



District of Peachland Annual Drinking Water Report – 2017



INTRODUCTION

The District of Peachland is legally required by the *Drinking Water Protection Act* to provide an annual report on their water supply systems. The annual report will provide water system users with an overview of the system, a summary of all water tests performed and an update to any maintenance and/or improvements made to the system.

Facility Name/Number: District of Peachland Water Distribution System (#561)

Facility Name/Number: Peachland Creek Water Treatment Facility (#2288)

Facility Name/Number: Trepanier Creek Water Treatment Facility (#2289)

Facility Name/Number: Okanagan Lake Pumps Water Treatment Facility (#2290)

WATER SOURCES

Water for the District of Peachland is supplied from three surface water sources;

- Peachland Creek
- Trepanier Creek
- Okanagan Lake

It should be noted that in the past, Peachland Creek sometimes been referred to as “Deep Creek”. As such, any information within this report that notes Deep Creek is ultimately referring to Peachland Creek.

The Peachland Creek system supplies water to all properties accessed from Princeton Avenue as well as those that lie further south. It also supplies the properties accessed from Ponderosa Drive and the downtown area as far north as 11th Street (approximately). The Trepanier system supplies water to the remainder of the properties in the District (from 11th Street north). When the Okanagan Lake pumps are operated in place of the Trepanier Creek Intake, the supply area is identical to the Trepanier system.

The majority of water is supplied from the Peachland Creek (PCI) system (approximately 2/3) with the remainder supplied by the Trepanier Creek (TCI) system (approximately 1/3) and the Okanagan Lake Pumps. The Okanagan Lake Pumps (LPH) are typically operated during spring freshet/runoff to supply less turbid water to the Trepanier system. In 2017, the Okanagan Lake Pumps were active from May 5 – June 14 (spring freshet) and Oct 27 – Nov 23 (sediment removal project at Trepanier Creek Intake).

DISTRIBUTION SYSTEM

The District of Peachland currently uses chlorine gas as its primary disinfectant. The disinfectant is injected using flow paced technology and is dosed to provide inactivation of bacteria, viruses and giardia cysts which may be present within the surface water source.

District staff maintains a first user residual ranging from 0.9 – 1.2 mg/L (depending on the time of year and clarity of the raw water). At the ends of the system, a chlorine residual goal is set for approximately 0.2 mg/L. A residual of chlorine remaining in the distribution system extends a measure of protection against any possible contamination entering the system after disinfection.

The distribution system and supply includes:

- 16 pressure reducing stations,
- 1 very high consequence dam (Peachland Lake)
- 1 high consequence dam (Silver Lake)
- 1 significant consequence dam (Glen Lake)
- 4 active reservoirs
- 6 active pump stations
- Approximately 81 km of pipeline

The Water Department is staffed by operators certified through the Environmental Operators Certification Program (EOCP – the association responsible for certification of system operators and classification of water distribution and treatment systems within British Columbia), with their certifications noted below;

- Leadhand: Water Distribution Level IV / Water Treatment Level II
- Water Mechanic: Water Distribution Level II / Water Treatment Level I
- Water Mechanic: Water Distribution Level I

These operators have the capability to monitor the system at all times (24 hours per day, 365 days per year) through the use of the SCADA system (supervisory control and data acquisition). The system is set to alarm if it drifts beyond pre-determined set points, calling the standby operator to alert them.

ROUTINE MAINTENANCE

Fire Hydrants

All municipally owned fire hydrants are inspected, pressure tested and flushed annually. Hydrants undergo a complete tear down and rebuild on an as-needed basis.

Main Valve Exercising

Main valves are exercised at least biennially or on an as-needed basis.

System Flushing

System flushing occurs annually during the fall. Hydrants and blowoffs are used to pass higher velocity water through the system in order to scour any sediment that may have settled in the system over the year.

Pressure Reducing Valves (PRVs)

PRV's are inspected monthly and rebuilt or repaired on an as-needed basis.

WATER MASTER PLAN

In 2007, the then mayor and council adopted the Water Master Plan (WMP), a set of comprehensive upgrades that was anticipated to provide treated water to Peachland in its entirety by the years 2023/24. The WMP was updated in 2015.

If more in-depth information is desired, it is available at the District's website (<http://www.peachland.ca/water-master-plan-2015>)

In early 2016, the District applied for a government grant in the amount of \$6.96 million dollars to go towards construction of a water treatment plant facility, a total project cost of \$18.8M. On March 13, 2017 it was announced that the District was successful in obtaining this funding. The Government of Canada and the Province of British Columbia will each contribute \$3.48M. The District will contribute \$7.6M from reserves and it is anticipated that \$4.3M will be obtained through long term borrowing.

In discussion with engineering consultants and IHA, it was decided to add a second, related project to the scope of construction; the construction of a large diameter water main to interconnect the Peachland Creek and Trepanier Creek systems. Once the water treatment plant and this new distribution main are in place, the entire distribution system will be serviced from the Peachland Creek source. This will allow treated water to be delivered to all homes in the District connected to the distribution system. It is anticipated that both the Water Treatment Plant and Interconnect will be operational by 2020. Costs for the interconnect are estimated at \$4.9M. The District has applied for senior government funding to assist with these costs but if unsuccessful, will need to borrow the funds to proceed with the project.

Long term borrowing for these two projects requires elector assent (\$4.3M for WTP and \$4.9M for water system interconnect). In this case, the District initiated the alternative approval process (AAP) in late 2017. If approved by the electorate, council will endorse the borrowing of the funds in early 2018.

The installation of this water treatment plant will allow the District to meet the minimum requirements of the Drinking Water Treatment Objectives for Surface Water Supplies in British Columbia. If the minimum requirements are not met, water users can potentially be at increased risk of illness from protozoan pathogens.

WATER SAMPLING

Drinking water samples are tested weekly for *E.Coli* and total coliform counts by Caro Analytical Services in Kelowna. There were no positive bacteriological samples detected in 2017.

District employees monitor and record daily turbidity values along with pH and chlorine levels. Turbidity is one of the main parameters leading to a water quality advisory or a boil water notice. As the turbidity increases over 1 NTU, a water quality advisory is instituted. Similarly, as it increases over 5 NTU, a boil water notice is instituted. For ease of understanding and communication, if one of the sources increases over the noted thresholds, the entire system is

placed on an advisory/order. Turbidity can affect the number and type of microorganisms that enter a surface water source. As surface waters experience increased flows (ie. spring runoff, major rainfall events, etc), turbidity can fluctuate dramatically and the public is notified accordingly. Records of average daily turbidity values can be found in Appendix V.

Chlorine concentrations are monitored continuously at 4-5 stations throughout the system (depending on the time of year) as well as daily grab samples at a number of locations to ensure instrument accuracy, allowing CT values to be monitored.

Raw source water samples are also collected annually in order to perform a comprehensive analysis, giving an indication of any changes occurring within the water supplies. It should be noted that all raw sources tested are within the maximum allowable concentration (MAC) limits set out in the Guidelines for Canadian Drinking Water Quality. Lastly, trihalomethanes (THM's) are also tested annually to provide an indication of the level of disinfection byproducts present in the water supply system. The results from the comprehensive and THM analyses are included in Appendices I and II, respectively. The result sheets also indicate the limit or guideline for each parameter listed.

WATER QUALITY ADVISORIES / BOIL WATER NOTICES / DO NOT USE NOTICE

Water quality advisories and boil water notices are notifications designed to inform the public of possible public health threats. The decision to institute an advisory or notice is made in discussion with staff at the Interior Health Authority (IHA).

A water quality advisory (WQA) is the lowest-level notification and used in situations where the possible public health threat is modest. These advisories are instituted when the turbidity in the water source increases over a value of 1 NTU (nephelometric turbidity units). Details of WQA's issued are noted below.

A boil water notice (BWN) is a moderate-level notification used in situations where the possible public health threat is one that can be effectively addressed by boiling the water. These notices are typically instituted when the water source turbidity increases over 5 NTU or there is a failure in the disinfection system. Details of BWN's issued are noted below.

A do not use notice is the highest level of notification. It is used in situations where a significant public health threat exists (ie. Chemical spill, etc). There were no do not use notices issued in 2017.

- Mar 28/2017 - a BWN was initiated due to turbidity values increasing above 5 NTU in the Deep Creek source (due to a landslide approximately 1 km upstream of the intake).
- June 26/2017 - with turbidity decreasing below 1 NTU, the BWN was rescinded
- Oct 27/2017 - a WQA was initiated due to the potential of turbidity values increasing over 1 NTU (due to sediment removal project at both intakes)
- Nov 27/2017 - with turbidity decreasing below 1 NTU and the sediment removal project complete, the WQA was rescinded

WATER CONSUMPTION

In 2017, there was a total of 2,448.95 ML passing through the District Intakes. A monthly summary of consumption per intake and a graphical percentage comparison is located in Appendix III.

WORKS COMPLETED AND IN PROGRESS

- The Greata PRV replacement was completed. The new equipment replaces infrastructure that was nearing the end of its life cycle and also allowed for the installation of telemetry. With new flowmeters and pressure sensors, this allows a better understanding of the system in the area and will be valuable in the future in detecting leaks and pressure surges.
- Approximately 200m of water main on Minto Street was upgraded to allow for increased flow to the downtown area.
- McMillen Jacobs Associates, in conjunction with Urban Systems Ltd, started work on the provincially legislated dam safety review at Peachland Lake Dam. It is scheduled to be completed in early-mid 2018.
- Urban Systems Ltd. started work on an update to the Silver Lake Dam Safety Review.
- Pre-design and related investigations (geotechnical, studying other treatment plants, etc) began for the new Peachland Creek Water Treatment Plant.
- During the 2017 freshet, a significant volume of sediment was deposited at both the Peachland and Trepanier Intakes. This sediment was removed in late 2017 to ensure that water flow and capacity was maintained for the future.

Appendix I – Comprehensive Analyses (Deep Creek Intake, Trepanier Creek Intake)



CERTIFICATE OF ANALYSIS

REPORTED TO	Peachland, Corporation of the District of 5806 Beach Avenue PEACHLAND, BC V0H 1X7	WORK ORDER	7111777
ATTENTION	Shawn Grundy	RECEIVED / TEMP	2017-11-21 13:00 / 9°C
PO NUMBER		REPORTED	2017-11-28 17:08
PROJECT	General Potability	COC NUMBER	B58394
PROJECT INFO			

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO 17025:2005 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks



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

We've Got Chemistry



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

Ahead of the Curve



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

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

Authorized By:

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Account Manager

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TEST RESULTS

REPORTED TO PROJECT Peachland, Corporation of the District of
General Potability

WORK ORDER REPORTED 7111777
2017-11-28 17:08

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Deep Creek Intake (7111777-01) Matrix: Water Sampled: 2017-11-21 07:30						
Anions						
Chloride	3.64	AO ≤ 250	0.10	mg/L	2017-11-24	
Fluoride	0.15	MAC = 1.5	0.10	mg/L	2017-11-24	
Nitrate (as N)	0.010	MAC = 10	0.010	mg/L	2017-11-24	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2017-11-24	
Sulfate	16.5	AO ≤ 500	1.0	mg/L	2017-11-24	
General Parameters						
Alkalinity, Total (as CaCO3)	122	N/A	1.0	mg/L	2017-11-24	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2017-11-24	
Alkalinity, Bicarbonate (as CaCO3)	122	N/A	1.0	mg/L	2017-11-24	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2017-11-24	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2017-11-24	
Colour, True	8.4	AO ≤ 15	5.0	CU	2017-11-24	
Conductivity (EC)	276	N/A	2.0	µS/cm	2017-11-24	
Cyanide, Total	< 0.0020	MAC = 0.2	0.0020	mg/L	2017-11-28	
pH	7.73	7.0-10.5	0.10	pH units	2017-11-24	HT2
Temperature, at pH	22	N/A		°C	2017-11-24	HT2
Turbidity	0.27	OG < 1	0.10	NTU	2017-11-23	
Calculated Parameters						
Hardness, Total (as CaCO3)	142	None Required	0.500	mg/L		N/A
Langelier Index	0.03	N/A	-5.0	-	2017-11-28	
Solids, Total Dissolved	155	AO ≤ 500	1.00	mg/L		N/A
Total Metals						
Aluminum, total	0.0075	OG < 0.1	0.0050	mg/L	2017-11-24	
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2017-11-24	
Arsenic, total	0.00074	MAC = 0.01	0.00050	mg/L	2017-11-24	
Barium, total	0.0299	MAC = 1	0.0050	mg/L	2017-11-24	
Boron, total	0.0104	MAC = 5	0.0050	mg/L	2017-11-24	
Cadmium, total	0.000011	MAC = 0.005	0.000010	mg/L	2017-11-24	
Calcium, total	46.0	None Required	0.20	mg/L	2017-11-24	
Chromium, total	0.00057	MAC = 0.05	0.00050	mg/L	2017-11-24	
Cobalt, total	< 0.00010	N/A	0.00010	mg/L	2017-11-24	
Copper, total	0.00115	AO ≤ 1	0.00040	mg/L	2017-11-24	
Iron, total	0.014	AO ≤ 0.3	0.010	mg/L	2017-11-24	
Lead, total	< 0.00020	MAC = 0.01	0.00020	mg/L	2017-11-24	
Magnesium, total	6.62	None Required	0.010	mg/L	2017-11-24	
Manganese, total	0.00255	AO ≤ 0.05	0.00020	mg/L	2017-11-24	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2017-11-27	
Molybdenum, total	0.0125	N/A	0.00010	mg/L	2017-11-24	
Nickel, total	< 0.00040	N/A	0.00040	mg/L	2017-11-24	
Potassium, total	2.01	N/A	0.10	mg/L	2017-11-24	



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Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Deep Creek Intake (7111777-01) Matrix: Water Sampled: 2017-11-21 07:30, Continued						
<i>Total Metals, Continued</i>						
Selenium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2017-11-24	
Sodium, total	5.68	AO ≤ 200	0.10	mg/L	2017-11-24	
Strontium, total	0.318	N/A	0.0010	mg/L	2017-11-24	
Uranium, total	0.00251	MAC = 0.02	0.000020	mg/L	2017-11-24	
Zinc, total	< 0.0040	AO ≤ 5	0.0040	mg/L	2017-11-24	
<i>Microbiological Parameters</i>						
Coliforms, Total	53	MAC = 0	1	CFU/100 mL	2017-11-22	
Background Colonies	> 200	N/A	200	CFU/100 mL	2017-11-22	
E. coli	< 1	MAC = 0	1	CFU/100 mL	2017-11-22	
Trepanier Creek Intake (7111777-02) Matrix: Water Sampled: 2017-11-21 08:45						
<i>Anions</i>						
Chloride	26.9	AO ≤ 250	0.10	mg/L	2017-11-24	
Fluoride	< 0.10	MAC = 1.5	0.10	mg/L	2017-11-24	
Nitrate (as N)	0.070	MAC = 10	0.010	mg/L	2017-11-24	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2017-11-24	
Sulfate	19.9	AO ≤ 500	1.0	mg/L	2017-11-24	
<i>General Parameters</i>						
Alkalinity, Total (as CaCO ₃)	99.8	N/A	1.0	mg/L	2017-11-24	
Alkalinity, Phenolphthalein (as CaCO ₃)	< 1.0	N/A	1.0	mg/L	2017-11-24	
Alkalinity, Bicarbonate (as CaCO ₃)	99.8	N/A	1.0	mg/L	2017-11-24	
Alkalinity, Carbonate (as CaCO ₃)	< 1.0	N/A	1.0	mg/L	2017-11-24	
Alkalinity, Hydroxide (as CaCO ₃)	< 1.0	N/A	1.0	mg/L	2017-11-24	
Colour, True	6.1	AO ≤ 15	5.0	CU	2017-11-24	
Conductivity (EC)	327	N/A	2.0	µS/cm	2017-11-24	
Cyanide, Total	< 0.0020	MAC = 0.2	0.0020	mg/L	2017-11-28	
pH	7.53	7.0-10.5	0.10	pH units	2017-11-24	HT2
Temperature, at pH	22	N/A		°C	2017-11-24	HT2
Turbidity	0.17	OG < 1	0.10	NTU	2017-11-23	
<i>Calculated Parameters</i>						
Hardness, Total (as CaCO ₃)	148	None Required	0.500	mg/L	N/A	
Langelier Index	-0.3	N/A	-5.0	-	2017-11-28	
Solids, Total Dissolved	177	AO ≤ 500	1.00	mg/L	N/A	
<i>Total Metals</i>						
Aluminum, total	0.0063	OG < 0.1	0.0050	mg/L	2017-11-24	
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2017-11-24	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050	mg/L	2017-11-24	
Barium, total	0.0719	MAC = 1	0.0050	mg/L	2017-11-24	



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2017-11-28 17:08

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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Trepanier Creek Intake (7111777-02) | Matrix: Water | Sampled: 2017-11-21 08:45, Continued

Total Metals, Continued

Boron, total	0.0093	MAC = 5	0.0050	mg/L	2017-11-24	
Cadmium, total	< 0.000010	MAC = 0.005	0.000010	mg/L	2017-11-24	
Calcium, total	45.6	None Required	0.20	mg/L	2017-11-24	
Chromium, total	0.00063	MAC = 0.05	0.00050	mg/L	2017-11-24	
Cobalt, total	< 0.00010	N/A	0.00010	mg/L	2017-11-24	
Copper, total	0.00082	AO ≤ 1	0.00040	mg/L	2017-11-24	
Iron, total	0.018	AO ≤ 0.3	0.010	mg/L	2017-11-24	
Lead, total	< 0.00020	MAC = 0.01	0.00020	mg/L	2017-11-24	
Magnesium, total	8.38	None Required	0.010	mg/L	2017-11-24	
Manganese, total	0.00300	AO ≤ 0.05	0.00020	mg/L	2017-11-24	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2017-11-27	
Molybdenum, total	0.00614	N/A	0.00010	mg/L	2017-11-24	
Nickel, total	< 0.00040	N/A	0.00040	mg/L	2017-11-24	
Potassium, total	2.68	N/A	0.10	mg/L	2017-11-24	
Selenium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2017-11-24	
Sodium, total	12.4	AO ≤ 200	0.10	mg/L	2017-11-24	
Strontium, total	0.283	N/A	0.0010	mg/L	2017-11-24	
Uranium, total	0.00525	MAC = 0.02	0.000020	mg/L	2017-11-24	
Zinc, total	< 0.0040	AO ≤ 5	0.0040	mg/L	2017-11-24	

Microbiological Parameters

Coliforms, Total	57	MAC = 0	1	CFU/100 mL	2017-11-22	
Background Colonies	> 200	N/A	200	CFU/100 mL	2017-11-22	
E. coli	6	MAC = 0	1	CFU/100 mL	2017-11-22	

Deep - Swim Bay Washrooms (7111777-03) | Matrix: Water | Sampled: 2017-11-21 08:00

Calculated Parameters

Total Trihalomethanes	0.0665	MAC = 0.1	0.00400	mg/L	N/A	
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Haloacetic Acids

Monochloroacetic Acid	< 0.0020	N/A	0.0020	mg/L	2017-11-27	
Monobromoacetic Acid	0.0027	N/A	0.0020	mg/L	2017-11-27	
Dichloroacetic Acid	0.0228	N/A	0.0020	mg/L	2017-11-27	
Trichloroacetic Acid	0.0418	N/A	0.0020	mg/L	2017-11-27	
Dibromoacetic Acid	< 0.0020	N/A	0.0020	mg/L	2017-11-27	
Total Haloacetic Acids (HAA5)	0.0673	MAC = 0.08	0.00200	mg/L	N/A	
Surrogate: 2-Bromopropionic Acid	104		70-130	%	2017-11-27	

Volatile Organic Compounds (VOC)

Bromodichloromethane	0.0073	N/A	0.0010	mg/L	2017-11-24	
Bromoform	< 0.0010	N/A	0.0010	mg/L	2017-11-24	
Chloroform	0.0592	N/A	0.0010	mg/L	2017-11-24	



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Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Deep - Swim Bay Washrooms (7111777-03) Matrix: Water Sampled: 2017-11-21 08:00, Continued						
<i>Volatile Organic Compounds (VOC), Continued</i>						
Dibromochloromethane	< 0.0010	N/A	0.0010	mg/L	2017-11-24	
Surrogate: Toluene-d8	99		70-130	%	2017-11-24	
Surrogate: 4-Bromofluorobenzene	105		70-130	%	2017-11-24	

Trepanier - Todd Rd Washrooms (7111777-04) | Matrix: Water | Sampled: 2017-11-21 08:20

<i>Calculated Parameters</i>						
Total Trihalomethanes	0.0676	MAC = 0.1	0.00400	mg/L		N/A
<i>Haloacetic Acids</i>						
Monochloroacetic Acid	< 0.0020	N/A	0.0020	mg/L	2017-11-27	
Monobromoacetic Acid	0.0025	N/A	0.0020	mg/L	2017-11-27	
Dichloroacetic Acid	0.0204	N/A	0.0020	mg/L	2017-11-27	
Trichloroacetic Acid	0.0306	N/A	0.0020	mg/L	2017-11-27	
Dibromoacetic Acid	< 0.0020	N/A	0.0020	mg/L	2017-11-27	
Total Haloacetic Acids (HAA5)	0.0536	MAC = 0.08	0.00200	mg/L		N/A
Surrogate: 2-Bromopropionic Acid	109		70-130	%	2017-11-27	
<i>Volatile Organic Compounds (VOC)</i>						
Bromodichloromethane	0.0068	N/A	0.0010	mg/L	2017-11-24	
Bromoform	< 0.0010	N/A	0.0010	mg/L	2017-11-24	
Chloroform	0.0608	N/A	0.0010	mg/L	2017-11-24	
Dibromochloromethane	< 0.0010	N/A	0.0010	mg/L	2017-11-24	
Surrogate: Toluene-d8	97		70-130	%	2017-11-24	
Surrogate: 4-Bromofluorobenzene	102		70-130	%	2017-11-24	

Sample Qualifiers:

HT2 The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Peachland, Corporation of the District of General Potability

WORK ORDER REPORTED 7111777
2017-11-28 17:08

Analysis Description	Method Ref.	Technique	Location
Alkalinity in Water	SM 2320 B* (2011)	Titration with H2SO4	Kelowna
Anions in Water	SM 4110 B (2011)	Ion Chromatography	Kelowna
Coliforms, Total in Water	SM 9222 B (2006)	Membrane Filtration / m-Endo Agar	Kelowna
Colour, True in Water	SM 2120 C (2011)	Spectrophotometry (456 nm)	Kelowna
Conductivity in Water	SM 2510 B (2011)	Conductivity Meter	Kelowna
Cyanide, SAD in Water	ASTM D7511-12	Flow Injection with In-Line UV Digestion and Amperometry	Kelowna
E. coli in Water	SM 9222 G (2006)	Membrane Filtration / Nutrient Agar with MUG	Kelowna
Haloacetic Acids in Water	EPA 552.3*	Liquid-Liquid Microextraction, Derivatization and GC-ECD	Richmond
Hardness in Water	SM 2340 B* (2011)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	N/A
Langelier Index in Water	SM 2330 B (2010)	Calculation	N/A
Mercury, total in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	Richmond
pH in Water	SM 4500-H+ B (2011)	Electrometry	Kelowna
Solids, Total Dissolved in Water	SM 1030 E (2011)	Calculation: 100 x (([Cations]-[Anions])/([Cations]+[Anions]))	N/A
Total Metals in Water	EPA 200.2* / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	Richmond
Trihalomethanes in Water	EPA 5030B / EPA 8280D	Purge&Trap / GC-MSD (SIM)	Richmond
Turbidity in Water	SM 2130 B (2011)	Nephelometry	Kelowna

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

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
>	Greater than the specified Result
°C	Degrees Celcius
AO	Aesthetic Objective
CFU/100 mL	Colony Forming Units per 100 millilitres
CU	Colour Units (referenced against a platinum cobalt standard)
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
NTU	Nephelometric Turbidity Units
OG	Operational Guideline (treated water)
pH units	pH < 7 = acidic, pH > 7 = basic
µS/cm	Microsiemens per centimetre
ASTM	ASTM International Test Methods
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

General Comments:

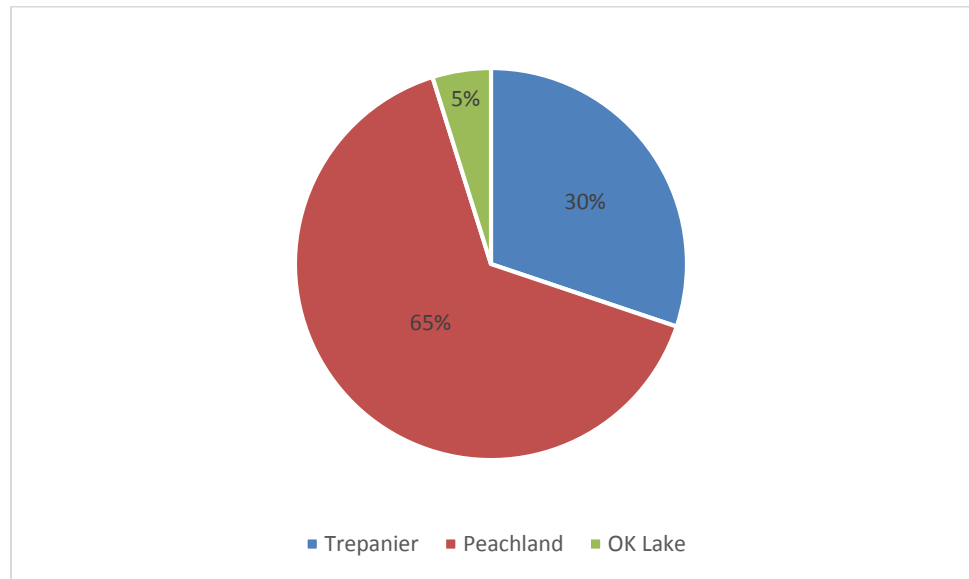
The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued unless otherwise agreed to in writing. The quality control (QC) data is available upon request

Appendix II – Trihalomethane Analyses

Please see Appendix I – pp 11-12.

Appendix III – 2017 Water Consumption

Month	Volume (IGal)				Volume	
	Trepanier	Peachland	Lake Pumps	Total	m3	ML
January	4,906,500	14,352,000	0	19,258,500	87,626	87.55
February	4,838,000	14,237,000	0	19,075,000	86,791	86.72
March	5,184,900	13,831,000	0	19,015,900	86,522	86.45
April	7,816,600	15,895,000	0	23,711,600	107,888	107.80
May	2,195,300	24,218,000	16,114,500	42,527,800	193,501	193.34
June	19,141,400	45,788,000	9,787,500	74,716,900	339,962	339.67
July	38,264,700	70,183,000	0	108,447,700	493,437	493.01
August	36,178,500	62,091,000	0	98,269,500	447,126	446.74
September	26,900,300	47,983,000	0	74,883,300	340,719	340.43
October	9,928,600	19,857,000	18,275	29,803,875	135,608	135.49
November	1,458,600	6,658,500	88,650	8,205,750	37,336	37.30
December	5,715,200	15,062,000		20,777,200	94,536	94.46
TOTALS	162,528,600	350,155,500	26,008,925	538,693,025	2,451,053	2,448.95



Peachland water source use (percentage)

Appendix IV – Turbidity data

	Daily Average Turbidity (NTU)		
	Peachland	Trepanier	OK Lake
01-Jan-17	0.73	0.2	OFF
02-Jan-17	0.77	0.19	OFF
03-Jan-17	0.74	0.24	OFF
04-Jan-17	0.78	0.18	OFF
05-Jan-17	0.59	0.17	OFF
06-Jan-17	0.71	0.18	OFF
07-Jan-17	0.89	0.22	OFF
08-Jan-17	0.85	0.2	OFF
09-Jan-17	0.83	0.19	OFF
10-Jan-17	0.72	0.2	OFF
11-Jan-17	0.71	0.32	OFF
12-Jan-17	0.67	0.19	OFF
13-Jan-17	0.65	0.19	OFF
14-Jan-17	0.7	0.22	OFF
15-Jan-17	0.67	0.24	OFF
16-Jan-17	0.67	0.28	OFF
17-Jan-17	0.67	0.28	OFF
18-Jan-17	0.62	0.21	OFF
19-Jan-17	0.66	0.18	OFF
20-Jan-17	0.7	0.24	OFF
21-Jan-17	0.64	0.25	OFF
22-Jan-17	0.6	0.37	OFF
23-Jan-17	0.58	0.22	OFF
24-Jan-17	0.56	0.26	OFF
25-Jan-17	0.58	0.19	OFF
26-Jan-17	0.55	0.19	OFF
27-Jan-17	0.53	0.17	OFF
28-Jan-17	0.54	0.23	OFF
29-Jan-17	0.51	0.18	OFF
30-Jan-17	0.52	0.15	OFF
31-Jan-17	0.51	0.17	OFF
01-Feb-17	0.52	0.22	OFF
02-Feb-17	0.62	0.2	OFF
03-Feb-17	0.56	0.12	OFF
04-Feb-17	0.53	0.13	OFF
05-Feb-17	0.56	0.14	OFF
06-Feb-17	0.76	0.15	OFF

	Daily Average Turbidity (NTU)		
	Peachland	Trepanier	OK Lake
10-Feb-17	0.83	0.26	OFF
11-Feb-17	0.74	0.2	OFF
12-Feb-17	0.62	0.19	OFF
13-Feb-17	0.58	0.17	OFF
14-Feb-17	0.54	0.19	OFF
15-Feb-17	0.53	0.4	OFF
16-Feb-17	0.58	0.18	OFF
17-Feb-17	0.6	0.15	OFF
18-Feb-17	0.78	0.15	OFF
19-Feb-17	0.74	0.22	OFF
20-Feb-17	0.75	0.24	OFF
21-Feb-17	0.64	0.21	OFF
22-Feb-17	0.6	0.17	OFF
23-Feb-17	0.6	0.26	OFF
24-Feb-17	0.62	0.18	OFF
25-Feb-17	0.86	0.27	OFF
26-Feb-17	0.8	0.28	OFF
27-Feb-17	0.71	0.2	OFF
28-Feb-17	0.59	0.26	OFF
01-Mar-17	0.69	0.68	OFF
02-Mar-17	0.8	0.43	OFF
03-Mar-17	0.74	0.28	OFF
04-Mar-17	0.66	0.41	OFF
05-Mar-17	0.78	0.49	OFF
06-Mar-17	0.9	0.48	OFF
07-Mar-17	0.68	0.63	OFF
08-Mar-17	0.76	0.87	OFF
09-Mar-17	0.81	0.8	OFF
10-Mar-17	0.88	0.77	OFF
11-Mar-17	0.63	0.52	OFF
12-Mar-17	0.79	0.19	OFF
13-Mar-17	0.71	0.18	OFF
14-Mar-17	0.73	0.21	OFF
15-Mar-17	0.83	0.21	OFF
16-Mar-17	0.69	0.26	OFF
17-Mar-17	0.81	0.62	OFF
18-Mar-17	0.76	0.29	OFF

07-Feb-17	0.79	0.13	OFF
08-Feb-17	0.74	0.27	OFF
09-Feb-17	0.66	0.26	OFF

19-Mar-17	0.8	0.5	OFF
20-Mar-17	0.74	0.42	OFF
21-Mar-17	0.74	0.36	OFF

	Daily Average Turbidity (NTU)		
	Peachland	Trepanier	OK Lake
22-Mar-17	0.74	0.35	OFF
23-Mar-17	0.7	0.38	OFF
24-Mar-17	0.73	0.38	OFF
25-Mar-17	0.69	0.37	OFF
26-Mar-17	0.7	0.54	OFF
27-Mar-17	0.71	0.46	OFF
28-Mar-17	0.68	0.44	OFF
29-Mar-17	9.21	0.58	OFF
30-Mar-17	11.28	0.74	OFF
31-Mar-17	10.61	0.76	OFF
01-Apr-17	7.39	0.75	OFF
02-Apr-17	4.35	0.85	OFF
03-Apr-17	3.47	0.74	OFF
04-Apr-17	2.53	0.92	OFF
05-Apr-17	1.81	0.69	OFF
06-Apr-17	1.38	0.69	OFF
07-Apr-17	1.22	0.66	OFF
08-Apr-17	1.39	1.2	OFF
09-Apr-17	3.04	1.38	OFF
10-Apr-17	2.49	1.2	OFF
11-Apr-17	1.95	1.18	OFF
12-Apr-17	1.61	1.13	OFF
13-Apr-17	1.46	1.45	OFF
14-Apr-17	1.67	1.56	OFF
15-Apr-17	1.93	1.28	OFF
16-Apr-17	1.96	1.25	OFF
17-Apr-17	2.15	1.43	OFF
18-Apr-17	2.28	1.32	OFF
19-Apr-17	2.54	1.66	OFF
20-Apr-17	4.51	1.6	OFF
21-Apr-17	2.77	2.64	OFF
22-Apr-17	2.97	3.35	OFF
23-Apr-17	5.24	1.98	OFF
24-Apr-17	5.06	1.95	OFF
25-Apr-17	4.74	2.16	OFF
26-Apr-17	4.41	2.18	OFF
27-Apr-17	3.93	1.93	OFF
28-Apr-17	4.63	1.8	OFF

	Daily Average Turbidity (NTU)		
	Peachland	Trepanier	OK Lake
02-May-17	2.92	1.4	OFF
03-May-17	2.59	1.25	OFF
04-May-17	2.92	1.67	OFF
05-May-17	3.93	2.61	0.5
06-May-17	21.19	OFF	0.4
07-May-17	28.6	OFF	0.4
08-May-17	28.57	OFF	1
09-May-17	27.45	OFF	3
10-May-17	23.11	OFF	3
11-May-17	16.95	OFF	2.8
12-May-17	12.37	OFF	2.6
13-May-17	10.54	OFF	0.5
14-May-17	8.85	OFF	0.4
15-May-17	7.06	OFF	1.1
16-May-17	5.59	OFF	2.4
17-May-17	4.69	OFF	3.2
18-May-17	4.1	OFF	2.4
19-May-17	3.54	OFF	1.5
20-May-17	2.96	OFF	1.4
21-May-17	2.57	OFF	1.3
22-May-17	2.29	OFF	1.6
23-May-17	2.29	OFF	1.3
24-May-17	2.27	OFF	0.6
25-May-17	2.72	OFF	1
26-May-17	3.41	OFF	1.3
27-May-17	3.39	OFF	1.4
28-May-17	2.95	OFF	1.3
29-May-17	2.61	OFF	1.2
30-May-17	2.38	OFF	1.4
31-May-17	2.2	OFF	1.3
01-Jun-17	2.15	OFF	1.3
02-Jun-17	2.72	OFF	1.4
03-Jun-17	2.71	OFF	1.4
04-Jun-17	2.59	OFF	1.13
05-Jun-17	2.29	OFF	1.15
06-Jun-17	2.09	OFF	1.4
07-Jun-17	1.97	OFF	1.2
08-Jun-17	1.82	OFF	1.3

29-Apr-17	3.96	1.51	OFF
01-May-17	3.12	1.38	OFF

09-Jun-17	1.69	OFF	1.2
10-Jun-17	1.62	OFF	1.55

	Daily Average Turbidity (NTU)		
	Peachland	Trepanier	OK Lake
11-Jun-17	1.54	OFF	1.3
12-Jun-17	1.47	OFF	1.32
13-Jun-17	1.52	OFF	1
14-Jun-17	1.4	OFF	0.9
15-Jun-17	1.2	1.12	OFF
16-Jun-17	1.15	1.1	OFF
17-Jun-17	1.09	1.1	OFF
18-Jun-17	1.07	0.96	OFF
19-Jun-17	1.05	0.86	OFF
20-Jun-17	1.03	0.79	OFF
21-Jun-17	0.9	0.74	OFF
22-Jun-17	0.7	0.65	OFF
23-Jun-17	0.7	0.52	OFF
24-Jun-17	0.64	0.48	OFF
25-Jun-17	0.6	0.44	OFF
26-Jun-17	0.6	0.44	OFF
27-Jun-17	0.6	0.52	OFF
28-Jun-17	0.54	0.54	OFF
29-Jun-17	0.54	0.61	OFF
30-Jun-17	0.59	0.58	OFF
01-Jul-17	0.6	0.54	OFF
02-Jul-17	0.54	0.51	OFF
03-Jul-17	0.52	0.49	OFF
04-Jul-17	0.51	0.44	OFF
05-Jul-17	0.49	0.49	OFF
06-Jul-17	0.49	0.54	OFF
07-Jul-17	0.5	0.5	OFF
08-Jul-17	0.48	0.49	OFF
09-Jul-17	0.49	0.45	OFF
10-Jul-17	0.48	0.46	OFF
11-Jul-17	0.48	0.41	OFF
12-Jul-17	0.5	0.4	OFF
13-Jul-17	0.53	0.4	OFF
14-Jul-17	0.59	0.43	OFF
15-Jul-17	0.51	0.42	OFF
16-Jul-17	0.53	0.44	OFF
17-Jul-17	0.53	0.43	OFF
18-Jul-17	0.53	0.49	OFF
19-Jul-17	0.49	0.51	OFF

	Daily Average Turbidity (NTU)		
	Peachland	Trepanier	OK Lake
21-Jul-17	0.5	0.48	OFF
22-Jul-17	0.5	0.54	OFF
23-Jul-17	0.49	0.55	OFF
24-Jul-17	0.51	0.56	OFF
25-Jul-17	0.51	0.52	OFF
26-Jul-17	0.51	0.57	OFF
27-Jul-17	0.51	0.38	OFF
28-Jul-17	0.51	0.3	OFF
29-Jul-17	0.51	0.25	OFF
30-Jul-17	0.53	0.26	OFF
31-Jul-17	0.52	0.25	OFF
01-Aug-17	0.53	0.25	OFF
02-Aug-17	0.54	0.26	OFF
03-Aug-17	0.52	0.33	OFF
04-Aug-17	0.53	0.22	OFF
05-Aug-17	0.56	0.23	OFF
06-Aug-17	0.55	0.23	OFF
07-Aug-17	0.56	0.21	OFF
08-Aug-17	0.55	0.2	OFF
09-Aug-17	0.54	0.19	OFF
10-Aug-17	0.54	0.22	OFF
11-Aug-17	0.5	0.22	OFF
12-Aug-17	0.46	0.2	OFF
13-Aug-17	0.48	0.21	OFF
14-Aug-17	0.5	0.24	OFF
15-Aug-17	0.49	0.25	OFF
16-Aug-17	0.47	0.24	OFF
17-Aug-17	0.42	0.26	OFF
18-Aug-17	0.43	0.26	OFF
19-Aug-17	0.43	0.24	OFF
20-Aug-17	0.42	0.25	OFF
21-Aug-17	0.42	0.25	OFF
22-Aug-17	0.42	0.27	OFF
23-Aug-17	0.45	0.29	OFF
24-Aug-17	0.45	0.31	OFF
25-Aug-17	0.46	0.31	OFF
26-Aug-17	0.5	0.31	OFF
27-Aug-17	0.47	0.31	OFF
28-Aug-17	0.46	0.31	OFF

20-Jul-17	0.51	0.48	OFF
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29-Aug-17	0.47	0.33	OFF
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	Daily Average Turbidity (NTU)		
	Peachland	Trepanier	OK Lake
30-Aug-17	0.47	0.37	OFF
31-Aug-17	0.47	0.36	OFF
01-Sep-17	0.47	0.4	OFF
02-Sep-17	0.47	0.41	OFF
03-Sep-17	0.47	0.47	OFF
04-Sep-17	0.45	0.47	OFF
05-Sep-17	0.46	0.47	OFF
06-Sep-17	0.48	0.47	OFF
07-Sep-17	0.52	0.47	OFF
08-Sep-17	0.48	0.38	OFF
09-Sep-17	0.55	0.33	OFF
10-Sep-17	0.55	0.32	OFF
11-Sep-17	0.55	0.33	OFF
12-Sep-17	0.55	0.33	OFF
13-Sep-17	0.53	0.33	OFF
14-Sep-17	0.53	0.31	OFF
15-Sep-17	0.54	0.28	OFF
16-Sep-17	0.54	0.28	OFF
17-Sep-17	0.53	0.28	OFF
18-Sep-17	0.54	0.29	OFF
19-Sep-17	0.54	0.26	OFF
20-Sep-17	0.6	0.26	OFF
21-Sep-17	0.6	0.26	OFF
22-Sep-17	0.58	0.26	OFF
23-Sep-17	0.58	0.25	OFF
24-Sep-17	0.59	0.25	OFF
25-Sep-17	0.63	0.32	OFF
26-Sep-17	0.62	0.3	OFF
27-Sep-17	0.61	0.3	OFF
28-Sep-17	0.62	0.31	OFF
29-Sep-17	0.63	0.32	OFF
30-Sep-17	0.54	0.36	OFF
01-Oct-17	0.68	0.37	OFF
02-Oct-17	0.67	0.37	OFF
03-Oct-17	0.77	0.38	OFF
04-Oct-17	0.6	0.39	OFF
05-Oct-17	0.45	0.45	OFF
06-Oct-17	0.42	0.47	OFF
07-Oct-17	0.5	0.49	OFF

	Daily Average Turbidity (NTU)		
	Peachland	Trepanier	OK Lake
09-Oct-17	0.42	0.55	OFF
10-Oct-17	0.51	0.56	OFF
11-Oct-17	0.5	0.61	OFF
12-Oct-17	0.4	0.65	OFF
13-Oct-17	0.4	0.68	OFF
14-Oct-17	0.39	0.7	OFF
15-Oct-17	0.44	0.69	OFF
16-Oct-17	0.46	0.69	OFF
17-Oct-17	0.51	0.71	OFF
18-Oct-17	0.92	0.61	OFF
19-Oct-17	0.59	0.36	OFF
20-Oct-17	0.59	0.26	OFF
21-Oct-17	0.61	0.42	OFF
22-Oct-17	0.58	0.38	OFF
23-Oct-17	0.57	0.39	OFF
24-Oct-17	0.57	1.38	OFF
25-Oct-17	0.58	0.35	OFF
26-Oct-17	0.56	0.27	OFF
27-Oct-17	0.55	0.24	0.35
28-Oct-17	0.53	0.38	0.56
29-Oct-17	0.53	0.36	0.29
30-Oct-17	0.55	0.27	0.35
31-Oct-17	0.56	0.24	0.41
01-Nov-17	0.54	0.24	0.59
02-Nov-17	0.51	0.24	0.3
03-Nov-17	0.56	0.28	0.53
04-Nov-17	0.55	0.31	0.28
05-Nov-17	0.53	0.34	0.3
06-Nov-17	0.52	0.28	0.3
07-Nov-17	0.54	0.3	0.32
08-Nov-17	0.55	0.32	0.33
09-Nov-17	0.51	0.38	0.43
10-Nov-17	1.12	0.47	0.25
11-Nov-17	1.15	0.59	0.24
12-Nov-17	0.61	0.6	0.27
13-Nov-17	0.53	0.71	0.4
14-Nov-17	0.52	0.85	0.23
15-Nov-17	0.48	0.87	0.46
16-Nov-17	0.92	0.85	0.37

08-Oct-17	0.44	0.51	OFF
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17-Nov-17	0.68	0.9	0.35
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	Daily Average Turbidity (NTU)		
	Peachland	Trepanier	OK Lake
18-Nov-17	0.54	5	0.26
19-Nov-17	0.46	4.98	0.28
20-Nov-17	0.38	4.97	0.26
21-Nov-17	0.45	4.57	0.4
22-Nov-17	0.39	1.7	0.23
23-Nov-17	0.43	0.32	0.24
24-Nov-17	0.4	0.65	OFF
25-Nov-17	0.51	0.66	OFF
26-Nov-17	0.47	0.64	OFF
27-Nov-17	0.46	0.61	OFF
28-Nov-17	0.49	0.64	OFF
29-Nov-17	0.55	0.85	OFF
30-Nov-17	0.63	0.76	OFF
01-Dec-17	0.72	0.48	OFF
02-Dec-17	0.66	0.22	OFF
03-Dec-17	0.52	0.14	OFF
04-Dec-17	0.54	0.13	OFF
05-Dec-17	0.39	0.15	OFF
06-Dec-17	0.45	0.15	OFF
07-Dec-17	0.52	0.2	OFF
08-Dec-17	0.58	0.14	OFF
09-Dec-17	0.61	0.13	OFF
10-Dec-17	0.37	0.15	OFF
11-Dec-17	0.4	0.16	OFF
12-Dec-17	0.38	0.15	OFF
13-Dec-17	0.38	0.23	OFF
14-Dec-17	0.39	0.14	OFF
15-Dec-17	0.4	0.15	OFF
16-Dec-17	0.44	0.18	OFF
17-Dec-17	0.43	0.13	OFF
18-Dec-17	0.43	0.14	OFF
19-Dec-17	0.41	0.12	OFF
20-Dec-17	0.41	0.14	OFF
21-Dec-17	0.43	0.17	OFF
22-Dec-17	0.46	0.17	OFF
23-Dec-17	0.48	0.19	OFF
24-Dec-17	0.5	0.16	OFF
25-Dec-17	0.53	0.14	OFF
26-Dec-17	0.55	0.21	OFF

	Daily Average Turbidity (NTU)		
	Peachland	Trepanier	OK Lake
28-Dec-17	0.48	0.12	OFF
29-Dec-17	0.5	0.15	OFF
30-Dec-17	0.49	0.17	OFF
31-Dec-17	0.51	0.18	OFF

27-Dec-17	0.57	0.14	OFF
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