



Portland Water Bureau

Triannual Water Quality Analysis

April 2019

Bull Run Water

The Portland Water Bureau supplies water to over 970,000 people in the Portland metropolitan area. The primary water source is the protected Bull Run watershed 26 miles east of Portland. The water from Bull Run is low in dissolved minerals and meets or exceeds all drinking water quality standards as measured at the entry point to the distribution system.

Water Treatment

Chlorine is used as the primary raw water disinfectant. The chlorine concentration entering the distribution system is adjusted seasonally to account for changes in water quality. Since September 2014, the target chlorine concentration has ranged from 2.2 to 2.5 parts per million (ppm). Once primary disinfection is complete, ammonium hydroxide (aqueous ammonia) is added to the chlorinated water. Ammonia reacts with chlorine to form a long-lasting chloramine disinfectant residual. Chlorine and ammonia are used in a ratio of approximately 4.9 to 1 by weight. At the end of the disinfection process, sodium hydroxide (NaOH) is added to the water at a dose of 3 to 5 ppm to raise the pH of the water to approximately 8.2 pH units. The addition of NaOH helps prevent corrosion of system piping and household plumbing, which in turn reduces the amount of lead, copper and other metals that can leach into the water from pipes, solder joints and plumbing fixtures.

The Portland Water Bureau is currently working on two major treatment improvements for Bull Run drinking water. To learn more about the improved corrosion control and filtration projects, visit: www.portlandoregon.gov/water/BullRunTreatment

Water Quality Standards

The U.S. Environmental Protection Agency (EPA) and the Oregon Health Authority-Drinking Water Services (OHA-DWS) set water quality standards for public water supplies.

Primary standards are set by federal and state regulations to protect public health, and are usually given as Maximum Contaminant Levels (MCLs). Lead and copper have action levels which cannot be exceeded at selected water customers' taps.

Secondary standards are federal and state guidelines set to assure aesthetic water quality and are given as Secondary Maximum Contaminant Levels (SMCLs).

The secondary standards apply to substances that may affect water taste, odor, or color; may stain sinks, bathtubs, or laundry; or may interfere with treatment processes.

About This Report

This report presents analytical results for Portland's water to those needing technical data on water quality. The report covers results for treated Bull Run water from May 2018 to April 2019, emphasizing results from **April 2, 2019**. Analytical results for groundwater from the Columbia South Shore Well Field were last included in the April 2018 report, and will be reported on again in August 2019.

Please feel free to provide feedback on the report; contact information is provided at the bottom of the report. Additional background information is available in the annual Water Quality Report, delivered to Portland customers in early June and posted at:

www.portlandoregon.gov/water/waterqualityreport.

Most analytical results in this document are reported in parts per million (ppm), which is equivalent to milligrams per liter (mg/L). One part per million corresponds to one penny in \$10,000. When other units are used, they are displayed adjacent to the analytical results.

Many substances were either present at levels below the reporting limits of the prescribed method or were not detected. These results are shown as less than the Method Reporting Limit (<MRL). The MRL is the lowest concentration that can be reliably reported for the test method.

Treated Bull Run Water

Samples of treated water were collected at the outlet of the Lusted Hill Treatment Facility on **April 2, 2019**.

Physical Characteristics include temperature, pH, specific conductance, color, and solids. Results are reported in ppm unless otherwise noted.

| Physical Characteristics | 12-Month Range | April 2, 2019 | MRL* | EPA Standard |
|--|----------------|---------------|-----------|---------------------------------------|
| With Secondary Standards | | | | SMCL |
| pH, Field (Standard pH Units) | 7.9 – 8.5 | 8.44 | 0.1 | 6.5 – 8.5 |
| Total Dissolved Solids (TDS) | 26 – 35 | 26 | 5 | 500 |
| Color (Color Units) | 5 – 8 | 5 | 5 | 15 |
| Hardness (as CaCO ₃) | 6.8 – 9.7 | 6.8 | 0.5 | 250** |
| Unregulated | | | | |
| Specific Conductance (µmhos/cm @25°C) | 29.0 – 40.5 | 29.9 | 1 | Not regulated |
| Water Temperature, Field (°C) | 4.2 – 17.4 | 6.6 | 0.1 | Not regulated |
| Total Suspended Solids (TSS) | <0.5 | <0.5 | 0.5 | Not regulated |
| Total Solids (TS @180°C) | 26 – 35 | 26 | 5 | Not regulated |
| Turbidity (Nephelometric Turbidity Units; NTU) | 0.18 – 0.97 | 0.35 | 0.30/0.05 | Not regulated at this point in system |

* Method Reporting Limits may vary over time; thus, for some analytes, more than one MRL is listed.

**The SMCL for hardness is a secondary standard set by the State of Oregon; there is no secondary standard set by the EPA.

Nutrients are chemicals that plants and bacteria need to grow. All results are reported in ppm.

| Nutrients | 12-Month Range | April 2, 2019 | MRL | EPA Standard |
|---|----------------|---------------|-------|---------------|
| With Primary Standards | | | | MCL |
| Nitrate Nitrogen (NO ₃ ⁻ as N) | <0.010 – 0.048 | 0.018 | 0.010 | 10 |
| Nitrite Nitrogen (NO ₂ ⁻ as N) | <0.005 | <0.005 | 0.005 | 1 |
| Unregulated | | | | |
| Ammonia Nitrogen, Total (NH ₃ as N) | 0.33 – 0.49 | 0.42 | 0.01 | Not regulated |
| Ammonia Nitrogen, Free (NH ₃ as N) | 0.010 – 0.062 | 0.014 | 0.01 | Not regulated |
| Nitrogen, Organic (N) | <0.05 | <0.05 | 0.05 | Not regulated |
| Nitrogen, Total (N) | 0.31 – 0.41 | 0.32 | 0.05 | Not regulated |
| Phosphorus, Reactive (PO ₄ ³⁻ as P) | <0.003 – 0.003 | <0.003 | 0.003 | Not regulated |
| Phosphorus, Total (P) | <0.01 | <0.01 | 0.01 | Not regulated |
| Silica (SiO ₂ as Si) | 4.2 – 5.0 | 4.2 | 1 | Not regulated |
| Total Organic Carbon (TOC as C) | 0.67 – 1.30 | 0.68 | 0.30 | Not regulated |

Anions and cations are negative and positive ions, respectively. When water flows over or through soil and rocks, minerals dissolve in the water where they form anions and cations. All results are reported in ppm.

| Anions and Cations | 12-Month Range | April 2, 2019 | MRL* | EPA Standard |
|--|----------------|---------------|-------|---------------|
| With Primary Standards | | | | MCL |
| Cyanide (CN ⁻) | <0.005 | <0.005 | 0.005 | 0.2 |
| Fluoride (F ⁻) | <0.025 | <0.025 | 0.025 | 4.0 |
| With Secondary Standards | | | | SMCL |
| Chloride (Cl ⁻) | 2.9 – 3.5 | 2.9 | 0.25 | 250 |
| Fluoride (F ⁻) | <0.025 | <0.025 | 0.025 | 2.0 |
| Sulfate (SO ₄ ²⁻) | 0.35 – 0.42 | 0.42 | 0.25 | 250 |
| Unregulated | | | | |
| Total Alkalinity (as CaCO ₃) | 5.6 – 15.0 | 9.8 | 1.0 | Not regulated |
| Hydroxide Alkalinity (OH ⁻ as CaCO ₃) | <0.1 | <0.1 | 0.1 | Not regulated |
| Carbonate Alkalinity (CO ₃ ²⁻ as CaCO ₃) | <0.1 | <0.1 | 0.1 | Not regulated |
| Bicarbonate Alkalinity (HCO ₃ ⁻ as CaCO ₃) | 9.7 – 13.0 | 9.7 | 0.1 | Not regulated |
| Carbon Dioxide, Total (CO ₂) | 8.9 – 12.0 | 8.9 | 0.1 | Not regulated |
| Carbon Dioxide, Free (CO ₂) | 0.31 – 0.46 | 0.31 | 0.1 | Not regulated |
| Bromide (Br ⁻) | Not Tested | Not Tested | 0.005 | Not regulated |
| Calcium (Ca ²⁺) | 1.7 – 2.3 | 1.7 | 0.050 | Not regulated |
| Magnesium (Mg ²⁺) | 0.65 – 0.99 | 0.65 | 0.050 | Not regulated |
| Potassium (K ⁺) | 0.18 – 0.28 | 0.18 | 0.10 | Not regulated |
| Sodium (Na ⁺) | 3.2 – 4.3 | 3.2 | 1.0 | Not regulated |

Treated Bull Run Water (cont.)

Metals are a group of similar elements that occur naturally in the earth's crust. Many have potential health effects at low levels and are considered primary contaminants by the EPA. Other metals, such as iron, are not generally considered harmful to health at low concentrations but can cause nuisance effects, such as discolored water. These are considered secondary contaminants. All results are reported in ppm.

| Metals* | 12-Month Range | April 2, 2019 | MRL** | EPA Standard |
|---------------------------------|--------------------|---------------|----------------|------------------------|
| With Primary Standards | | | | MCL |
| Antimony (Sb) | <0.00050 | <0.00050 | 0.00050 | 0.006 |
| Arsenic (As) | <0.00050 | <0.00050 | 0.00050 | 0.010 |
| Barium (Ba) | 0.00082 – 0.00149 | 0.00082 | 0.00050 | 2 |
| Beryllium (Be) | <0.00050 | <0.00050 | 0.00050 | 0.004 |
| Cadmium (Cd) | <0.00050 | <0.00050 | 0.00050 | 0.005 |
| Chromium (Cr) | <0.00050 | <0.00050 | 0.00050 | 0.1 |
| Copper (Cu) | <0.00050 – 0.00071 | <0.00050 | 0.00050 | Treatment technique*** |
| Lead (Pb) | <0.00005 | <0.00005 | 0.00005 | Treatment technique*** |
| Mercury (Hg) | <0.0001 | <0.0001 | 0.0001 | 0.002 |
| Selenium (Se) | <0.0025 | <0.0025 | 0.0025 | 0.05 |
| Thallium (Tl) | <0.00050 | <0.00050 | 0.00050 | 0.002 |
| With Secondary Standards | | | | SMCL |
| Aluminum (Al) | 0.0145 – 0.0270 | 0.0192 | 0.0020 | 0.05 – 0.2 |
| Copper (Cu) | <0.00050 – 0.00071 | <0.00050 | 0.00050 | 1 |
| Iron (Fe) | 0.0183 – 0.0915 | 0.0183 | 0.0050 | 0.3 |
| Manganese (Mn) | 0.00170 – 0.03110 | 0.00181 | 0.00050 | 0.05 |
| Silver (Ag) | <0.00050 | <0.00050 | 0.00050 | 0.1 |
| Zinc (Zn) | <0.0010 | <0.0010 | 0.0010/0.00050 | 5 |
| Unregulated | | | | |
| Nickel (Ni) | <0.00050 | <0.00050 | 0.00050 | Not regulated |

*All metals results represent the total concentration rather than constituent parts, such as the dissolved fraction or components with specific valences.

** Method Reporting Limits may vary over time; thus, for some analytes, more than one MRL is listed.

***Instead of an MCL, EPA requires a treatment technique to address copper and lead above their respective action levels of 1.3 and 0.015 mg/L in drinking water, as measured at the point of use.

Volatile Organic Chemicals (VOCs) include solvents, disinfection by-products, and industrial and commercial products. The test measures the concentration of 60 VOCs, of which 23 are regulated and have state and federal MCLs. All results are reported in ppm.

| VOCs | 12-Month Range | April 2, 2019 | MRL | EPA Standard |
|-------------------------------|--------------------|---------------|------------------|---|
| With Primary Standards | | | | MCL |
| 21 Volatile Organic Chemicals | All <MRL | All <MRL | 0.00050 – 0.002* | Various* |
| Bromodichloromethane** | <0.00050 – 0.00106 | <0.00050 | 0.00050 | 0.080 mg/L for Total Trihalomethanes (TTHM) |
| Chloroform** | 0.00720 – 0.01550 | 0.00720 | 0.00050 | 0.080 mg/L for Total Trihalomethanes (TTHM) |
| Unregulated | | | | |
| 37 Volatile Organic Chemicals | All <MRL | All <MRL | 0.00050 – 0.002* | Not regulated |

*Each individual chemical compound has its own MRL and/or MCL values.

**Bromodichloromethane and chloroform are the most commonly occurring trihalomethane disinfection by-products. Disinfection by-products are formed when naturally occurring organic and inorganic materials in the water react with chlorine and other disinfectants.

Abbreviations:

| | |
|------|---|
| < | Less Than |
| MRL | Method Reporting Limit |
| ppm | Parts Per Million (equivalent to Milligrams per Liter [mg/L]) |
| MCL | Maximum Contaminant Level |
| SMCL | Secondary Maximum Contaminant Level |
| -- | No Sample Result |
| N/A | Not Applicable |

Would you like to access the Triannual Water Quality Report electronically?

Contact Randy Albright by email at randy.albright@portlandoregon.gov to be added to the electronic mailing list for the Triannual Water Quality report, which is compiled three times a year. The Portland Water Bureau's general web address is www.portlandoregon.gov/water. The web site includes a wealth of historical information, reference material, and updates on current issues. Click the [What We Do](#) link for information on water quality reports, state and federal drinking water regulations, source waters, water treatment and more. The past year's Triannual Water Quality Reports can be found at: www.portlandoregon.gov/water/triannual, and additional water quality information can be found at: www.portlandoregon.gov/water/waterquality.