



Portland Water Bureau Triannual Water Quality Analysis August 2013

Bull Run Water

The Portland Water Bureau supplies water to over 930,000 people in the Portland metropolitan area. The primary source is water drawn from the protected Bull Run watershed 25 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

Water is first disinfected with chlorine, typically entering the system at about 2 parts per million (ppm). For the months of October and November this year, chlorine was adjusted to 3 ppm, and then reduced to 2.5 ppm in December. Ammonium hydroxide (aqueous ammonia) is added 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) and ammonium hydroxide (NH₄OH) are added to the water. Sodium hydroxide (at a dose of 3 to 5 ppm) is added to raise the pH approximately 1 pH unit. This helps prevent corrosion of household plumbing and lowers the amount of lead and copper that can leach into the water.

Water Quality Standards

The U.S. Environmental Protection Agency (EPA) and the Oregon Health Authority-Drinking Water Services set water quality standards. Primary standards are set by regulations to protect public health and these standards are usually given as maximum contaminant levels (MCL). Lead and copper standards are determined by action levels. These action levels, when exceeded at selected consumers' taps, trigger requirements that water providers take steps to reduce corrosion and provide public education.

Secondary standards are guidelines set to assure good aesthetic quality and are set as secondary maximum contaminant levels (SMCL).

These secondary standards identify levels of substances that may affect taste, odor or color of water, may stain sinks and bathtubs, or may interfere with treatment processes.

About the Report

This report presents analysis results for Portland's water to those needing technical data. The report covers results from October 2012 through September 2013, emphasizing August 2013 results from Bull Run, and including August 2013 results from the Columbia South Shore Well Field. Please feel free to provide feedback on the report; contact information is provided toward the end of the report. Additional background information is available in the annual Water Quality Report, mailed to Portland postal customers in early June and posted at www.portlandoregon.gov/water/waterqualityreport.

Most substances listed within this document are reported in units of concentration, parts per million. One part per million corresponds to one penny in \$10,000. When other units are used, they are displayed adjacent to the name of the substance.

Many substances were either present in levels below the reporting limits of the prescribed method or were not detected. These results are shown with a "<MRL" (less than the method reporting limit) in the result column. The method reporting limit (MRL) is the lowest quantity that can be reliably reported for the test method.

Abbreviations:

<	Less Than
MRL	Method Reporting Limit
ppm	Parts Per Million (equivalent to mg/L)
MCL	Maximum Contaminant Level
SMCL	Secondary Maximum Contaminant Level
--	No Sample Result
NA	Not Applicable

Bull Run Treated Water

Treated water samples were collected at the outlet of the Lusted Hill Treatment Facility on **August 13, 2013**.

Physical characteristics include temperature, pH, specific conductance, color, and solids. These characteristics themselves pose no health risk. Results reported as parts per million unless otherwise noted.

Physical Characteristics	Past 12 Months Range	August 13, 2013	MRL	EPA Standard
Secondary Contaminant				SMCL
pH (Standard Units), field	7.9 – 8.1	8.0	NA	6.5 – 8.5
Total Dissolved Solids	27 – 31	29	1	500
Color (Color Units)	5 – 20	7	5	15
Unregulated Characteristics				
Specific Conductance (µmhos/cm @25°C)	17 – 48	36	0.1	Not Regulated
Water temperature (°C)	4.3 – 17.5	14.7	NA	Not Regulated
Total Suspended Solids	<MRL – 0.8	<MRL	0.5	Not Regulated
Total Solids (@180°C)	27 – 32	29	1	Not Regulated
Turbidity (NTU)	0.18 – 1.32	0.37	0.05	Not Regulated at this point in system

Nutrients are chemicals that plants and bacteria need to grow. All results reported as parts per million.

Nutrients	Past 12 Months Range	August 13, 2013	MRL*	EPA Standard
Primary Contaminants				MCL
Nitrate Nitrogen (NO ₃ -N)	<MRL – 0.06	<MRL	0.01	10
Nitrite Nitrogen (NO ₂ -N)	<MRL	<MRL	0.005	1
Unregulated Contaminants				
Ammonia Nitrogen, Free (NH ₃ -N)	<MRL – 0.025	0.014	0.01/0.02	Not Regulated
Nitrogen, Organic (N)	<MRL	<MRL	0.01/0.05	Not Regulated
Phosphorus, Reactive (PO ₄ -P)	<MRL – 0.003	<MRL	0.003	Not Regulated
Phosphorus, Total (P)	<MRL	<MRL	0.01	Not Regulated
Silica (SiO ₂ as Si)	3.8 – 4.4	4.4	1.0	Not Regulated
Total Organic Carbon (TOC as C)	0.86 – 1.8	0.86	0.3	Not Regulated

Anions and cations are negative and positive ions. When water flows over soil and rocks, major constituents dissolve in water where they form anions and cations. All results reported as parts per million.

Anions and Cations	Past 12 Months Range	August 13, 2013	MRL*	EPA Standard
Primary Contaminant				MCL
Fluoride (F)	<MRL	<MRL	0.025	4.0
Secondary Contaminants				SMCL
Chloride (Cl)	2.3 – 3.1	2.3	0.25	250
Fluoride (F)	<MRL	<MRL	0.025	2.0
Hardness (as CaCO ₃)	5.9 – 7.5	7.5	0.1	250**
Sulfate (SO ₄)	0.36 – 0.46	0.36	0.25	250
Unregulated Contaminants				
Total Alkalinity (as CaCO ₃)	6.6 – 16	12	1.0	Not Regulated
Hydroxide Alkalinity (as CaCO ₃)	<MRL	<MRL	0.1	Not Regulated
Carbonate Alkalinity (as CaCO ₃)	<MRL	<MRL	0.1	Not Regulated
Bicarbonate Alkalinity (as CaCO ₃)	7.4 – 11	11	0.1	Not Regulated
Carbon Dioxide, Free (CO ₂)	0.5 – 1.5	0.5	0.1	Not Regulated
Carbon Dioxide, Total (CO ₂)	8.0 – 11	11	0.1	Not Regulated
Calcium (Ca)	1.4 – 1.8	1.8	0.5/0.05/0.022	Not Regulated
Magnesium (Mg)	0.5 – 0.7	0.7	0.5/0.05	Not Regulated
Potassium (K)	<MRL – 0.2	0.2	0.22/0.1	Not Regulated
Sodium (Na)	2.8 – 4.0	4.0	0.5/0.22/0.05	Not Regulated

* Testing for some analytes in 2012-13 was done by more than one method. In these cases, more than one MRL is listed.

**Hardness of 250 is a secondary standard in the Oregon Administrative Rules; there is no secondary standard set by EPA.

Bull Run Treated Water (cont.)

Metals are a group of similar elements that occur in the earth's crust. Many are toxic at low levels and are considered primary contaminants by EPA. Other metals, such as iron, are not toxic, but can cause nuisance effects, such as discolored water. These are considered secondary contaminants. All results reported as parts per million.

Metals*	Past 12 Months Range	August 13, 2013	MRL**	EPA Standard
Primary Contaminants				MCL
Antimony (Sb)	<MRL	<MRL	0.0005/0.00005	0.006
Arsenic (As)	<MRL	<MRL	0.0005	0.010
Barium (Ba)	0.0009 – 0.0012	0.0009	0.0005/0.00005	2
Beryllium (Be)	<MRL	<MRL	0.0005/0.00002	0.004
Cadmium (Cd)	<MRL	<MRL	0.0005/0.00002	0.005
Chromium (Cr)	<MRL – 0.0008	0.0008	0.0005/0.0002	0.1
Copper (Cu)	<MRL – 0.0006	<MRL	0.03/0.0005	Treatment Technique***
Cyanide (CN)	<MRL	<MRL	0.01	0.2
Lead (Pb)	<MRL	<MRL	0.001/0.00005	Treatment Technique***
Mercury (Hg)	<MRL	<MRL	0.0005/0.0002/0.0001	0.002
Selenium (Se)	<MRL	<MRL	0.0025/0.001	0.05
Thallium (Tl)	<MRL	<MRL	0.0005/0.00002	0.002
Secondary Contaminants				SMCL
Aluminum (Al)	0.015 – 0.069	0.015	0.002/0.0005	0.05 – 0.2
Iron (Fe)	<MRL – 0.068	0.068	0.2/0.0222/0.005	0.3
Manganese (Mn)	0.004 – 0.011	0.011	0.0005/0.00005	0.05
Silver (Ag)	<MRL	<MRL	0.0005/0.00002	0.1
Zinc (Zn)	<MRL – 0.001	<MRL	0.1/0.0005	5
Unregulated Contaminants				
Nickel (Ni)	<MRL	<MRL	0.0005/0.0002	Not Regulated

* All metals results represent the total metal (e.g. total iron, total chromium) rather than constituent parts, such as the dissolved components or components with certain valencies.

** Testing for metals in 2012-13 was done by more than one method. Thus for some analytes, more than one MRL is listed.

***Instead of an MCL, EPA requires a treatment technique to address copper and lead in drinking water.

Groundwater Operations

The Columbia South Shore Well Field was operated for a short duration in July and August 2013, from July 30th through August 8th. This operation exercised all equipment and allowed for identification of needed repairs. The water produced in this exercise was blended with Bull Run water and served to the public, contributing between 2 and 5 million gallons per day (MGD) to the system during that time, or approximately 1-3% of the water served. Groundwater was drawn from wells in three aquifers: Blue Lake (BLA), Sand and Gravel (SGA), and Troutdale Sand (TSA) aquifers.

Groundwater was monitored at wellheads and the groundwater pump station. Samples were tested for regulated and unregulated parameters, including physicals, solids, nutrients, anions, cations, metals, and organics. The Portland Water Bureau's groundwater quality surpasses federal and state requirements; results are shown on the following page.

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

Contact Sarah Silkie by email at Sarah.Silkie@portlandoregon.gov to be added to the electronic mailing list for the Triannual Water Quality report, which is compiled three times a year. For more information about Portland's drinking water, visit www.portlandoregon.gov/water. Click the **What We Do** link for detailed information on water quality reports, state and federal drinking water regulations, treatment, sources and more. The web site includes a wealth of historical information, reference material, and updates on current issues.

Groundwater

The range of values for samples collected at wellheads during groundwater operations in July and August 2013 is shown in the wellheads column. The GWPS (groundwater pump station) column shows water quality after treatment at the entry point to the distribution system from a sample collected August 1, 2013. This represents water blended from multiple wells.

Physical characteristics include temperature, pH, specific conductance, color, and solids. These characteristics themselves pose no health risk. Results reported in parts per million unless otherwise noted.

Physical Characteristics	Wellheads	GWPS	MRL	EPA Standard
Secondary Contaminants				SMCL
pH (Standard units)	6.6 – 8.6	8.0	NA	6.5 – 8.5
Color (Standard Units)	<MRL - 15	7	5	15
Unregulated Characteristics				
Specific Conductance (µmhos/cm @25°C)	109 – 322	229	0.1	Not Regulated
Water temperature (°C)	12.5 – 15.3	15.1	NA	Not Regulated
Total Solids (@ 180 °C)	87 – 260	150	1	Not Regulated
Turbidity (NTU)	<MRL – 1.33	0.75	0.3	Not Regulated

Nutrients are chemicals that plants and bacteria need to grow. All results reported as parts per million.

Nutrients	Wellheads	GWPS	MRL	EPA Standard
Primary Contaminants				MCL
Nitrate Nitrogen (NO ₃ -N)	<MRL – 2.1	0.23	0.01	10
Unregulated Contaminants				
Ammonia Nitrogen, Free (NH ₃ -N)	<MRL – 0.12	0.06	0.01	Not Regulated
Total Organic Carbon (TOC as C)	<MRL – 1.3	0.46	0.3	Not Regulated

Anions and cations are negative and positive ions. When water flows over or through soil and rocks, major constituents dissolve in water where they form anions and cations. All results reported as parts per million.

Anions and Cations	Wellheads	GWPS	MRL	EPA Standard
Secondary Contaminants				SMCL
Hardness (as CaCO ₃)	53 – 210	79	0.1	250*
Unregulated Contaminants				
Total Alkalinity (as CaCO ₃)	65 – 210	97	1.0	Not Regulated
Calcium (Ca)	12 – 46	19	0.05	Not Regulated
Magnesium (Mg)	5.1 – 22	7.7	0.05	Not Regulated

* Hardness of 250 is a secondary standard in the Oregon Administrative Rules; there is no secondary standard set by EPA.

Metals are a group of similar elements that occur in the earth's crust. Many are toxic at low levels and are considered primary contaminants by EPA. Other metals, such as iron, are not toxic, but can cause nuisance effects, such as discolored water. These are considered secondary contaminants. Results reported in parts per million.

Metals	Wellheads	GWPS	MRL	EPA Standard
Secondary Contaminants				SMCL
Iron (Fe), Total	<MRL – 0.42	0.085	0.005	0.3
Manganese (Mn), Total	<MRL – 1.5	0.031	0.0005	0.05

Volatile Organic Chemicals (VOCs) include solvents, disinfection by products, and industrial and commercial products.

Total Trihalomethanes (THMs) are disinfection by products.

Contaminants	Wellheads	GWPS	MRL	EPA Standard
Primary Contaminants				MCL
Volatile Organic Chemicals	<MRL	<MRL	0.001/0.0005	Various
Total THMs	<MRL	0.0012	0.0005	Not regulated at this point in the system