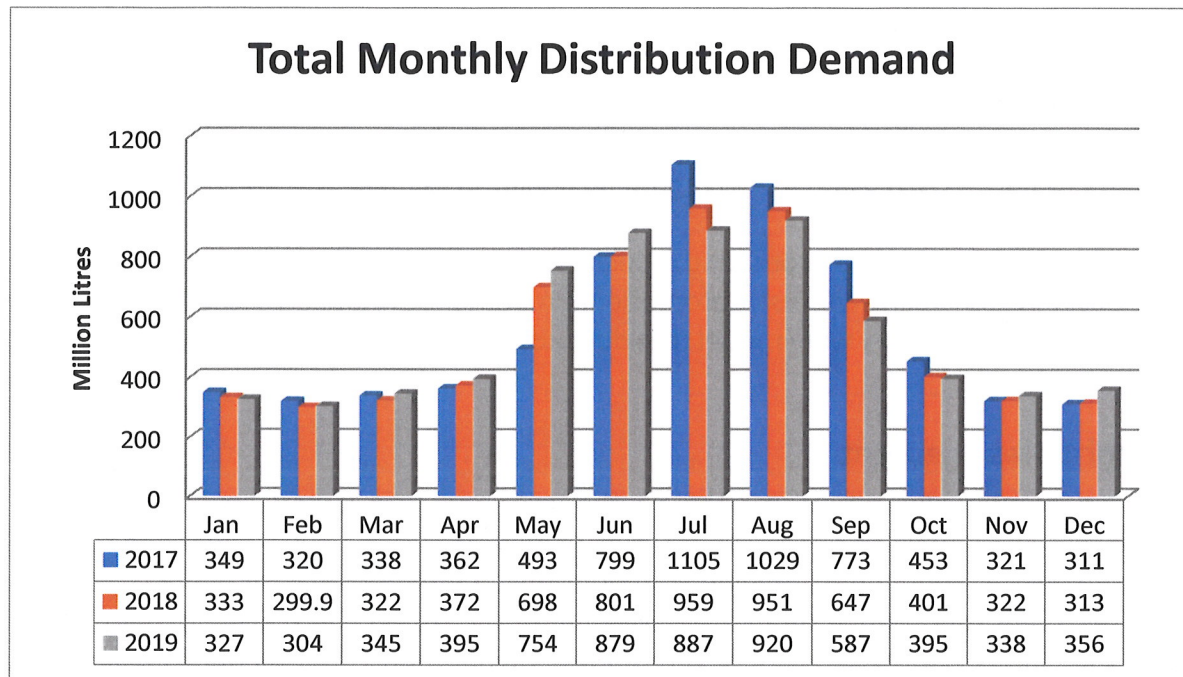
Chart 9: 2011 – 2019 Raw Water Demand / Including West Bench Irrigation District



Demand has a direct impact on existing water infrastructure as well as community planning. In 2019 peak day was 36.6 million litres which occurred on Aug 06, 2019. This includes water supply to the West Bench Irrigation System.

Average Yearly Daily Demand per person was 540 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 2017 – 2019



2019 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 2019. Peak day demand was lower at 36.6 ML from the previous year of 41.2 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.

4. Collaborate with OBWB and RDOS regarding public messaging

Purpose – cost sharing initiative promoting similar messages. The City is a member of the Okanagan Basin Water Board and uses promotional material developed by the board. This information is based on a valley wide model to reduce costs and provide consistent messaging.

10.0 Drought Management

A stage three drought declaration for the southern interior was issued by the provincial government in the summer of 2019. As a result of this review the City is working with a consulting engineer to continue to develop a drought management plan. This work started in 2016 and phase one was completed in 2018 with phase two to be completed in 2020. 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 report will identify drought resilience for each source and the requirements to mitigate an extended drought. The end report will identify trigger points and provide decision making guidelines for each level of drought. A communications protocol will be clearly defined 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 Pentiction Creek flowing into Campbell Mountain Diversion Dam followed by Pentiction #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 Pentiction 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 Pentiction Creek and Pentiction #2 dam.

Pentiction # 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 Pentiction Creek is calculated to be 46.26 million litres per day. 2019 peak day for Pentiction Creek irrigation system was 15.3 million litres recorded at the Randolph Rd flow meter on Aug 08th. Peak day demand for 2019 is calculated to be 33 % of allotted daily capacity. Total demand on Pentiction Creek Irrigation system in 2019 was 1.25 billion litres.

Ellis Creek Irrigation System

The Ellis Creek Diversion dam was constructed in 1966 by Interior Contracting Ltd. of Pentiction, 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 Aug 06, 2019 when 10.5-million-liter demand was recorded by the Ellis Creek Irrigation flow meter. Peak day demand for 2019 is calculated to be 105% of allotted daily capacity. Total demand on Ellis Creek Irrigation system for 2019 was 690 million litres.

Chart 11: Irrigation Water Use 2008 -2019

Year	Penticton Creek Irrigation	Ellis Creek Irrigation
	Million Litres	Million Litres
2008	1532	331
2009	2687	356
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

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 2,237 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 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 2019

1. Hydrant maintenance program – Completed both A and B services
2. Installation of 5 new hydrants as per spacing and development plan
3. Ellis #4 pre-construction design completed
4. WTP Chlorine gas to liquid hypochlorite conversion
5. WTP Filter valve and actuator replacement
6. Purchased new chemical dosing pumps

Capital projects anticipated for 2020

1. Hydrant maintenance program A and B services
2. Installation of 15 new hydrants as per spacing and development plan
3. Irrigation Meter program 50 installation planned
4. Ellis #4 pre-construction redesign tender
5. Ok Lake pump station electrical upgrade
6. WTP Chlorine gas to liquid hypochlorite conversion – completion
7. WTP Filter valve and actuator replacement – on going
8. Complete Drought Management Plan Phase II – completion

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

Appendix A Quick Facts 2019

Lake				
	Min	Max	Average	Units
Alkalinity	104.0	135.8	114.3	mg/L (CaCO ₃)
Colour Apparent	2.0	21.0	7.0	Colour Units
Colour True	1.0	19.0	3.7	Colour Units
Hardness	112	132	122	mg/L (CaCO ₃)
pH	7.7	8.3	8.1	pH Units
Turbidity	0.083	1.12	0.2	NTU
Creek				
	Min	Max	Average	Units
Alkalinity	8.0	28	19.1	mg/L (CaCO ₃)
Colour Apparent	17	140	54.2	Colour Units
Colour True	11	111	47.05	Colour Units
Hardness	6	29	16	mg/L (CaCO ₃)
pH	6.86	7.82	7.48	pH Units
Turbidity	0.298	3.07	0.622	NTU

2019 Raw Source Water Volumes

Flows				
		Million Litres		
Ellis Creek Irrigation		690		
Penticton Creek Irrigation		1252		
Penticton Creek Domestic		0		
Okanagan Lake		6484		
Warren Ave Well		0.0		
Total Plant Intake		6484		

2019 Distribution Quick Facts

Parameter	Result	Unit	Date
Total Distribution	6484	ML	2019
Maximum Day	36.6	ML/d	Aug 06
Minimum Day	8.68	ML/d	Feb 16
Average Daily	16.79	ML/d	2019 Average
Average Daily / Capita	540.0	L/d/c	2019 Average
Maximum Daily / Capita	1083	L/d/c	Aug 06
Minimum Daily / Capita	257	L/d/c	Feb 6
Average Alkalinity	81.5	mg/L (CaOH ₃)	2019 Average
Chlorine Avg. @ Plant	1.35	mg/L	2019 Average
Hardness Average	112	mg/L (CaOH ₃)	2019 Average
Temp Average	5.85	Celsius	2019 Average
pH Average	7.71		2019 Average
Turbidity Avg.	0.073	NTU	2019 Average

Appendix B – Water Quality Lab Reports

- **March 20, 2019 – City Wide Sampling**
- **July 17, 2019 – City Wide Sampling**
- **Nov 18, 2019 – City Wide Sampling**



Water Treatment Plant
1900 Penticton Avenue
Penticton, B.C., V2A 3K6

Exova
#104, 19575 – 55A Avenue
Surrey, B.C., V3S 8P8

Mar 20, 2019

Exova Testing:

For the Environmental Sample Information Sheet B06878, please find the following 32 sample bottles. The P.O. number for these tests is S19-0005. Please send the invoice to City of Penticton, 616 Okanagan Avenue East, V2A 3K6, and Attn: Mike Firlotte.

1. Three sets of: two 1-L plastic sample bottles from the following sites; PRV Station, Okanagan Lake from lab tap, and Penticton Creek upstream. Please perform the following analyses on the enclosed 1-L samples.

Total Suspended Solids	Alkalinity	Nitrite	Fluoride
Total Dissolved Solids	Carbonate	Nitrate	
pH	Bicarbonate	Conductivity	
Hydroxide	Ortho-Phosphate	Colour	
Chloride	Sulfate	Hardnes	

2. Three 250 ml poly bottles with H_2SO_4 vial for Total Phosphorus & Ammonia from the following three sites; PRV Station, Okanagan Lake from lab tap, and Penticton Creek Upstream.
3. Three THM (Trihalomethanes) sets of three from the following locations; Randolph Road Station, PRV Station, and Symthe Drive. Please report the concentrations of Cl_3CH , Cl_2BrCH , $ClBr_2CH$ and Br_3CH separately.
4. Four 250 mL samples for TOC analyses from the following locations: PRV Station, Okanagan Lake from lab tap, Penticton Creek Upstream, and post filtration 100% Lake(filter #5). The samples were preserved with concentrated HCl vials.
5. Three 125 mL poly bottle samples for free cyanide analyses (CN^-) from the following locations: Okanagan Lake from lab tap, Penticton Creek Upstream, and PRV Station. Samples preserved with 6N NaOH vials.
6. Four 250 ml poly bottle samples for dissolved aluminum from the following locations: PRV Station, Penticton Creek Upstream, Penticton Creek Downstream, and Backwash Pond. These samples were 0.45 μm filtered and preserved with HNO_3 vials.
7. Three 125ml samples(HNO_3 preserved) for Trace Metals analysis from PRV Station, Okanagan Lake lab tap, and Penticton Creek Upstream.

If you require any additional information please contact the undersigned at (250 490 2560)

Sincerely

Don Mortimer
Rob Phillips

Exova

www.exova.com

**Project Information**

Project ID: **PE 13491 + Quarterly**
Project Name: **CITY OF PENTICTON**
Project Location:
Legal Location:
PO/AFE#: **S17-0005**
Proj. Acct. Code:

Billing Information

Company: **City of Penticton**
Address: **Water Treatment Plant 1900 Penticton, BC V2A 2N5**
Attention: **Brent Edge Mike Firlotte**
Phone: **(250) 490-2560**
Cell:
Fax: **(250) 490-2561**
E-mail: **wtp@penticton.ca**
Agreement ID: **8325**
Copy of report: **X**

Copy of Report To:

Company: **City of Penticton**
Address: **Water Treatment Plant 1900 Penticton, BC V2A 2N5**
Attention: **Brent Edge Mike Firlotte**
Phone: **(250) 490-2560**
Cell:
Fax: **(250) 490-2561**
E-mail: **wtp@penticton.ca**
Copy of invoice: **X**

RUSH Priority

Upon filling out this section, client accepts that surcharges will be applied to the analysis

Date Required
As Indicated
All Analysis
When "ASAP" is requested, turn around will default to a 100% RUSH priority, with pricing and turn around time to match. Please contact the lab prior to submitting RUSH samples.

Signature

Sample Custody (please print)

Sampled by: **DM/JB/AE**
Company: **CITY OF PENTICTON**
I authorize Exova to proceed with the work indicated on this form:
Date: **MAR 20/2019** Initial: **JB**
This section for Lab use only

Date/Time stamp:

Special Instructions/Comments (please include contact information including ph. # if different from above).

THM's REPORT Cl_2CH , Cl_2BrCH , $ClBr_2CH$, Br_2CH
TOC - VIAL PRESERVED
CN - FREE CYANIDE CN^2
TOTAL P - VIAL PRESERVED

Include Regulatory Requirements Below:

Number of Containers

DISS AI -
TSS, TDS
 Ph_3EC , Cadour, HARD ALK
 CO_3^{2-} , HCO_3^- , OH^- , F^- , Cl^-
 NH_3 , PO_4^{3-} , SO_4^{2-} , CN^-
TTV
THM's
TOC
 NO_2^- , NO_3^-

Sample Identification	Location	Depth IN CM M	Date/Time sampled	Matrix	Sampling Method	Enter tests above (✓ relevant samples below)	Indicate below any deficiencies in the condition of samples:
1 SMYTHE DRIVE			March 20/2019	W	GRAB	3	Were Exova supplies used?
2 PRV STATION			"	W	GRAB	10	Were there any damage to the shipping container?
3 FILTER #5 POST FILTRATION			"	W	GRAB	1	Were the containers packaged well?
4 O.R. LAKE SAMPLE TAP			"	W	GRAB	6	Were any extra samples received (document below)?
5 BACKWASH POND			"	W	COMP	1	Are samples within recommended holding times/temp?
6 PENTICTON CREEK UPSTREAM			"	W	GRAB	7	
7 PENTICTON CREEK DOWNSTREAM			"	W	GRAB	1	
8 RANDOLPH RD. STATION			"	W	GRAB	3	
9							
10							
11							
12							
13							
14							
15							

Environmental Sample Information Sheet

Note: Proper completion of this form is required in order to proceed with analysis

Please indicate any potentially hazardous samples

Lot: **1339965** COC



Shipping: COD Y/N

Cooler temp: **3-7°C**

and size of coolers received:

Delivery Method: **LOOMIS**

Waybill:

Received by: **LC**

Page of

Control # **B06878**

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.: 519-0005 Proj. Acct. code:	Lot ID: 1339965 Control Number: B06878 Date Received: Mar 21, 2019 Date Reported: Mar 29, 2019 Report Number: 2389215
Attn: Accounts Payable Sampled By: DM/JB/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
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Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / Test Report
Email - Multiple Reports By Agreement	PDF	COA

Notes To Clients:

- Mar 25, 2019 - Appropriately preserved samples were not received for total mercury analysis of samples #1339965-2, 4, and 6. Analysis was performed on samples preserved with nitric acid.

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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.: 519-0005 Proj. Acct. code:	Lot ID: 1339965 Control Number: B06878 Date Received: Mar 21, 2019 Date Reported: Mar 29, 2019 Report Number: 2389215
Attn: Accounts Payable Sampled By: DM/JB/AE Company: City of Penticton		

Reference Number		1339965-1	1339965-2	1339965-8	Nominal Detection Limit
Sample Date		Mar 20, 2019	Mar 20, 2019	Mar 20, 2019	
Sample Time		NA	NA	NA	
Sample Location					
Sample Description		Smythe Drive / 3.7°C	PRV Station / 3.7°C	Randolph Rd Station / 3.7°C	
Matrix		Water	Water	Water	
Analyte	Units	Results	Results	Results	
Trihalomethanes Screen - Water					
Chloroform	mg/L	0.077	0.048	0.049	0.001
Bromodichloromethane	mg/L	0.009	0.005	0.006	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	0.086	0.053	0.055	0.001
Trihalomethanes - Surrogate Recovery					
Dibromofluoromethane EPA Surrogate	%	125	124	123	50-140
Toluene-d8 EPA Surrogate	%	99	98	100	50-140
Bromofluorobenzene EPA Surrogate	%	102	94	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.: 519-0005 Proj. Acct. code:	Lot ID: 1339965 Control Number: B06878 Date Received: Mar 21, 2019 Date Reported: Mar 29, 2019 Report Number: 2389215
Attn: Accounts Payable Sampled By: DM/JB/AE Company: City of Penticton		

		Reference Number	1339965-2	1339965-3	1339965-4
		Sample Date	Mar 20, 2019	Mar 20, 2019	Mar 20, 2019
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	PRV Station / 3.7°C	Filter #5 Post Filtration / 3.7°C	Okanagan Lake Sample Tap / 3.7°C
		Matrix	Water	Water	Water
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Inorganic Nonmetallic Parameters					
Organic Carbon	Total Nonpurgeable	mg/L	4.0	3.9	4.5
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	<0.003		<0.003

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.: 519-0005 Proj. Acct. code:	Lot ID: 1339965 Control Number: B06878 Date Received: Mar 21, 2019 Date Reported: Mar 29, 2019 Report Number: 2389215
Attn: Accounts Payable Sampled By: DM/JB/AE Company: City of Penticton		

		Reference Number	1339965-2	1339965-4	1339965-6	
		Sample Date	Mar 20, 2019	Mar 20, 2019	Mar 20, 2019	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	PRV Station / 3.7°C	Okanagan Lake Sample Tap / 3.7°C	Penticton Creek Upstream / 3.7°C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Total						
Calcium	Total	mg/L	32	33	6.8	0.01
Magnesium	Total	mg/L	8.8	8.8	1.8	0.02
Potassium	Total	mg/L	2.3	2.4	0.62	0.04
Silicon	Total	mg/L	3.4	3.5	5.6	0.005
Sulfur	Total	mg/L	9.5	9.6	1.2	0.02
Sodium	Total	mg/L	11	11	3.2	0.1
Titanium	Total	mg/L	0.008	0.009	0.004	0.002
Digestion	Preparation		Field Pres, digest as total Hg	Field Pres, digest as total Hg	Field Pres, digest as total Hg	
Mercury	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Physical and Aggregate Properties						
Colour	True	Colour units	<5	<5	15	5
Solids	Total Suspended	mg/L	2	<2	<2	2
Solids	Total Dissolved	mg/L	210	210	92	5
Routine Water						
pH - Holding Time			Exceeded	Exceeded	Exceeded	
pH	at 25 °C		7.90	7.92	7.34	0.01
Electrical Conductivity		µS/cm at 25 °C	297	290	67	1
Bicarbonate		mg/L	128	133	34	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	105	109	28	5
Chloride	Dissolved	mg/L	8.81	5.06	1.04	0.05
Fluoride	Dissolved	mg/L	0.18	0.18	0.09	0.01
Nitrate - N	Dissolved	mg/L	0.09	0.08	0.06	0.01
Nitrite - N	Dissolved	mg/L	<0.01	<0.01	<0.01	0.01
Sulfate (SO4)	Dissolved	mg/L	30.1	30.1	3.5	0.1
Hardness	Total	mg CaCO3/L	117	118	24	1
Trace Metals Total						
Aluminum	Total	mg/L	0.076	0.004	0.062	0.001
Antimony	Total	mg/L	0.00007	0.00009	0.00003	0.00002
Arsenic	Total	mg/L	0.0004	0.0005	<0.0001	0.0001
Barium	Total	mg/L	0.021	0.022	0.0088	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	0.010	0.009	<0.002	0.002
Cadmium	Total	mg/L	<0.00001	<0.00001	0.00002	0.00001

Analytical Report

Bill To: City of Penticton	Project ID: PE 13491 + Quarterly	Lot ID: 1339965
616 Okanagan Avenue East	Project Name: City of Penticton	Control Number: B06878
Penticton, BC, Canada	Project Location:	Date Received: Mar 21, 2019
V2A 3K6	LSD:	Date Reported: Mar 29, 2019
Attn: Accounts Payable	P.O.: 519-0005	Report Number: 2389215
Sampled By: DM/JB/AE	Proj. Acct. code:	
Company: City of Penticton		

		Reference Number	1339965-2	1339965-4	1339965-6	
		Sample Date	Mar 20, 2019	Mar 20, 2019	Mar 20, 2019	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	PRV Station / 3.7°C	Okanagan Lake Sample Tap / 3.7°C	Penticton Creek Upstream / 3.7°C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Trace Metals Total - Continued						
Chromium	Total	mg/L	<0.00005	<0.00005	<0.00005	0.00005
Cobalt	Total	mg/L	0.00002	<0.00002	0.00006	0.00002
Copper	Total	mg/L	0.0005	0.0040	0.0006	0.0002
Iron	Total	mg/L	0.008	0.019	0.21	0.002
Lead	Total	mg/L	0.00001	0.00007	0.00005	0.00001
Lithium	Total	mg/L	0.0034	0.0033	0.0009	0.0005
Manganese	Total	mg/L	<0.001	<0.001	0.005	0.001
Molybdenum	Total	mg/L	0.0034	0.0035	0.00088	0.00002
Nickel	Total	mg/L	0.0006	0.0004	0.0003	0.0002
Selenium	Total	mg/L	0.0005	0.0005	<0.0002	0.0002
Silver	Total	mg/L	<0.00001	<0.00001	0.00033	0.00001
Strontium	Total	mg/L	0.27	0.28	0.070	0.0001
Tellurium	Total	mg/L	<0.00005	<0.00005	<0.00005	0.00005
Thallium	Total	mg/L	0.00001	<0.00001	0.00004	0.00001
Thorium	Total	mg/L	<0.00005	<0.00005	0.00026	0.00005
Tin	Total	mg/L	0.0021	<0.0001	<0.0001	0.0001
Uranium	Total	mg/L	0.0022	0.0025	0.0011	0.00001
Vanadium	Total	mg/L	0.00039	0.00051	0.00032	0.00005
Zinc	Total	mg/L	0.0031	0.0040	0.0016	0.0005
Zirconium	Total	mg/L	<0.0001	0.0001	0.0006	0.0001

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.: 519-0005 Proj. Acct. code:	Lot ID: 1339965 Control Number: B06878 Date Received: Mar 21, 2019 Date Reported: Mar 29, 2019 Report Number: 2389215
Attn: Accounts Payable Sampled By: DM/JB/AE Company: City of Penticton		

		Reference Number	1339965-2	1339965-5	1339965-6
		Sample Date	Mar 20, 2019	Mar 20, 2019	Mar 20, 2019
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	PRV Station / 3.7°C	Backwash Pond / 3.7°C	Penticton Creek Upstream / 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 0.084	0.061	0.045	0.001

Analytical Report

Bill To:	City of Penticton	Project ID:	PE 13491 + Quarterly	Lot ID:	1339965
	616 Okanagan Avenue East	Project Name:	City of Penticton	Control Number:	B06878
	Penticton, BC, Canada	Project Location:		Date Received:	Mar 21, 2019
	V2A 3K6	LSD:		Date Reported:	Mar 29, 2019
Attn:	Accounts Payable	P.O.:	519-0005	Report Number:	2389215
Sampled By:	DM/JB/AE	Proj. Acct. code:			
Company:	City of Penticton				

Reference Number	1339965-6
Sample Date	Mar 20, 2019
Sample Time	NA
Sample Location	
Sample Description	Penticton Creek Upstream / 3.7°C

Matrix	Water
--------	-------

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Inorganic Nonmetallic Parameters					
Organic Carbon	Total Nonpurgeable	mg/L	4.4		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	0.004		0.003

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.: 519-0005 Proj. Acct. code:	Lot ID: 1339965 Control Number: B06878 Date Received: Mar 21, 2019 Date Reported: Mar 29, 2019 Report Number: 2389215
Attn: Accounts Payable Sampled By: DM/JB/AE Company: City of Penticton		

Reference Number	1339965-7
Sample Date	Mar 20, 2019
Sample Time	NA
Sample Location	
Sample Description	Penticton Creek Downstream / 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	0.047			0.001

Approved by:



Carol Nam, Dipl. T.
Quality Officer

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.: 519-0005 Proj. Acct. code:	Lot ID: 1339965 Control Number: B06878 Date Received: Mar 21, 2019 Date Reported: Mar 29, 2019 Report Number: 2389215
Attn: Accounts Payable Sampled By: DM/JB/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 23, 2019	Exova Surrey
Alk, pH, EC, Turb in water (BC)	APHA	* Conductivity, 2510 B	Mar 23, 2019	Exova Surrey
Alk, pH, EC, Turb in water (BC)	APHA	* pH - Electrometric Method, 4500-H+ B	Mar 23, 2019	Exova Surrey
Ammonia-N in Water (Surrey)	APHA	* Flow Injection Analysis, 4500-NH3 H	Mar 22, 2019	Exova Surrey
Anions by IEC in water (Surrey)	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Mar 22, 2019	Exova Surrey
Carbon Organic (Total) in water (TOC)	APHA	High-Temperature Combustion Method, 5310 B	Mar 25, 2019	Exova Edmonton
Cyanide (Dissolved) in water	Alta. Env. Method	* Cyanide, Simple Extractable (Automated Pyridine-Barbituric Acid Colorimetric Method), 06608L	Mar 29, 2019	Exova Edmonton
Mercury Low Level (Total) in water (Surrey)	EPA	* Mercury in Water by Cold Vapor Atomic Fluorescence Spectrometry, 245.7	Mar 22, 2019	Exova Surrey
Metals SemiTrace (Total) in Water (Surrey)	US EPA	* Metals & Trace Elements by ICP-AES, 6010C	Mar 25, 2019	Exova Surrey
Phosphorus - orthophosphate by Smartchem (Surrey)	APHA	Ascorbic Acid Reduction Method, 4500-P E	Mar 22, 2019	Exova Surrey
Phosphorus - total by Smartchem (Surrey)	APHA	* Persulfate digestion method, 4500-P B5	Mar 25, 2019	Exova Surrey
Solids Dissolved (Total, Fixed and Volatile) - Surrey	APHA	* Total Dissolved Solids Dried at 180 C, 2540 C	Mar 22, 2019	Exova Surrey
Solids Suspended (Total, Fixed and Volatile) - Surrey	APHA	* Total Suspended Solids Dried at 103-105°C, 2540 D	Mar 25, 2019	Exova Surrey
THM - Water	US EPA	* Volatile Organic Compounds by GCMS / Purge and Trap for Aqueous Samples, 8260B/5030B	Mar 25, 2019	Exova Calgary
Trace Metals (dissolved) in Water (Surrey)	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Mar 25, 2019	Exova Surrey
Trace Metals (Total) in Water (Surrey)	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Mar 25, 2019	Exova Surrey
True Color in water (Surrey)	APHA	* Spectrophotometric - Single Wavelength Method, 2120 C	Mar 23, 2019	Exova Surrey

* 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

Comments:

- Mar 25, 2019 - Appropriately preserved samples were not received for total mercury analysis of samples #1339965-2, 4, and 6. Analysis was performed on samples preserved with nitric acid.

Methodology and Notes

Bill To:	City of Penticton	Project ID:	PE 13491 + Quarterly	Lot ID:	1339965
	616 Okanagan Avenue East	Project Name:	City of Penticton	Control Number:	B06878
	Penticton, BC, Canada	Project Location:		Date Received:	Mar 21, 2019
	V2A 3K6	LSD:		Date Reported:	Mar 29, 2019
Attn:	Accounts Payable	P.O.:	519-0005	Report Number:	2389215
Sampled By:	DM/JB/AE	Proj. Acct. code:			
Company:	City of Penticton				

Please direct any inquiries regarding this report to our Client Services Group or to the Operations Manager at the coordinates indicated at the top left of this page.

Results relate only to samples as submitted.

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



Water Treatment Plant
1900 Penticton Avenue
Penticton, B.C., V2A 3K6

Exova
#104, 19575 – 55A Avenue
Surrey, B.C., V3S 8P8

July 17, 2019

Exova Testing:

For the Environmental Sample Information Sheet B06879, please find the following 32 sample bottles. The P.O. number for these tests is S19-0005. Please send the invoice to City of Penticton, 616 Okanagan Avenue East, V2A 3K6, and Attn: Mike Firlotte.

1. Three sets of: two 1-L plastic sample bottles from the following sites; PRV Station, Okanagan Lake from lab tap, and Penticton Creek upstream. Please perform the following analyses on the enclosed 1-L samples.

Total Suspended Solids	Alkalinity	Nitrite	Fluoride
Total Dissolved Solids	Carbonate	Nitrate	
pH	Bicarbonate	Conductivity	
Hydroxide	Ortho-Phosphate	Colour	
Chloride	Sulfate	Hardnes	

2. Three 250 ml poly bottles with H_2SO_4 vial for Total Phosphorus & Ammonia from the following three sites; PRV Station, Okanagan Lake from lab tap, and Penticton Creek Upstream.
3. Three THM (Trihalomethanes) sets of three from the following locations; Randolph Road Station, PRV Station, and Symthe Drive. Please report the concentrations of Cl_3CH , Cl_2BrCH , $ClBr_2CH$ and Br_3CH separately.
4. Four 250 mL samples for TOC analyses from the following locations: PRV Station, Okanagan Lake from lab tap, Penticton Creek Upstream, and post filtration 100% Lake(filter #6). The samples were preserved with concentrated HCl vials.
5. Three 125 mL poly bottle samples for free cyanide analyses (CN^-) from the following locations: Okanagan Lake from lab tap, Penticton Creek Upstream, and PRV Station. Samples preserved with 6N NaOH vials.
6. Four 250 ml poly bottle samples for dissolved aluminum from the following locations: PRV Station, Penticton Creek Upstream, Penticton Creek Downstream, and Backwash Pond. These samples were 0.45 μm filtered and preserved with HNO_3 vials.
7. Three 125ml samples(HNO_3 preserved) for Trace Metals analysis from PRV Station, Okanagan Lake lab tap, and Penticton Creek Upstream..

If you require any additional information please contact the undersigned at (250 490 2560)

Sincerely
Don Mortimer/ Anika Engel

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.: S19-0005 Proj. Acct. code:	Lot ID: 1364671 Control Number: B06879 Date Received: Jul 18, 2019 Date Reported: Jul 26, 2019 Report Number: 2424998
Attn: Accounts Payable Sampled By: DM/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
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Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / Test Report
Email - Multiple Reports By Agreement	PDF	COA

Notes To Clients:

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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.: S19-0005 Proj. Acct. code:	Lot ID: 1364671 Control Number: B06879 Date Received: Jul 18, 2019 Date Reported: Jul 26, 2019 Report Number: 2424998
Attn: Accounts Payable Sampled By: DM/AE Company: City of Penticton		

		Reference Number	1364671-1	1364671-2	1364671-3
		Sample Date	Jul 17, 2019	Jul 17, 2019	Jul 17, 2019
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Penticton Creek Upstream / 13.8 °C	Penticton Creek Downstream / 13.8 °C	PRV Station / 13.8 °C
		Matrix	Water	Water	Water
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Trace Metals Dissolved					
Digestion	Dissolved	Lab filtered & preserved	Lab filtered & preserved	Lab filtered & preserved	
Aluminum	Dissolved	mg/L 0.089	0.086	0.083	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.: S19-0005 Proj. Acct. code:	Lot ID: 1364671 Control Number: B06879 Date Received: Jul 18, 2019 Date Reported: Jul 26, 2019 Report Number: 2424998
Attn: Accounts Payable Sampled By: DM/AE Company: City of Penticton		

		Reference Number	1364671-1	1364671-3	1364671-4	
		Sample Date	Jul 17, 2019	Jul 17, 2019	Jul 17, 2019	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Penticton Creek Upstream / 13.8 °C	PRV Station / 13.8 °C	Okanagan Lake / 13.8 °C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Inorganic Nonmetallic Parameters						
Organic Carbon	Total Nonpurgeable	mg/L	7.9	3.6	4.1	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
Nitrate - N		mg/L	<0.01	0.11	0.12	0.01
Nitrite - N		mg/L	<0.003	<0.003	<0.003	0.003
Orthophosphate-P	Dissolved	mg/L	<0.002	<0.002	0.005	0.002
Phosphorus	Total	mg/L	0.007	<0.003	<0.003	0.003
Metals Total						
Calcium	Total	mg/L	4.3	32	32	0.01
Magnesium	Total	mg/L	1.1	8.7	8.6	0.02
Potassium	Total	mg/L	0.50	2.4	2.3	0.04
Silicon	Total	mg/L	5.6	3.2	3.2	0.005
Sulfur	Total	mg/L	0.61	9.6	9.6	0.02
Sodium	Total	mg/L	2.4	11	11	0.1
Titanium	Total	mg/L	<0.002	0.003	0.003	0.002
Physical and Aggregate Properties						
Colour	True	Colour units	43	<5	<5	5
Solids	Total Suspended	mg/L	<2	<2	<2	2
Solids	Total Dissolved	mg/L	110	220	260	5
Routine Water						
pH - Holding Time			Exceeded	Exceeded	Exceeded	
pH	at 25 °C		7.69	7.68	7.87	0.01
Electrical Conductivity		µS/cm at 25 °C	49	302	296	1
Bicarbonate		mg/L	28	128	136	5
Carbonate		mg/L	<6	<6	<6	6
Hydroxide		mg/L	<5	<5	<5	5
P-Alkalinity	as CaCO ₃	mg/L	<5	<5	<5	5
T-Alkalinity	as CaCO ₃	mg/L	23	105	112	5
Chloride	Dissolved	mg/L	0.56	9.18	5.03	0.05
Fluoride	Dissolved	mg/L	0.04	0.12	0.11	0.01
Sulfate (SO ₄)	Dissolved	mg/L	1.5	29.3	29.3	0.1
Hardness	Total	mg CaCO ₃ /L	15	117	116	1
Trace Metals Total						
Aluminum	Total	mg/L	0.12	0.085	0.001	0.001
Antimony	Total	mg/L	0.00003	0.00006	0.00006	0.00002
Arsenic	Total	mg/L	<0.0001	0.0004	0.0005	0.0001
Barium	Total	mg/L	0.0076	0.020	0.020	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	Project ID: PE 13491 + Quarterly Project Name: City of Penticton Project Location: LSD: P.O.: S19-0005 Proj. Acct. code:	Lot ID: 1364671 Control Number: B06879 Date Received: Jul 18, 2019 Date Reported: Jul 26, 2019 Report Number: 2424998
Attn: Accounts Payable Sampled By: DM/AE Company: City of Penticton		

		Reference Number	1364671-1	1364671-3	1364671-4	
		Sample Date	Jul 17, 2019	Jul 17, 2019	Jul 17, 2019	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Penticton Creek Upstream / 13.8 °C	PRV Station / 13.8 °C	Okanagan Lake / 13.8 °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	0.009	0.009	0.002
Cadmium	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Chromium	Total	mg/L	0.00020	<0.00005	<0.00005	0.00005
Cobalt	Total	mg/L	0.00004	<0.00002	<0.00002	0.00002
Copper	Total	mg/L	<0.0002	0.0002	0.0054	0.0002
Iron	Total	mg/L	0.15	0.003	0.005	0.002
Lead	Total	mg/L	<0.00001	<0.00001	0.00008	0.00001
Lithium	Total	mg/L	0.0007	0.0030	0.0031	0.0005
Manganese	Total	mg/L	0.005	<0.001	<0.001	0.001
Molybdenum	Total	mg/L	0.00051	0.0033	0.0032	0.00002
Nickel	Total	mg/L	0.0005	0.0004	0.0005	0.0002
Selenium	Total	mg/L	<0.0002	0.0004	0.0004	0.0002
Silver	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Strontium	Total	mg/L	0.052	0.27	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	0.00006	<0.00005	<0.00005	0.00005
Tin	Total	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Uranium	Total	mg/L	0.00062	0.0017	0.0022	0.00001
Vanadium	Total	mg/L	0.00092	<0.00005	<0.00005	0.00005
Zinc	Total	mg/L	<0.0005	0.0017	0.010	0.0005
Zirconium	Total	mg/L	0.0008	0.0002	0.0002	0.0001

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.: S19-0005 Proj. Acct. code:	Lot ID: 1364671 Control Number: B06879 Date Received: Jul 18, 2019 Date Reported: Jul 26, 2019 Report Number: 2424998
Attn: Accounts Payable Sampled By: DM/AE Company: City of Penticton		

		Reference Number	1364671-3	1364671-6	1364671-7
		Sample Date	Jul 17, 2019	Jul 17, 2019	Jul 17, 2019
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	PRV Station / 13.8 °C	Randolph Rd. Station / 13.8 °C	Smythe Dr. Sample Stn. / 13.8 °C
		Matrix	Water	Water	Water
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Trihalomethanes Screen - Water					
Chloroform	mg/L	0.037	0.052	0.054	0.001
Bromodichloromethane	mg/L	0.003	0.005	0.005	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	0.040	0.057	0.059	0.001
Trihalomethanes - Surrogate Recovery					
Dibromofluoromethane	EPA Surrogate %	125	128	128	50-140
Toluene-d8	EPA Surrogate %	107	107	106	50-140
Bromofluorobenzene	EPA Surrogate %	97	97	94	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.: S19-0005 Proj. Acct. code:	Lot ID: 1364671 Control Number: B06879 Date Received: Jul 18, 2019 Date Reported: Jul 26, 2019 Report Number: 2424998
Attn: Accounts Payable Sampled By: DM/AE Company: City of Penticton		

Reference Number 1364671-5
Sample Date Jul 17, 2019
Sample Time NA
Sample Location
Sample Description Post Filter #6 / 13.8
°C

Matrix Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Inorganic Nonmetallic Parameters					
Organic Carbon	Total Nonpurgeable	mg/L	3.5		0.5

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.: S19-0005 Proj. Acct. code:	Lot ID: 1364671 Control Number: B06879 Date Received: Jul 18, 2019 Date Reported: Jul 26, 2019 Report Number: 2424998
Attn: Accounts Payable Sampled By: DM/AE Company: City of Penticton		

Reference Number 1364671-8
Sample Date Jul 17, 2019
Sample Time NA
Sample Location
Sample Description Backwash Pond /
13.8 °C
Matrix Water

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Trace Metals Dissolved						
Digestion	Dissolved		Lab filtered & preserved			
Aluminum	Dissolved	mg/L	0.114			0.001

Approved by:



Mathieu Simoneau
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: P.O.: S19-0005 Proj. Acct. code:	Lot ID: 1364671 Control Number: B06879 Date Received: Jul 18, 2019 Date Reported: Jul 26, 2019 Report Number: 2424998
Attn: Accounts Payable Sampled By: DM/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	Jul 22, 2019	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* Conductivity, 2510 B	Jul 22, 2019	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* pH - Electrometric Method, 4500-H+ B	Jul 22, 2019	Element Vancouver
Ammonia-N in Water (VAN)	APHA	* Flow Injection Analysis, 4500-NH3 H	Jul 19, 2019	Element Vancouver
Anions by IEC in water (VAN)	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Jul 19, 2019	Element Vancouver
Carbon Organic (Total) in water (TOC)	APHA	High-Temperature Combustion Method, 5310 B	Jul 22, 2019	Element Edmonton - Roper Road
Cyanide (Dissolved) in water	Alta. Env. Method	* Cyanide, Simple Extractable (Automated Pyridine-Barbituric Acid Colorimetric Method), 06608L	Jul 26, 2019	Element Edmonton - Roper Road
Metals SemiTrace (Total) in Water (VAN)	US EPA	* Metals & Trace Elements by ICP-AES, 6010C	Jul 19, 2019	Element Vancouver
Nitrite + Nitrate-N in Water - Smartchem (VAN)	APHA	* Automated Cadmium Reduction Method, 4500-NO3- F	Jul 19, 2019	Element Vancouver
Phosphorus - orthophosphate by Smartchem (VAN)	APHA	Ascorbic Acid Reduction Method, 4500-P E	Jul 19, 2019	Element Vancouver
Phosphorus - total by Smartchem (VAN)	APHA	* Persulfate digestion method, 4500-P B5	Jul 22, 2019	Element Vancouver
Solids Dissolved (Total, Fixed and Volatile) - VAN	APHA	* Total Dissolved Solids Dried at 180 C, 2540 C	Jul 24, 2019	Element Vancouver
Solids Suspended (Total, Fixed and Volatile) - VAN	APHA	* Total Suspended Solids Dried at 103-105°C, 2540 D	Jul 22, 2019	Element Vancouver
THM - Water	US EPA	* Volatile Organic Compounds by GCMS / Purge and Trap for Aqueous Samples, 8260B/5030B	Jul 19, 2019	Element Calgary
Trace Metals (dissolved) in Water (VAN)	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Jul 23, 2019	Element Vancouver
Trace Metals (Total) in Water (VAN)	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Jul 19, 2019	Element Vancouver
True Color in water (VAN)	APHA	* Spectrophotometric - Single Wavelength Method, 2120 C	Jul 19, 2019	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:	1364671
	616 Okanagan Avenue East	Project Name:	City of Penticton	Control Number:	B06879
	Penticton, BC, Canada	Project Location:		Date Received:	Jul 18, 2019
	V2A 3K6	LSD:		Date Reported:	Jul 26, 2019
Attn:	Accounts Payable	P.O.:	S19-0005	Report Number:	2424998
Sampled By:	DM/AE	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.

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

Exova

www.exova.com

Testing
Advising
Assuring

Project Information

Project ID: **PE 13491 + QUANTITY**
Project Name: **CITY OF PENTICTON**
Project Location:
Legal Location:
PO/AFE#: **SM-0005**
Proj. Acct. Code:

Billing Information

Company: **City of Penticton**
Address: **Water Treatment Plant 1900 Penticton, BC V2A 2N5**
Attention: **Brent Edge MIKE FILOTTE**
Phone: **(250) 490-2560**
Cell:
Fax: **(250) 490-2561**
E-mail: **wtp@penticton.ca**
Agreement ID: **8325**
Copy of report: ☒

Copy of Report To:

Company: **City of Penticton**
Address: **Water Treatment Plant 1900 Penticton, BC V2A 2N5**
Attention: **Brent Edge MIKE FILOTTE**
Phone: **(250) 490-2560**
Cell:
Fax: **(250) 490-2561**
E-mail: **wtp@penticton.ca**
Copy of invoice: ☒

RUSH Priority

Upon filling out this section, client accepts that surcharges will be applied to the analysis

Date Required
As Indicated ☐ All Analysis ☐
When "ASAP" is requested, turn around will default to a 100% RUSH priority, with pricing and turn around time to match. Please contact the lab prior to submitting RUSH samples.

Signature
Sample Custody (please print)

Report Results ☐ E-mail ☐ Online ☐
Mail ☐ Fax ☐ PDF ☐
Excel ☐

Special Instructions/Comments (please include contact information including ph. # if different from above).

QA/QC Report

Include Regulatory Requirements Below:

Number of Containers
↓
Diss Al-
TSS, TDS, Ph, EC, Conduct
Hard, Alk
CO₂, HCO₃, OH, Cl-
NO₂, NO₃, NH₄, PO₄-P
SO₄, Cu, Pb, Tl
THM's
TOC
TOTAL METALS

Sampled by: **DM A.E**
Company: **CITY OF PENTICTON**
I authorize Exova to proceed with the work indicated on this form:
Date: **JULY 17/2019** Initial: **D. Martin**
This section for Lab use only

Date/Time stamp:
JUL 18 '19 12:13

Sample Identification	Location	Depth IN CM M	Date/Time sampled	Matrix	Sampling Method	Enter tests above (√ relevant samples below)	Indicate below any deficiencies in the condition of samples:
1 PENTICTON CREEK UPSTREAM			JULY 17, 2019	W	GRAB	7 ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	Were Exova supplies used?
2 PENTICTON CREEK DOWNSTREAM			"	"	"	1 ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	Were there any damage to the shipping container?
3 PAV STATION			"	"	"	10 ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	Were the containers packaged well?
4 OKANAGAN LAKE	LAB TAP		"	"	"	6 ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	Were any extra samples received (document below)?
5 POST FILTER # 6			"	"	"	1 ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	Are samples within recommended holding times/temp?
6 RANDOLPH RD STATION			"	"	"	3 ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	
7 SMYTHE DR. STATION			"	"	"	3 ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	
8 BACKWASH POND			"	"	COMP	1 ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	
9							
10							
11							
12							
13							
14							
15							

Environmental Sample Information Sheet

Note: Proper completion of this form is required in order to proceed with analysis

Please indicate any potentially hazardous samples

Page of Control # **B06879**

Lot: 1364671 COC



Shipping: COD Y/N
Cooler temp: **13.8°C**
and size of coolers received:
Delivery Method:
Waybill:
Received by:



Water Treatment Plant
1900 Penticton Avenue
Penticton, B.C., V2A 3K6

Exova
#104, 19575 – 55A Avenue
Surrey, B.C., V3S 8P8

Nov 18, 2019

Exova Testing:

For the Environmental Sample Information Sheet B06894, please find the following 38 sample bottles. The P.O. number for these tests is S19-0005. Please send the invoice to City of Penticton, 616 Okanagan Avenue East, V2A 3K6, and Attn: Mike Firlotte.

1. Three sets of: two 1-L plastic sample bottles from the following sites; PRV Station, Okanagan Lake from lab tap, and Penticton Creek upstream. Please perform the following analyses on the enclosed 1-L samples.

Total Suspended Solids	Alkalinity	Nitrite	Fluoride
Total Dissolved Solids	Carbonate	Nitrate	
pH	Bicarbonate	Conductivity	
Hydroxide	Ortho-Phosphate	Colour	
Chloride	Sulfate	Hardnes	

2. Three 250 ml poly bottles with H_2SO_4 vial for Total Phosphorus & Ammonia from the following three sites; PRV Station, Okanagan Lake from lab tap, and Penticton Creek Upstream.
3. Three THM (Trihalomethanes) sets of three from the following locations; Randolph Road Station, PRV Station, and Symthe Drive. Please report the concentrations of Cl_3CH , Cl_2BrCH , $ClBr_2CH$ and Br_3CH separately.
4. Four 250 mL samples for TOC analyses from the following locations: PRV Station, Okanagan Lake from lab tap, Penticton Creek Upstream, and post filtration 100% Lake(filter #1). The samples were preserved with concentrated HCl vials.
5. Three 125 mL poly bottle samples for free cyanide analyses (CN^-) from the following locations: Okanagan Lake from lab tap, Penticton Creek Upstream, and PRV Station. Samples preserved with 6N NaOH vials.
6. Four 250 ml poly bottle samples for dissolved aluminum from the following locations: PRV Station, Penticton Creek Upstream, Penticton Creek Downstream, and Backwash Pond. These samples were 0.45 μm filtered and preserved with HNO_3 vials.
7. Three 125ml glass bottles(HCl preserved for Total Mercury analysis from PRV Station, Okanagan Lake lab tap, and Penticton Creek Upstream.
8. Three 125ml samples(HNO_3 preserved) for Trace Metals analysis from PRV Station, Okanagan Lake lab tap, and Penticton Creek Upstream..
9. Three sets of two samples for HAA's from Smythe Road Sample Station, PRV, and Randolph Rd Station.

If you require any additional information please contact the undersigned at (250 490 2560)

Sincerely
Don Mortimer/ Rob Phillips

Project Information
 Project ID: PE 13491 + QUARTARY
 Project Name: CITY OF PENTICTON
 Project Location: _____
 Legal Location: _____
 PO/AFE#: SM-0005
 Proj. Acct. Code: _____

Billing Information		Copy of Report To:	
Company:	City of Penticton	Company:	City of Penticton
Address:	Water Treatment Plant 1900 Penticton, BC V2A 2N5	Address:	Water Treatment Plant 1900 Penticton, BC V2A 2N5
Attention:	Brent Edge MIKE FILLOTTE	Attention:	Brent Edge
Phone:	(250) 490-2560	Phone:	(250) 490-2560
Cell:		Cell:	
Fax:	(250) 490-2561	Fax:	(250) 490-2561
E-mail:	wtp@penticton.ca	E-mail:	wtp@penticton.ca
Agreement ID:	8325		
Copy of report:	X	Copy of invoice:	X

RUSH Priority
 Upon filling out this section, client accepts that surcharges will be applied to the analysis.
 Date Required: _____
 As Indicated: ☒ All Analysis
 When "ASAP" is requested, turn around will default to a 100% RUSH priority, with pricing and turn around time to match. Please contact the lab prior to submitting RUSH samples.
 Signature: _____

Report Results	E-mail	Online	PDF	QA/QC Report
Mail	Fax	Excel		
Special Instructions/Comments (please include contact information including ph. # if different from above).				Include Regulatory Requirements Below:

Sample Custody (please print)
 Sampled by: DM/RP
 Company: CITY OF PENTICTON
 I authorize Exova to proceed with the work indicated on this form:
 Date: Nov 18/11 Initial: D.M.
This section for Lab use only
 Date/Time stamp: NOV 18 2011 16:40

Sample Identification	Location	Depth IN CM M	Date/Time sampled	Matrix	Sampling Method	Number of Containers	Enter tests above (✓ relevant samples below)	Indicate below any deficiencies in the condition of samples:
1 <u>SMITH DRIVE</u>						5		Were Exova supplies used?
2 <u>PRV STATION</u>						12	✓	Was there any damage to the shipping container?
3 <u>FILTER # 2 POST FILTRATION</u>						1	✓	Were the containers packaged well?
4 <u>O.K. LAKE SAMPLE TAP</u>						6	✓	Were any extra samples received (document below)?
5 <u>BACKWASH POND</u>						1	✓	Are samples within recommended holding times/temp?
6 <u>PENTICTON CREEK UPSTREAM</u>						7	✓	
7 <u>PENTICTON CREEK DOWNSTREAM</u>						1	✓	
8 <u>RANDOLPH RD. STATION</u>						5	✓	
9								
10								
11								
12								
13								
14								
15								

Environmental Sample Information Sheet		Lot: 1392498 COC	Shipping:	# and size of coolers received:
Note: Proper completion of this form is required in order to proceed with analysis			COD Y/N	
Please indicate any potentially hazardous samples			Cooler temp:	Delivery Method:
Page	Control # B06894		6.8°C	Waybill:
			Received by:	

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.: S19-0005 Proj. Acct. code:	Lot ID: 1392498 Control Number: B06878 Date Received: Nov 19, 2019 Date Reported: Nov 29, 2019 Report Number: 2467432
Attn: Accounts Payable Sampled By: DM/RP 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
Email - Single Report	PDF	COR

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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.: S19-0005 Proj. Acct. code:	Lot ID: 1392498 Control Number: B06878 Date Received: Nov 19, 2019 Date Reported: Nov 29, 2019 Report Number: 2467432
Attn: Accounts Payable Sampled By: DM/RP Company: City of Penticton		

		Reference Number	1392498-1	1392498-2	1392498-8
		Sample Date	Nov 18, 2019	Nov 18, 2019	Nov 18, 2019
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Smythe Drive / 6.8°C	PRV Station / 6.8°C	Randolph Rd. Station / 6.8°C
		Matrix	Water	Water	Water
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Trihalomethanes Screen - Water					
Chloroform	mg/L	0.055	0.033	0.049	0.001
Bromodichloromethane	mg/L	0.006	0.004	0.006	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	0.061	0.037	0.055	0.001
Trihalomethanes - Surrogate Recovery					
Dibromofluoromethane	EPA Surrogate %	106	105	106	50-140
Toluene-d8	EPA Surrogate %	99	101	97	50-140
Bromofluorobenzene	EPA Surrogate %	100	98	98	50-140
Haloacetic Acids - Water					
Monochloroacetic Acid	µg/L	<2.0	<2.0	<2.0	2.0
Monobromoacetic Acid	µg/L	<2.0	<2.0	<2.0	2.0
Dichloroacetic Acid	µg/L	16.7	15.1	22.3	2.0
Bromochloroacetic Acid	µg/L	3.0	2.8	3.4	2.0
Dibromoacetic Acid	µg/L	<2.0	<2.0	<2.0	2.0
Trichloroacetic Acid	µg/L	27.2	19.6	29.4	2.0
Total Haloacetic Acids (HAA6)	µg/L	46.9	37.5	55.1	2.0

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.: S19-0005 Proj. Acct. code:	Lot ID: 1392498 Control Number: B06878 Date Received: Nov 19, 2019 Date Reported: Nov 29, 2019 Report Number: 2467432
Attn: Accounts Payable Sampled By: DM/RP Company: City of Penticton		

		Reference Number	1392498-2	1392498-3	1392498-4	
		Sample Date	Nov 18, 2019	Nov 18, 2019	Nov 18, 2019	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	PRV Station / 6.8°C	Filter #2 Post Filtration / 6.8°C	Okanagan Lake Sample Tap / 6.8°C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Inorganic Nonmetallic Parameters						
Organic Carbon	Total Nonpurgeable	mg/L	4.1	3.1	3.8	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	<0.003		0.007	0.003

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.: S19-0005 Proj. Acct. code:	Lot ID: 1392498 Control Number: B06878 Date Received: Nov 19, 2019 Date Reported: Nov 29, 2019 Report Number: 2467432
Attn: Accounts Payable		
Sampled By: DM/RP		
Company: City of Penticton		

		Reference Number	1392498-2	1392498-4	1392498-6	
		Sample Date	Nov 18, 2019	Nov 18, 2019	Nov 18, 2019	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	PRV Station / 6.8°C	Okanagan Lake Sample Tap / 6.8°C	Penticton Creek Upstream / 6.8°C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Total						
Calcium	Total	mg/L	33	33	3.7	0.01
Magnesium	Total	mg/L	8.5	8.4	0.87	0.02
Potassium	Total	mg/L	2.3	2.3	0.45	0.04
Silicon	Total	mg/L	3.2	3.3	5.4	0.005
Sulfur	Total	mg/L	10	10	0.54	0.02
Sodium	Total	mg/L	10	11	1.9	0.1
Titanium	Total	mg/L	0.003	0.005	0.002	0.002
Digestion	Preparation		Unpres, digest as Total Hg	Unpres, digest as Total Hg	Unpres, digest as Total Hg	
Mercury	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00005
Physical and Aggregate Properties						
Colour	True	Colour units	<5	<5	31	5
Solids	Total Suspended	mg/L	<2	<2	2	2
Solids	Total Dissolved	mg/L	150	190	38	5
Routine Water						
pH - Holding Time			Exceeded	Exceeded	Exceeded	
pH	at 25 °C		7.84	8.03	7.30	0.01
Electrical Conductivity		µS/cm at 25 °C	303	298	37	1
Bicarbonate		mg/L	131	139	17	5
Carbonate		mg/L	<6	<6	<6	6
Hydroxide		mg/L	<5	<5	<5	5
P-Alkalinity	as CaCO ₃	mg/L	<5	<5	<5	5
T-Alkalinity	as CaCO ₃	mg/L	108	114	14	5
Chloride	Dissolved	mg/L	9.88	5.08	0.36	0.05
Fluoride	Dissolved	mg/L	0.12	0.14	0.05	0.01
Nitrate - N	Dissolved	mg/L	0.12	0.12	<0.01	0.01
Nitrite - N	Dissolved	mg/L	<0.01	<0.01	<0.01	0.01
Sulfate (SO ₄)	Dissolved	mg/L	28.5	28.6	1.2	0.1
Hardness	Total	mg CaCO ₃ /L	117	116	12.7	1
Trace Metals Total						
Aluminum	Total	mg/L	0.059	0.004	0.11	0.001
Antimony	Total	mg/L	0.00005	0.00004	<0.00002	0.00002
Arsenic	Total	mg/L	0.0003	0.0005	<0.0001	0.0001
Barium	Total	mg/L	0.020	0.020	0.0054	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	0.010	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	Project ID: PE 13491 + Quarterly Project Name: City of Penticton Project Location: LSD: P.O.: S19-0005 Proj. Acct. code:	Lot ID: 1392498 Control Number: B06878 Date Received: Nov 19, 2019 Date Reported: Nov 29, 2019 Report Number: 2467432
Attn: Accounts Payable Sampled By: DM/RP Company: City of Penticton		

		Reference Number	1392498-2	1392498-4	1392498-6	
		Sample Date	Nov 18, 2019	Nov 18, 2019	Nov 18, 2019	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	PRV Station / 6.8°C	Okanagan Lake Sample Tap / 6.8°C	Penticton Creek Upstream / 6.8°C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Trace Metals Total - Continued						
Chromium	Total	mg/L	<0.00005	<0.00005	0.00019	0.00005
Cobalt	Total	mg/L	0.00003	<0.00002	0.00004	0.00002
Copper	Total	mg/L	0.0008	0.0036	0.0003	0.0002
Iron	Total	mg/L	0.007	0.005	0.19	0.002
Lead	Total	mg/L	0.00003	0.00013	<0.00001	0.00001
Lithium	Total	mg/L	0.0029	0.0030	0.0005	0.0005
Manganese	Total	mg/L	<0.001	<0.001	0.004	0.001
Molybdenum	Total	mg/L	0.0033	0.0033	0.00045	0.00002
Nickel	Total	mg/L	0.0004	0.0005	0.0003	0.0002
Selenium	Total	mg/L	0.0004	0.0004	<0.0002	0.0002
Silver	Total	mg/L	<0.00001	<0.00001	<0.00001	0.00001
Strontium	Total	mg/L	0.25	0.26	0.041	0.0001
Tellurium	Total	mg/L	<0.00005	<0.00005	<0.00005	0.00005
Thallium	Total	mg/L	0.00002	<0.00001	<0.00001	0.00001
Thorium	Total	mg/L	<0.00005	<0.00005	0.00007	0.00005
Tin	Total	mg/L	<0.0001	<0.0001	<0.0001	0.0001
Uranium	Total	mg/L	0.0016	0.0024	0.00048	0.00001
Vanadium	Total	mg/L	0.00014	0.00024	0.00054	0.00005
Zinc	Total	mg/L	0.012	0.0071	0.0029	0.0005
Zirconium	Total	mg/L	<0.0001	<0.0001	0.0006	0.0001

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.: S19-0005 Proj. Acct. code:	Lot ID: 1392498 Control Number: B06878 Date Received: Nov 19, 2019 Date Reported: Nov 29, 2019 Report Number: 2467432
Attn: Accounts Payable Sampled By: DM/RP Company: City of Penticton		

		Reference Number	1392498-2	1392498-5	1392498-6
		Sample Date	Nov 18, 2019	Nov 18, 2019	Nov 18, 2019
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	PRV Station / 6.8°C	Backwash Pond / 6.8°C	Penticton Creek Upstream / 6.8°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 0.056	0.031	0.126	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.: S19-0005 Proj. Acct. code:	Lot ID: 1392498 Control Number: B06878 Date Received: Nov 19, 2019 Date Reported: Nov 29, 2019 Report Number: 2467432
Attn: Accounts Payable Sampled By: DM/RP Company: City of Penticton		

Reference Number 1392498-6
Sample Date Nov 18, 2019
Sample Time NA
Sample Location
Sample Description Penticton Creek
Upstream / 6.8°C

		Matrix	Water			
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Inorganic Nonmetallic Parameters						
Organic Carbon	Total Nonpurgeable	mg/L	6.1			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	0.006			0.003

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.: S19-0005 Proj. Acct. code:	Lot ID: 1392498 Control Number: B06878 Date Received: Nov 19, 2019 Date Reported: Nov 29, 2019 Report Number: 2467432
Attn: Accounts Payable Sampled By: DM/RP Company: City of Penticton		

Reference Number 1392498-7
Sample Date Nov 18, 2019
Sample Time NA
Sample Location
Sample Description Penticton Creek
Downstream / 6.8°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	0.092		0.001

Approved by:



Matthew Norman, BSc, PChem
Operations Chemist

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: P.O.: S19-0005 Proj. Acct. code:	Lot ID: 1392498 Control Number: B06878 Date Received: Nov 19, 2019 Date Reported: Nov 29, 2019 Report Number: 2467432
Attn: Accounts Payable Sampled By: DM/RP 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	Nov 20, 2019	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* Conductivity, 2510 B	Nov 20, 2019	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* pH - Electrometric Method, 4500-H+ B	Nov 20, 2019	Element Vancouver
Ammonia-N in Water (VAN)	APHA	* Flow Injection Analysis, 4500-NH3 H	Nov 25, 2019	Element Vancouver
Anions by IEC in water (VAN)	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Nov 21, 2019	Element Vancouver
Carbon Organic (Total) in water (TOC)	APHA	High-Temperature Combustion Method, 5310 B	Nov 22, 2019	Element Edmonton - Roper Road
Cyanide (Dissolved) in water	Alta. Env. Method	* Cyanide, Simple Extractable (Automated Pyridine-Barbituric Acid Colorimetric Method), 06608L	Nov 27, 2019	Element Edmonton - Roper Road
Haloacetic Acids - Water	US EPA	* US EPA method, 552.3	Nov 26, 2019	Eurofins Environment Testing Canada - Ot
Mercury Low Level (Total) in water (VAN)	EPA	* Mercury in Water by Cold Vapor Atomic Fluorescence Spectrometry, 245.7	Nov 20, 2019	Element Vancouver
Metals SemiTrace (Total) in Water (VAN)	US EPA	* Metals & Trace Elements by ICP-AES, 6010C	Nov 21, 2019	Element Vancouver
Phosphorus - orthophosphate by Smartchem (VAN)	APHA	Ascorbic Acid Reduction Method, 4500-P E	Nov 20, 2019	Element Vancouver
Phosphorus - orthophosphate by Smartchem (VAN)	APHA	Ascorbic Acid Reduction Method, 4500-P E	Nov 29, 2019	Element Vancouver
Phosphorus - total by Smartchem (VAN)	APHA	* Persulfate digestion method, 4500-P B5	Nov 25, 2019	Element Vancouver
Phosphorus - total by Smartchem (VAN)	APHA	* Persulfate digestion method, 4500-P B5	Nov 28, 2019	Element Vancouver
Solids Dissolved (Total, Fixed and Volatile) - VAN	APHA	* Total Dissolved Solids Dried at 180 C, 2540 C	Nov 25, 2019	Element Vancouver
Solids Suspended (Total, Fixed and Volatile) - VAN	APHA	* Total Suspended Solids Dried at 103-105°C, 2540 D	Nov 25, 2019	Element Vancouver
THM - Water	US EPA	* Volatile Organic Compounds by GCMS / Purge and Trap for Aqueous Samples, 8260B/5030B	Nov 21, 2019	Element Calgary
Trace Metals (dissolved) in Water (VAN)	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Nov 21, 2019	Element Vancouver
Trace Metals (Total) in Water (VAN)	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Nov 21, 2019	Element Vancouver
True Color in water (VAN)	APHA	* Spectrophotometric - Single Wavelength Method, 2120 C	Nov 21, 2019	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	Project ID: PE 13491 + Quarterly	Lot ID: 1392498
616 Okanagan Avenue East	Project Name: City of Penticton	Control Number: B06878
Penticton, BC, Canada	Project Location:	Date Received: Nov 19, 2019
V2A 3K6	LSD:	Date Reported: Nov 29, 2019
Attn: Accounts Payable	P.O.: S19-0005	Report Number: 2467432
Sampled By: DM/RP	Proj. Acct. code:	
Company: City of Penticton		

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