REGIONAL DISTRICT OF CENTRAL KOOTENAY

# Annual Report of Monitoring
# Lister Water System

*Environmental Services - Utilities*

Developed in accordance with the
*British Columbia Drinking Water Protection Act*



**Created by:** Shari Imada
**Date:** September 2018

| LISTER WATER SYSTEM | |
|---|---|
| Period of Monitoring Covered by this Report: | January 1 - December 31, 2017 |
| Interior Health Permit to Operate Facility Number: | 12-098-00372 |
| EOCP Classification: | SWS |
| IHA Permit: | Drinking Water System 15 - 300 Connections |
| Location of Water Supply System: | Lister, BC |

**Contact Information:**
Regional District of Central Kootenay
Box 590, 202 Lakeside Drive
Nelson, BC V1L 5R4
Ph: (250) 352-6665
Email: WaterContact@rdck.bc.ca

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# 1. Bacteriological Monitoring

Lister Water System's water source is a groundwater well. A reservoir commissioned in late 2013 combined with chlorine disinfection continues to be effective for improved water quality in the Lister system.

Water is sampled regularly in the reservoir and locations within the distribution system. There were no adverse water sample results in 2017.

# 2. Chlorine Residual Monitoring

The Lister treatment system includes handheld chlorine residual monitoring at the reservoir. A summary of chlorine residual information is included in Appendix A. The Regional District targets a minimum of chlorine residual of 0.2 mg/L (CT) as complete loss of residual would result in a water quality concern. In 2017, the chlorine residual consistently remained over the CT level.

# 3. Other Sampling

A full parameter (comprehensive) sample was taken from on June 13, 2017. The results which are presented in Appendix B show that water quality in the Lister system meets the *Guidelines for Canadian Drinking Water Quality*.

# 4. Planned Improvements

## 4.1 Steps Taken to Address Adverse Sample Results

There were no adverse sample results in 2017.

## 4.2 Improvements Required by Operating Permit or Drinking Water Officer

There are no improvements required on the Interior Health Issued Operating Permit.

## 4.3 Additional Improvement Plans

There is currently a backlog of approximately $3.2 million in water line replacements identified in asset management planning. An assessment study will be undertaken in 2018-2019 to determine long term asset replacement and an upgrade schedule.

# 5. Water Conservation

Mandatory stage 1 water conservation measures are in place from June 1 to September 30 every year. In Stage 1 measures, watering lawns, gardens, trees and shrubs is permitted only from 7pm to 10am daily. Watering using drip irrigation, a watering can or a hand held hose is permitted anytime.

# 6. Training and Certification

| OPERATOR | ACTIVE EOCP LEVELS |
|---|---|
| Robin L. Douville | CH, WT-II, WD-II |
| Cody Peck | CH, WT-II, WD-II |
| Evan Bjarnason | CH, WT-II, WD-II |

# 7. Emergency Response Plan

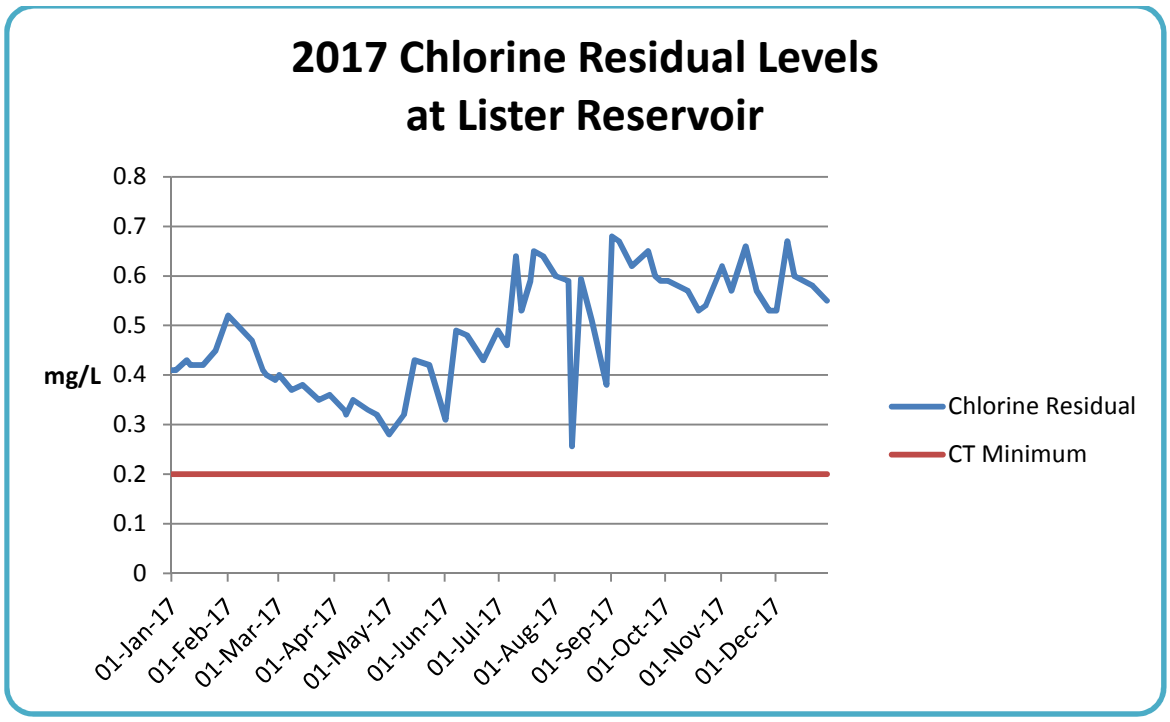
An Emergency Response Plan has been developed for the Lister Water System. The plan includes emergency contact information, a communications plan, and detailed procedures for the following types of incidents:

- broken water main;
- source contamination;
- elevated turbidity levels in treated water;
- fire in a building;
- flood conditions;
- loss of source;
- presence of coliforms or E. coli;
- pump failure; and
- power failure.

# 8. Wellhead Protection Plan

Having a wellhead protection plan is good practice. A comprehensive plan has not yet been developed but the wellheads are protected from flooding.

# Appendix A: Chlorine Residual Monitoring



# Appendix B: Comprehensive Water Quality Analysis

**Comprehensive Sample taken on June 13, 2017**

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **REPORTED TO** | Regional District of Central Kootenay - Erickson<br>531B 16th Ave. South<br>CRESTON, BC V0B 1G5 | **TEL**<br>**FAX** | 1-250-428-3567<br>- |
| **ATTENTION** | Robin Douville | **WORK ORDER** | 7061219 |
| **PO NUMBER** | RDCK- Erickson | **RECEIVED / TEMP** | 2017-06-14 11:15 / 10°C |
| **PROJECT** | Lister RDCK Water Service | **REPORTED** | 2017-06-21 |
| **PROJECT INFO** | | **COC NUMBER** | B36262 |

**General Comments:**

CARO Analytical Services employs methods which are conducted according to procedures accepted by appropriate regulatory agencies, and/or are conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts, except where otherwise agreed to by the client.

The results in this report apply to the samples analyzed in accordance with the Chain of Custody or Sample Requisition 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.

Authorized By: **Kristin McKeown**
Account Manager

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

# ANALYSIS INFORMATION

| | | | |
|---|---|---|---|
| **REPORTED TO** | Regional District of Central Kootenay - Erickson | **WORK ORDER** | 7061219 |
| **PROJECT** | Lister RDCK Water Service | **REPORTED** | 2017-06-21 |

| Analysis Description | Method Reference | Technique | Location |
|---|---|---|---|
| Alkalinity in Water | APHA 2320 B* | Titration with H2SO4 | Kelowna |
| Anions by IC in Water | APHA 4110 B | Ion Chromatography with Chemical Suppression of Eluent Conductivity | Kelowna |
| Coliforms, Total (MF-CCA) in Water | APHA 9222* | Membrane Filtration / Incubation on Chromocult Agar | Kelowna |
| Colour, True in Water | APHA 2120 C | Spectrophotometry (456 nm) | Kelowna |
| Conductivity in Water | APHA 2510 B | Conductivity Meter | Kelowna |
| Cyanide, SAD in Water | ASTM D7511-12 | Flow Injection Analysis with In-Line Ultraviolet Digestion and Amperometric Detection | Kelowna |
| E. coli (MF-CCA) in Water | APHA 9222* | Membrane Filtration / Incubation on Chromocult Agar | Kelowna |
| Hardness (as CaCO3) in Water | APHA 2340 B* | Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Estimated) | N/A |
| Langelier Index in Water | APHA 2330 B | Calculation | N/A |
| Mercury, total by CVAFS in Water | EPA 245.7* | BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS) | Richmond |
| pH in Water | APHA 4500-H+ B | Electrometry | Kelowna |
| Solids, Total Dissolved (calc) in Water | APHA 1030 E | Calculation: 100 x ([Cations]-[Anions])/ ([Cations]+[Anions]) | N/A |
| Temperature (lab) in Water | APHA 2550 B | Thermometer | Kelowna |
| Total Metals by ICPMS in Water | APHA 3030 E* / APHA 3125 B | HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma Mass Spectrometry (ICP-MS) | Richmond |
| Trihalomethanes in Water | EPA 5030B / APHA 6200 B | Purge&Trap / Purge and Trap Capillary Column GC-MSD | Richmond |
| Turbidity in Water | APHA 2130 B | Nephelometry | Kelowna |

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

**Method Reference Descriptions:**

| | |
|---|---|
| APHA | Standard Methods for the Examination of Water and Wastewater, 22nd Edition, American Public Health Association/American Water Works Association/Water Environment Federation |
| ASTM | ASTM International Test Methods |
| EPA | United States Environmental Protection Agency Test Methods |

**Glossary of Terms:**

| | |
|---|---|
| MRL | Method Reporting Limit |
| < | Less than the Reported Detection Limit (RDL) - the RDL may be higher than the MRL due to various factors such as dilutions, limited sample volume, high moisture, or interferences |
| AO | Aesthetic objective |
| MAC | Maximum acceptable concentration (health based) |
| OG | Operational guideline (treated water) |
| °C | Degrees Celcius |
| CFU/100 mL | Colony Forming Units per 100 millilitres |
| CU | Colour Units (referenced against a platinum cobalt standard) |
| mg/L | Milligrams per litre |
| NTU | Nephelometric Turbidity Units |
| pH units | pH < 7 = acidic, ph > 7 = basic |
| µS/cm | Microsiemens per centimetre |

# ANALYSIS INFORMATION

| | | | |
|---|---|---|---|
| **REPORTED TO** | Regional District of Central Kootenay - Erickson | **WORK ORDER** | 7061219 |
| **PROJECT** | Lister RDCK Water Service | **REPORTED** | 2017-06-21 |

**Standards / Guidelines Referenced in this Report:**

Guidelines for Canadian Drinking Water Quality (Feb 2017)

Website: http://www.hc-sc.gc.ca/ewh-semt/alt_formats/pdf/pubs/water-eau/sum_guide-res_recom/sum_guide-res_recom-eng.pdf

***Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user***

CARO ANALYTICAL SERVICES

# SAMPLE ANALYTICAL DATA

**REPORTED TO** Regional District of Central Kootenay - Erickson
**PROJECT** Lister RDCK Water Service

**WORK ORDER** 7061219
**REPORTED** 2017-06-21

| Analyte | Result / *Recovery* | Standard / Guideline | MRL / *Limits* | Units | Prepared | Analyzed | Notes |
|---|---|---|---|---|---|---|---|
| **Sample ID: Lister Reservoir Discharge (7061219-01) [Water] Sampled: 2017-06-13 09:30** | | | | | | | |
| ***Anions*** | | | | | | | |
| Chloride | **0.79** | AO ≤ 250 | 0.10 | mg/L | N/A | 2017-06-15 | |
| Fluoride | < 0.10 | MAC = 1.5 | 0.10 | mg/L | N/A | 2017-06-15 | |
| Nitrate (as N) | **0.195** | MAC = 10 | 0.010 | mg/L | N/A | 2017-06-15 | |
| Nitrite (as N) | < 0.010 | MAC = 1 | 0.010 | mg/L | N/A | 2017-06-15 | |
| Sulfate | **7.7** | AO ≤ 500 | 1.0 | mg/L | N/A | 2017-06-15 | |
| ***General Parameters*** | | | | | | | |
| Alkalinity, Total (as CaCO3) | **54.2** | N/A | 2.0 | mg/L | N/A | 2017-06-15 | |
| Alkalinity, Phenolphthalein (as CaCO3) | < 1.0 | N/A | 2.0 | mg/L | N/A | 2017-06-15 | |
| Alkalinity, Bicarbonate (as CaCO3) | **54.2** | N/A | 2.0 | mg/L | N/A | 2017-06-15 | |
| Alkalinity, Carbonate (as CaCO3) | < 1.0 | N/A | 2.0 | mg/L | N/A | 2017-06-15 | |
| Alkalinity, Hydroxide (as CaCO3) | < 1.0 | N/A | 2.0 | mg/L | N/A | 2017-06-15 | |
| Colour, True | < 5.0 | AO ≤ 15 | 5.0 | CU | N/A | 2017-06-16 | |
| Conductivity (EC) | **128** | N/A | 2.0 | µS/cm | N/A | 2017-06-15 | |
| Cyanide, Total | < 0.0020 | MAC = 0.2 | 0.0020 | mg/L | N/A | 2017-06-15 | |
| pH | **7.68** | 7-10.5 | 0.01 | pH units | N/A | 2017-06-15 | HT2 |
| Temperature, at pH | **20** | N/A | | °C | N/A | 2017-06-15 | HT2 |
| Turbidity | **0.31** | OG < 0.1 | 0.10 | NTU | N/A | 2017-06-14 | |
| ***Calculated Parameters*** | | | | | | | |
| Total Trihalomethanes | < 0.00400 | MAC = 0.1 | 0.00400 | mg/L | N/A | N/A | |
| Hardness, Total (as CaCO3) | **53.2** | N/A | 0.500 | mg/L | N/A | N/A | |
| Langelier Index | **-0.8** | N/A | -5.0 | - | N/A | 2017-06-21 | |
| Solids, Total Dissolved (calc) | **66.4** | N/A | 1.00 | mg/L | N/A | N/A | |
| ***Total Metals*** | | | | | | | |
| Aluminum, total | **0.0199** | OG < 0.1 | 0.0050 | mg/L | 2017-06-15 | 2017-06-15 | |
| Antimony, total | < 0.00010 | MAC = 0.006 | 0.00010 | mg/L | 2017-06-15 | 2017-06-15 | |
| Arsenic, total | **0.00756** | MAC = 0.01 | 0.00050 | mg/L | 2017-06-15 | 2017-06-15 | |
| Barium, total | < 0.0050 | MAC = 1 | 0.0050 | mg/L | 2017-06-15 | 2017-06-15 | |
| Boron, total | **0.017** | MAC = 5 | 0.004 | mg/L | 2017-06-15 | 2017-06-15 | |
| Cadmium, total | < 0.000010 | MAC = 0.005 | 0.000010 | mg/L | 2017-06-15 | 2017-06-15 | |
| Calcium, total | **18.2** | N/A | 0.20 | mg/L | 2017-06-15 | 2017-06-15 | |
| Chromium, total | < 0.00050 | MAC = 0.05 | 0.00050 | mg/L | 2017-06-15 | 2017-06-15 | |
| Cobalt, total | < 0.00010 | N/A | 0.00010 | mg/L | 2017-06-15 | 2017-06-15 | |
| Copper, total | **0.00420** | AO ≤ 1 | 0.00020 | mg/L | 2017-06-15 | 2017-06-15 | |
| Iron, total | **0.043** | AO ≤ 0.3 | 0.010 | mg/L | 2017-06-15 | 2017-06-15 | |
| Lead, total | **0.00029** | MAC = 0.01 | 0.00010 | mg/L | 2017-06-15 | 2017-06-15 | |
| Magnesium, total | **1.88** | N/A | 0.010 | mg/L | 2017-06-15 | 2017-06-15 | |
| Manganese, total | **0.00093** | AO ≤ 0.05 | 0.00020 | mg/L | 2017-06-15 | 2017-06-15 | |
| Mercury, total | < 0.00002 | MAC = 0.001 | 0.00002 | mg/L | 2017-06-19 | 2017-06-20 | |
| Molybdenum, total | **0.00120** | N/A | 0.00010 | mg/L | 2017-06-15 | 2017-06-15 | |
| Nickel, total | **0.00099** | N/A | 0.00020 | mg/L | 2017-06-15 | 2017-06-15 | |
| Potassium, total | **1.31** | N/A | 0.02 | mg/L | 2017-06-15 | 2017-06-15 | |
| Selenium, total | < 0.00050 | MAC = 0.05 | 0.00050 | mg/L | 2017-06-15 | 2017-06-15 | |
| Sodium, total | **2.56** | AO ≤ 200 | 0.02 | mg/L | 2017-06-15 | 2017-06-15 | |
| Uranium, total | **0.00102** | MAC = 0.02 | 0.000020 | mg/L | 2017-06-15 | 2017-06-15 | |

# SAMPLE ANALYTICAL DATA

**REPORTED TO** Regional District of Central Kootenay - Erickson
**PROJECT** Lister RDCK Water Service

**WORK ORDER** 7061219
**REPORTED** 2017-06-21

| Analyte | Result / *Recovery* | Standard / Guideline | MRL / *Limits* | Units | Prepared | Analyzed | Notes |
|---|---|---|---|---|---|---|---|
| **Sample ID: Lister Reservoir Discharge (7061219-01) [Water] Sampled: 2017-06-13 09:30, Continued** | | | | | | | |
| ***Total Metals, Continued*** | | | | | | | |
| Zinc, total | **0.0069** | AO ≤ 5 | 0.0040 | mg/L | 2017-06-15 | 2017-06-15 | |
| ***Microbiological Parameters*** | | | | | | | |
| Coliforms, Total | < 1 | MAC = None Detected | 1 | CFU/100 mL | N/A | 2017-06-14 | |
| E. coli | < 1 | MAC = None Detected | 1 | CFU/100 mL | N/A | 2017-06-14 | |
| ***Volatile Organic Compounds (VOC)*** | | | | | | | |
| Bromodichloromethane | < 0.001 | N/A | 0.001 | mg/L | N/A | 2017-06-20 | |
| Bromoform | < 0.001 | N/A | 0.001 | mg/L | N/A | 2017-06-20 | |
| Chloroform | **0.001** | N/A | 0.001 | mg/L | N/A | 2017-06-20 | |
| Dibromochloromethane | < 0.001 | N/A | 0.001 | mg/L | N/A | 2017-06-20 | |
| *Surrogate: Toluene-d8* | *98* | | *70-130* | % | *N/A* | *2017-06-20* | |
| *Surrogate: 4-Bromofluorobenzene* | *97* | | *70-130* | % | *N/A* | *2017-06-20* | |

**Sample / Analysis Qualifiers:**

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