***YRWC Public Water System Annual Report (258.00)***

***-2024-***

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*Vince Hiebert, Operations Manager*

*Date Prepared: March 2025* Y*ellowhead Regional Water Co-op Inc.*

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1. **Introduction:**

The Yellowhead Regional Water Co-op Annual Report for 2024 summarizes the water utility’s ability to provide safe potable water and comply with provincial regulations.

1. **Description of the Water System**

The Yellowhead Regional Water Co-op (YRWC) provides potable drinking water to a population of approximately 3,500 residents and continues to grow. Corrective actions were taken if required and reported for normal minor variations during the course of operations.

The Yellowhead Regional Co-op water system consists of a network of pressure pipelines, booster stations, a pressure reducing station, water storage reservoirs, and meter stations. The YRWC owns the Arden, Austin, MacGregor, Plumas, and Gladstone (yellowhead) water storage reservoirs. The Co-op also owns the Lansdowne, Poplar Bluff and Bagot booster stations, as well as the Westlake Gladstone (PR) Pressure Reducing station. The Coop also contributed financially to the construction of the new Poplar Bluff Industrial reservoir located south of Simplot which was put in service in June of 2024.

* 1. **Water Supply Source**

The Portage water treatment plant obtains water for treatment from the Assiniboine River. The intake structure is located 0.5 km from the plant. The Assiniboine River water is a collection of water from Alberta, central Saskatchewan, southern Saskatchewan, North Dakota, and southern and western Manitoba. Several large cities and processing companies are located along the Assiniboine River and Souris River systems and use the waterway as a source water supply.

The YRWC receives its treated water supply from the City of Portage la Prairie Water Treatment Plant (City of Portage WTP) via the new PBIP reservoir, which uses the Assiniboine River as the raw water supply. The system provides treated water to the Rural Municipalities of North Norfolk, Westlake-Gladstone, Glenella-Lansdowne and the Towns of Gladstone and MacGregor; and the Villages of Austin, Bagot, Rossendale, Westbourne, Plumas and Arden, and as of the summer of 2024 the community of Langruth as well.

* 1. **Water Treatment Plant Process (City of Portage)**

* *General Plant Description*

The Portage la Prairie WTP is a conventional lime softening plant with pre-clarification, biologically activated dual media filtration, ozone, carbon dioxide for pH adjustment and granular activated carbon filters with chlorine disinfection for the distribution system. Design capacity of 34 million liters/day (net).

The city obtains its water from the Assiniboine River (River). There are three 125-hp motors-265 l/s pumps to transfer the raw water from the river impoundment area upstream of the spillway structure to the WTP. Each stage of treatment is described in more below:

* *Ballasted Flocculation Clarification*

Ballasted flocculation clarification is a unique process. Poly-aluminum Chloride and polymers are added to the raw water inside a mixing chamber to promote coagulation and flocculation (a process in which suspended solids are drawn together to form larger/heavier settleable clusters known as floc) Very fine sand is added to the mix to make the floc settle very quickly. This portion removes a large portion of turbidity, organics, and algae, thus reducing taste odor issues. Potassium permanganate is added as a pre-oxidant. The pre-clarified water is then passed through to the next process.

* Softening Clarifiers

Softening clarifiers are large circular basins, where hydrated lime and polymers are added for further coagulation and flocculation. Lime raises the ph. to a point where calcium and magnesium are settled out, thus removing substantial hardness from the water. Sodium hydroxide is also added to the softening clarifiers to aid in the removal of non-carbonate hardness lowering the overall water hardness.

* Re-Carbonation

Re-carbonation is the next step, where carbon dioxide is bubbled through the water to form carbonic acid to lower the ph. Stabilizing the pH and prevents corrosion or scaling throughout the City’s water distribution system. The lowering of the pH also aids in the ozone process.

* Ozone

is a strong oxidant that is effective at destroying parasitic organisms such as Giardia Lamblia and Cryptosporidium cysts, and the breaking down of organics. It is also effective in the elimination of viruses and bacteria. This process involves the bubbling of ozone gas that is produced on site into the water prior to filtration.

* Calcium Thiosulphate

Since excess ozone gas can be a health hazard for plant operators, calcium thiosulphate is added to quench any remaining ozone after the ozonation process.

* Filtration

Dual media filtration follows the ozone disinfection process. The breakdown of organics promotes biologically active filtration which significantly improves further organics removal. The filters contain anthracite and sand media in separate layers for extended filter life. The filters have an up-to-date stainless-steel under-drain system for improved filtration and the backwashing performance. Organics removal is crucial to the reduction of distribution by-products found in the drinking water supply after chlorination. The filtered water is then passed to a under floor reservoir where the water is then either pumped to the granular activated carbon (GAC) contactors, continued treatment process, or it is diverted for back washing the dual media filters or the GAC contactors. Using non-chlorinated water for backwashing respects the environment, as the backwash waste is ultimately returned to the river.

* GAC Filters

Granular activated carbon contactors are utilized as a final polishing step for the ultimate reduction in organics, and for the final taste and odor elimination. The adsorption of organic matter by the activated carbon reduces the amount of chlorine required for final disinfection, which ultimately minimizes disinfection by-products in the drinking water system.

* Disinfection

Chlorine gas is used as a final disinfectant for the filtered water. Chlorine is injected between the GAC filters and the onsite reservoir. The on-site reservoir provides contact time well above the 20-minute minimum and this ensure complete disinfection. A chlorine residual is maintained in the distribution system to meet provincial regulations and to eliminate any re-growth of pathogenic organisms.

* Fluoride

Fluoride addition is mandated by Manitoba Public Health and is added to potable water for dental health reasons. Fluoride strengthens tooth enamel and assists in the reduction of tooth decay. Fluoride naturally occurs in surface and groundwater in this area at concentrations of 0.2 to 0.4 mg/l. The WTP fluoride addition only increases the concentration to about 0.6 – 0.7 mg/l. Manitoba health, seniors, and active living provides funding and monitoring for the fluoridation program.

* Orthophosphate

A very low concentration of phosphoric acid is added as an orthophosphate source. Orthophosphates reduce corrosion within the distribution system, and they reduce the leaching of lead from a homes service line into an individual customer’s drinking water.

* Sodium Hydroxide

Otherwise known as caustic, this is added to raise the pH and increase the alkalinity of the water prior to entering the distribution system. Increases the pH of the finished water also reduces corrosivity.

* Residuals Solids Management

Softening Clarifiers periodically blowdown sludge that accumulates on the bottom of their basins. The waste sludge, comprised of “unwanted” material removed from the raw water, as well as the chemicals and lime used through the treatment process, is collected, and pumped to two 45,000 cubic meter sludge drying ponds. These ponds are located south of the WTP and across the river, the sludge settles to the bottom and clarified water is returned to the river.

* *Plant Specifications:*

The Plant type is a Conventional lime softening plant with Pre-clarification, biologically activate dual media filtration, ozone, carbon dioxide for pH adjustment and Granular Activated Carbon filters with chlorine disinfection for the distribution system. Design capacity of 34 million litres/day (net).

* 1. **Classification and Certification**
* The City of Portage WTP is classified as a Class 4 water treatment facility and a Class 2 Water Distribution facility, and the YHRC water distribution system is classified as a Class 2 water distribution facility.
* The facility classifications are used to determine certification requirements for water system operators, and falls under the Manitoba Environment, Climate and Parks’ *Water and Wastewater Facility Operators Regulation* under the Environment Act.

1. **Water System Non-Compliance Incidents (YRWC)**

|  |  |  |
| --- | --- | --- |
| DATE | INCIDENT | OUTCOME |
| 2024 | YRWC met all sampling requirements for 2024 | Compliant |
| 2024 | Elevated HAA results in 2024 | Non-Compliant |

1. **Drinking Water Safety Orders, Warnings, and Charges**

There were no Drinking Water Safety Orders or warnings issued under the Yellowhead licence (258.00), nor were any charges laid on the system.

# **Major Expenses Incurred**

Aside from routine maintenance in 2024 the Yellowhead Regional Water Coop accrued some larger expenses from a few unplanned water breaks as well as finalizing projects that will benefit the water system for years to come. A description of 2024 costs are listed below:

1. Financially contributing to the new Poplar Bluff Industrial Park Reservoir which will supply water to the Coop. The PBIP reservoir became operational in June of 2024.
2. Planned future upgrades at the reservoir in the town of Plumas, and other YRWC locations

1. Also, in 2024 The YRWC experienced 2 unplanned water breaks that affected to mainline that supplies water to the YRWC. The First one happened on May 25th 2024 on the 18” incoming line at the Poplar Bluff booster. In order to get the system operational again the Poplar Bluff booster was bypassed and the incoming line break was capped in order to restore normal operation of the water system. The Second Major unplanned water break happened Oct 28 half mile west of the Poplar bluff booster. EF moon was hired to fix this break. Both water breaks interrupted the ability for the YRWC to supply water to each of the member municipalities. This inability to supply water, caused the entire YRWC to be on a boil water advisory until water sample results came back as per the DWO.

1. **YRWC 2024 system maintenance (Brief Overview)**

* Poplar Bluff Booster- This booster was taken out of service in June due to a major mainline break. Besides the leak on the 18” incoming line, there were 2 other leaks that developed at the Poplar Bluff booster. One being at the building and the other at a valve on the outgoing line. Both were repaired throughout the summer when time allowed. These leaks were repaired by EF moons
* Bagot Booster- The chlorine pump and analyzer are being moved from the Poplar Bluff booster to the Bagot booster due to not being needed anymore at Poplar Bluff.
* MacGregor Reservoir (100,000gal) 
  + In January the Rhombus vfd’s were repaired
  + In March we had alarms repaired on the MacGregor wtp generator.
  + In May one of the 7.5 hp pump were removed and repaired.
  + In July repairs also took place on the 3rd 10hp distribution pump
* Austin Reservoir (120,000gal) – There were no repairs needed
* Pressure Reducing Station- There were no repairs needed other than regular maintenance.
* Gladstone Reservoir (250,000 gal)
  + In Jan we did repairs to the Incoming Bray Valve due to end-of-life service
  + In March we had some Relays repaired on the Gladstone Fire pump
  + In July a distribution pump and motor were replaced due to end of life
* Lansdowne Booter – The Incoming water supply header was replaced in October.
  + In November the distribution pump #1 was removed and replaced due to end of life.
* Plumas Reservoir (90,000 gal) –
  + Planning continues to take place for future upgrades to the Plumas reservoir. These upgrades will take place in the spring of 2025
  + In July work took place on the incoming supply valve.
* Arden Reservoir (35,000gal) – In January, repairs took place on the vfd’s in the Arden wtp
  + Also, in February the UPS was replaced in the Arden PLC.

1. **Future System Expansion**

* *Yellowhead Regional Water Coop/RM of Portage (bypass meter pit installations)*
  + In 2025 the YRWC plans to partner with the RM of Portage to install Bypass meter pits which will be installed in the Westbourne area as well as the Rossendale area. These meter pits will be used to supply water to the either the RM of portage distribution areas or the YRWC distribution area during water repairs to prevent water outages or during a shutdown on the mainline. Going forward this improvement will help prevent water outages in the future.

# **List of Water Quality Standards & Monitoring Requirements**

The Province of Manitoba has adopted a number of water quality standards from the *Health Canada Guidelines for Canadian Drinking Water Quality*. The health-based parameters express the maximum acceptable concentrations for drinking water. Concentration values in excess of the guidelines constitute a health-related issue and require corrective actions. Public water systems are required to monitor chlorine levels and undertake regular bacterial testing.

**THM’s & HAA’s** are a water quality standard that we as a coop continue to monitor as per our operating Licence. In certain areas of the YRWC we are out of compliance in regards to THM’s, however we continue to monitor this and with future PWTP upgrades, this is expected to improve. A compliance plan has been required to address elevated THM levels. which mainly consists of the combination of further operational changes and mechanical upgrades to the City of Portage WTP to improve organics removal and reduce THM formation potential. In 2018 the YHRC completed a pilot project to use specific aeration equipment (PAX) to target and decrease THM in the treated water which installed at the Plumas Reservoir. This system is still in operation and continues to lower THM’s in the Plumas distribution system. Efforts continue to lower THM levels through out the whole system

The Manitoba health-based standards for THM and HAA are 100 µg/L (micrograms per liter) and 80 µg/L, respectively. Both THM and HAA are by-products of disinfection, where chlorine combines with trace amounts of organics in the water. THM and HAA levels in the YRWC distribution system are sampled every second year, they were monitored this year in 2024 and are scheduled to be tested again in 2026. Below are the water quality and treatment standards as well as the water quality monitoring requirements for the Yellowhead Regional Water Coop for 2024.

Test results are shown in ***Appendix A***.

***Water Quality / Treatment Standards:***

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Quality Standard** | **Compliance** |
| Total Coliform | Less than one total coliform bacteria detectable per 100mL in all distributed water | 100% |
| E. coli | Less than one E. coli bacteria detectable per 100mL in all distributed water | 100% |
| Chlorine Residual | A free Chlorine residual of at least 0.1mg/L at all times at any point in the water distribution system | 100% |
| Total Trihalomethanes (THM’s) | Less than or equal to 0.10 mg/L as locational annual average of quarterly samples. Next sampling year 2024 | Next sampling year 2026 |
| Total Haloacetic acids (HAA’s) | Less than or equal to 0.08 mg/L as locational annual average of quarterly samples. Next sampling year 2024 | Next sampling year 2026 |
| Lead | Less than or equal to 0.005 mg/L in the water distribution system | As per DWO. |
| Manganese | Less than or equal to 0.12 mg/L | Compliant |

***Monitoring Requirements:***

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Monitoring Requirement** | **Compliance** |
| Bacteriological (total coliform and E. coli) | Biweekly sampling program with each set of samples consisting of a minimum of eight (8) distribution samples from the following.   * Water entering the reservoir at Gladstone * Water entering the reservoirs at Arden, Austin, MacGregor, and Plumas (two samples shall be alternated each sampling period) * Water leaving the Arden, Austin, Gladstone, MacGregor and Plumas reservoirs   Consecutive sample sets to be separated by at least 12 days | 99% |
| Free chlorine (distribution system) | * One sample per day of water entering the Yellowhead distribution system at the Poplar Bluff booster station * One sample per day of water leaving the Arden, Austin, MacGregor and Plumas Reservoirs * Continuous sampling of water entering the regional distribution system from the Gladstone reservoir * A confirmatory sample to be taken daily at the online chlorine analyzer sampling point of water entering the regional distribution system from the Gladstone Reservoir * At the same times and location(s) as bacteriological distribution system sampling | 100% |
| Total chlorine (distribution system) | * One sample per day of water entering the Yellowhead distribution system at the Poplar Bluff booster station * One sample per day of water leaving the Arden, Austin, MacGregor and Plumas reservoir * One confirmatory sample per day of water entering the regional distribution system from the Gladstone reservoir * At the same times and location(s) as bacteriological distribution system sampling | 100% |
| Total Metals | One Sample every two years at mid-point in the distribution system | Compliant |
| Total Trihalomethanes | One preserved distribution system sample taken on a quarterly basis during February, May, August, and November, every second year at the furthest point in the distribution system. | Compliant  For 2024  (258.00) |
| Total Haloacetic acids (HAA’s) (distribution sytem) | One preserved distribution system sample taken on a quarterly basis during February, May, August, and November, every second year at a mid point in the distribution system. | Non-compliant  For 2024  (258.00) |
| Lead | As per the instructions of the Drinking Water Officer | Compliant |
| Manganese | One Distribution Sample taken every year | Compliant |
| Other Parameters | As per the instructions of the Drinking Water Officer | n/a |

**Appendix: A**

***Results and Analysis***



**Bacterial, THM & HAA Results**

**Chlorine Residual Analysis**

**Water Chemistry Results**

***2024 Results: - Incoming Reservoir samples Highlighted***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **M/D/Y** | **Sample Identification** | **TC** | **EC** | **CL2 Free** | **CL2 Total** |
| 1/2/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.51 | 2.14 |
| 1/2/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 0.87 | 1.47 |
| 1/2/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 0.96 | 1.53 |
| 1/2/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1.5 | 2.1 |
| 1/3/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.22 | 1.94 |
| 1/3/2024 | Yellowhead 3 Dist - MacGregor Incoming | 0 | 0 | 0.97 | 1.44 |
| 1/3/2024 | Yellowhead 3 Dist - Austin Incoming | 0 | 0 | 1.02 | 1.52 |
| 1/3/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 0.79 | 1.68 |
| 1/15/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.29 | 1.87 |
| 1/15/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 1.23 | 1.84 |
| 1/16/2024 | Yellowhead 3 Dist - Plumas Incoming | 0 | 0 | 0.86 | 1.35 |
| 1/16/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.47 | 2.11 |
| 1/16/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 0.72 | 1.27 |
| 1/16/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 1.54 | 2.11 |
| 1/16/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1.1 | 2.3 |
| 1/16/2024 | Yellowhead 3 Dist - Arden Incoming | 0 | 0 | 0.7 | 1.5 |
| 1/29/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.16 | 1.69 |
| 1/29/2024 | Yellowhead 3 Dist - MacGregor Incoming | 0 | 0 | 1.11 | 1.54 |
| 1/29/2024 | Yellowhead 3 Dist - Austin Incoming | 0 | 0 | 0.59 | 0.98 |
| 1/29/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 1.05 | 1.56 |
| 1/30/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1 | 2.1 |
| 1/30/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.14 | 1.64 |
| 1/30/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 1.4 | 1.99 |
| 1/30/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 1.11 | 1.68 |
| 2/13/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.45 | 1.99 |
| 2/13/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 1.24 | 1.91 |
| 2/13/2024 | Yellowhead 3 Dist - Plumas Incoming | 0 | 0 | 0.77 | 1.24 |
| 2/13/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.1 | 1.64 |
| 2/13/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 1.09 | 1.71 |
| 2/13/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 1.31 | 1.74 |
| 2/13/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 0.9 | 2 |
| 2/13/2023 | Yellowhead 3 Dist - Arden Incoming | 0 | 0 | 0.8 | 1.6 |
| 2/26/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.17 | 1.5 |
| 2/26/2024 | Yellowhead 3 Dist - MacGregor Incoming | 0 | 0 | 1.15 | 1.47 |
| 2/26/2024 | Yellowhead 3 Dist - Austin Incoming | 0 | 0 | 0.95 | 1.56 |
| 2/26/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 1.09 | 1.55 |
| 2/27/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1 | 1.49 |
| 2/27/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 1.07 | 1.63 |
| 2/27/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 0.71 | 1.01 |
| 2/28/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1.2 | 2.3 |
| 3/11/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.21 | 1.96 |
| 3/11/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 0.99 | 1.39 |
| 3/12/2024 | Yellowhead 3 Dist - Plumas Incoming | 0 | 0 | 1.21 | 1.75 |
| 3/12/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.13 | 1.6 |
| 3/12/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 0.7 | 1.35 |
| 3/12/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 1.05 | 1.59 |
| 3/13/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1.2 | 2.4 |
| 3/13/2024 | Yellowhead 3 Dist - Arden Incoming | 0 | 0 | 1.7 | 2.5 |
| 3/25/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1.1 | 2 |
| 3/25/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.08 | 1.49 |
| 3/25/2024 | Yellowhead 3 Dist - MacGregor Incoming | 0 | 0 | 0.91 | 1.35 |
| 3/25/2024 | Yellowhead 3 Dist - Austin Incoming | 0 | 0 | 0.73 | 1.1 |
| 3/25/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 1.06 | 1.43 |
| 3/26/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.41 | 2.01 |
| 3/26/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 1.19 | 1.67 |
| 3/26/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 0.79 | 1.27 |
| 4/9/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.34 | 1.69 |
| 4/9/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 1.39 | 1.77 |
| 4/9/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1.2 | 2.3 |
| 4/9/2024 | Yellowhead 3 Dist - Arden Incoming | 0 | 0 | 1.1 | 1.7 |
| 4/9/2024 | Yellowhead 3 Dist - Plumas Incoming | 0 | 0 | 0.74 | 1.11 |
| 4/9/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.32 | 2.03 |
| 4/9/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 1.25 | 1.72 |
| 4/9/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 1.09 | 1.49 |
| 4/23/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.56 | 1.86 |
| 4/23/2024 | Yellowhead 3 Dist - MacGregor Incoming | 0 | 0 | 1.89 | 2.15 |
| 4/23/2024 | Yellowhead 3 Dist - Austin Incoming | 0 | 0 | 1.33 | 1.67 |
| 4/23/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 1.34 | 1.82 |
| 4/23/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.43 | 1.88 |
| 4/23/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 1.39 | 1.83 |
| 4/23/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 1.14 | 1.53 |
| 4/23/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1 | 2.1 |
| 5/7/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.33 | 1.63 |
| 5/7/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 1.21 | 1.6 |
| 5/7/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1.4 | 2.1 |
| 5/7/2024 | Yellowhead 3 Dist - Arden Incoming | 0 | 0 | 2.2 | 2.8 |
| 5/7/2024 | Yellowhead 3 Dist - Plumas Incoming | 0 | 0 | 1.01 | 1.33 |
| 5/7/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.13 | 1.6 |
| 5/7/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 1.02 | 1.69 |
| 5/7/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 1.02 | 1.3 |
| 5/21/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.1 | 1.49 |
| 5/21/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 1.05 | 1.47 |
| 5/21/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 1.32 | 1.6 |
| 5/21/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.44 | 1.79 |
| 5/21/2024 | Yellowhead 3 Dist - MacGregor Incoming | 0 | 0 | 1.36 | 1.68 |
| 5/21/2024 | Yellowhead 3 Dist - Austin Incoming | 0 | 0 | 0.93 | 1.38 |
| 5/21/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 1.45 | 1.94 |
| 5/21/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1 | 1.7 |
| 5/27/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.29 | 1.55 |
| 5/27/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.44 | 1.74 |
| 5/27/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 1.55 | 1.65 |
| 5/27/2024 | Yellowhead 3 Dist - Bagot Booster | 0 | 0 | 1.86 | 2.2 |
| 5/27/2024 | Yellowhead 3 Dist - PBIP Reservoir | 0 | 0 | 1.1 | 1.5 |
| 5/28/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.33 | 1.81 |
| 5/28/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1.6 | 2.5 |
| 5/28/2024 | Yellowhead 3 Dist - Plumas Outgoing | 0 | 0 | 1.43 | 1.78 |
| 5/28/2024 | Yellowhead 3 Dist - Bagot Booster | 0 | 0 | 2.53 | 2.8 |
| 5/28/2024 | Yellowhead 3 Dist - PBIP Reservoir | 0 | 0 | 2.2 | 3.4 |
| 6/3/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.28 | 1.64 |
| 6/3/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 1.65 | 1.98 |
| 6/4/2024 | Yellowhead 3 Dist - Plumas Incoming | 0 | 0 | 0.81 | 1.09 |
| 6/4/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.56 | 2.02 |
| 6/4/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 1.89 | 2.2 |
| 6/4/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 0.94 | 1.29 |
| 6/4/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1.2 | 1.8 |
| 6/4/2024 | Yellowhead 3 Dist - Arden Incoming | 0 | 0 | 0.9 | 1.7 |
| 6/18/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.51 | 1.99 |
| 6/18/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 1.4 | 1.89 |
| 6/18/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 1.07 | 1.49 |
| 6/19/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1.3 | 2.5 |
| 6/19/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.53 | 1.84 |
| 6/19/2024 | Yellowhead 3 Dist - MacGregor Incoming | 0 | 0 | 1.47 | 1.72 |
| 6/19/2024 | Yellowhead 3 Dist - Austin Incoming | 0 | 0 | 1.2 | 1.72 |
| 6/19/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 1.11 | 1.61 |
| 7/2/2024 | Yellowhead 3 Dist - Plumas Incoming | 0 | 0 | 1 | 1.64 |
| 7/2/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.1 | 1.5 |
| 7/2/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 0.7 | 1.21 |
| 7/2/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 1.24 | 1.56 |
| 7/3/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.34 | 1.6 |
| 7/3/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 1.34 | 1.69 |
| 7/3/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1.3 | 2.4 |
| 7/3/2024 | Yellowhead 3 Dist - Arden Incoming | 0 | 0 | 2.5 | 3.2 |
| 7/16/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.45 | 1.9 |
| 7/16/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 0.73 | 1.2 |
| 7/16/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 0.91 | 1.31 |
| 7/17/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.47 | 1.76 |
| 7/17/2024 | Yellowhead 3 Dist - MacGregor Incoming | 0 | 0 | 0.91 | 1.39 |
| 7/17/2024 | Yellowhead 3 Dist - Austin Incoming | 0 | 0 | 0.49 | 0.89 |
| 7/17/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 1.03 | 1.41 |
| 7/17/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1.1 | 2 |
| 7/29/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.39 | 1.77 |
| 7/29/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 1.21 | 1.43 |
| 7/29/2024 | Yellowhead 3 Dist - Plumas Incoming | 0 | 0 | 0.83 | 1.22 |
| 7/29/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.17 | 1.51 |
| 7/29/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 0.28 | 0.69 |
| 7/29/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 0.98 | 1.31 |
| 7/31/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1.3 | 2.3 |
| 7/31/2024 | Yellowhead 3 Dist - Arden Incoming | 0 | 0 | 0.9 | 1.3 |
| 8/12/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.28 | 1.48 |
| 8/12/2024 | Yellowhead 3 Dist - MacGregor Incoming | 0 | 0 | 1.22 | 1.44 |
| 8/12/2024 | Yellowhead 3 Dist - Austin Incoming | 0 | 0 | 0.82 | 1.11 |
| 8/12/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 1.03 | 1.45 |
| 8/13/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.4 | 1.85 |
| 8/13/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 0.36 | 1.26 |
| 8/13/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 0.89 | 1.2 |
| 8/13/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 0.9 | 1.9 |
| 8/26/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.01 | 1.37 |
| 8/26/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 1.31 | 1.79 |
| 8/27/2024 | Yellowhead 3 Dist - Plumas Incoming | 0 | 0 | 0.58 | 0.98 |
| 8/27/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.06 | 1.75 |
| 8/27/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 0.92 | 1.41 |
| 8/27/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 0.64 | 1 |
| 8/28/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1 | 1.9 |
| 8/28/2024 | Yellowhead 3 Dist - Arden Incoming | 0 | 0 | 1.4 | 2.2 |
| 9/9/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.12 | 1.47 |
| 9/9/2024 | Yellowhead 3 Dist - MacGregor Incoming | 0 | 0 | 1.08 | 1.45 |
| 9/9/2024 | Yellowhead 3 Dist - Austin Incoming | 0 | 0 | 0.54 | 1 |
| 9/9/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 1.16 | 1.66 |
| 9/10/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.23 | 1.78 |
| 9/10/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 0.94 | 1.46 |
| 9/10/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 1.24 | 1.57 |
| 9/11/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1.1 | 1.9 |
| 9/23/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.52 | 1.85 |
| 9/23/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 0.82 | 1.24 |
| 9/24/2024 | Yellowhead 3 Dist - Plumas Incoming | 0 | 0 | 0.72 | 1.1 |
| 9/24/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.57 | 1.88 |
| 9/24/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 1 | 1.36 |
| 9/24/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 0.87 | 1.22 |
| 8/28/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1.1 | 1.5 |
| 8/28/2024 | Yellowhead 3 Dist - Arden Incoming | 0 | 0 | 0.7 | 1.5 |
| 10/7/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.24 | 1.55 |
| 10/7/2024 | Yellowhead 3 Dist - MacGregor Incoming | 0 | 0 | 1.15 | 1.44 |
| 10/7/2024 | Yellowhead 3 Dist - Austin Incoming | 0 | 0 | 0.72 | 1.06 |
| 10/7/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 0.89 | 1.36 |
| 10/7/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.19 | 1.61 |
| 10/7/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 1.49 | 1.92 |
| 10/7/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 0.82 | 1.12 |
| 10/15/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1.2 | 1.8 |
| 10/21/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.04 | 1.33 |
| 10/21/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 0.9 | 1.23 |
| 10/22/2024 | Yellowhead 3 Dist - Plumas Incoming | 0 | 0 | 0.7 | 0.92 |
| 10/22/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.56 | 1.93 |
| 10/22/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 1.55 | 2.01 |
| 10/22/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 0.79 | 1.15 |
| 10/22/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1 | 2 |
| 10/22/2024 | Yellowhead 3 Dist - Arden Incoming | 0 | 0 | 1.1 | 2 |
| 10/23/2024 | Yellowhead 3 Dist - MacGregor Incoming | 0 | 0 | 0.72 | 0.92 |
| 10/23/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 1.36 | 1.97 |
| 10/23/2024 | Yellowhead 3 Dist - Austin Incoming | 0 | 0 | 0.92 | 1.28 |
| 10/23/2024 | Yellowhead 3 Dist - Bagot Booster | 0 | 0 | 1.66 | 1.86 |
| 10/23/2024 | Yellowhead 3 Dist - PR Station | 0 | 0 | 1.15 | 1.59 |
| 10/23/2024 | Yellowhead 3 Dist - Poplar Bluff Bst. | 0 | 0 | 1.41 | 1.67 |
| 11/5/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1.1 | 1.7 |
| 11/5/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.27 | 1.65 |
| 11/5/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 1 | 1.72 |
| 11/5/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 1.75 | 2.1 |
| 11/4/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.13 | 1.5 |
| 11/4/2024 | Yellowhead 3 Dist - MacGregor Incoming | 0 | 0 | 1.07 | 1.4 |
| 11/4/2024 | Yellowhead 3 Dist - Austin Incoming | 0 | 0 | 0.75 | 1.26 |
| 10/7/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 1.25 | 1.68 |
| 11/18/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 0.9 | 1.8 |
| 11/18/2024 | Yellowhead 3 Dist - Arden Incoming | 0 | 0 | 0.8 | 1.3 |
| 11/19/2024 | Yellowhead 3 Dist - Plumas Incoming | 0 | 0 | 0.66 | 1.04 |
| 11/19/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.17 | 1.31 |
| 11/19/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 0.9 | 1.2 |
| 11/19/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 1.54 | 1.94 |
| 11/21/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.01 | 1.42 |
| 11/21/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 1.41 | 1.83 |
| 12/2/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1.2 | 1.7 |
| 12/3/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.32 | 1.96 |
| 12/3/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 1.01 | 1.36 |
| 12/3/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 1.14 | 1.44 |
| 12/2/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.19 | 1.68 |
| 12/2/2024 | Yellowhead 3 Dist - MacGregor Incoming | 0 | 0 | 0.65 | 0.97 |
| 12/2/2024 | Yellowhead 3 Dist - Austin Incoming | 0 | 0 | 0.58 | 0.8 |
| 12/2/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 1.21 | 1.5 |
| 12/16/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.34 | 1.96 |
| 12/16/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 1.38 | 1.7 |
| 12/17/2024 | Yellowhead 3 Dist - Plumas Incoming | 0 | 0 | 0.54 | 0.98 |
| 12/17/2024 | Yellowhead 3 Dist - Gladstone Outgoing | 0 | 0 | 1.42 | 1.95 |
| 12/17/2024 | Yellowhead 3 Dist - Gladstone Incoming | 0 | 0 | 1.54 | 1.72 |
| 12/17/2024 | Yellowhead 3 Dist - Plumus Outgoing | 0 | 0 | 1.01 | 1.41 |
| 12/17/2024 | Yellowhead 3 Dist - Arden Outgoing | 0 | 0 | 1.2 | 1.7 |
| 12/17/2024 | Yellowhead 3 Dist - Arden Incoming | 0 | 0 | 0.4 | 1.2 |
| 12/30/2024 | Yellowhead 3 Dist - MacGregor Incoming | 0 | 0 | 1.16 | 1.57 |
| 12/30/2024 | Yellowhead 3 Dist - Austin Incoming | 0 | 0 | 0.46 | 0.83 |
| 12/30/2024 | Yellowhead 3 Dist - Austin Outgoing | 0 | 0 | 1.63 | 2.19 |
| 12/30/2024 | Yellowhead 3 Dist - MacGregor Outgoing | 0 | 0 | 1.67 | 2.08 |

**Trihalomethane (THM) 2024 results**

**\*\* Next Sampling Year 2026\*\***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **WATER SYSTEM NAME** | **CODE** | **FEB** | **MAY** | **AUG** | **NOV** | **AVG THM (µg/L)** |
| Municipality of North Norfolk | 151.50 | 126 | 112 | 195 | 136 | 142.3 |
| Municipality of Glenella-Lansdowne (@ Arden) | 6.25 | 138 | 97.4 | 174 | 148 | 139.4 |
| Municipality of Westlake-Gladstone (@ Plumas) | 247.20 | 46.7 | 44.9 | 62.2 | 46.5 | 50 |
| **Yellowhead Regional** | **258.00** | **70.2** | **90.3** | **97.5** | **58.7** | **79.2** |
|  |  |  |  |  |  |  |
| (Source - City PLaP - 171.00) |  |  |  |  |  |  |

Notes:

* All results reported in µg/l
* THM Annual Average Maximum Allowable Concentration = **100 µg/l**

**Haloacetic Acids (HAA) 2024 results**

**\*\* Next Sampling Year 2026\*\***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **WATER SYSTEM NAME** | **CODE** | **FEB** | **MAY** | **AUG** | **NOV** | **AVG HAA (µg/L)** |
| Municipality of North Norfolk | 151.50 | 27.7 | 41.7 | 52.5 | 22.1 | 35.8 |
| Municipality of Glenella-Lansdowne (@ Arden) | 6.25 | 29.9 | 62.2 | 51 | 42.5 | 46.4 |
| Municipality of Westlake-Gladstone (@ Plumas) | 247.20 | 62.4 | 62.9 | 82.7 | 75.4 | 70.9 |
| **Yellowhead Regional** | **258.00** | **82.6** | **82.5** | **107** | **90.6** | **90.7** |
|  |  |  |  |  |  |  |
| (Source - City PLaP - 171.00) |  |  |  |  |  |  |

Notes:

* All results reported in µg/l
* HAA Annual Average Maximum Allowable Concentration = **80 µg/l**

****

***YRWC 258.00 Total Metals Sampling Results (Next Sampling Year 2025)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Results Summary WP2324322** | | | | |
|  |  |  |  |  |
| **Project** |  |  |  |  |
| **Report To** | Kale Black, Manitoba Conservation & Climate | | |  |
| **Date Received** | 25-Sep-2023 16:15 |  |  |  |
| **Issue Date** | 02-Oct-2023 14:28 |  |  |  |
| **Amendment** | 0 |  |  |  |
|  |  |  |  |  |
| Client Sample ID |  |  | GLADSTONE RESERVE (OUTGOING) |  |
| Date Sampled |  |  | 25-Sep-2023 |  |
| Time Sampled |  |  | 08:10 |  |
| ALS Sample ID |  |  | WP2324322-001 |  |
| Analyte | Lowest Detection Limit | Units | Sub-Matrix: Water |  |
|  |  |  |  |  |
| **Total Metals (Matrix: Water)** |  |  |  |  |
| Aluminum, total | 0.0030 | mg/L | 0.0074 |  |
| Antimony, total | 0.00010 | mg/L | 0.00037 |  |
| Arsenic, total | 0.00010 | mg/L | 0.00059 |  |
| Barium, total | 0.00010 | mg/L | 0.0260 |  |
| Beryllium, total | 0.000020 | mg/L | <0.000020 |  |
| Bismuth, total | 0.000050 | mg/L | <0.000050 |  |
| Boron, total | 0.010 | mg/L | 0.085 |  |
| Cadmium, total | 0.0000050 | mg/L | 0.0000124 |  |
| Calcium, total | 0.050 | mg/L | 57.2 |  |
| Cesium, total | 0.000010 | mg/L | 0.000027 |  |
| Chromium, total | 0.00050 | mg/L | 0.00069 |  |
| Cobalt, total | 0.00010 | mg/L | <0.00010 |  |
| Copper, total | 0.00050 | mg/L | 0.0198 |  |
| Iron, total | 0.010 | mg/L | <0.010 |  |
| Lead, total | 0.000050 | mg/L | 0.000117 |  |
| Lithium, total | 0.0010 | mg/L | 0.0688 |  |
| Magnesium, total | 0.0050 | mg/L | 10.7 |  |
| Manganese, total | 0.00010 | mg/L | <0.00010 |  |
| Molybdenum, total | 0.000050 | mg/L | 0.00405 |  |
| Nickel, total | 0.00050 | mg/L | 0.00083 |  |
| Phosphorus, total | 0.050 | mg/L | <0.050 |  |
| Potassium, total | 0.050 | mg/L | 12.4 |  |
| Rubidium, total | 0.00020 | mg/L | 0.00315 |  |
| Selenium, total | 0.000050 | mg/L | 0.000407 |  |
| Silicon, total | 0.10 | mg/L | 2.42 |  |
| Silver, total | 0.000010 | mg/L | <0.000010 |  |
| Sodium, total | 0.050 | mg/L | 86.9 |  |
| Strontium, total | 0.00020 | mg/L | 0.224 |  |
| Sulfur, total | 0.50 | mg/L | 90.4 |  |
| Tellurium, total | 0.00020 | mg/L | <0.00020 |  |
| Thallium, total | 0.000010 | mg/L | <0.000010 |  |
| Thorium, total | 0.00010 | mg/L | <0.00010 |  |
| Tin, total | 0.00010 | mg/L | <0.00010 |  |
| Titanium, total | 0.00030 | mg/L | <0.00030 |  |
| Tungsten, total | 0.00010 | mg/L | <0.00010 |  |
| Uranium, total | 0.000010 | mg/L | 0.000034 |  |
| Vanadium, total | 0.00050 | mg/L | 0.00097 |  |
| Zinc, total | 0.0030 | mg/L | 0.0079 |  |
| Zirconium, total | 0.00020 | mg/L | <0.00020 |  |

**PWTP (171.00) Genreal Chemistry:**

General Chemistry and Metals

**June 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Calculated Parameters** | **UNITS** | **RAW** | **TREATED** |
| **Anion Sum** | meq/L | 5.4 | 4.2 |
| **Cation Sum** | meq/L | 5.2 | 4.2 |
| **Hardness (CaCO3)** | mg/L | 200 | 150 |
| **Total Hardness (CaCO3)** | mg/L | 274 | 149 |
| **Ion Balance (% Difference)** | % | 1.5 | 0.058 |
| **Nitrate (N)** | mg/L | 0.54 | 0.65 |
| **Nitrate (NO3)** | mg/L | 2.4 | 2.9 |
| **Nitrite (NO2)** | mg/L | 0.057 | 0.033 |
| **Calculated Total Dissolved Solids** | mg/L | 300 | 260 |
|  |  |  |  |
| **Misc. Inorganics** | **UNITS** | **RAW** | **TREATED** |
| **Conductivity** | uS/cm | 510 | 440 |
| **pH** | pH | 8.5 | 7.55 |
| **Total Organic Carbon (C)** | mg/L | 9.4 | 4.2 |
|  |  |  |  |
| **Lab Filtered Inorganics** | **UNITS** | **RAW** | **TREATED** |
| **Dissolved Organic Carbon (C)** | mg/L | 9.9 | 3.7 |
|  |  |  |  |
| **Anions** | **UNITS** | **RAW** | **TREATED** |
| **Alkalinity (PP as CaCO3)** | mg/L | 3.2 | 1 |
| **Alkalinity (Total as CaCO3)** | mg/L | 150 | 75 |
| **Bicarbonate (HCO3)** | mg/L | 750 | 91 |
| **Bromate** | mg/L | n/a | 0.0095 |
| **Carbonate (CO3)** | mg/L | 3.8 | 1 |
| **Dissolved Fluoride (F)** | mg/L | 0.12 | 0.78 |
| **Hydroxide (OH)** | mg/L | 1 | 1 |
| **Chloride (Cl)** | mg/L | 10 | 23 |
| **Sulphate (SO4)** | mg/L | 100 | 95 |
|  |  |  |  |
| **Nutrients** | **UNITS** | **RAW** | **TREATED** |
| **Total Carbon (C)** | mg/L | 45 | 22 |
| **Total Inorganic Carbon (C)** | mg/L | 35 | 18 |
| **Nitrite (N)** | mg/L | 0.017 | 0.010 |
| **Nitrate plus Nitrite (N)** | mg/L | 0.55 | 0.65 |
| **Misc Organics** | **UNITS** | **RAW** | **TREATED** |
| **Phenols** | mg/L | 0.0015 | 0.0015 |
|  |  |  |  |
| **Physical Properties** | **UNITS** | **RAW** | **TREATED** |
| **True Colour** | PtCo Units | 35 | 2 |
| **Turbidity** | NTU | 230 | 0.1 |
|  |  |  |  |
| **Lab Filtered Elements** | **UNITS** | **RAW** | **TREATED** |
| **Dissolved Calcium (Ca)** | mg/L | 44 | 47 |
| **Dissolved Iron (Fe)** | mg/L | 0.06 | 0.06 |
| **Dissolved Magnesium (Mg)** | mg/L | 22 | 7.2 |
| **Dissolved Manganese (Mn)** | mg/L | 0.004 | 0.004 |
| **Dissolved Potassium (K)** | mg/L | 12 | 13 |
| **Dissolved Sodium (Na)** | mg/L | 20 | 21 |
|  |  |  |  |
| **Total Metals by ICPMS** | **UNITS** | **RAW** | **TREATED** |
| **Total Aluminum (Al)** | ug/L | 5910.00 | 6.70 |
| **Total Antimony (Sb)** | ug/L | 0.50 | 0.50 |
| **Total Arsenic (As)** | ug/L | 7.94 | 0.27 |
| **Total Barium (Ba)** | ug/L | 168.00 | 48.80 |
| **Total Berylium (Be)** | ug/L | 0.33 | 0.10 |
| **Total Bismuth (Bi)** | ug/L | 1.00 | 1.00 |
| **Total Boron (B)** | ug/L | 72.00 | 50.00 |
| **Total Cadmium (Cd)** | ug/L | 0.21 | 0.01 |
| **Total Cesium (Cs)** | ug/L | 1.22 | 0.20 |
| **Total Chromium (Cr)** | ug/L | 9.30 | 1.00 |
| **Total Cobalt (Co)** | ug/L | 5.04 | 0.20 |
| **Total Copper (Cu)** | ug/L | 14.40 | 18.40 |
| **Total Iron (Fe)** | ug/L | 11200.00 | 10.00 |
| **Total Lead (Pb)** | ug/L | 6.42 | 0.20 |
| **Total Lithium (Li)** | ug/L | 35.80 | 25.30 |
| **Total Manganese (Mn)** | ug/L | 538.00 | 1.00 |
| **Total Molybdenum (Mo)** | ug/L | 2.60 | 2.40 |
| **Total Nickel (Ni)** | ug/L | 16.70 | 1.00 |
| **Total Phosphorus (P)** | ug/L | 495.00 | 445.00 |
| **Total Rubidium (Rb)** | ug/L | 15.80 | 2.48 |
| **Total Selenium (Se)** | ug/L | n/a | n/a |
| **Total Silicon (Si)** | ug/L | 21700.00 | 3370.00 |
| **Total Silver (Ag)** | ug/L | 0.05 | 0.02 |
| **Total Strontium (Sr)** | ug/L | 223.00 | 122.00 |
| **Total Tellurium (Te)** | ug/L | 1.00 | 1.00 |
| **Total Thallium (TI)** | ug/L | 0.13 | 0.01 |
| **Total Tin (Sn)** | ug/L | 5.00 | 5.00 |
| **Total Titanium (Ti)** | ug/L | 99.00 | 5.00 |
| **Total Tungsten (W)** | ug/L | 1.00 | 1.00 |
| **Total Uranium (U)** | ug/L | 3.06 | 0.10 |
| **Total Vanadium (V)** | ug/L | 22.20 | 5.00 |
| **Total Zinc (Zn)** | ug/L | 43.50 | 530.00 |
| **Total Zirconium (Zr)** | ug/L | 1.34 | 0.10 |
| **Total Calcium (Ca)** | mg/L | 64.20 | 48.30 |
| **Total Magnesium (Mg)** | mg/L | 27.70 | 6.93 |
| **Total Potassium (K)** | mg/L | 13.30 | 11.60 |
| **Total Sodium (Na)** | mg/L | 21.00 | 21.10 |
| **Total Sulphur (S)** | mg/L | n/a | n/a |

Exceeds 1 Criteria Policy/Level

Appendix E: General Chemistry and Metals

**December 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Calculated Parameters** | **UNITS** | **RAW** | **TREATED** |
| **Anion Sum** | meq/L | 11 | 6.7 |
| **Cation Sum** | meq/L | 11 | 7.2 |
| **Hardness (CaCO3)** | mg/L | 420 | 170 |
| **Total Hardness (CaCO3)** | mg/L | 378 | 153 |
| **Ion Balance (% Difference)** | % | 3.1 | 3.5 |
| **Nitrate (N)** | mg/L | 0.050 | 0.086 |
| **Nitrate (NO3)** | mg/L | 0.22 | 0.38 |
| **Nitrite (NO2)** | mg/L | 0.033 | 0.033 |
| **Calculated Total Dissolved Solids** | mg/L | 610 | 430 |
|  |  |  |  |
| **Field Parameters** | **UNITS** | **RAW** | **TREATED** |
| **Field Total Chlorine** | mg/L | 0 | 2.30 |
| **Field Free Chlorine** | mg/L | 0 | 1.81 |
|  |  |  |  |
| **Misc. Inorganics** | **UNITS** | **RAW** | **TREATED** |
| **Conductivity** | uS/cm | 900 | 660 |
| **pH** | pH | 8.44 | 6.8 |
| **Total Organic Carbon (C)** | mg/L | 8.3 | 4.5 |
|  |  |  |  |
| **Lab Filtered Inorganics** | **UNITS** | **RAW** | **TREATED** |
| **Dissolved Organic Carbon (C)** | mg/L | 8.5 | 4.8 |
|  |  |  |  |
| **Anions** | **UNITS** | **RAW** | **TREATED** |
| **Alkalinity (PP as CaCO3)** | mg/L | 8.5 | 1 |
| **Alkalinity (Total as CaCO3)** | mg/L | 300 | 92 |
| **Bicarbonate (HCO3)** | mg/L | 350 | 110 |
| **Bromate** | mg/L | n/a | 0.0095 |
| **Carbonate (CO3)** | mg/L | 10 | 1 |
| **Dissolved Fluoride (F)** | mg/L | 0.2 | 0.69 |
| **Hydroxide (OH)** | mg/L | 1 | 1 |
| **Chloride (Cl)** | mg/L | 23 | 27 |
| **Sulphate (SO4)** | mg/L | 190 | 200 |
|  |  |  |  |
| **Nutrients** | **UNITS** | **RAW** | **TREATED** |
| **Total Carbon (C)** | mg/L | 74 | 26 |
| **Total Inorganic Carbon (C)** | mg/L | 65 | 21 |
| **Nitrite (N)** | mg/L | 0.010 | 0.010 |
| **Nitrate plus Nitrite (N)** | mg/L | 0.050 | 0.086 |
|  |  |  |  |
| **Misc Organics** | **UNITS** | **RAW** | **TREATED** |
| **Phenols** | mg/L | 0.0015 | 0.0015 |
|  |  |  |  |
| **Physical Properties** | **UNITS** | **RAW** | **TREATED** |
| **True Colour** | PtCo Units | 32 | 2.4 |
| **Turbidity** | NTU | 86 | 0.12 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Lab Filtered Elements** | **UNITS** | **RAW** | **TREATED** |
| **Dissolved Calcium (Ca)** | mg/L | 85 | 49 |
| **Dissolved Iron (Fe)** | mg/L | 0.060 | 0.060 |
| **Dissolved Magnesium (Mg)** | mg/L | 50 | 12 |
| **Dissolved Manganese (Mn)** | mg/L | 0.025 | 0.0040 |
| **Dissolved Potassium (K)** | mg/L | 11 | 12 |
| **Dissolved Sodium (Na)** | mg/L | 64 | 80 |
|  |  |  |  |
| **Total Metals by ICPMS** | **UNITS** | **RAW** | **TREATED** |
| **Total Aluminum (Al)** | ug/L | 1690.00 | 3.00 |
| **Total Antimony (Sb)** | ug/L | 0.50 | 0.50 |
| **Total Arsenic (As)** | ug/L | 5.41 | 0.44 |
| **Total Barium (Ba)** | ug/L | 99.10 | 17.40 |
| **Total Berylium (Be)** | ug/L | 0.10 | 0.10 |
| **Total Bismuth (Bi)** | ug/L | 1.00 | 1.00 |
| **Total Boron (B)** | ug/L | 115.00 | 58.00 |
| **Total Cadmium (Cd)** | ug/L | 0.058 | 0.010 |
| **Total Cesium (Cs)** | ug/L | 0.32 | 0.20 |
| **Total Chromium (Cr)** | ug/L | 2.50 | 1.00 |
| **Total Cobalt (Co)** | ug/L | 1.43 | 0.20 |
| **Total Copper (Cu)** | ug/L | 4.50 | 17.30 |
| **Total Iron (Fe)** | ug/L | 3040.00 | 10.00 |
| **Total Lead (Pb)** | ug/L | 1.66 | 0.20 |
| **Total Lithium (Li)** | ug/L | 58.90 | 55.40 |
| **Total Manganese (Mn)** | ug/L | 256.00 | 1.00 |
| **Total Molybdenum (Mo)** | ug/L | 3.10 | 2.80 |
| **Total Nickel (Ni)** | ug/L | 6.10 | 1.00 |
| **Total Phosphorus (P)** | ug/L | 218.00 | 485.00 |
| **Total Rubidium (Rb)** | ug/L | 5.30 | 2.53 |
| **Total Selenium (Se)** | ug/L | n/a | n/a |
| **Total Silicon (Si)** | ug/L | 10800.00 | 2250.00 |
| **Total Silver (Ag)** | ug/L | 0.02 | 0.02 |
| **Total Strontium (Sr)** | ug/L | 285.00 | 148.00 |
| **Total Tellurium (Te)** | ug/L | 1.00 | 10.00 |
| **Total Thallium (TI)** | ug/L | 0.05 | 0.01 |
| **Total Tin (Sn)** | ug/L | 5.00 | 5.0 |
| **Total Titanium (Ti)** | ug/L | 38.20 | 5.0 |
| **Total Tungsten (W)** | ug/L | 1.00 | 1.00 |
| **Total Uranium (U)** | ug/L | 0.045 | 0.01 |
| **Total Vanadium (V)** | ug/L | 7.20 | 5.00 |
| **Total Zinc (Zn)** | ug/L | 11.80 | 5.00 |
| **Total Zirconium (Zr)** | ug/L | 1.29 | 0.01 |
| **Total Calcium (Ca)** | mg/L | 81.10 | 43.80 |
| **Total Magnesium (Mg)** | mg/L | 42.60 | 10.50 |
| **Total Potassium (K)** | mg/L | 10.50 | 10.40 |
| **Total Sodium (Na)** | mg/L | 54.90 | 68.30 |
| **Total Sulphur (S)** | mg/L | n/a | n/a |

Exceeds 1 Criteria Policy/Level

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**2024 YRWC Residential Lead Sampling Program**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **2024 Yellowhead Regional Water Coop RDT Total Lead testing** | | | | | |
| **Orange highlighting designates samples over 0.005 mg/l** | | | | | |
| **#** | **Date** | **House Address** | **Risk Zone** | **RDT mg/L** | **After 5 min water flush mg/L** |
| **1** | July 3rd | \*\*\*\* | MacGregor | 0.000992 |  |
| **2** | July 3rd | \*\*\*\* | MacGregor | 0.000994 |  |
| **3** | July 3rd | \*\*\*\* | MacGregor | 0.000192 |  |
| **4** | July 3rd | \*\*\*\* | MacGregor | 0.000739 |  |
| **5** | July 3rd | \*\*\*\* | MacGregor | 0.000269 |  |
| **6** | Oct 23rd | \*\*\*\* | Arden | 0.000586 |  |
| **7** | Oct 23rd | \*\*\*\* | Arden | 0.000743 |  |
| **8** | Oct 23rd | \*\*\*\* | Arden | 0.002060 |  |
| **9** | Oct 23rd | \*\*\*\* | Arden | 0.000836 |  |
| **10** | Oct 23rd | \*\*\*\* | Arden | 0.006500 | 0.00289 / *Sampled Jan 29th 2025* |
| **11** | Oct 23rd | \*\*\*\* | Arden | 0.001220 |  |
| **12** | Oct 23rd | \*\*\*\* | Arden | 0.001290 |  |
| **13** | Oct 23rd | \*\*\*\* | Arden | 0.000740 |  |
| **14** | Oct 23rd | \*\*\*\* | Arden | 0.000333 |  |
| **15** | Oct 23rd | \*\*\*\* | Arden | 0.000403 |  |
| **16** | April 22nd | \*\*\*\* | Gladstone | 0.001830 |  |
| **17** | April 22nd | \*\*\*\* | Gladstone | 0.000606 |  |
| **18** | April 22nd | \*\*\*\* | Gladstone | 0.000940 |  |
| **19** | April 22nd | \*\*\*\* | Gladstone | 0.000885 |  |
| **20** | April 22nd | \*\*\*\* | Gladstone | 0.003730 |  |
| **21** | April 22nd | \*\*\*\* | Plumas | 0.002720 |  |
| **22** | April 22nd | \*\*\*\* | Plumas | 0.001460 |  |
| **23** | April 22nd | \*\*\*\* | Plumas | 0.000445 |  |
| **24** | April 22nd | \*\*\*\* | Plumas | 0.000894 |  |
| **25** | August 7th | \*\*\*\* | Westbourne | 0.004700 |  |
| **26** | August 7th | \*\*\*\* | Westbourne | 0.001580 |  |
| **27** | August 7th | \*\*\*\* | Gladstone | 0.001120 |  |
| **28** | August 7th | \*\*\*\* | Gladstone | 0.001150 |  |
| **29** | August 7th | \*\*\*\* | Gladstone | 0.000567 |  |
| **30** | August 7th | \*\*\*\* | Gladstone | 0.000439 |  |
| **31** | August 7th | \*\*\*\* | Gladstone | 0.000749 |  |
| **32** | August 7th | \*\*\*\* | Gladstone | 0.001580 |  |
| **33** | June 17th | \*\*\*\* | Langruth | 0.000352 |  |
| **34** | June 17th | \*\*\*\* | Langruth | 0.000460 |  |
| **35** | June 17th | \*\*\*\* | Langruth | 0.001310 |  |
| **36** | June 17th | \*\*\*\* | Langruth | 0.000908 |  |
| **37** | June 17th | \*\*\*\* | Langruth | 0.000639 |  |
| **38** | June 17th | \*\*\*\* | Langruth | 0.000398 |  |
| **39** | June 17th | \*\*\*\* | Langruth | 0.000525 |  |
| **40** | October 15th | \*\*\*\* | Langruth | 0.000317 |  |
| **41** | October 15th | \*\*\*\* | Langruth | 0.000443 |  |
| **42** | October 15th | \*\*\*\* | Langruth | 0.001500 |  |
| **43** | October 24th | \*\*\*\* | Gladstone | 0.002700 |  |
| **44** | October 24th | \*\*\*\* | Gladstone | 0.002880 |  |
| **45** | October 24th | \*\*\*\* | Gladstone | 0.001410 |  |
| **46** | June 19th | \*\*\*\* | North Norfolk | 0.001800 |  |
| **47** | June 19th | \*\*\*\* | North Norfolk | 0.001000 |  |
| **48** | June 19th | \*\*\*\* | North Norfolk | 0.002500 |  |
| **49** | June 19th | \*\*\*\* | North Norfolk | 0.001800 |  |
| **50** | June 19th | \*\*\*\* | MacGregor | 0.000877 |  |
| **51** | June 19th | \*\*\*\* | MacGregor | 0.000234 |  |
| **52** | June 19th | \*\*\*\* | MacGregor | 0.001880 |  |
| **53** | June 19th | \*\*\*\* | MacGregor | 0.000406 |  |
| **54** | June 19th | \*\*\*\* | MacGregor | 0.001620 |  |
| **55** | June 19th | \*\*\*\* | Austin | 0.000491 |  |
| **56** | June 19th | \*\*\*\* | Austin | 0.000789 |  |
| **57** | June 19th | \*\*\*\* | Austin | 0.002000 |  |
| **58** | June 19th | \*\*\*\* | Austin | 0.002290 |  |
| **59** | June 19th | \*\*\*\* | Austin | 0.000453 |  |
| **60** | June 19th | \*\*\*\* | Austin | 0.002980 |  |

**Appendix B**

**Water Treatment Plant Process Diagram[[1]](#footnote-1)**



1. Obtained from WSP (Formerly Genivar) [↑](#footnote-ref-1)