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# Annual Water System Report

## 2019

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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 has certified water operators to ensure systems operations comply with regulations set out by the BC Interior Health Authority (IHA).

WATER SYSTEMS	EOCP #	2019 CONNECTIONS
EAST SIDE LAKE WINDERMERE	1926 & 1927	894
WINDERMERE	1098	632
HOLLAND CREEK	N/A	383
EDGEWATER	649	465
RUSHMERE	1854	36
SPUR VALLEY	2421	73
MOYIE	2742	71
ELKO	2407	62

## 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, 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 objectives 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, the water system's 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:

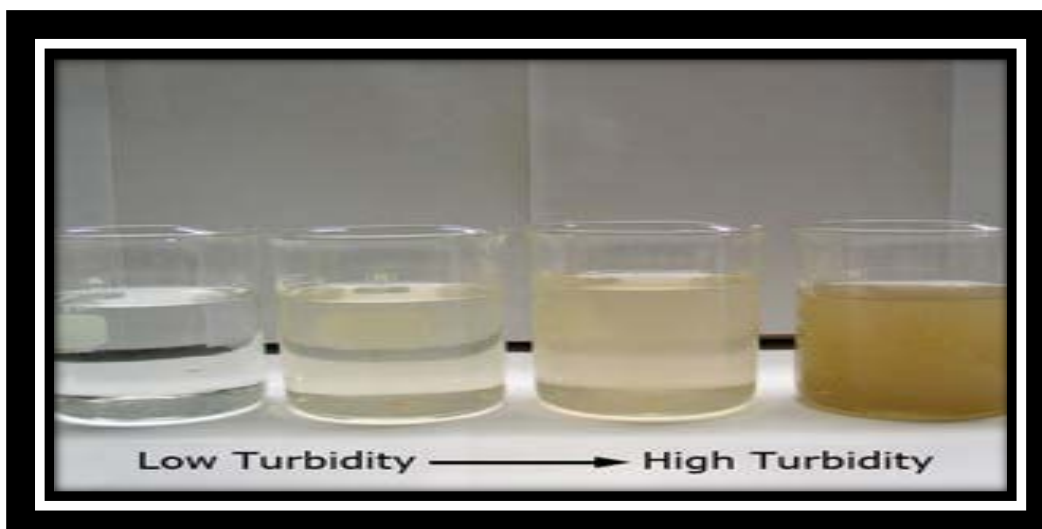
The presence of total coliforms in the water system is an indicator that the system is experiencing re-growth of pathogens, that infiltration has occurred, or that it has not been properly treated at the source. It is an indication that potential exists for bacteria to cause adverse health effects. The 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, 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.



For all of its surface source water systems the RDEK monitors turbidity with continuous monitoring instrumentation and verifies values with daily grab samples, using this- as a basis for determining 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:

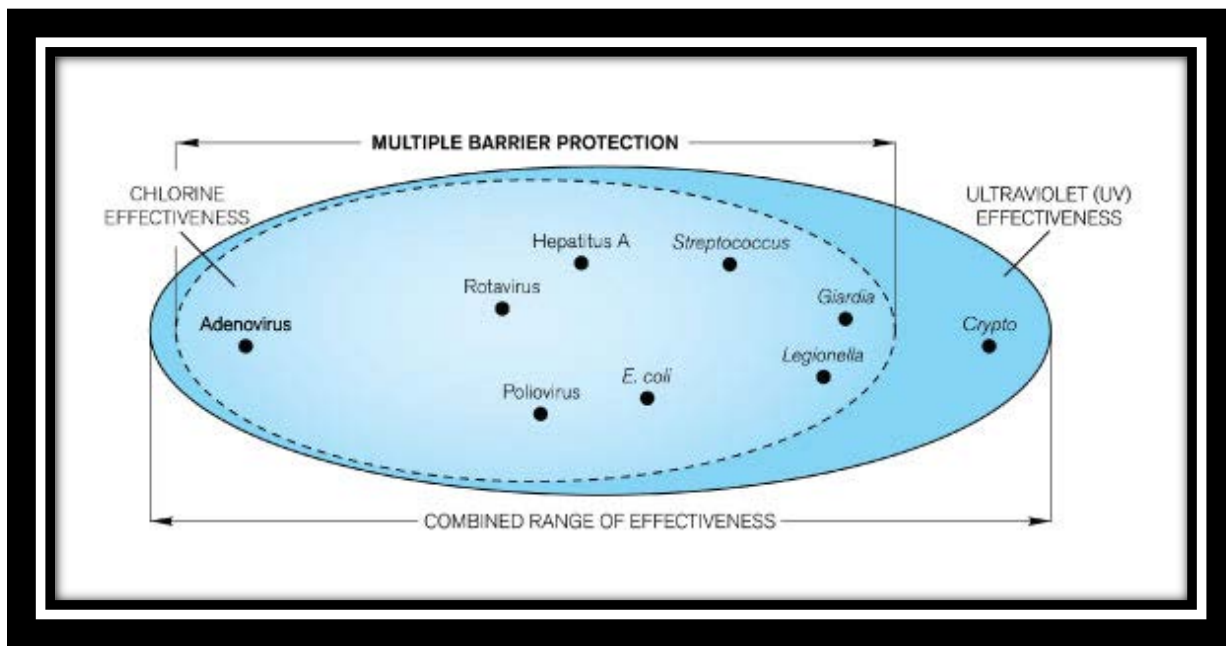
Most RDEK water systems are currently using chlorine to disinfect the water prior to sending it through the distribution system. Maintaining free chlorine residual in all parts of the system is important in keeping the water safe from bacteriological growth and other disease-causing organisms.

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. Testing at remote points of distribution systems is also done routinely.

#### 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 and 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 0.08 mg/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 one result exceeding the Canadian Drinking Water thresholds for THMs in Edgewater in 2019. 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](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](http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/index-eng.php#tech_doc)

\*As per IHA standards, Spur Valley, Moyie, Elko, and Holland Creek are groundwater-sourced systems and 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%
			Windermere	98% <sup>1</sup>
			Edgewater	100%
			Holland Creek	100%
			Timber Ridge	100%
			Rushmere	100%
			Spur Valley	100%
		Monthly	Moyie	91% <sup>1</sup>
			Elko	100%
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% $\geq 0.5\text{mg/L}$
		Five days/week	Windermere	100% $\geq 0.5\text{mg/L}$
			Edgewater	100% $\geq 0.5\text{mg/L}$
			Timber Ridge Distribution	100% $\geq 0.2\text{mg/L}$
		One day/week	Holland Creek Distribution	100% $\geq 0.2\text{mg/L}$
		Three days/week	Rushmere	98.7% $\geq 0.5\text{mg/L}^2$
			Spur Valley	96.8% $\geq 0.5\text{mg/L}^2$
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% $\leq 0.3$ NTU 100% $\leq 1.0$ NTU
		Five days/week	Windermere	80% $\leq 1.0$ NTU 100% $\leq 5.0$ NTU
			Edgewater	97.9% $\leq 1.0$ NTU
			Holland Creek	100% $\leq 0.3$ NTU
			Timber Ridge	98.3% $\leq 0.3$ NTU 100 % $\leq 1.0$ NTU
		Three days/week	Rushmere	100% $\leq 0.30$ NTU
			Spur Valley	100% $\leq 0.30$ NTU
		Total Trihalomethanes	Maximum Allowable Annual Average of 0.1mg/L	Quarterly
Windermere	100%			
Edgewater	75% <sup>3</sup>			
Holland Creek	N/A (groundwater)			
Timber Ridge	100%			
Rushmere	N/A			
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%
			Windermere	100%
			Edgewater	100%
			Holland Creek	N/A (groundwater)
			Timber Ridge	100%
			Rushmere	N/A (small system)
			Spur Valley	N/A (groundwater)
Edgewater Raw Water Monitoring for Filtration Deferral	<u>E. Coli</u> : <10% of samples may exceed 20/100 in any 6 month period	Weekly	Edgewater	100%
	<u>Total Coliform</u> : <10% of samples may exceed 100/100mL in any 6 month period		Edgewater	68%<100/100mL <sup>4</sup>
	<u>Turbidity</u> : <1 NTU		Edgewater	97.9%

<sup>1</sup> One positive test for coliform. Retest was negative

<sup>2</sup> 100% > 0.02 mg/L residual in distribution

<sup>3</sup> One THM test result of 0.116 therefore flushing frequency increased. Annual average = 0.075

<sup>4</sup> 16/50 untreated samples ≥ 100/100 mL

Please see Appendix A for monthly turbidity, chlorine residual, and consumption data for each system graphed over time.

## 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/	Lake Windermere	Pumped/ Gravity	Flocculation & Filtration, Chlorine & UV disinfection	5	962m <sup>3</sup>	Yes
Windermere	Lake Windermere	Pumped/ Gravity	Chlorine disinfection	2	Concrete 1250m <sup>3</sup> & 1600m <sup>3</sup>	Yes
Edgewater	Lake Baptiste	Gravity	Chlorine & UV disinfection	3	Steel 800m <sup>3</sup> & 400m <sup>3</sup>	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 <sup>3</sup>	No <sup>1</sup>
Spur Valley	Groundwater Well	Pumped/ Gravity	Chlorine disinfection	0	Concrete 125m <sup>3</sup> & 222m <sup>3</sup>	Yes <sup>2</sup>
Moyie	Groundwater Well	Pumped/ Gravity	No treatment or disinfection	0	Concrete 71m <sup>3</sup>	No
Elko	Groundwater Well	Pumped	No treatment or disinfection	0	No storage	No

<sup>1</sup>Fire protection by tender only

<sup>2</sup>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.

#### 2019 Events and System Improvements:

- New coagulant storage tank installed at WTP
- All UV bulbs and 1 wiper switch assembly replaced
- Generator at WTP repaired
- Storage Compound fencing behind WTP completed
- EOCP classification review completed for WTP
- Advised many customers about watering restrictions not being followed
  - Notices handed out along with personal dialogue

#### 2020 Plans:

- Complete connection to Windermere project
- Construct Swansea Road and Timber Ridge watermain loop for improved system pressure and operation
- Upgrade lake intake and WTP pumping capacity
- Clean 940 Reservoir and clear well
- Improve and upgrade SCADA remote monitoring

### 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 that is located beside the Windermere Public Beach. During this transfer, chlorine gas is used to disinfect the water. It is then pumped to the distribution system and across Highway 93/95 to 1250m<sup>3</sup> and 1600m<sup>3</sup> concrete reservoirs. This process is monitored using instrumentation and alarm dialers to notify operators of problems. These sites are frequented 5 days per week and processes are verified and recorded

#### 2019 Events and System Improvements:

- 4 fire hydrants replaced
- Distribution upgrades completed to improve fire flows
- Some leaks in PRVs found and repaired
- Leak on Reservoir recirculation/sample line repaired

#### 2020 Plans:

- Complete connection to East Side Lake Windermere WTP treated water and remove Water Quality Advisory
- Decommission Lake Windermere intake and chlorination station
- Continue distribution watermain upgrades in older parts of community



### 6.3 Edgewater Water System:

The source water intake for Edgewater is located in Lake Baptiste, approximately two kilometers southeast of the community. Edgewater water is disinfected with both UV and chlorine and is stored at the Hewitt Road reservoirs that provide 1200m<sup>3</sup> 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.

#### 2019 Events and System Improvements:

- Substantial leaks discovered and repaired
- Lake Baptiste Siphon line recharge assembly installed near lake
- Lake Baptiste Dam upgrades completed
- Watermain extension to property on Edgewater South Approach Road completed
- Water Quality Advisory in place for a time due to turbidity above 1.0 NTU (August)

#### 2020 Plans:

- Safety upgrades to 2 Pressure Reducing Valve vaults
- Noxious weed and vegetation control on siphon line from Lake Baptiste to the Water Treatment Plant
- Completion of hydraulic model for water distribution system

### 6.4 Holland Creek Water System:

The community is supplied with potable water by Kinbasket Water & Sewer Company (KWSC). The well-sourced water is chlorinated to protect against contamination within the distribution system. The Holland Creek system has no reservoirs – all storage is provided by KWSC.

#### 2019 Events and System Improvements:

- Isolation valves and drains installed on either side of Pressure Reducing Valve station

#### 2020 Plans:

- Possible expansion of Service Area to Athalmer Corridor
- Inoperable water valve replacement

### 6.5 Rushmere Water System:

The Rushmere water system draws raw water from Lake Windermere and is treated by way of a small membrane filtration treatment plant. Treated water is stored within the plant and pumped to the community using two variable frequency drive distribution pumps. 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. The Rushmere water system is primarily for domestic use with some lawn and garden sprinkling. There is no fire protection via fire hydrants.

#### 2019 Events and System Improvements:

- Annual filter membranes clean-in-place completed
- 2 distribution check valves replaced due to failure

#### 2020 Plans:

- Raw water lake intake screen cleaning
- Raw water wet well cleaning



### 6.6 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 as it leaves the well 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.

#### 2019 Events and System Improvements:

- Water loss survey undertaken with result of 2 illegal connections found and 3 curbstops repaired
- Chlorine pump at pumphouse rebuilt

#### 2020 Plans:

- Ongoing pursuit of unaccounted-for consumption (leakage, unmetered services, etc) in system

### 6.7 Moyie Water System:

Moyie water is pumped from a 57m deep well to a 71m<sup>3</sup> reservoir that maintains the pressure in the distribution system. The water is not chlorinated. RDEK operators are on site 2 times per week to ensure proper operation and perform monthly bacteriological sampling. The pumphouse is also outfitted with automatic alarm dialers to alert staff of any problems.

#### 2019 Events and System Improvements:

- A gasket failure in pumphouse led to manual operation of pump for several days and replacement of some electrical and electronic equipment
- System flow meter failure and rebuild
- Addition of watermain valve at Queens and Hwy 3 for system operation

#### 2020 Plans:

- Ongoing leak detection
- Reservoir cleaning
- Valve repair or new valve at reservoir

### 6.8 Elko Water System:

The community of Elko receives raw water from a well located near the pumphouse. 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. There is no chlorination in Elko.

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

#### 2019 Events and System Improvements:

- Pumphouse roof and gable upgrades
- Curb stop valve riser and stem replaced at Sheridan and Proctor

#### 2020 Plans:

- Pumphouse emergency lighting
- Raw water chemical test



## 7. Operator Certification

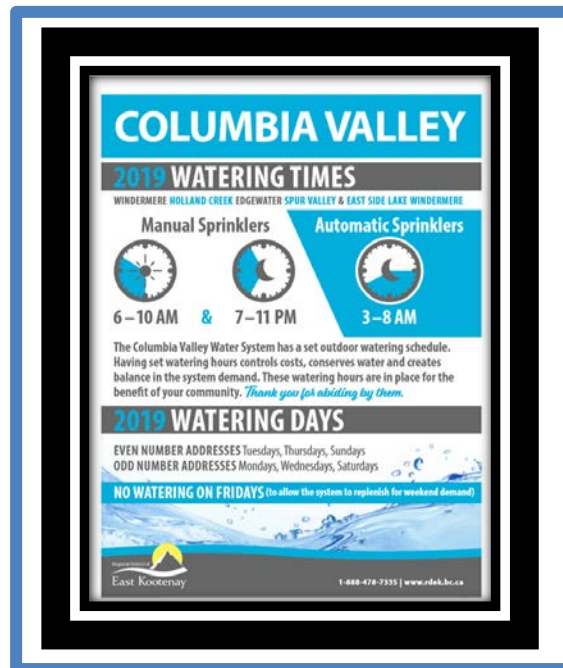
EOCP Certifications		
Employee	Certification #	Level
Norm Thies	6330	WT-III, WD-II MWWT-I, WWC-II, CH
Paul Oaks	6500	WT-I, WD-II, MWWT-I, WWC-I, CH
Krista Goodman	7969	WT-I, WD-MUII, MWWT-MUII, WWC-I, CH
Jennifer Bartsch	100454	WWC II, WWT I, WD II, WT II
Jim Ralph	3389	WT-III, WD-III, MWWT-II, WC-I, CH
Dave Berger	7040	SWS
Brian De Paoli	8973	SWS
Jeff Nicholajsen	141754	SWS

- WT: Water Treatment
- WD: Water Distribution
- MWWT: Wastewater Treatment
- WWC: Wastewater Collection
- CH: Chlorine Handling
- SWS: Small Water Systems
- MUII: Multi Utility



## 8. Water Conservation

The RDEK has several parts to its Water Conservation Strategy. We have adopted scheduled watering hours for most of the operated water systems (see below). We encourage the use of low-flow fixtures in new construction. Our operators diligently monitor our systems for problems and routinely check for un-accounted for consumption like leaks or unmetered use.



**COLUMBIA VALLEY**  
**2019 WATERING TIMES**  
WINDERMERE HOLLAND CREEK EDGEWATER SPIR VALLEY & EAST SIDE LAKE WINDERMERE

**Manual Sprinklers**      **Automatic Sprinklers**


6-10 AM & 7-11 PM      3-8 AM

The Columbia Valley 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.*

**2019 WATERING DAYS**  
EVEN NUMBER ADDRESSES Tuesdays, Thursdays, Sundays  
ODD NUMBER ADDRESSES Mondays, Wednesdays, Saturdays

**NO WATERING ON FRIDAYS** (to allow the system to replenish for weekend demand)

East Kootenay      1-888-478-7335 | www.rdek.bc.ca



**ELKO**  
**2019 WATERING TIMES**

**Manual Sprinklers**      **Automatic Sprinklers**

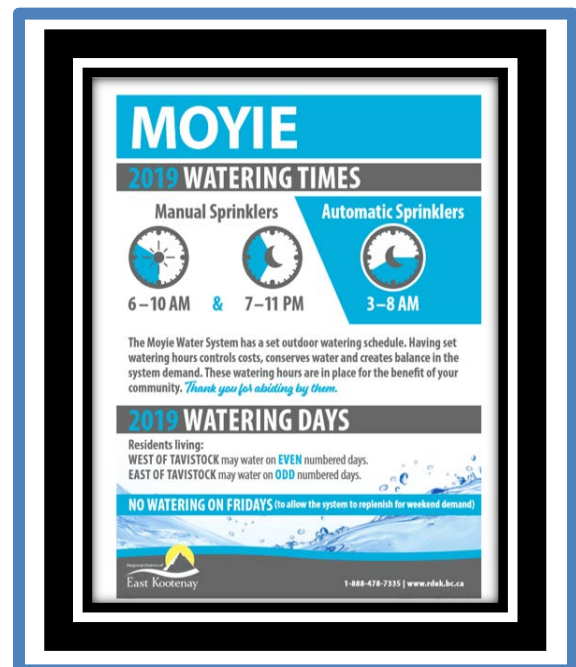
6-10 AM & 7-11 PM      3-8 AM

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.*

**2019 WATERING DAYS**  
Residents living:  
WEST OF MAIN STREET may water on **EVEN** numbered days.  
EAST OF MAIN STREET may water on **ODD** numbered days.

**NO WATERING ON FRIDAYS** (to allow the system to replenish for weekend demand)

East Kootenay      1-888-478-7335 | www.rdek.bc.ca



**MOYLE**  
**2019 WATERING TIMES**

**Manual Sprinklers**      **Automatic Sprinklers**

6-10 AM & 7-11 PM      3-8 AM

The Moyle 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.*

**2019 WATERING DAYS**  
Residents living:  
WEST OF TAVISTOCK may water on **EVEN** numbered days.  
EAST OF TAVISTOCK may water on **ODD** numbered days.

**NO WATERING ON FRIDAYS** (to allow the system to replenish for weekend demand)

East Kootenay      1-888-478-7335 | www.rdek.bc.ca



## 9. Summary

The RDEK is committed to providing safe potable water to the public by working with IHA and maintaining standards set by Canadian Drinking Water Guidelines. This report represents a way of communicating facts and keeping the public apprised of the operational processes of the RDEK's water systems in the East Kootenay.



**Appendix A**

**Monthly Turbidity, Chlorine Residual, and Total System Consumption**

