The Bull Run Watershed, our protected surface water supply, is located in the Mt. Hood National Forest 26 miles from Portland. The watershed is carefully managed to sustain and supply clean drinking water to a quarter of Oregon’s population. In a typical year, the watershed receives an astounding 135 inches of precipitation (rain and snow), that flows into the Bull Run River and then into two reservoirs that store nearly 10 billion gallons of drinking water. Due to the availability of the Columbia South Shore Well Field and the strong protections in place for the watershed, water from the Bull Run meets federal standards without needing to be filtered. Our Bull Run supply complies with all applicable state and federal regulations for source water. You can learn more by reading our 2003 Source Water Assessment (available at www.portlandoregon.gov/water/sourcewaterassessment or by calling 503-823-7525). The Assessment identifies the only contaminants of concern as naturally occurring microbes such as Giardia, Cryptosporidium, fecal coliform bacteria, and total coliform bacteria. These organisms are found in virtually all freshwater ecosystems and may be present in our supply at very low levels. The Portland Water Bureau is the only US water system to have obtained a variance from treatment for Cryptosporidium; see page 3 for more information.

The Columbia South Shore Well Field provides high-quality drinking water from 26 active wells located in three different aquifers. Located on the south shore of the Columbia River, the well field is the second largest water source in Oregon, and can produce up to 95 million gallons of water per day. The well field is used to supplement, or as an alternative to, the Bull Run supply during routine maintenance, turbidity events, emergencies, and when the bureau needs additional summer supply.

In collaboration with Gresham and Fairview, we work with businesses in the area to prevent hazardous material spills that could seep into the ground and impact groundwater. We also hold public events such as Aquifer Adventure, Cycle the Well Field, and Groundwater 101 to educate residents on how they can get involved. To learn more about our Well Field Protection Program or find upcoming events, visit www.portlandoregon.gov/water/groundwater or call 503-823-7473.

The Clackamas River Water District, City of Gresham, City of Lake Oswego, Rockwood Water People’s Utility District, Sunrise Water Authority, and Tualatin Valley Water District provide drinking water to some Portland customers who live near service area boundaries. Customers who receive water from these providers will also receive detailed water quality reports about these sources in addition to this report.
Bull Run Treatment Variance

The Portland Water Bureau is the only water provider in the United States to have received a variance to the treatment requirements for the parasite Cryptosporidium. A variance is state permission not to meet a maximum contaminant level (MCL) or a treatment technique under certain conditions. Water systems are eligible for these types of variances when regulators find that the required treatment is not necessary to protect public health because of the nature of the water system’s raw water source. Due to our high-quality raw water and protected watershed, the State of Oregon Health Authority (OHA) issued such a variance for the treatment of Cryptosporidium in March 2012. The treatment variance is valid for 10 years from the date it was issued. OHA may revoke the variance if the required conditions are not met.

To meet the requirements of our treatment variance, we:

- Protect the Watershed: Protection measures include maintaining or strengthening all existing legal and operational protections, monitoring the watershed to prevent trespassing, keeping strict controls for sanitary facilities, and regular field inspections of wildlife scat in the watershed.
- Monitor the Raw Water Intake: In 2016, we conducted regular monitoring for Cryptosporidium where raw water first enters the drinking water system at least two days each week. If Cryptosporidium is detected in any one sample, then we are required to begin a more intensive year-long monitoring program to demonstrate whether the Cryptosporidium concentration is less than 0.075 oocysts per 1,000 liters of water. We began this intensive monitoring after detecting Cryptosporidium in January 2017. Additional detections of Cryptosporidium during this period of monitoring could result in the loss of our variance.

Report and Notify: We report the results of watershed and raw water monitoring to OHA. Any Cryptosporidium detections must be reported within 24 hours and all our field inspections and tributary and wildlife scat monitoring results are reported annually. For Cryptosporidium detections at the raw water intake, we notify the public through our website and press releases.

Special Notice for Immuno-Compromised Persons

Some people may be more vulnerable to contaminants in drinking water than the general population.

Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplantation, people with HIV/AIDS or other immune system disorders, some elderly people, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. Environmental Protection Agency (EPA)/Centers for Disease Control and Prevention (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline at 800-426-4791.

Frequently Asked Questions About Water Quality

How does Portland test our drinking water?
The Portland Water Bureau monitors over 200 regulated and unregulated contaminants in drinking water. All monitoring data in this report are from 2016. If a known health-related contaminant is not listed in this report, the Portland Water Bureau did not detect it in drinking water.

How is our drinking water treated?
The first step in the treatment process for Portland’s drinking water is disinfection using chlorine. Next, ammonia is added to form nitrates, which ensure that disinfection remains adequate throughout the distribution system.

2016 Results of Cryptosporidium Monitoring at the Raw Water Intake

<table>
<thead>
<tr>
<th>Number of Samples</th>
<th>Total Volume</th>
<th>Detinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>208</td>
<td>5,368.9 L</td>
<td>None</td>
</tr>
</tbody>
</table>

In 2016, there were no detections of Cryptosporidium during Raw Water Intake Monitoring. In January 2017, two samples from the raw water intake collected during observation monitoring were positive for Cryptosporidium.

As a result, on January 8, 2017, the Portland Water Bureau began increased demonstration monitoring. These and additional results, as well as updated information on the status of the treatment variance, can be found at www.portlandoregon.gov/water/treatmentvariance.

WaterWorks in Your Neighborhood

The Portland Water Bureau is excited to release WaterWorks, a map-based, online tool that helps our customers see where we are actively working in the City. Using WaterWorks, customers will be able to find current projects or events that impact their water service or water quality, such as water system improvement projects, water main breaks, or water main flushing. The map also includes additional information, including what customers can do and who to contact for more information. WaterWorks adds to the Water Bureau’s already outstanding customer service by providing information at our customer’s fingertips, either on the computer or a mobile device.

To see what is happening in your neighborhood, visit WaterWorks at www.portlandoregon.gov/water/waterworks.

More Questions? Contact the Water Line
WBWaterLine@portlandoregon.gov | 503-823-7525 | More FAQs: www.portlandoregon.gov/water/FAQ

WaterWorks was developed using a grant awarded by the City of Portland Innovation Fund and the Portland City Council.
## Contaminants Detected in 2016

### Untreated Source Water from the Bull Run Watershed

<table>
<thead>
<tr>
<th>Regulated Contaminant</th>
<th>Minimum Detected</th>
<th>Maximum Detected</th>
<th>Maximum Contaminant Level (MCL), Treatment Technique or Maximum Residual Disinfectant Level (MRDL)</th>
<th>Maximum Contaminant Level Goal (MCLG)</th>
<th>Sources of Contaminant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turbidity</td>
<td>0.20 NTU</td>
<td>0.94 NTU</td>
<td>Cannot exceed 5 NTU more than 2 times in 12 months</td>
<td>Not Applicable</td>
<td>Erosion of natural deposits</td>
</tr>
<tr>
<td>Fecal Coliform Bacteria</td>
<td>Not detected</td>
<td></td>
<td>100% of samples had 20 or fewer bacterial colonies per 100 milliliters of water</td>
<td>Not Applicable</td>
<td>Animal wastes</td>
</tr>
<tr>
<td>Giardia</td>
<td>Not detected</td>
<td>2 Giardia cysts in an 11-liter sample</td>
<td>Treatment technique required: Disinfection to kill 99.9% of cysts</td>
<td>Not Applicable</td>
<td>Animal wastes</td>
</tr>
</tbody>
</table>

### Treated Drinking Water from Bull Run Watershed and Columbia South Shore Well Entry Points to the Distribution System

<table>
<thead>
<tr>
<th>Source of Contaminant</th>
<th>90th Percentile Value</th>
<th>Minimum Detected</th>
<th>Maximum Detected</th>
<th>Maximum Contaminant Level Goal (MCLG)</th>
<th>Sources of Contaminant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrate-Nitrogen</td>
<td>&lt;0.010 parts per million</td>
<td>0.16 parts per million</td>
<td>10 parts per million</td>
<td>18 parts per million</td>
<td>Found in natural aquifer deposits; animal wastes</td>
</tr>
<tr>
<td>Arsenic</td>
<td>&lt;0.010 parts per billion</td>
<td>0.04 parts per billion</td>
<td>10 parts per billion</td>
<td>0 parts per billion</td>
<td></td>
</tr>
<tr>
<td>Barium</td>
<td>0.00017 parts per million</td>
<td>0.00918 parts per million</td>
<td>2 parts per million</td>
<td>2 parts per million</td>
<td>Found in natural deposits</td>
</tr>
<tr>
<td>Copper</td>
<td>&lt;0.0050 parts per million</td>
<td>0.00205 parts per million</td>
<td>Not Applicable</td>
<td>1.3 parts per million</td>
<td></td>
</tr>
<tr>
<td>Fluoride</td>
<td>&lt;0.025 parts per million</td>
<td>0.18 parts per million</td>
<td>4 parts per million</td>
<td>4 parts per million</td>
<td></td>
</tr>
<tr>
<td>Lead</td>
<td>&lt;0.050 parts per million</td>
<td>0.12 parts per million</td>
<td>Not Applicable</td>
<td>0 parts per billion</td>
<td></td>
</tr>
</tbody>
</table>

### Treated Drinking Water from Points throughout the Distribution System of Reservoirs, Tanks and Mains

<table>
<thead>
<tr>
<th>Source of Contaminant</th>
<th>Total chiclor Residual Running Annual Average</th>
<th>Total chlror Residual at Any One Site</th>
<th>Total Trichloromethanes</th>
<th>Regulated Contaminant</th>
<th>90th Percentile Value</th>
<th>Number of Sites Exceeding the Action Level</th>
<th>Lead and Copper Rule Exceedence</th>
<th>Maximum Contaminant Level Goal (MCLG)</th>
<th>Source of Contaminant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Caliform Bacteria</td>
<td>1.75 parts per million</td>
<td>1.84 parts per million</td>
<td>4 parts per million</td>
<td>Not Detected</td>
<td>2 samples in October (0.8%) had detectable coliform bacteria</td>
<td>Treatment technique required: Less than 5% of samples in a month have detectable coliform bacteria</td>
<td>Not Applicable</td>
<td>Found throughout the environment</td>
<td></td>
</tr>
<tr>
<td>Chlorine Residual</td>
<td>0.26 parts per million</td>
<td>2.33 parts per million</td>
<td>Not Applicable</td>
<td>1.0 parts per billion</td>
<td>39.4 parts per billion</td>
<td>60 parts per billion</td>
<td>Not Applicable</td>
<td>Byproduct of drinking water disinfection</td>
<td></td>
</tr>
<tr>
<td>Total Trichloromethanes</td>
<td>20.8 parts per billion</td>
<td>27.0 parts per billion</td>
<td>80 parts per billion</td>
<td>Not Applicable</td>
<td>0.0 parts per billion</td>
<td>68.1 parts per billion</td>
<td>Not Applicable</td>
<td>Byproduct of drinking water disinfection</td>
<td></td>
</tr>
</tbody>
</table>

### Lead and Copper Sampling at High-Risk Residential Water Taps

<table>
<thead>
<tr>
<th>Regulated Contaminant</th>
<th>Minimum Detected</th>
<th>Average Detected</th>
<th>Maximum Detected</th>
<th>Source of Contaminant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>17.4 parts per billion</td>
<td>12.5% of samples (14 out of 112) exceeded the lead action level of 15 parts per billion</td>
<td>More than 10% of the homes tested have lead levels greater than 15 parts per billion</td>
<td>Corrosion of household and commercial building plumbing systems</td>
</tr>
<tr>
<td>Copper</td>
<td>0.314 parts per million</td>
<td>0% of samples (0 out of 112) exceeded the copper action level of 1.3 parts per million</td>
<td>More than 10% of the homes tested have copper levels greater than 1.3 parts per million</td>
<td></td>
</tr>
</tbody>
</table>

### Unregulated Contaminant

<table>
<thead>
<tr>
<th>Unregulated Contaminant</th>
<th>Minimum Detected</th>
<th>Average Detected</th>
<th>Maximum Detected</th>
<th>Source of Contaminant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radon</td>
<td>340 picocuries per liter</td>
<td>340 picocuries per liter</td>
<td>340 picocuries per liter</td>
<td>Found in natural deposits</td>
</tr>
<tr>
<td>Sodium</td>
<td>3.36 parts per million</td>
<td>6.70 parts per million</td>
<td>16.3 parts per million</td>
<td></td>
</tr>
<tr>
<td>Vanadium</td>
<td>&lt;0.00010 parts per million</td>
<td>0.00098 parts per million</td>
<td>0.00390 parts per million</td>
<td></td>
</tr>
</tbody>
</table>

See Notes on Contaminants on page 7 for more information.

## Definitions

**Action Level**
The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

**Maximum Contaminant Level (MCL)**
The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as is necessary for control of microbial contaminants.

**Maximum Contaminant Level Goal (MCLG)**
The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

**Maximum Residual Disinfectant Level (MRDL)**
The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

**Maximum Residual Disinfectant Level Goal (MRDLG)**
The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

**Nephelometric Turbidity Units (NTU)**
The unit of measurement of turbidity or cloudiness in water as measured by the amount of light passing through a sample.

**Part Per Million (ppm)**
One part per million corresponds to one penny in $10,000 or approximately one minute in two years. One part per million is equal to 1,000 parts per billion.

**Part Per Billion (ppb)**
One part per billion corresponds to one penny in $10,000,000 or approximately one minute in 2,000 years.

**Picocuries Per Liter**
Picocurie is a measurement of radioactivity. One picocurie is one trillion times smaller than one curie.

**Treatment Technique**
A required process intended to reduce the level of a contaminant in drinking water.
Notes on Contaminants

Arsenic, Barium, Fluoride, and Vanadium

These metals are elements found in the earth’s crust. They can dissolve into water that is in contact with natural deposits. At the levels found in Portland’s drinking water, they are unlikely to contribute to adverse health effects.

Disinfection Byproducts

During disinfection, certain byproducts form as a result of chemical reactions between chlorine and naturally occurring organic matter in the water. These byproducts can have negative health effects. Trihalomethanes and haloacetic acids are regulated disinfection byproducts that have been detected in Portland’s water. Adding ammonia to chlorine results in a more stable disinfectant and helps to minimize the formation of disinfection byproducts.

Fecal Coliform Bacteria

The presence of fecal coliform bacteria in source water indicates that water may be contaminated with animal wastes. The Portland Water Bureau uses chlorine to kill these bacteria.

Giardia

Wildlife in the watershed may be hosts to Giardia, the organism that causes giardiasis. The Portland Water Bureau uses chlorine to control these organisms.

Lead and Copper

Lead and copper are rarely detected in the source water. The main source of lead and copper in drinking water is the corrosion of home and building plumbing. Lead and copper are tested at customers’ homes that have lead solder and where levels are the highest. Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure. For more information, see Reducing Exposure to Lead on page 9.

Nitrate - Nitrogen

Nitrate, measured as nitrogen, can support microbial growth (bacteria and algae). Nitrate levels exceeding the standards can contribute to health problems. At the levels found in Portland’s drinking water, nitrate is unlikely to contribute to adverse health effects.

Radon

Radon is a naturally occurring radioactive gas that cannot be seen, tasted, or smelled. Radon can be detected at very low levels in the Bull Run water supply and at varying levels in Portland’s groundwater supply. Based on the historical levels of radon in groundwater combined with the limited amount of groundwater used, radon is unlikely to contribute to adverse health effects. For information about radon, call the EPA’s Radon Hotline (800-555-RADON) or www.epa.gov/radon.

Sodium

There is currently no drinking water standard for sodium. Sodium is an essential nutrient. At the levels found in drinking water, it is unlikely to contribute to adverse health effects.

Total Chlorine Residual

Total chlorine residual is a measure of free chlorine and combined chlorine and ammonia in our distribution system. Chlorine residual is a low level of chlorine remaining in water and is designed to maintain disinfection through the entire distribution system.

Total Coliform Bacteria

Coliforms are bacteria that are naturally present in the environment. They are used as an indicator that other potentially-harmful bacteria may be present. The Portland Water Bureau uses chlorine to kill these bacteria.

Turbidity

Turbidity is a measure of the water’s clarity. Increased turbidity is typically caused by large storms that suspend organic material in our source water. This can interfere with disinfection and provide an environment for microbial growth. When turbidity rises, the Portland Water Bureau can shut down the Bull Run system and serve water from the Columbia South Shore Well Field.

Information from the EPA About Drinking Water Contaminants

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency’s Safe Drinking Water Hotline at 800-426-4791 or at www.epa.gov/safewater.

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants in drinking water sources may include:

- **Microbial contaminants**, such as viruses and bacteria, which may come from wildlife or septic systems.
- **Inorganic contaminants**, such as salts and metals, which can occur naturally or result from urban stormwater runoff, industrial or domestic wastewater discharges or farming.
- **Pesticides and herbicides**, which may come from a variety of sources such as farming, urban stormwater runoff and septic systems.
- **Radioactive contaminants**, which can occur naturally.

In order to ensure that tap water is safe to drink, the EPA has regulations that limit the amount of certain contaminants in water provided by public water systems and require monitoring for these contaminants. Food and Drug Administration regulations establish limits for contaminants in bottled water, which must provide the same protection for public health.
Reducing Exposure to Lead

Lead is commonly found in a variety of places throughout our environment. While lead is rarely found in our source waters and there are no known lead service lines in the water system, lead can be found in some homes. In Portland, lead enters drinking water from the corrosion (wearing away) of household plumbing materials containing lead. These materials include lead-based solder used to join copper pipe — commonly used in homes built or plumbed between 1970 and 1985 — and brass components and faucets. Lead in household plumbing can dissolve into drinking water when water sits in those pipes for several hours, such as overnight or after returning from work or school.

If present, lead at elevated levels can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The Portland Water Bureau is responsible for providing high-quality drinking water, but cannot control the variety of materials used in plumbing components in homes or buildings. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your drinking water, you can request a free lead-in-water test from the LeadLine. Information on lead in drinking water, testing methods and steps you can take to minimize exposure is available from the LeadLine, 503-988-4000, www.leadline.org or the Safe Drinking Water Hotline, (800) 426-4791, www.epa.gov/safewater/lead.

In Portland, the most common sources of lead exposure are lead-based paint, household dust, soil, and plumbing materials. Lead is also found in other household objects such as toys, cosmetics, and pottery.

Water Testing

Twice each year, the Portland Water Bureau and regional water providers in the Bull Run service area monitor for lead and copper in tap water from a sample group of more than 100 homes. These are homes where the plumbing is known to contain lead solder, and represent a worst-case scenario for lead in water. Samples are collected after the water has been standing in the household plumbing for more than 6 hours.

A Lead and Copper Rule exceedance for lead occurs when more than 10 percent of these homes exceed the lead action level of 15 parts per billion. In testing conducted in October 2016, more than 10 percent of homes, 14 of 112, exceeded the lead action level. As a result of exceeding the action level, the Portland Water Bureau has been informing customers and encouraging them to follow the easy steps to reduce exposure to lead in water.

Protecting Public Health

The Portland Water Bureau’s Lead Hazard Reduction Program is a comprehensive approach to reduce exposure to lead. Through this program the Portland Water Bureau provides:

- **Corrosion Control Treatment**: Reduces corrosion of lead in plumbing by increasing the pH of the water. This pH adjustment has reduced lead in tap water up to 70 percent.
- **Lead in Water Testing**: Provides free lead in water testing to everyone, but targets testing the water in households most at-risk from lead in water. These are homes built between 1970 and 1985 with pregnant women or children ages six or younger in the home.
- **Education, Outreach and Testing**: Funds agencies and organizations that provide education, outreach, and testing on all sources of lead.

**Home Lead Hazard Reduction**

Supports the Portland Lead Hazard Control Program to provide grants to minimize lead paint hazards in homes.

**Future Improvements**

On March 1, 2017, Portland City Council authorized the Portland Water Bureau to begin a Corrosion Control Treatment Pilot. This is the first step to implementation of improved corrosion control treatment to further reduce the levels of lead in drinking water.

This decision was based on results from a corrosion control study to determine the main causes of lead in drinking water in our system. The results of this study indicated that additional treatment is the most effective means of further reducing lead in water from home and building plumbing.

The Corrosion Control Treatment Pilot will evaluate the different treatment potentials for effectiveness at reducing lead as well as other potential impacts to water quality and operations. This information will then guide the design and construction phases of the project.

The entire project is anticipated to take up to five years, with treatment in place by Spring 2022.
Questions? We’re Here to Help

You have a range of options for contacting the Portland Water Bureau on topics from programs and projects to issues with your account and information about public meetings.

Central Information Line
8 a.m. – 5 p.m., Monday – Friday
503-823-7404
For general information about projects, programs, and public meetings.
You can also learn more on our website: www.portlandoregon.gov/water

Customer Service
8 a.m. – 5 p.m., Monday – Friday
503-823-7770
PWBCustomerService@portlandoregon.gov
For questions or information about your account.

Water Line
8:30 a.m. – 4:30 p.m., Monday – Friday
503-823-7525
WBWaterLine@portlandoregon.gov
For questions regarding water quality or water pressure.

Emergency Line
24 hours, 7 days a week
503-823-4874
For water system emergencies.

For Additional Information
Oregon Health Authority
Drinking Water Services: 971-673-0405
http://public.health.oregon.gov/
HealthyEnvironments/DrinkingWater
Portland Water Bureau's Water System ID: 4100657

Look for us on Facebook and Twitter:
www.facebook.com/portlandwaterbureau
@portlandwater

Para obtener una copia de este informe en español, por favor llame al siguiente número o visite el sitio Web que aparece abajo:

Для получения копии этого отчета на русском языке позвоните по указанному ниже номеру телефона или зайдите на указанный ниже вебсайт:

Để có được một bản sao của báo cáo này bằng Tiếng Việt, xin vui lòng gọi số điện thoại hoặc truy cập vào trang web dưới đây:

要索取这份报告的中文复本, 请拨打下列电话号码或访问下列网站

www.portlandoregon.gov/water/wqreport
(503) 823-7770

To help ensure equal access to City programs, services and activities, the City of Portland will provide translation, reasonably modify policies/procedures and provide auxiliary aids/services/alternative formats to persons with disabilities. For accommodations, translations, complaints and additional information, contact 503-823-7525, use City TTY 503-823-6868, or use Oregon Relay Service: 711.

Copies of this report are available on the Portland Water Bureau's website: www.portlandoregon.gov/water/wqreport