Experts Recommend New Drinking Water Treatment Method

In August 2008, the cities of Lake Oswego and Tigard formally endorsed a partnership agreement for sharing drinking water resources and costs. Lake Oswego's water supply system is near capacity and key facilities need expansion and upgrades. Tigard residents seek ownership in a water supply system. Both cities want to keep water affordable for their customers and sharing the cost of new infrastructure to serve both communities does that. The Partnership is planning to expand Lake Oswego's existing drinking water infrastructure to serve both communities.

A 2007 engineering report concluded the current direct filtration treatment process at Lake Oswego's plant must be upgraded to improve treatment reliability and continue to produce top quality drinking water. The treatment plant is over 40 years old and has a number of operational challenges. The plant is also at capacity on hot summer days.

A panel of national experts in drinking water treatment and public health recently confirmed the 2007 findings, recommending that Tigard and Lake Oswego pursue conventional filtration. Ozone treatment, which was not considered in the 2007 study, is also recommended to best protect public health and ensure good tasting water in the long term.

The expert panel confirmed that the quality of the Clackamas River drinking water source is very good. Combining conventional filtration with ozone treatment will meet future drinking water standards and provide additional assurance of safer, aesthetically pleasing drinking water.

An eight-member Citizen Sounding Board also participated in the evaluation of drinking water treatment methods. The Sounding Board considered community values, project impacts and costs. At the conclusion of the process, Sounding Board members unanimously backed the expert panel's recommendation.

Lake Oswego and Tigard City Councils will consider the treatment recommendation in late 2010, when more refined cost data is available.

Treatment Recommendation: Conventional Filtration Plus Ozone

“An expert panel recommends converting Lake Oswego’s aging water treatment plant to a new process: conventional filtration plus ozone. The recommendation is also supported by an eight-member Citizen Sounding Board with representatives from Tigard and Lake Oswego.”

“The recommended treatment process will improve reliability and meet current and future regulations.”
— Jeff Neemann, P.E., Black and Veatch
Expert Panel

“I am very much in favor of the recommendation. Ozone fits in with sustainability goals.”
— Bruce Brown, AIA
Citizen Sounding Board
New Treatment Process

Conventional filtration plus ozone treatment adds three new steps to the existing water treatment process. The first two new steps, flocculation and sedimentation, will remove more material from the water before filtration. Today, the filters do most of the hard work: removing silt and other materials from the water, but at a reduced filter efficiency. With the new process, filters will be aided by the new treatment steps. The filters will operate for longer periods between cleanings and better remove any remaining materials, especially during the winter months when water from the river contains more sediment.

The third new step, ozone treatment placed ahead of filtration, eliminates the need to pre-chlorinate the water, destroys pathogens and breaks down substances that cause taste and odor problems.

Together, these new treatment steps create a much more effective and dependable treatment process that will provide decades of excellent quality drinking water to Lake Oswego and Tigard customers.

Ozone (O₃) is oxygen gas (O₂) with an extra oxygen atom. Ozone treatment works through a process called “oxidation.” During oxidation, the extra atom oxidizes—or destroys—taste and odor-causing materials and microorganisms, leaving only pure oxygen in the water.

An ozone generator uses electrical energy to produce ozone from oxygen gas for the water treatment process. Lightning storms produce ozone naturally; that is what creates the “clean” smell after a summer storm.

The use of ozone treatment offers many benefits:

- Provides an additional treatment barrier to protect public health
- Consistently produces water that is pleasant tasting, year-round
- Retrofit and replacement of inefficient fixtures in City facilities
- Reduces the amount of chlorine needed for disinfection
- Is capable of meeting emerging concerns for pathogens, algal toxins, disinfection by-products, pharmaceuticals and personal care products
- Represents proven technology, with the number of ozone installations increasing in Oregon and across the U.S. due to its ability to provide multiple water quality benefits

A 2007 study published by the Water Research Foundation examined several methods to remove emerging contaminants of concern and concluded:

- Of the disinfectants evaluated, ozone provides the highest degree of contaminant removal; and
- Ozone is the most powerful disinfectant for the removal of emerging contaminants of concern.

An ozone generator at Wilsonville’s water treatment plant transforms oxygen into a powerful disinfectant.
Ozone Now or Later?
Ozone treatment is not required to meet current drinking water regulations. It is an enhancement that offers multiple health and aesthetic benefits. Ozone treatment is recommended to remove anticipated regulated contaminants, but those future rules are not likely to be in place by 2016 when the new treatment plant goes on-line.

The project team compared capital costs for three options: 1) installing ozone during the initial treatment plant upgrade; 2) adding space and piping for ozone during the initial upgrade, but deferring installation of the ozone treatment tanks, building, and equipment until 2026; and 3) adding the entire ozone treatment system in 2026 – ten years after the upgrade is completed.

Initial estimates show adding ozone now will increase capital costs $10 to $20 million. Adding ozone later will cost more and increase construction impacts on the neighborhood.

### Ozone Capital Cost Comparison\(^{a,b}\)

<table>
<thead>
<tr>
<th>Construction Completion</th>
<th>2016</th>
<th>2026</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Install ozone treatment now.</td>
<td>$17.8 M</td>
<td>$0 M</td>
<td>$17.8 M</td>
</tr>
<tr>
<td>2 Add space and piping now. Defer ozone until later.</td>
<td>$3.6 M</td>
<td>$20.1 M</td>
<td>$23.7 M</td>
</tr>
<tr>
<td>3 Defer ozone until 2026.</td>
<td>$0 M</td>
<td>$25.1 M</td>
<td>$25.1 M</td>
</tr>
</tbody>
</table>

\(^a\)All values are actual costs at time shown.
\(^b\)Assumes 3.5% per year inflation of construction costs.
\(^c\)Assumes 20% of ozone facilities are included in the initial construction.

### History of Ozone Treatment

- **1785** Characteristic odor detected near electrical sparks
- **1840** Ozone named from Greek word “ozein” to smell
- **1857** First ozone generator designed
- **1893** First drinking water plant uses ozone (Oudshoorn, Netherlands)
- **1906** Bon Voyage drinking water plant (Nice, France) began using ozone (and still in use today!)
- **1940s** Ozone introduced at several water treatment plants in the United States
- **Today** Hundreds of ozone water treatment plants across the U.S.

### Ozone Communities

**OREGON**
- Medford
- Roseburg
- Wilsonville

**WASHINGTON**
- Seattle
- Tacoma
- Walla Walla

**OTHER U.S. CITIES**
- Dallas
- Las Vegas
- Los Angeles
- Orlando

**AROUND THE WORLD**
- Barcelona
- Mexico City
- Paris
- Shanghai
Learn More
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