PORTLAND WATER BUREAU
FROM FOREST TO FAUCET

Randy Leonard, Commissioner
David G. Shaff, Administrator

1120 SW 5th Avenue, Room 600
Portland, Oregon 97204-1926
Information: 503-823-7404
www.portlandonline.com/water

An Equal Opportunity Employer

April 21, 2011

Answers to Frequently Asked Questions about Portland's Open Reservoirs

1) Why is Portland required to discontinue using the open reservoirs at Mt. Tabor and Washington Park?

In 2006 the Environmental Protection Agency finalized the Long Term 2 Enhanced Surface Water Treatment Rule, known as LT2 for short. The rule requires that water utilities discontinue the use of open finished water reservoirs or treat the water as it exits the reservoir for *Cryptosporidium*, *Giardia*, and viruses.

2) Can't Portland fight the rule?

Portland has been fighting this rule for 7 years, pursuing legal, administrative, and legislative remedies. Portland filed a legal challenge to the rule in the United States Court of Appeals for the District of Columbia Circuit (Court) along with briefs filed by New York City, Oregon Wild, the Oregon Chapter of the Physicians for Social Responsibility and Walla Walla, WA. In its records review challenge, Portland requested that the requirements of LT2 for water systems to cover or treat open reservoirs and for unfiltered water systems to provide treatment to address *Cryptosporidium* be invalidated (vacated) by the Court.

The Court heard oral arguments in the case on September 25th, 2007. On November 6th, 2007 the Court issued its decision rejecting Portland's challenge in which Judge Tatel concluded "Portland's and New York's attacks on this rule-making are all either inaccurate, irrelevant, or both."

Since then, we have engaged Portland's Congressional delegation extensively in pursuit of a potential legislative remedy for Portland. Our representatives have reported that there is no support in Congress for legislative relief for Portland.

Currently we are in the late stages of completing our application for a variance from the treatment component of the rule, which if approved by the State of Oregon, will save ratepayers more than $100 million.

3) Why isn't Portland pursuing a variance to avoid covering the reservoirs?

The LT2 rule only has a variance provision for the *treatment* portion of the rule, which impacts the Bull Run water supply. Portland is vigorously pursuing this option to avoid additional treatment of Bull Run water.

The EPA has confirmed to Portland that no option exists in the rule for an *open reservoir* variance.

Portland sought legal advice from the same firm that represented the City in the legal challenge, and it affirmed that EPA's interpretation of the rule has legal precedence and would most likely be upheld by the courts.

4) Why can't we just ignore the rule?

Ignoring the rule would put Portland in violation of federal law, which would result in large fines from the state and federal government. In that event, not only would Portland's ratepayers ultimately be forced to comply with the rule, but they would be required to also bear the costs of expensive and unnecessary fines. This would also potentially impact Portland's bond rating, which would raise borrowing costs, and thus impact rates even more.

5) What about getting the "waiver" people are talking about?

There is no such thing as a "waiver." When advocates speak of getting a "waiver", they are talking about legislative action by the Congress to amend the federal Safe Drinking Water Act and exempt Portland from the rule which would then have to be signed by the President in order to become law.

Commissioner Leonard did ask our Congressional representatives about the likelihood of obtaining legislative action on behalf of Portland and was told there was no support in Congress for such an amendment.

6) Does covered storage increase risks of gas buildup in the reservoirs?

No. All reservoirs, covered or uncovered, have an air gap above the water surface that is vented into the atmosphere.

For nearly 30 years, almost every customer of the Portland Water Bureau has consumed drinking water that has been stored in a covered reservoir or tank, and the water quality consistently meets or exceeds that of the open reservoirs.

Closed reservoirs, because they continue to have air exchange above the water surface, allow venting to occur. Screened vents in closed reservoirs are sized to ensure adequate air flow through the reservoir to prevent pressurization and also prevent "off-gas" buildup. Air quality has not been a problem at any of the Water Bureau's many closed reservoirs and tanks. The Water Bureau inspects and maintains vents and reservoir access points are on a regular basis to prevent intrusions from animals, birds or humans. Additionally, the State Drinking Water Program performs inspections at these sites every three years.

7) Is radon an issue in Portland drinking water that will be affected by eliminating open drinking water storage?

No. Radon is not detectable in Portland's main supply, the Bull Run watershed, which contributes on average over 97% of the total water supply.

Radon gas naturally occurs in the Western United States from underground rock formations. Portland has detectable amounts of radon it its water system from the Columbia South Shore Well Field which is used for emergency backup and to augment the Bull Run source to provide summer supply and constitutes an average of approximately 3% of the total water supply. However, these amounts do not cause the drinking water to exceed the proposed rule for radon.

8) What is nitrification, and are closed reservoirs a risk in Portland's system?

Nitrification is a biochemical process that in excess can interfere with the disinfection process in drinking water systems. The conditions within Portland's open finished drinking water reservoirs are more conducive to causing nitrification than the conditions within closed reservoirs.

In Portland's drinking water system, the first step of the nitrification process-- decomposition of chloramine disinfectant-- is accelerated by loss of chlorine residual as drinking water passes through the open reservoirs. Exposure of chloraminated water over a large surface area to wind and sunlight and airborne pollutants such as pollen, dust and animal waste has a significant role in this decomposition of the chloramines.

Closed water storage facilities (i.e. tanks or covered reservoirs) do typically have the type of bacteria which are capable of feeding on ammonia and contributing to nitrification. However, without significant availability of ammonia from chloramine decomposition, or high temperatures, it is difficult for such bacteria to multiply and interfere with disinfection.

9) What role does sunlight play in disinfection of drinking water in open reservoirs?

Exposure to sunlight raises water temperatures and encourages the growth of algae and bacteria, which has been a recurring problem at our open reservoirs. Sunlight can also contribute to an increase in disinfection byproducts, loss of chlorine, reduction of pH (which can cause corrosion in home plumbing), increased total coliform production, and taste and odor issues. Additionally, elevated water temperatures in the open reservoirs increases nitrification and growth of total coliforms.

In highly controlled settings, processes similar to sunlight are used to provide water treatment; however, natural sunlight is not strong enough to provide demonstrable improvement in water quality. The exposure to sunlight actually has a greater number of negatives than positives. Sunlight is not a controllable treatment method, and cannot not be relied upon to adequately disinfect drinking water.

10) Why have waterborne disease outbreaks been associated with closed drinking water reservoirs?

Portland has never had a disease outbreak caused by its closed storage reservoirs.

Closed reservoirs that have had waterborne outbreaks have been in systems that experienced operational or mechanical failures and which have typically been infiltrated by animals.

Open reservoirs, on the other hand, with their large water surface areas are much more vulnerable to animals entering, swimming, defecating, or dying in them. It is fairly common for Portland Water Bureau maintenance workers to find dead animals, excrement and other contaminants in the open reservoirs – this water goes directly to the customers' tap without further treatment.

Many of the documented outbreaks associated with closed reservoirs have been tracked to animals that have made their way into closed reservoirs. Animals are able to enter a closed reservoir through a broken or missing screen on its vent or overflow. Due to the screening of vents and overflow

piping, evidence of animal access has never been discovered in our closed storage tanks. In Oregon, the State Drinking Water Program reviews the function of vent screens and overflows. The Water Bureau inspects and maintains vent screens and access points to its closed reservoirs and tanks on a monthly basis.

11) What about rubberized asphalt coatings leaching into the water on a new reservoir?
The new reservoirs planned at Powell Butte and Kelly Butte will be built of reinforced concrete. No rubberized asphalt coatings will be placed inside the reservoirs next to the drinking water. However, it is standard practice to apply waterproofing to the exterior of concrete structures of this type.

12) Wouldn't it be cheaper to maintain the open reservoirs than build covered storage?
The open reservoirs range from 100 to 117 years old. While they may look fine when full, they are in poor condition. The concrete is deteriorated, with cracks and chunks missing, the lining panels have eroded, and the steel pipes and valves are corroding.

In the last 10 years $40 million dollars have been spent on reservoir maintenance, and the costs continue to climb. Perhaps most importantly, the reservoirs and pipes are not structurally sound enough to withstand an earthquake, and would be unusable for water storage at a time when they would be most needed. It has been estimated that the reservoirs would need over $125 million dollars in improvements to seismically reinforce them. This would still not meet the EPA's regulatory requirement to cover them or treat the water exiting them.

13) What was the AwwaRF Project 3021 sampling at Portland's open reservoirs and how does it relate to the requirements of the LT2 rule or a Variance for Open Reservoirs?
In 2008 and 2009 the Portland Water Bureau participated in the Water Research Foundation (WaterRF) Project 3021, Detection of Infectious *Cryptosporidium* in Water. The purpose of the WaterRF project was to "examine conventionally filtered surface water for the presence of infectious *Cryptosporidium* using both cell culture techniques and molecular methods," and "attempt to repeat a recent study that reported a risk of infectious *Cryptosporidium* in filtered drinking water so that a scientifically sound consensus may be reached."

The Water Bureau's sample volumes ranged from 83.5 liters to 305.6 liters, for a total volume of about 7,000 liters during the study. Eighteen samples were collected approximately twice per month from June 2008 to April 2009. The results of the study were that no infectious *Cryptosporidium* oocysts were detected in any of the Water Bureau's samples. Additionally, no infectious oocysts were detected for any utility participating in this study.

EPA has indicated that variances are not available for the open reservoir requirements of LT2. Even if a variance to the open reservoir requirements of LT2 were available, the WaterRF study would not be adequate to achieve a variance.

The WaterRF study does not document the absence of *Cryptosporidium* and other public health risks in the open reservoirs. It simply shows that no infectious oocysts were detected in any of Portland's samples collected on 18 occasions. Given the literature that addresses the potential for direct microbial and chemical contamination and other forms of water quality degradation associated with

open finished water reservoirs, the data from the WaterRF study would not be considered convincing evidence for EPA, public health officials, or the scientific community in general.

Furthermore, the WaterRF study would not suffice as an adequate variance application (if one were available) for the following reasons:

1. The Water Bureau's sampling frequency and total number of samples from this study is insufficient compared to what EPA requested for the source water variance.
2. The Water Bureau's sampling location was only from Reservoir 4 (and occasionally from Reservoir 5) and not representative of all open reservoirs.
3. The WaterRF project did not use EPA Method 1623 for analysis. Method 1623 is required for LT2 monitoring.
4. LT2 samples must be analyzed by an EPA approved laboratory. The laboratory in the Texas Agrilife Research center used in the WaterRF study is not an EPA approved laboratory for *Cryptosporidium*.
5. The WaterRF research project did not sample for *Giardia* or viruses. The LT2 rule states that public water systems "using uncovered finished water storage facilities must either cover the storage facility or treat the storage facility discharge to achieve inactivation and/or removal of 4-log virus, 3-log *Giardia* lamblia, and 2-log *Cryptosporidium*." The open reservoir requirements of the LT2 rule are not solely concerned with *Cryptosporidium*.

14) Wouldn't it be cheaper to delay construction into the future?

Construction costs have been very low the last two years. Construction related inflation is anticipated to accelerate at faster rates than general consumer inflation, particularly with increasing fuel costs. Contractor bids can be expected to rise as we grow out of this recession and bond costs are expected to climb from historically low rates. Taken together, now is the right time to complete capital projects. Not only will it be less costly, but it will add jobs to the regional economy.

Further, delaying these projects into the future beyond what we have been authorized by the EPA would put the Portland Water Bureau in violation of federal law, and subject ratepayers to the costs of steep fines, and jeopardize the bureau's bond rating making capital projects more expensive.

15) How much is it going to cost?

The current average residential water bill is $25 per month. This cost will rise by about $21 per month (or less than a dollar a day) over the next 5 years.

The City of Portland offers the Sewer & Water Bill Discount Program to eligible seniors and others on limited incomes to provide monthly discounts.

The bureau is also planning to convert its quarterly billing practice to monthly billing by July 2012, which will help ratepayers incorporate their water and sewer costs into their monthly budgets.

16) What is New York City doing regarding compliance with the open reservoir requirements of the LT2 Rule?

New York City has one large uncovered finished drinking water reservoir called Hillview which the State of New York directed the City to cover by 2016 through an administrative order. Earlier this

year New York City formally requested a deferral of the deadline requirement for it to cover Hillview which would extend the compliance deadline to 2026 if it is granted. New York City is not requesting a variance to the open reservoir requirements of the LT2 rule.

New York City is conducting several capital improvement projects on its drinking water system which make the large Hillview covering project difficult to do simultaneously. The rationale of New York City's deferral request is that sequencing these projects so that the reservoir covering comes last will be most protective of water quality and public health.

17) Why can't we do what Rochester, NY is doing?

Rochester serves a population about the 1/4 the size that we do. Rochester also has a filtration plant upstream of their open reservoirs and uses free chlorine to disinfect. Rochester has proposed to install UV reactors inside its existing gatehouses to treat for *Cryptosporidium* and *Giardia*, and then it believes it can achieve chlorine contact time for virus inactivation downstream inside its pipes before serving customers. The system has not been designed yet so Rochester staff does not know for certain if this approach will work.

Portland has a different system. Portland uses chloramines to maintain disinfection. Portland would be required to treat for *Cryptosporidium*, *Giardia* and viruses at the reservoir outlets, which requires a much higher UV dose, and much larger equipment that could not fit into the existing gatehouses. The most likely configuration would be to install one UV facility downstream and below the outlets of the open reservoirs (one at Mt. Tabor and one at Washington Park). This would require pumping back up into the distribution system, which would eliminate the sustainable and elegant gravity feed system and add more long term operational costs. Each UV treatment facility would inhabit a footprint of approximately 3-5 acres. In addition, there would still be significant maintenance costs for the reservoirs, which are rated in poor condition. Treatment at the outlets would be more expensive than new covered storage, and was an option considered and rejected by the 2004 Independent Review Panel because of cost.

18) What did the rate payer oversight committee, Portland Utility Review Board (PURB) recommend to Council about the reservoirs?

The PURB recommended that Portland comply with the reservoir portion of the rule, and requested that the City Council adopt a formal resolution directing the Water Bureau to replace the existing in-town open reservoirs with secure enclosed storage on a schedule to comply with the EPA approved plan.

The PURB stated that "the reservoirs are old and decaying, in need of replacement independent of the LT2 rules, this is necessary system maintenance work."

19) What does Multnomah County Health Department say about open reservoirs?

Multnomah County Health Department (MCHD) has recommended that all open reservoirs be removed from the water system. MCHD acts in an advisory capacity to the City of Portland on health matters.