



Supplemental Water Quality Data: April 2022

(Formerly called Triannual Water Quality Analysis)

About Portland's Water

Portland uses surface water from the Bull Run Watershed as its primary source year-round. Groundwater from the Columbia South Shore Well Field is an important secondary source, which is used when the surface water supply is limited or temporarily unavailable. The groundwater system is also operated annually for several weeks in a blending mode with surface water to ensure all equipment is in good working order. In 2021, groundwater was operated from August 3 to 27, providing about 42% of PWB's water supply. Find more information on our [About Portland's Water System page](https://portland.gov/water/system) (portland.gov/water/system). Dates that we have used groundwater are on our [Groundwater Use page](https://portland.gov/water/GroundwaterUse) (portland.gov/water/GroundwaterUse).

Drinking water treatment is a three-step process currently undergoing some changes:

1. **Chlorine (Cl₂)** is added as a disinfectant to inactivate microorganisms such as bacteria, *Giardia*, and viruses, which could otherwise make people sick. The target chlorine level at the entry point to the distribution system varies seasonally, ranging between 2.2 and 2.5 parts per million (ppm).
2. **Ammonia (NH₃)** is added to stabilize the chlorine and form a longer-lasting chloramine disinfectant in the distribution system piping.
3. Until April 20, 2022, **sodium hydroxide (NaOH)** had been added to increase the pH of the finished water to approximately 8.2 to 8.3 pH units to reduce corrosion of premise plumbing materials such as lead, which can be found in solder used to join copper pipes and in brass plumbing fixtures in older homes. Sodium hydroxide was phased out when Improved Corrosion Control Treatment (ICCT) was initiated on April 20, 2022.
4. After April 20, 2022, **soda ash (Na₂CO₃) and carbon dioxide (CO₂)**, rather than sodium hydroxide, are being added to address corrosion control. This is an additional step towards reducing the corrosivity of the finished water, which increases the pH and the total alkalinity of the water. As a result of this change, the pH of finished water is now approximately 8.3 to 8.4 pH units, and the total alkalinity has risen from approximately 8 to 25 ppm. Over the next few months, the target pH will be increased to 8.6 pH units.

The Portland Water Bureau is also working on designing and constructing a new filtration plant for the Bull Run surface water supply. Find out more on our [Bull Run Projects page](https://portland.gov/BullRunProjects) (portland.gov/BullRunProjects).

About This Report

The Portland Water Bureau releases drinking water test results three times per year for users who need water quality data beyond what is provided in our annual water quality report. These data include the most recent test results from both water sources: our surface water source in the Bull Run Watershed and our groundwater source in the Columbia South Shore Well Field.

The Bull Run samples are collected at the outlet of the Lusted Hill Treatment Facility. This location is typically sampled three times per year in April, August, and November. The included data tables contain results from the most recent sampling event on **April 5, 2022** as well as the range of results for the past 12 months (May 1, 2021 through April 30, 2022).

The Well Field samples are collected at the outlet of the Groundwater Pump Station. This location is typically sampled once per year. The included data tables contain results from the most recent sampling event on **August 4, 2021** as well as the range of results from the past 3 years (September 1, 2018 through August 31, 2021).

A list of definitions and abbreviations can be found after the data tables.

Find this data and additional test results on our [Drinking Water Test Results page](https://portland.gov/water/TestResults) (portland.gov/water/TestResults).

Have questions about water quality or this data? Contact our Water Quality Line: WBWaterLine@portlandoregon.gov or 503-823-7525.

Have feedback on this report or want to be added to our email distribution list? Email Randy Albright at randy.albright@portlandoregon.gov.

Data for Treated Bull Run Water

Physical Characteristics

Physical characteristics include temperature, pH, specific conductance, color, and solids.

Physical characteristic	4/5/22 results	12-month range	Standard limit	Standard type	Units
Color	5	5 – 7	15	Secondary	Color Units
Hardness (as CaCO ₃)	5.7	5.7 – 10	250	Secondary (Oregon)	ppm
Hardness (in grains per gallon)	0.33	0.33 – 0.58	-	None in these units	Grains per US gallon
pH, Field	8.2	7.8 – 8.7	6.5 – 8.5	Secondary	Standard pH Units
Specific Conductance	29	29 - 42	-	None	µmhos/cm @25°C
Temperature	7.2	4.4 – 17.2	-	None	degrees Celsius
Total Dissolved Solids (TDS)	22	22 – 32	500	Secondary	ppm
Total Suspended Solids (TSS)	<0.5	<0.5 – 0.7	-	None	ppm
Total Solids (TS @180°C)	25	25 - 34	-	None	ppm
Turbidity	0.3	0.2 – 1.6	5	Other – see notes	Nephelometric Turbidity Units (NTU)

Nutrients

Nutrients are naturally occurring organic and inorganic substances that microorganisms and plants need to grow.

Nutrient (chemical compound)	4/5/22 results	12-month range	Standard limit	Standard type	Units
Ammonia Nitrogen, Free (NH ₃ as N)	0.028	<0.01 – 0.11	-	None	ppm
Ammonia Nitrogen, Total (NH ₃ as N)	0.47	0.34 – 0.60	-	None	ppm
Nitrate Nitrogen (NO ₃ ⁻ as N)	<0.010	<0.010 – 0.05	10	Primary	ppm
Nitrite Nitrogen (NO ₂ ⁻ as N)	<0.005	<0.005	1	Primary	ppm
Nitrogen, Organic (N)	<0.05	<0.05	-	None	ppm
Nitrogen, Total (N)	0.34	0.34 – 0.40	-	None	ppm
Phosphorus, Reactive (PO ₄ ³⁻ as P)	<0.003	<0.003	-	None	ppm
Phosphorus, Total (P)	<0.01	<0.01	-	None	ppm
Silica (SiO ₂ as Si)	3.8	3.8 – 4.9	-	None	ppm
Total Organic Carbon (TOC as C)	0.98	0.79 – 1.20	-	None	ppm

Anions and Cations

Anions (negatively charged ions) and cations (positively charged ions) enter the water when it flows over or through soil and rocks, dissolving minerals into the water.

Anions and cations (chemical compound)	4/5/22 results	12-month range	Standard limit	Standard type	Units
Alkalinity, Bicarbonate (HCO ₃ ⁻ as CaCO ₃)	8.4	8.4 – 13	-	None	ppm
Alkalinity, Carbonate (CO ₃ ²⁻ as CaCO ₃)	<0.1	<0.1	-	None	ppm
Alkalinity, Hydroxide (OH ⁻ as CaCO ₃)	<0.1	<0.1	-	None	ppm
Alkalinity, Total (as CaCO ₃)	8.5	3.4 – 27	-	None	ppm
Calcium (Ca ²⁺)	1.4	1.4 – 2.4	-	None	ppm
Carbon Dioxide, Free (CO ₂)	0.42	0.35 – 0.42	-	None	ppm
Carbon Dioxide, Total (CO ₂)	7.8	7.8 – 12	-	None	ppm
Chloride (Cl ⁻)	2.6	2.6 – 3.5	250	Secondary	ppm
Cyanide (CN ⁻)	<0.005	<0.005	0.2	Primary	ppm
Fluoride (F ⁻)	<0.025	<0.025	4.0 / 2.0	Primary / Secondary	ppm
Magnesium (Mg ²⁺)	0.55	0.55 – 1.1	-	None	ppm
Potassium (K ⁺)	0.16	0.16 – 0.29	-	None	ppm
Sodium (Na ⁺)	3.4	3.4 – 4.1	-	None	ppm
Sulfate (SO ₄ ²⁻)	0.41	0.35 – 0.41	250	Secondary	ppm

Metals

Metals are a group of similar elements that occur naturally in the Earth's crust. The following results are for the total metal concentration in treated water. Note that lead and copper are regulated at the customer tap; see the Annual Water Quality report for regulatory data for customer taps.

Metal (atomic symbol)	4/5/22 results	12-month range	Standard limit	Standard type	Units
Aluminum (Al)	0.0267	0.0137 – 0.0267	0.05 – 0.2	Secondary	ppm
Antimony (Sb)	<0.00050	<0.00050	0.006	Primary	ppm
Arsenic (As)	<0.00050	<0.00050	0.010	Primary	ppm
Barium (Ba)	0.00074	0.00074 – 0.00111	2	Primary	ppm
Beryllium (Be)	<0.00050	<0.00050	0.004	Primary	ppm
Cadmium (Cd)	<0.00050	<0.00050	0.005	Primary	ppm
Chromium (Cr)	<0.00050	<0.00050	0.1	Primary	ppm
Copper (Cu)	<0.00050	<0.00050	1.3	Other – see notes	ppm
Iron (Fe)	0.0158	0.0158 – 0.0980	0.3	Secondary	ppm
Lead (Pb)	<0.00005	<0.00005	0.015	Other – see notes	ppm
Manganese (Mn)	0.00121	0.00121 – 0.01610	0.05	Secondary	ppm
Mercury (Hg)	<0.00010	<0.00010	0.002	Primary	ppm
Nickel (Ni)	<0.00050	<0.00050	-	None	ppm
Selenium (Se)	<0.0025	<0.0025	0.05	Primary	ppm
Silver (Ag)	<0.00050	<0.00050	0.1	Secondary	ppm
Thallium (Tl)	<0.00050	<0.00050	0.002	Primary	ppm
Zinc (Zn)	<0.0020	<0.0020	5	Secondary	ppm

Volatile Organic Chemicals (VOCs)

Volatile Organic Chemicals (VOCs) include solvents, disinfection by-products, and industrial and commercial products. The test measures the concentration of 60 individual VOCs. Of those, Portland commonly detects only bromodichloromethane and chloroform in treated surface water. These two VOCs are part of a group of VOCs called trihalomethanes. Trihalomethanes are disinfection by-products, which form when naturally occurring organic and inorganic materials in the water react with chlorine or other disinfectants.

Volatile Organic Chemical	4/5/22 results	12-month range	Standard limit	Standard type	Units
Bromodichloromethane	0.00051	<0.00050 – 0.00095	0.080	Other – see notes	ppm
Chloroform	0.00935	0.00679 – 0.01330	0.080	Other – see notes	ppm
58 additional Volatile Organic Chemicals	All <MRL	All <MRL	Depends on Compound	21 – Primary 37 – None	ppm

Data for Treated Groundwater

Physical Characteristics

Physical characteristics include temperature, pH, specific conductance, color, and solids.

Physical characteristic	8/4/21 results	3-year range	Standard limit	Standard type	Units
Color	<5	<5 - 7	15	Secondary	Color Units
Hardness (as CaCO ₃)	76	50 – 90	250	Secondary (Oregon)	ppm
Hardness (in grains per gallon)	4.4	2.9 – 5.2	-	None in these units	Grains per US gallon
pH, Field	8.2	8.1 – 8.5	6.5 – 8.5	Secondary	Standard pH Units
Specific Conductance	205.3	171.3 – 206.9	-	None	µmhos/cm @25°C
Temperature	18.7	16.1 – 19.2	-	None	degrees Celsius
Total Dissolved Solids (TDS)	150	120 – 150	500	Secondary	ppm
Total Suspended Solids (TSS)	<0.5	<0.5 – 0.5	-	None	ppm
Total Solids (TS @180°C)	150	120 – 150	-	None	ppm
Turbidity	0.07	<0.05 – 0.98	-	see notes	Nephelometric Turbidity Units (NTU)

Nutrients

Nutrients are naturally occurring organic and inorganic substances that microorganisms and plants need to grow.

Nutrient (chemical compound)	8/4/21 results	3-year range	Standard limit	Standard type	Units
Ammonia Nitrogen, Free (NH ₃ as N)	0.022	0.012 – 0.30	-	None	ppm
Ammonia Nitrogen, Total (NH ₃ as N)	0.54	0.47 – 0.54	-	None	ppm
Nitrate Nitrogen (NO ₃ ⁻ as N)	0.30	0.034 – 0.30	10	Primary	ppm
Nitrite Nitrogen (NO ₂ ⁻ as N)	<0.005	<0.005	1	Primary	ppm
Phosphorus, Reactive (PO ₄ ³⁻ as P)	0.11	0.11 – 0.13	-	None	ppm
Phosphorus, Total (P)	0.11	0.10 – 0.13	-	None	ppm
Silica (SiO ₂ as Si)	19.2	17.4 – 19.9	-	None	ppm
Total Organic Carbon (TOC as C)	<0.30	<0.30 – 0.40	-	None	ppm

Anions and Cations

Anions (negatively charged ions) and cations (positively charged ions) enter the water when it flows over or through soil and rocks, dissolving minerals into the water.

Anions and cations (chemical compound)	8/4/21 results	3-year range	Standard limit	Standard type	Units
Alkalinity, Bicarbonate (HCO ₃ ⁻ as CaCO ₃)	93	74 – 93	-	None	ppm
Alkalinity, Carbonate (CO ₃ ²⁻ as CaCO ₃)	1.4	0.7 – 1.4	-	None	ppm
Alkalinity, Hydroxide (OH ⁻ as CaCO ₃)	<0.1	<0.1	-	None	ppm
Alkalinity, Total (as CaCO ₃)	94	75 – 115	-	None	ppm
Calcium (Ca ²⁺)	17	14 – 17	-	None	ppm
Chloride (Cl ⁻)	3.6	3.0 – 5.2	250	Secondary	ppm
Cyanide (CN ⁻)	<0.005	<0.005	0.2	Primary	ppm
Fluoride (F ⁻)	0.16	0.13 – 0.17	4.0 / 2.0	Primary / Secondary	ppm
Magnesium (Mg ²⁺)	7.9	6.7 – 8.0	-	None	ppm
Potassium (K ⁺)	2.7	2.4 – 2.7	-	None	ppm
Sodium (Na ⁺)	15	12 – 15	-	None	ppm
Sulfate (SO ₄ ²⁻)	5.5	4.2 – 5.5	250	Secondary	ppm

Metals

Metals are a group of similar elements that occur naturally in the earth's crust. The following results are for the total metal concentration in treated water. Note that lead and copper are regulated at the customer tap; see the Annual Water Quality report for regulatory data for customer taps.

Metal (atomic symbol)	8/4/21 results	3-year range	Standard limit	Standard type	Units
Aluminum (Al)	0.00256	0.00213 – 0.00475	0.05 – 0.2	Secondary	ppm
Antimony (Sb)	<0.00050	<0.00050	0.006	Primary	ppm
Arsenic (As)	0.00080	0.00070 – 0.00109	0.010	Primary	ppm
Barium (Ba)	0.00874	0.00739 – 0.01350	2	Primary	ppm
Beryllium (Be)	<0.00050	<0.00050	0.004	Primary	ppm
Cadmium (Cd)	<0.00050	<0.00050	0.005	Primary	ppm
Chromium (Cr)	<0.00050	<0.00050	0.1	Primary	ppm
Copper (Cu)	<0.00050	<0.00050	1.3	Other – see notes	ppm
Iron (Fe)	0.0209	0.0127 – 0.0545	0.3	Secondary	ppm
Lead (Pb)	<0.00005	<0.00005	0.015	Other – see notes	ppm
Manganese (Mn)	0.0183	0.0183 – 0.0620	0.05	Secondary	ppm
Mercury (Hg)	<0.00010	<0.00010	0.002	Primary	ppm
Nickel (Ni)	<0.00050	<0.00050	-	None	ppm
Selenium (Se)	<0.0025	<0.0025	0.05	Primary	ppm
Silver (Ag)	<0.00050	<0.00050	0.1	Secondary	ppm
Thallium (Tl)	<0.00050	<0.00050	0.002	Primary	ppm
Vanadium (V)	0.00330	0.00168 – 0.00330	-	None	ppm
Zinc (Zn)	<0.0020	<0.0020	5	Secondary	ppm

Volatile Organic Chemicals (VOCs)

Volatile Organic Chemicals (VOCs) include solvents, disinfection by-products, and industrial and commercial products. The test measures the concentration of 60 individual VOCs. Of those, Portland commonly detects only chloroform in treated groundwater. Chloroform is part of a group of VOCs called trihalomethanes. Trihalomethanes are disinfection by-products and form when naturally occurring organic and inorganic materials in the water react with chlorine or other disinfectants.

Volatile Organic Chemical	8/4/21 results	3-year range	Standard limit	Standard type	Units
Bromodichloromethane	<0.00050	<0.00050	0.080	Other – see notes	ppm
Chloroform	<0.00050	<0.00050 – 0.00077	0.080	Other – see notes	ppm
58 additional Volatile Organic Chemicals	All <MRL	All <MRL	Depends on Compound	21 – Primary 37 – None	ppm

Notes

Drinking Water Standards

Regulatory standards (or limits) are set by the Environmental Protection Agency (EPA) and the State of Oregon for substances in drinking water. Substances that have a standard based on health risk or aesthetic characteristics are called regulated contaminants. Unregulated substances do not have a drinking water standard, but the EPA may consider setting a standard for them in the future.

There are four types of standards referred to in this report:

- **Primary** standards are set for contaminants that have potential health effects. These standards are usually given as Maximum Contaminant Levels (MCLs) intended to protect public health. Water systems are required to test for most substances with primary standards at the entry point to the distribution system and report any detections in their annual water quality report. Exceptions to the compliance location for primary standards are listed below under 'Other'.
- **Secondary** standards are set for contaminants that can have aesthetic water quality impact. These are not generally considered harmful to health at low concentrations. These standards 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. Water systems are not required to test for these substances but can use the SMCLs as guidance for aesthetic considerations.
- **Other:** Compliance with primary drinking water standards for turbidity, lead and copper, and trihalomethane VOCs are determined at different points in the water system.
 - Turbidity in unfiltered surface water or groundwater under the direct influence of surface water is regulated at the raw water intake rather than at the entry point to the distribution system. PWB's groundwater system has not been determined to be under the direct influence of surface water, and therefore no turbidity standards apply to the groundwater system.
 - Lead and copper are regulated at customer taps, rather than at the entry point to the distribution system.
 - Trihalomethane VOCs are regulated as the sum of results for a group of four trihalomethane compounds (Total Trihalomethanes), in the distribution system rather than at the entry point to the distribution system.
- **None:** Not all substances found in water have a regulatory standard. Water systems are not required to test for unregulated substances. Portland provides data for these substances in this report since their presence in water may impact some users.

Definitions and Abbreviations Used in Data Tables

Method Reporting Limit (MRL)

The method reporting limit (MRL) is the lowest concentration of a substance that can be reliably reported for the test method. In the data tables, substances that had results below the MRL have a less than symbol (<) in front of the numerical MRL. For VOCs, <MRL is used when many individual VOCs that have different MRLs are grouped together.

Parts per Million (ppm)

Water providers use ppm to describe a small amount of a substance within the water. In time measurement, one part per million is about 32 seconds out of one year. Parts per million (ppm) is equivalent to milligrams per liter (mg/L).