



Annual Water Systems Report

REGIONAL DISTRICT OF EAST KOOTENAY
2018



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1. RDEK Water Systems Overview

The Regional District of East Kootenay (RDEK) strives to provide a safe and reliable water supply to all of its customers. As required by the Drinking Water Protection Act, this annual water report is intended to inform the public of the water systems owned and operated by the RDEK and provide details on water quality, system maintenance and improvements, water conservation tactics, and more. The RDEK's certified water operators ensure systems operations are in compliance with regulations set out by the BC Interior Health Authority (IHA).

Water Systems	EOCP #	2018 Connections
East Side Lake Windermere	1926 & 1927	885 *
Windermere	1098	628
Timber Ridge	1099	347 **
Holland Creek	N/A	375
Edgewater	649	462
Rushmere	1854	36
Spur Valley	2421	73
Moyie	2742	70
Elko	2407	62

* As of June 2018, Timber Ridge joined East Side Lake Windermere

** Timber Ridge Connection totals up to June 2018

2. Water Treatment Objectives

The Canadian Drinking Water Guidelines, developed by Health Canada, are designed to protect the health of community members and in particular those most vulnerable; children, the elderly, and individuals with compromised immune systems. The parameters set out in those guidelines are the performance goals every water system should strive to achieve in order to provide the cleanest, safest and most reliable drinking water possible.

A Maximum Acceptable Concentration (MAC) level has been established by Health Canada for microbiological criteria. Each MAC has been designed to safeguard health, assuming a lifelong consumption of drinking water containing the substances at the maximum concentration level.

Aesthetic Objectives (AO) apply to characteristics of drinking water that can affect its acceptance by consumers. These would include such criteria as taste, odour, and appearance. Some AO's, like turbidity, could pose a health risk to some at-risk consumers if the MAC levels are exceeded.

In the East Kootenay, the IHA acts as the water quality regulator by issuing Operating Permits and placing conditions on those permits. Those conditions are generally found in the BC Drinking Water Protection Act and the Canadian Drinking Water Guidelines.

IHA employs the 4-3-2-1-0 treatment objective to ensure water-borne illnesses are not jeopardizing the public's health:

- Based on Canadian Drinking Water Quality Guidelines
- 4 log (99.99%) inactivation of viruses
- 3 log (99.9%) inactivation of or removal of Giardia and Cryptosporidium

- 2 treatment processes for surface water (typically this includes filtration and disinfection)
- 1 for <1 Nephelometric Turbidity Units (NTU) of turbidity (with a target of 0.1 NTU)
- 0 fecal coliform and E. Coli

3. Water Quality Monitoring

Monitoring programs are established as required by IHA Regulations, Operating Permit, and the Drinking Water Officer. Bacteriological testing is a major requirement and is performed routinely in every RDEK water system. Samples are submitted to an approved lab where they are tested for Total Coliform and E. Coli Bacteria.

Coliforms:

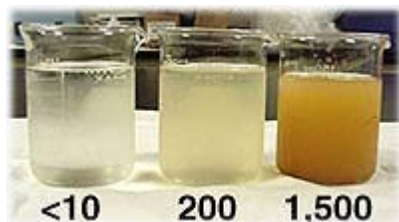
The presence of total coliforms in the water system is an indicator that the system is experiencing re-growth of pathogens, that infiltration has occurred, or that it has not been properly treated at source. It is an indication that potential exists for bacteria causing adverse health effects. The MAC for total coliform in all RDEK operated water systems is 0 per 100 mL. If a sample comes back positive for coliform, operators review sampling practices and system operations anomalies, and a re-sample is conducted. If that result is positive then the main is flushed, monitored, and tested again. If the third result is positive, the main is taken out of service, chlorinated, flushed and remains out of service until acceptable results are obtained.

E. coli:

Escherichia coli is one species in the fecal coliform group and is a definite indicator of the presence of feces in the distribution system. The MAC for E.coli is 0 per 100 mL. An unacceptable MAC test for E.coli triggers an immediate boil water order by the Medical Health Officer which remains in effect until the problem is identified, isolated, resolved, and acceptable test results are obtained.

Turbidity:

Turbidity is a measure of water clarity. Turbid water can look cloudy or opaque and can also affect the color of the water. Turbidity is measured in Nephelometric Turbidity Units, or NTU. The instrument used for measuring is called nephelometer or turbidimeter, which measures the intensity of light scattered at 90 degrees as a beam of light passes through a water sample.



The RDEK monitors turbidity with continuous monitoring instrumentation and verifies values with daily grab samples in all of its surface source water systems, using this as a basis for general water quality. Water Quality Advisories are issued when turbidity levels are greater than 1 NTU. Boil Water Notices are issued at or above 5 NTU. Depending on the treatment system, Health Canada recommends different turbidity level objectives; however, if it is above 1 NTU, a Water Quality Advisory is issued.

Chlorine Disinfection:

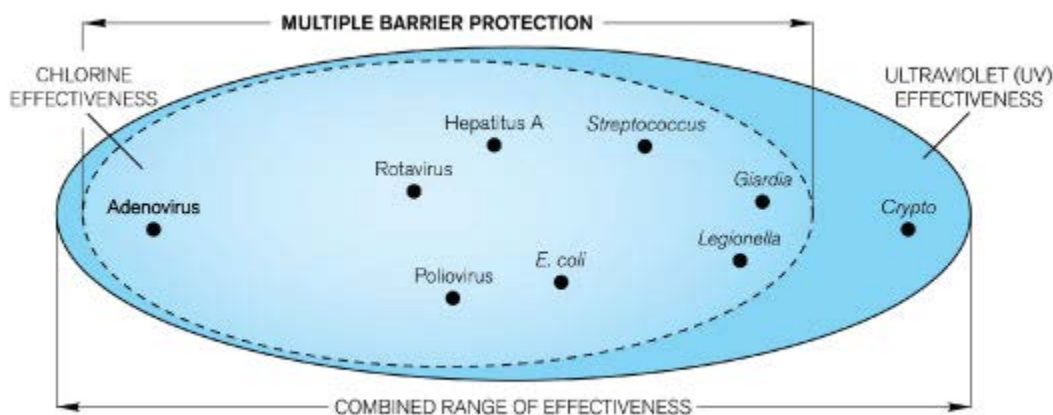
Most RDEK water systems are currently using chlorine to disinfect the water prior to sending it through the distribution system. Maintaining free chlorine residual in all parts of the system is important in keeping the water safe from bacteriological growth and other disease-causing organisms.

To ensure adequate chlorine levels exist, the RDEK has a number of online chlorine analyzers that monitor residuals and will alert an operator should a residual fall below a desired point.

Ultraviolet Light Disinfection:

Ultraviolet light (UV) destroys harmful organisms by causing a molecular change in their DNA makeup that prevents them from multiplying. This process destroys the ability of the organism to spread disease - when pathogens cannot multiply, they are considered to be no longer harmful.

UV is often used in conjunction with chlorination for added protection and to combat organisms such as cryptosporidium. Cryptosporidium is a chlorine resistant protozoan but can easily be inactivated by UV. Another advantage of UV disinfection is that it does not produce any disinfection by-products. The East Side Lake Windermere & Edgewater water systems have been equipped with a UV disinfection system.



Disinfection By-Products:

Disinfection by-products are formed when disinfectants used in water treatment react with bromide and/or natural organic matter (i.e., decaying vegetation) present in the source water. Different disinfectants produce different types or amounts of disinfection by-products. Disinfection by-products, for which MAC's have been established, have been identified in drinking water, including trihalomethanes and haloacetic acids.

- Trihalomethanes (THM) are a group of four chemicals that are formed along with other disinfection by-products when chlorine or other disinfectants used to control microbial contaminants in drinking water react with naturally occurring organic and inorganic matter in water. The THM's are chloroform, bromodichloromethane, dibromochloromethane, and bromoform. The Canadian Drinking Water Guidelines have established a MAC to regulate total THM's (TTHM) at a maximum allowable annual average level of 0.1mg/L.
- Haloacetic Acids (HAA) are a group of chemicals that are formed along with other disinfection by-products when chlorine or other disinfectants used to control microbial contaminants in drinking water react with naturally occurring organic and inorganic matter in water. The Canadian Drinking Water Guidelines has established the MAC for haloacetic acids at 0.08mg/L based on a location's running annual average of quarterly samples taken in the distribution system.

The RDEK samples for both THM's and HAA's on a quarterly basis*. Of these samples, there was 1 result exceeding the Canadian Drinking Water thresholds for THMs in Edgewater in 2018. RDEK operators increased the frequency of distribution system flushing to further reduce THM's and continue to monitor the situation closely. All other tests met the required thresholds.

For more information on specific water quality parameters please contact the RDEK or visit the *Province of BC's Ministry of Healthy Living and Sport* website to find the *Drinking Water Protection Act and Regulation* http://www.health.gov.bc.ca/protect/dw_index.html or the Health Canada website to find the *Guidelines for Canadian Drinking Water Quality*. http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/index-eng.php#tech_doc

*As per IHA standards, groundwater-sourced systems (Spur Valley, Moyie, Elko, and Holland Creek) do not require THM or HAA testing.

Filtration:

Filtration is part of the treatment process in the Rushmere and East Side Lake Windermere water systems. In Rushmere, filtration is performed by an ultra-filter cartridge system.

The filtration system for East Side Lake Windermere consists of the following steps:

- Coagulation: Polyaluminum Chloride, a primary coagulant, is used to destabilize colloidal (particles that do not settle out) substances

- Flocculation: A polymer is added to clump the destabilized particles together into aggregates that can be more easily separated from the water.
- Settling: The water is sent through up-flow tube settlers, slowing down the flow to allow the floc to settle. This first step removes the majority of the solids.
- Filtration: The water is passed through a mixed-media adsorption clarifier, which removes non-settleable solids using buoyant media. The final filtration process removes any remaining solids creating a very low turbidity product.

4. Water Quality Performance

Parameters	Quality Standards	Frequency	Water Systems	Performance
Total Coliform, E.Coli	Less than one E.Coli and total coliform bacteria detectable per 100mL samples	Weekly	East Side Lake Windermere	100%
		Weekly	Windermere	100%
		Weekly	Edgewater	100%
		Weekly	Holland Creek	100%
		Weekly	Timber Ridge	100%
		Weekly	Rushmere	100%
		Weekly	Spur Valley	100%
		Monthly	Moyie	96%
		Monthly	Elko	98%
Free Chlorine Residual	Free chlorine residual minimum of 0.5mg/L entering the system after no less than 20 minutes contact time. Minimum of 0.2mg/L at any/all end points of the distribution system	Daily	East Side Lake Windermere	100% > 0.5 mg/L
		Five days/week	Windermere	99.6% ≥0.5mg/L
		Five days/week	Edgewater	99.6% ≥0.5mg/L
		One day/week	Holland Creek Distribution	100% ≥0.2mg/L
		Five days/week	Timber Ridge Distribution	100% ≥0.2mg/L
		Three days/week	Rushmere	98.8% ≥0.5mg/L
		Three days/week	Spur Valley	89.6% ≥ 0.5mg/L
Turbidity	Disinfected water shall not be higher than 1 NTU. Between 1 NTU and under 5 NTU a water quality advisory must be issued. Above 5 NTU a boil water notice is issued. Turbidity of water treated by membrane filtration shall not exceed 0.1 NTU in at least 95% of the samples in any month	Daily	East Side Lake Windermere	100% < 1.0 NTU
		Five days/week	Windermere	31% ≤1.0 NTU 100% ≤5.0 NTU
		Five days/week	Edgewater	100% ≤1.0 NTU
		Five days/week	Holland Creek	100% ≤1.0 NTU
		Five days/week	Timber Ridge	84.3% ≤0.3 NTU 100% ≤1.0 NTU
		Three days/week	Rushmere	100% ≤0.3 NTU 100% ≤1.0 NTU
		Three days/week	Spur Valley	98.8% ≤0.30 NTU 100% ≤1.0 NTU
Total Trihalomethanes	Maximum Allowable Annual Average of 0.1mg/L	Quarterly	East Side Lake Windermere	N/A
		Quarterly	Windermere	100%
		Quarterly	Edgewater	75%
		Quarterly	Holland Creek	N/A (groundwater)
		Quarterly	Timber Ridge	100%
		Quarterly	Rushmere	N/A
		Quarterly	Spur Valley	N/A (groundwater)

Parameters	Quality Standards	Frequency	Water Systems	Performance
Haloacetic Acids	Maximum Allowable Annual Average of 0.08mg/L	Quarterly	East Side Lake Windermere	100%
		Quarterly	Windermere	100%
		Quarterly	Edgewater	100%
		Quarterly	Holland Creek	N/A (groundwater)
		Quarterly	Timber Ridge	100%
		Quarterly	Rushmere	N/A (small water system)
		Quarterly	Spur Valley	N/A (groundwater)
	<u>E. Coli</u> : <10% of samples may exceed 20/100 in any 6 month period	Weekly	Edgewater	100%
Edgewater Raw Water Monitoring for Filtration Deferral	<u>Total Coliform</u> : <10% of samples may exceed 100/100mL in any 6 month period	Weekly	Edgewater	70.5%<100/100mL
	<u>Turbidity</u> : <1 NTU	Weekly	Edgewater	100%

Please see Appendix A for Monthly Average Turbidity, Chlorine Residual, and Water Consumption Data for each Water System.

5. Systems at a Glance

Water System	Source Water	Supply Method	Disinfection/ Treatment Process	Pressure Reducing Stations	Reservoir & Capacity	Hydrants For Fire Protection
East Side Lk Windermere/ Timber Ridge	Lake Windermere	Pumped/ Gravity	Flocculation & Filtration, Chlorine & UV disinfection	5	962m ³	Yes
Windermere	Lake Windermere	Pumped/ Gravity	Chlorine disinfection	2	Concrete 1250m ³ & 1600m ³	Yes
Edgewater	Lake Baptiste	Gravity	Chlorine & UV disinfection	3	Steel 800m ³ & 400m ³	Yes
Holland Creek	Groundwater Well	Pumped/ Gravity	Chlorine disinfection	1	Supplied by Kinbasket Water and Sewer	Yes
Rushmere	Lake Windermere	Pumped	Ultra filtration and Chlorine disinfection	0	Polyurethane 17m ³	No*
Spur Valley	Groundwater Well	Pumped/ Gravity	Chlorine disinfection	0	Concrete 125m ³ & 222m ³	Yes**
Moyie	Groundwater Well	Pumped/ Gravity	No treatment or disinfection	0	Concrete 71m ³	No
Elko	Groundwater Well	Pumped	No treatment or disinfection	0	No storage	No

* Fire protection by tender only

** Insufficient fire flows through hydrants. Protection by tender only.

6. Water Systems in Detail

6.1 East Side Lake Windermere Water System:

East Side Lake Windermere's water is drawn from Lake Windermere and pumped from the Baltac Pumping Station to the East Side Lake Windermere Water Treatment Plant (WTP) located on Windermere Loop Road. It passes through the coagulation, flocculation, settling and filtration treatment stages and the filtered water is then disinfected using UV and chlorine before being fed to the reservoir and distribution system. The entire process is monitored via Supervisory Control and Data Acquisition (SCADA) instrumentation and auto-dialer alarms as well as being verified and documented by operators daily.

2018 Events and System Improvements:

- Water treatment plant, distribution system and customer base acquisition complete October 1, 2018
- Columbia Valley RDEK office relocated to East Side Lake Windermere WTP
- Open House event a success with many in attendance
- SCADA upgrades for system complete
- Emergency eyewash/shower installed at WTP
- Many spare parts and equipment acquired

2019 Plans:

- Complete connection to Windermere reservoirs & distribution system (including some upgrades to WTP)
- Upgrade Baltac Road Pressure Reducing Valve building

6.2 Windermere Water System:

Windermere's water is drawn from Lake Windermere and pumped from the Lake Pumping Station to the Water Pumping Station located beside the Windermere Public Beach. During this transfer, it is disinfected with chlorine gas and pumped again to the distribution system and across Highway 93/95 to a 1250m³ and a 1600m³ concrete reservoir. The water in the reservoir is then sent into the distribution system and ultimately to customers. This process is monitored using instrumentation and alarm dialers to notify the operators when a problem occurs. These sites are frequented 5 days per week and processes are verified and recorded.

2018 Events and System Improvements:

- Completion of acquisition of Parr Utilities
- Start of planning and engineering of connection of Parr Utilities now East Side Lake Windermere WTP to Windermere distribution system

2019 Plans:

- Completion of connection of East Side Lake Windermere WTP to Windermere Distribution
- Upgrades to distribution for fire flows
- Pressure Reducing Valve replacement and upgrades

6.3 Edgewater Water System:

The source water intake for Edgewater is located in Lake Baptiste, approximately two kilometers southeast of town adjacent to the Elk Park Ranches. The water flows from Lake Baptiste, through the UV Water Plant, to steel reservoirs, and then on to consumers all using the force of gravity.

Edgewater water is disinfected with both UV and chlorine and is stored at the Hewitt Road reservoirs which provide 1200m³ of treated storage. The RDEK has the capability to fully monitor the entire process through Edgewater's SCADA system which alerts the operators of any potential problems.

2018 Events and System Improvements:

- Emergency Operation Plan created
- Baptiste Dam upgrade near completion
- Several line repairs throughout year resulting in reduced consumption
- Two illegal connections eliminated
- Two culvert washouts at steel reservoirs repaired
- Double Check Valve Assembly at reservoir towers repaired

2019 Plans:

- Complete Baptiste Dam upgrade
- Install Siphon Line Recharge Assembly
- EPA NET water model update for fire flow issues

6.4 Holland Creek Water System:

The community is supplied with potable water by Kinbasket Water & Sewer Company (KWSC). Well source water is chlorinated to protect against contamination within the distribution system should it become compromised. Water is metered by KWSC before entering Holland Creek. The system contains one PRV station which is located just prior to the first connection.

2018 Events and System Improvements:

- Antler Ridge subdivision very active with new construction (water and sewer connections)

2019 Plans:

- Pressure Reducing Valve safety retrofit
- Valve remove & replace (Mountain Heights)

6.5 Timber Ridge Water System:

Timber Ridge has a bulk water connection to the East Side Lake Windermere WTP (formerly the Parr Utilities WTP. The Parr Utilities WTP was purchased by the RDEK in October of 2018.) In the East Side Lake Windermere WTP raw water from Lake Windermere is brought to IHA standards that conform to 4-3-2-1-0 treatment objectives. The RDEK operates a reservoir and pump house (Phase 3 Pump House) within Timber Ridge to deliver sufficient pressures. The pump station also provides a point for the RDEK to monitor water quality through chlorine and turbidity level analysis and a location for automatic alarm dialers to alert staff of any problems with the system.

2018 Events and System Improvements:

- Acquisition of Parr Utilities and establishment of East Side Lake Windermere Water Service Area that includes the Timber Ridge Water System Service Area

2019 Plans:

- See 6.1 East Side Lake Windermere Water System

6.6 Rushmere Water System:

The community of Rushmere is supplied with treated water from Lake Windermere through a small membrane filtration treatment plant. Treated water is stored within the plant and pumped to the community using two variable frequency distribution pumps. Rushmere water system is dedicated to domestic use with some lawn and garden sprinkling. There is no water distribution fire protection through fire hydrants.

The plant is highly automated and operators have remote monitoring and control capability via SCADA. The plant is attended at a minimum of 3 times per week and can alert staff when problems occur.

2018 Events and System Improvements:

- New distribution pump and motor acquired
- Two pump check valves replaced
- Uninterrupted Power Supply (UPS) failed and replaced in WTP

2019 Plans:

- Ongoing maintenance and repair

6.7 Spur Valley Water System:

The community of Spur Valley is supplied with water from a groundwater well situated just south of the community. The water is chlorinated and then pumped to two reservoirs before being distributed to residents. The RDEK has the capability to fully monitor the entire process through Spur Valley's SCADA system which alerts the operators of any potential problems. Operators are on site a minimum of 3 times per week.

2018 Events and System Improvements:

- Air relief valve in facility rebuilt

2019 Plans:

- Ongoing maintenance and repair
- Leak detection and unaccounted-for water assessment

6.8 Moyie Water System:

The Moyie Water System receives its groundwater from a 57 meter deep well. Water is pumped from the well using a 15 horsepower well pump up to a 71m³ reservoir which maintains the pressure in the distribution system. The water is not chlorinated. RDEK operators are on site 2-3 times per week to ensure proper operation and perform monthly bacteriological sampling. The pump house is also outfitted with automatic alarm dialers to alert staff when regular functions are compromised.

2018 Events and System Improvements:

- Completion of Lake Street & Moyie Ave Watermain Replacement Project

2019 Plans:

- Unaccounted for system water loss source detection and repair
- Replace blow off Queens and Campbell
- Repair reservoir mainline valve

6.9 Elko Water System:

The community of Elko receives raw water from a well located near the pump house. The well is located in a confined aquifer, and water is pumped directly to the distribution system. Because there is no storage reservoir in Elko, the water system relies solely on the continuous operation of the pump to keep up with demand.

RDEK operators are on site 2 to 3 times per week to ensure proper operation and perform bacteriological sampling monthly as required. The pump house is also outfitted with automatic alarm dialers to alert staff when regular operations are compromised.

2018 Events and System Improvements:

- Ongoing maintenance and repair

2019 Plans:

- Building roof & gable maintenance

7. Operator Certification

EOCP Certifications		
Employee	Certification #	Level
Norm	6330	WT-III, WD-II MWWT-I, WWC-II, CH
Ginger	6821	WT-II, WD-II, MWWT-II, WWC-I, CH
Paul	6500	WT-I, WD-II, MWWT-I, WWC-I, CH
Krista	7969	WT-I, WD-II, MWWT-I, WWC-I, CH
Jennifer	100454	WWC II, WWT I, WD II, WT II
Dave	7040	SWS
Brian	8973	SWS
Jeff	141754	SWS

* WT: Water Treatment

** WD: Water Distribution

*** MWWT: Wastewater Treatment

**** WWC: Wastewater Collection

***** CH: Chlorine Handling

***** SWS: Small Water Systems

***** MUI: Multi Utility


8. Water Conservation

Water is essential to life. We need water to grow food, keep clean, provide power, control fire, and last but not least, we need it to stay alive!

To provide enough clean fresh water for people, water is cleaned at drinking water treatment plants before it is used. And after water is used, it is cleaned again at wastewater treatment plants or by a septic system before being put back into the environment. Saving water is good for the earth, your family and your community.

As part of its Water Conservation Strategy, the RDEK devotes resources to system monitoring and leak detection in all of its water systems. The RDEK has also adopted a Watering Hours Schedule for most of the operated water systems.

Columbia Valley Watering Hours




The Columbia Valley Water Systems have a set outdoor watering schedule. Having set watering hours controls costs, conserves water and creates balance in the system demand. These watering hours are in place for the benefit of your community. Thank you for abiding by them.


Windermere, Timber Ridge, Holland Creek, Edgewater, Spur Valley and East Side Lake Windermere Water Systems 2018 Watering Times

WATERING HOURS

MANUAL SPRINKLERS:




6 AM - 10 AM



7 PM - 11 PM

AUTOMATIC SPRINKLERS:



3 AM - 8 AM

WATERING DAYS

EVEN NUMBER ADDRESSES

(House number ends in 0,2,4,6,8)

Tuesdays, Thursdays, Sundays


ODD NUMBER ADDRESSES

(House number ends in 1,3,5,7,9)

Mondays, Wednesdays, Saturdays

NO WATERING ON FRIDAYS

(to allow reservoirs to replenish for weekend demand)





For more information, contact the RDEK Engineering Services Department at 1-888-478-7335


Moyie Watering Hours

The Moyie Water System has a set outdoor watering schedule. Having set watering hours controls costs, conserves water and creates balance in the system demand. These watering hours are in place for the benefit of your community. Thank you for abiding by them.

Moyie Water System 2018 Watering Times

WATERING HOURS


<u>MANUAL SPRINKLERS:</u>  6 AM - 10 AM	<u>AUTOMATIC SPRINKLERS:</u>  7 PM - 11 PM
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3 AM - 8 AM

WATERING DAYS

Residents living west of Tavistock can water on **EVEN** numbered days and residents east of Tavistock can water on **ODD** numbered days.

NO WATERING ON FRIDAYS
(to allow reservoirs to replenish for weekend demand)



For more information,
contact the RDEK Engineering
Services Department at
1-888-478-7335

Elko Watering Hours

The Elko Water System has a set outdoor watering schedule. Having set watering hours controls costs, conserves water and creates balance in the system demand. These watering hours are in place for the benefit of your community. Thank you for abiding by them.

Elko Water System 2018 Watering Times

WATERING HOURS

<u>MANUAL SPRINKLERS:</u>  6 AM - 10 AM	<u>AUTOMATIC SPRINKLERS:</u>  7 PM - 11 PM
--	---


3 AM - 8 AM

WATERING DAYS

Residents west of Main Street water on **EVEN** numbered days, and residents east of Main Street on **ODD** numbered days.

NO WATERING ON FRIDAYS
(to allow reservoirs to replenish for weekend demand)



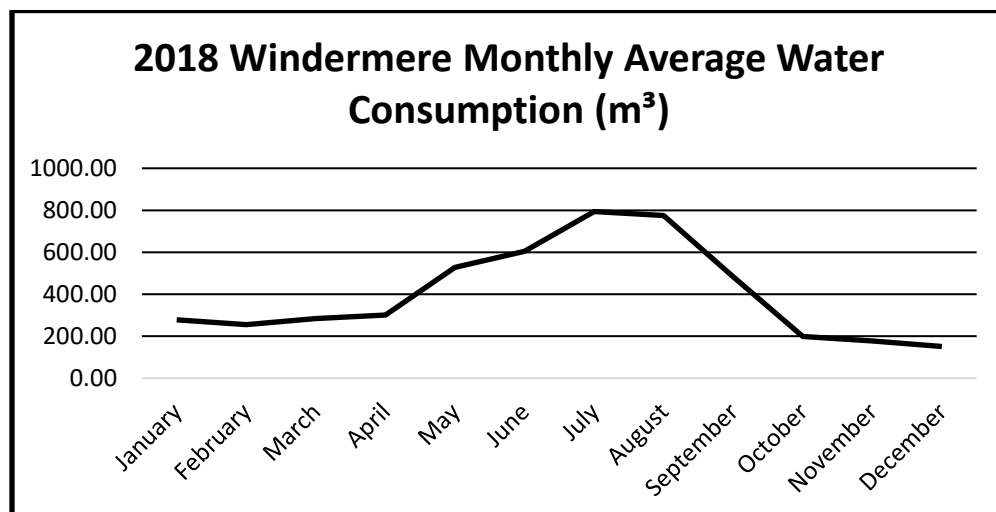
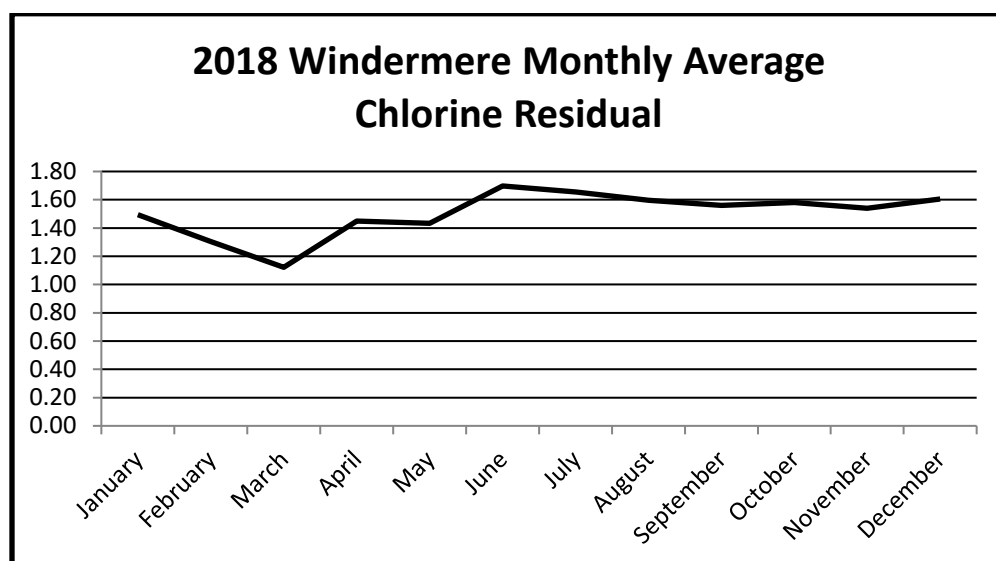
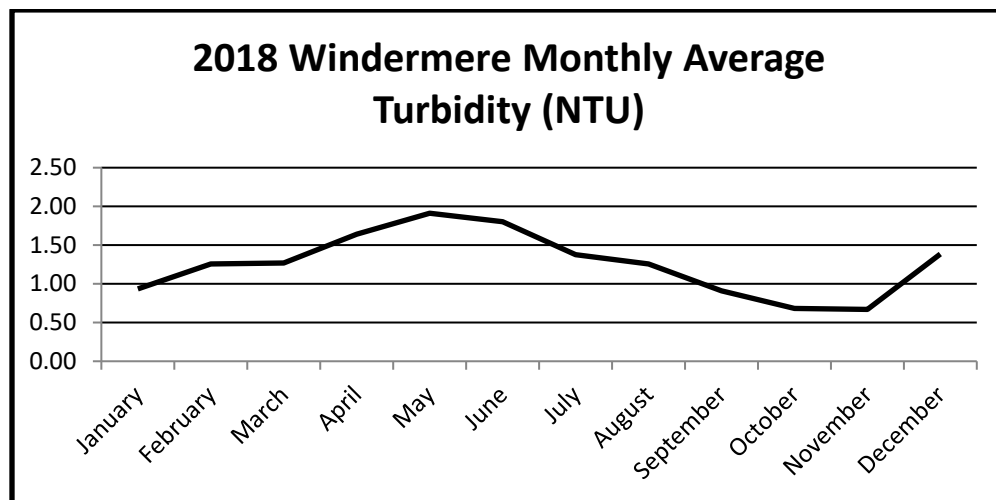
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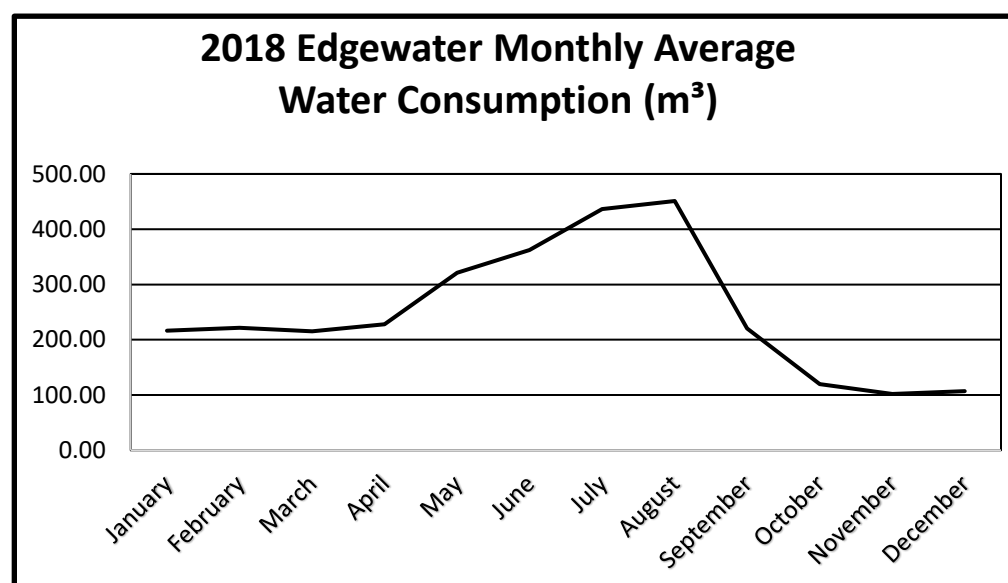
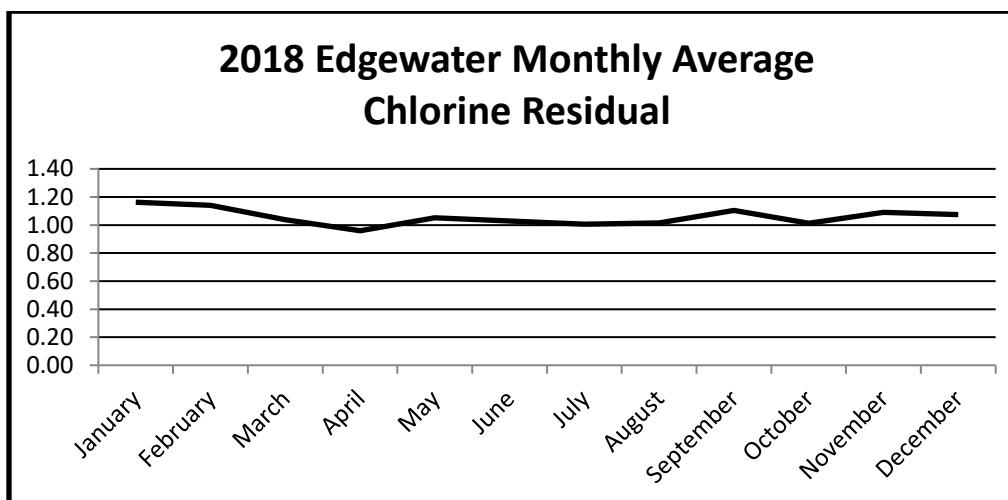
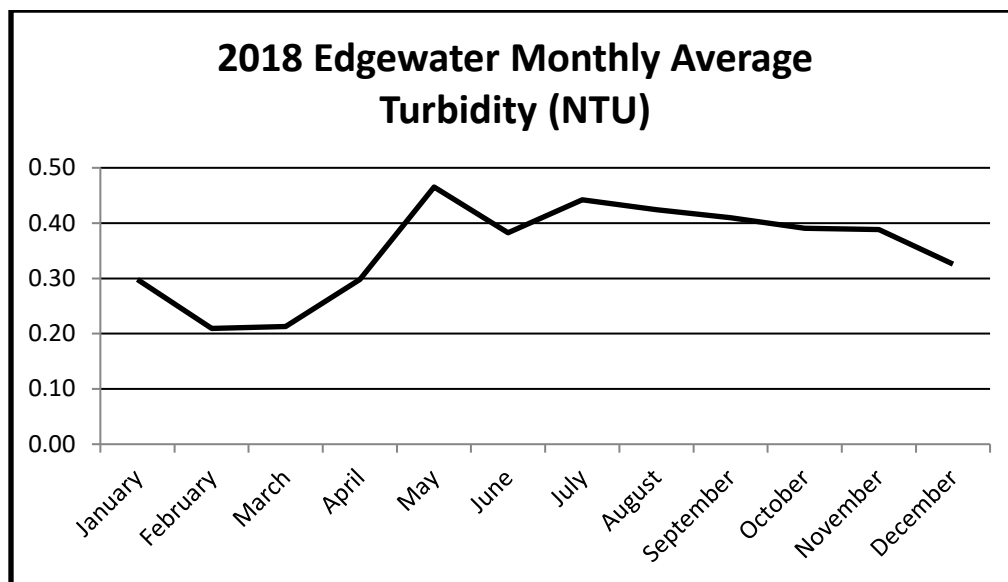
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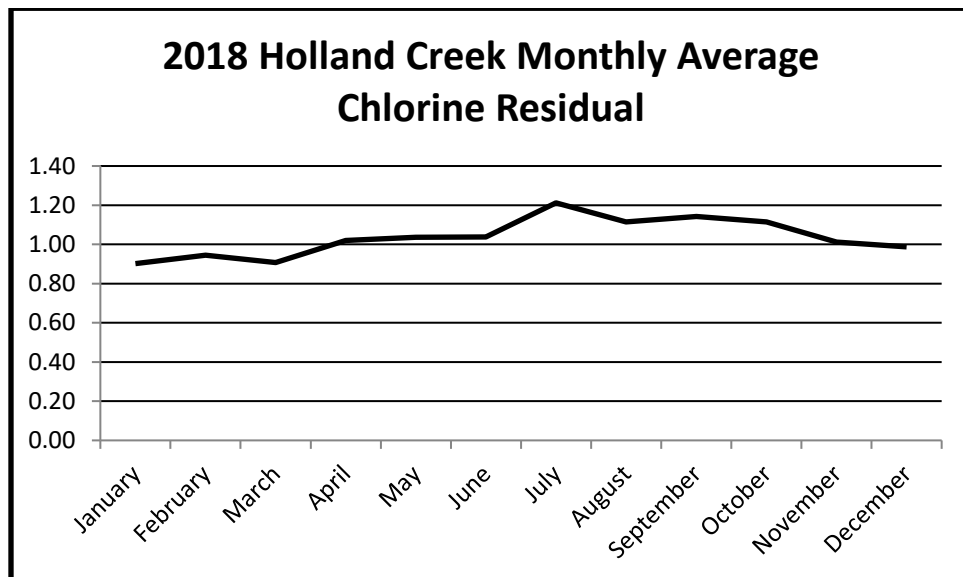
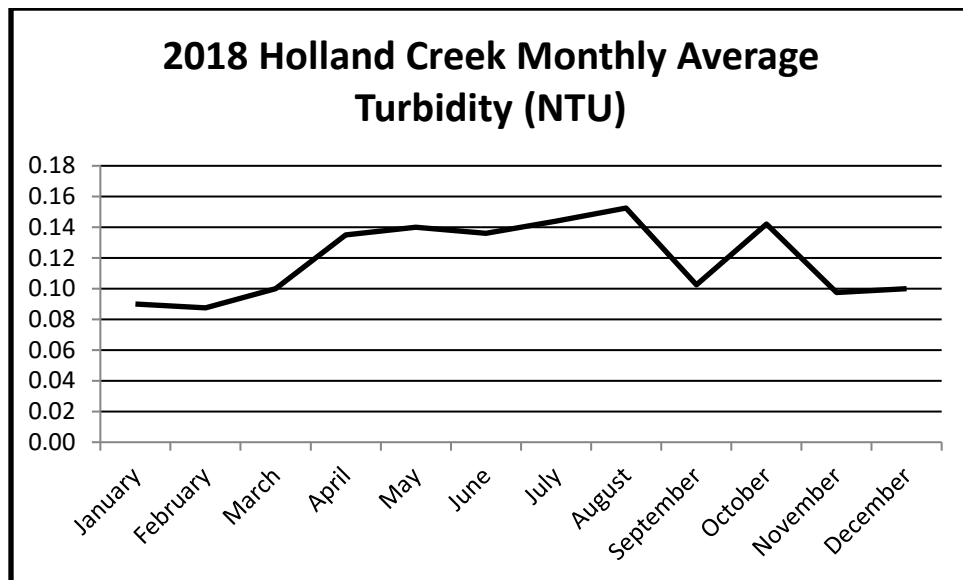
The RDEK is committed to providing safe potable water in as efficient a manner as possible. Working with the IHA to plan for future improvements while facing obstacles as they are presented is a major part of what we do. This report represents a way of communicating facts and keeping the public apprised of what happened in 2018 as well as things to come in the future. We hope it has helped shed some light on current operation processes of our water services in the East Kootenay.

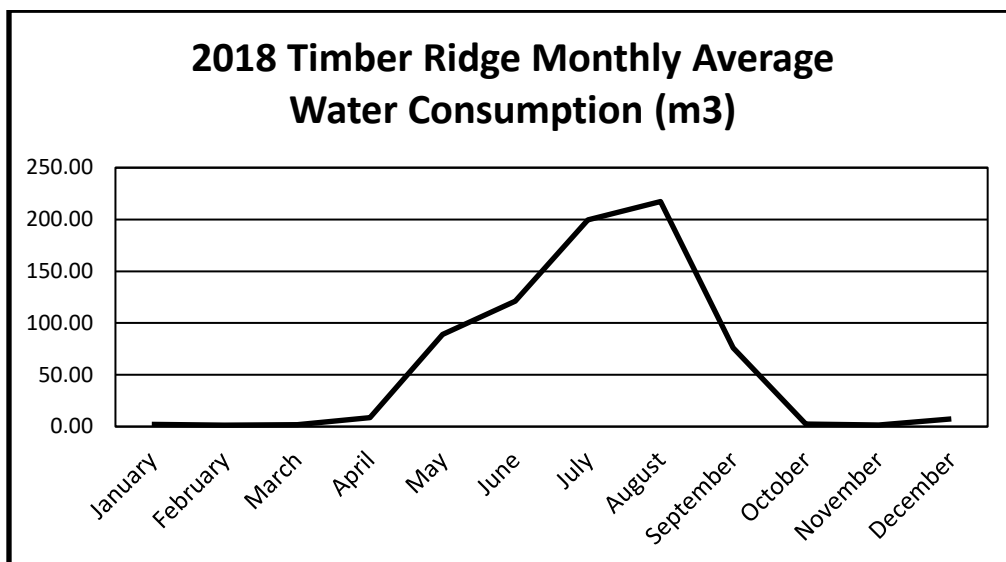
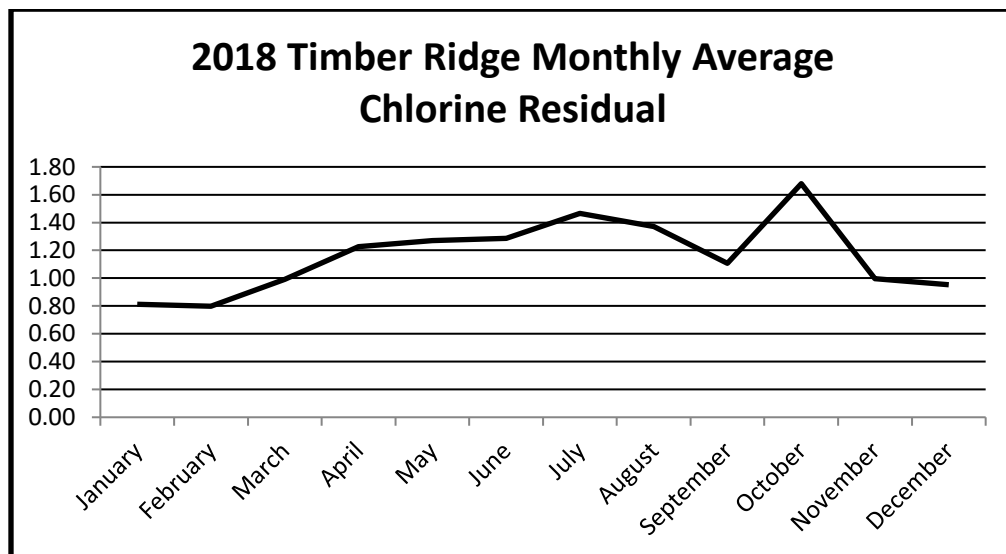
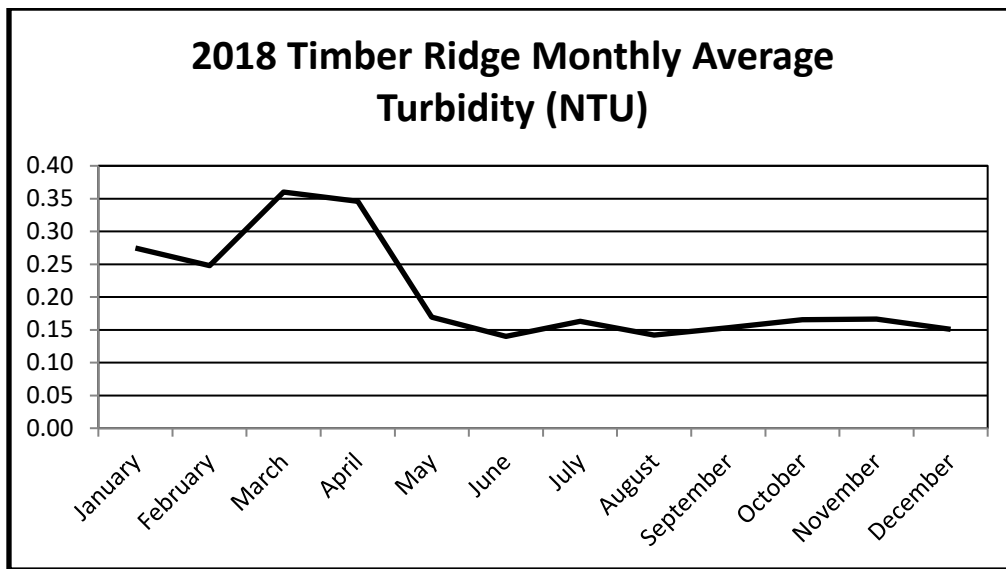
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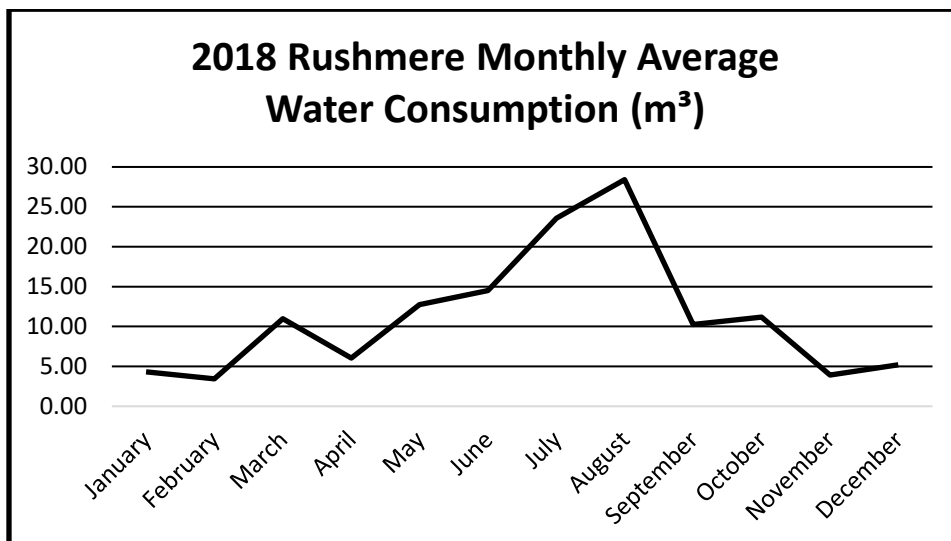
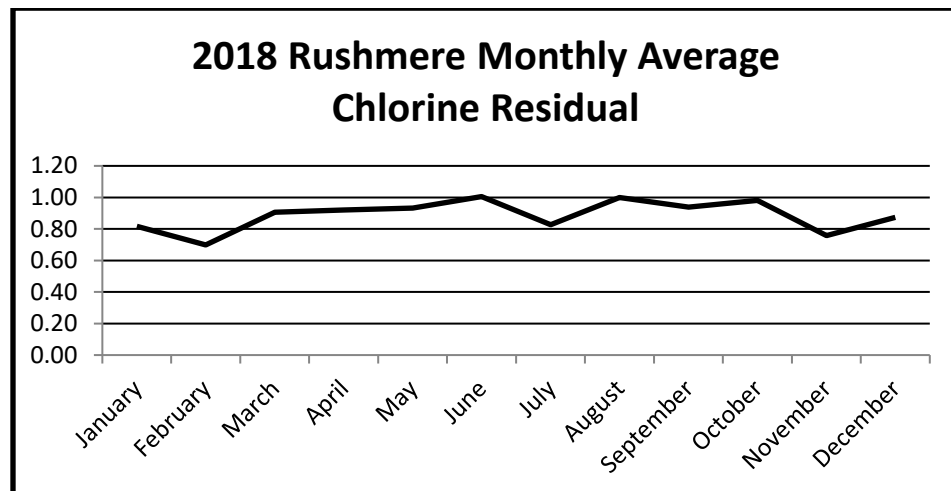
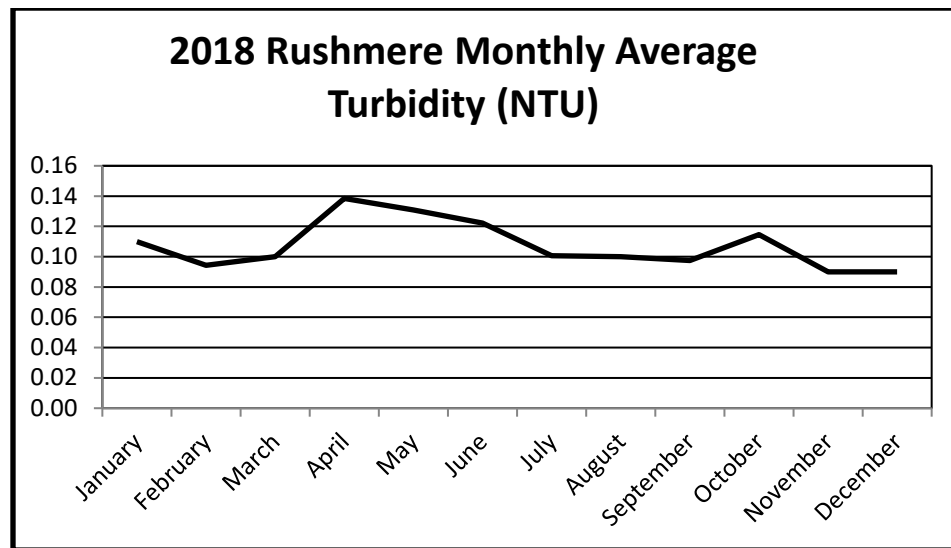
Water System Data

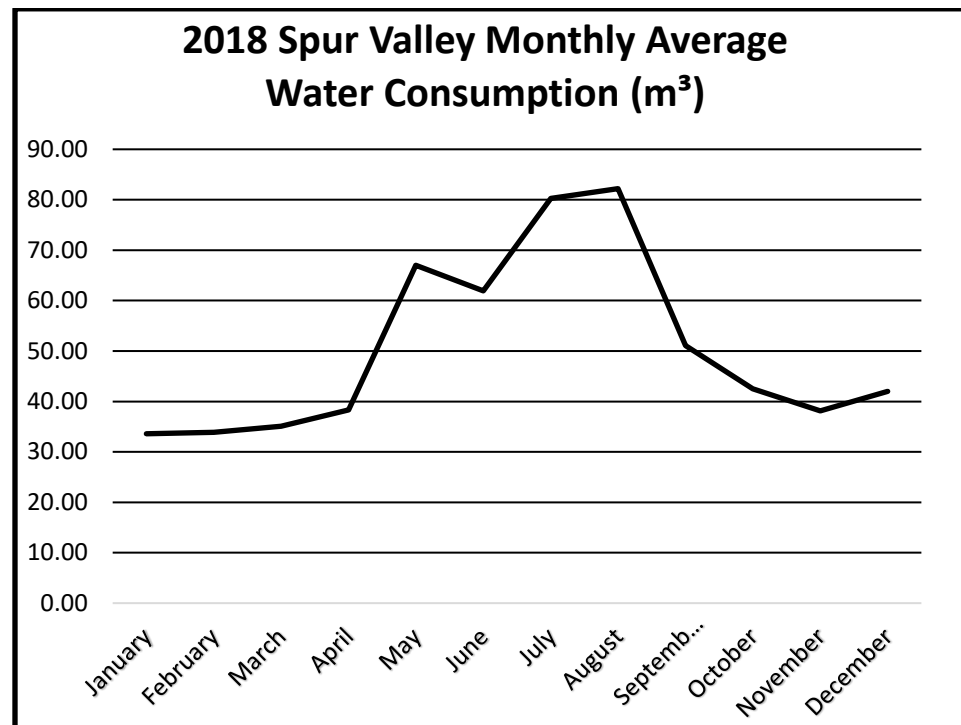
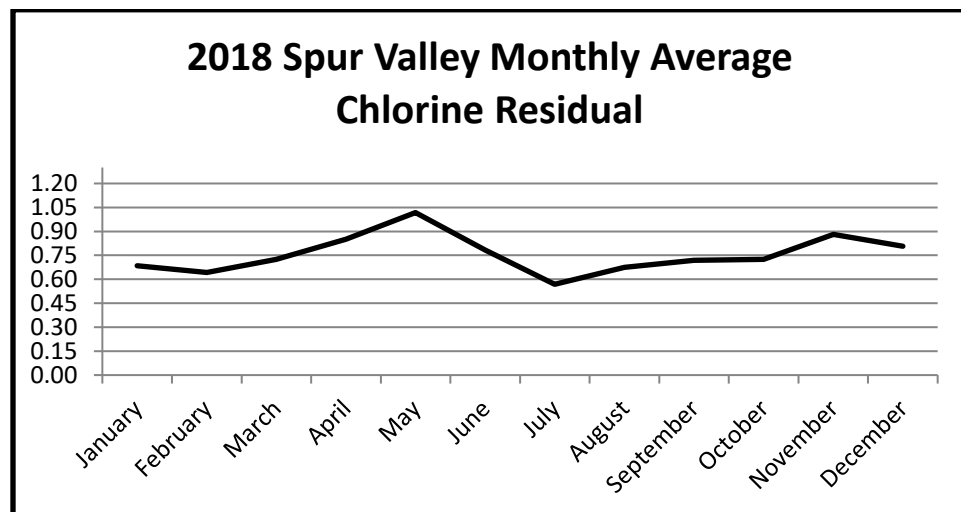
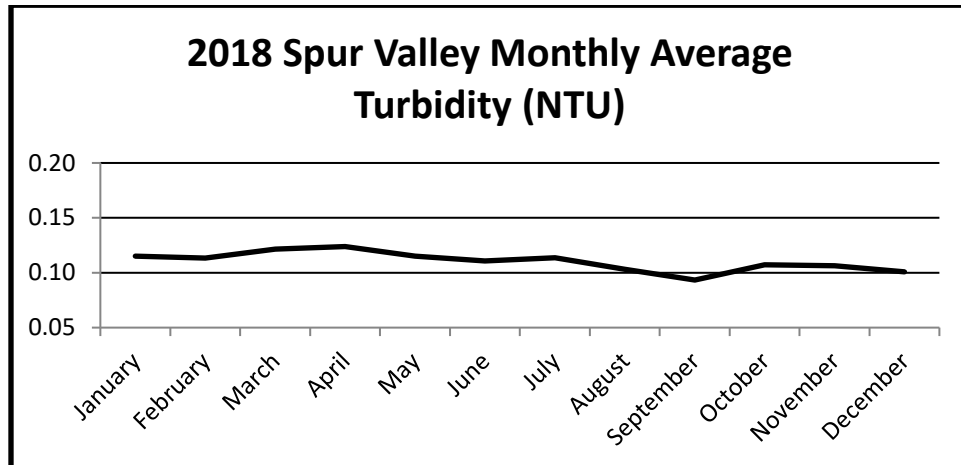


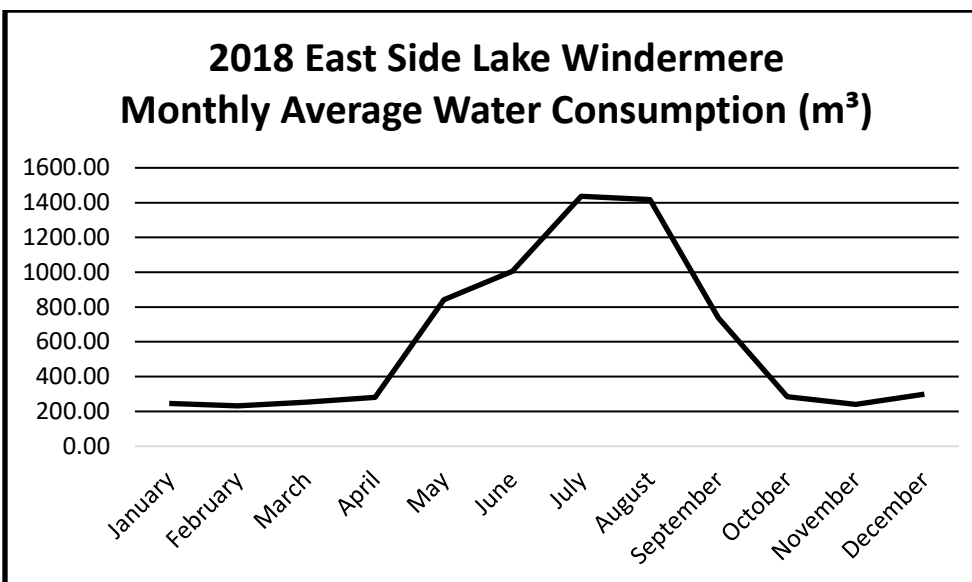
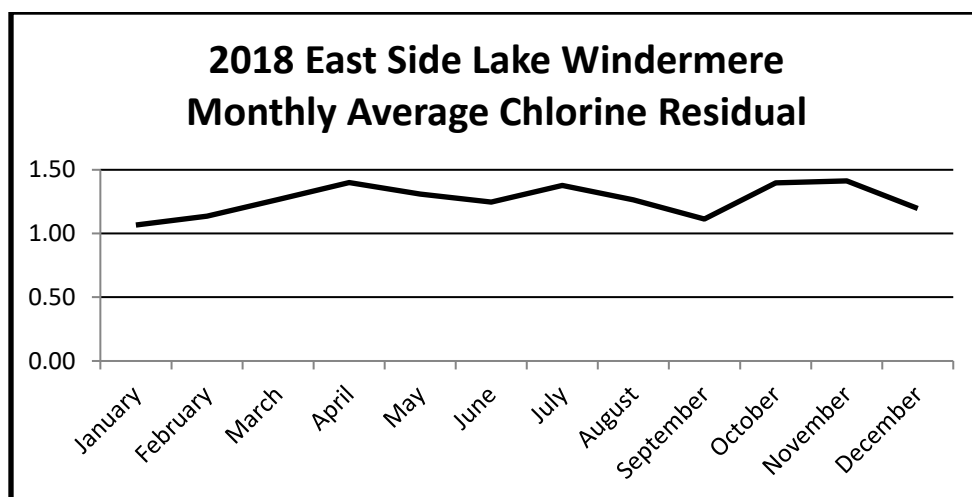
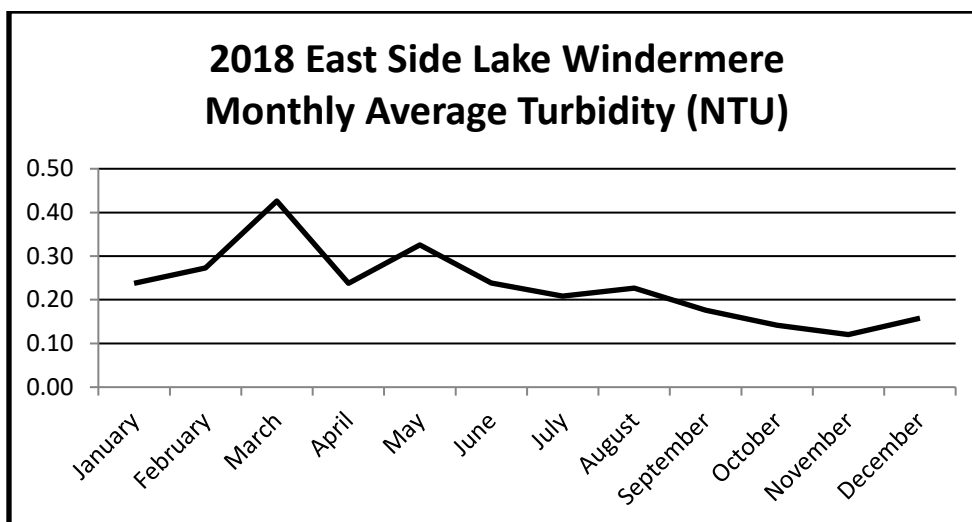












Note: RDEK took over East Side Lake Windermere Water System operation October 1, 2018.
Previous Data supplied by previous operator.