

# Healthy Drinking Waters

for

M A S S A C H U S E T T S

Safe and healthy lives in safe and healthy communities

## Ozone Treatment of Drinking Water Supplies

### *Effective Against:*

*pathogenic (disease-causing) organisms including bacteria and viruses, phenols (aromatic organic compounds), some color, taste and odor problems, iron and manganese, and turbidity.*

### *Not Effective Against:*

*large cysts and some other large organisms, inorganic chemicals, and heavy metals.*

### How Ozone Treatment Works

Ozone is a chemical form of pure oxygen. Like chlorine, ozone is a strong oxidizing agent and is used in much the same way – to kill disease-causing bacteria and viruses. It is effective against most amoebic cysts, and destroys bacteria and aromatic organic compounds (also known as phenols). Ozone may not kill large cysts and some other large organisms, so these should be eliminated by filtration or other procedures prior to ozone treatment. Ozone is also effective in eliminating or controlling color, taste, and odor problems. It oxidizes iron and manganese.

Ozone treatment units are installed as a point-of-use treatment system. Raw water enters one opening and treated water emerges from another. Inside the treatment unit, ozone is produced by an electrical corona discharge or ultraviolet irradiation of dry air



or oxygen. The ozone is mixed with the water whenever the water pump is running. Ozone generation units require a system to clean and remove the humidity from the air. This system requires routine maintenance. An ozone treatment system can be very energy intensive.

Ozone treatment can produce harmful by-products in drinking water. For example, if bromide is present in the raw water, ozone reacts with it to form bromate, shown to cause cancer in rats. The U.S. Environmental Protection Agency (EPA) has set a drinking water standard for bromate in water at 0.010 mg/L. For more information see the fact sheet entitled *Drinking Water Standards*.

The major benefit of ozone treatment is that it is effective as a disinfectant. In contrast to chlorine, ozone is active over a



wide pH and temperature range. The required contact time is so short that it is not a consideration in the system design. However, this is not true for *Giardia* and *Cryptosporidium*, both of which require a longer contact time.

### Maintenance

Always follow the manufacturer's instruction for maintenance, cleaning, and part replacement. Regardless of the quality of the equipment purchased, it will not perform satisfactorily unless maintained in accordance with the manufacturer's recommendations for maintenance, cleaning, and part replacement. Keep a logbook to record equipment maintenance and repairs.

### Other Considerations

Ensure the system you choose is installed and operated according to the manufacturer's instructions. After installation, retest both the raw water (prior to treatment) and the treated water at a state certified laboratory to ensure it is working properly and removing the contaminants. You should continue to test the quality of both the raw and treated water annually or more frequently (quarterly or semi-annually) if high levels of contaminants are present in the raw water. Frequent testing will also help you determine how well your treatment system is working and whether maintenance or replacement of components may be necessary.

Like chlorine, ozone is a toxic gas and ozone generators may leak and could create an ozone hazard within your home, causing illness. The greatest drawback with ozone treatment is its lack of an ozone residual time. With ozone treatment, disinfection occurs primarily at the point of contact between the ozone and the water. The disinfection process does not occur beyond the treatment unit. This contrasts with chlorination treatment where the residual

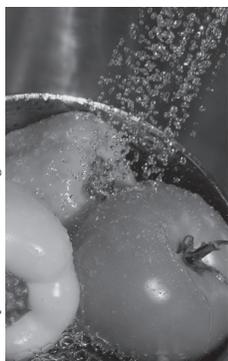


chlorine remains in the water and continues the disinfection process for some time. Ozone has an active residual time measured in minutes, whereas the active residual time for chlorine is measured in hours.

You can purchase equipment to test for residual ozone. The only way to know if the unit is working is to test for ozone residual or have bacterial tests conducted on the treated water. Ozonation equipment is expensive, and chlorination may still be desirable because of the low residual time for ozone.

### Questions to Ask Before You Buy

Before purchasing a water treatment device, have your water tested at a state certified laboratory to determine the contaminants present. This will help you determine if ozone is an effective treatment method for your situation. See the fact sheet *Questions to Ask When Purchasing Water Treatment Equipment* for more information.



©istockphoto.com/bluestocking

©istockphoto.com/Marek Thielka

Consumers should inquire about the following before purchasing an ozone system:

- Has the treatment system been tested and certified by a third party to ensure that it meets manufacturer's claims?
- Are there any special installation requirements that may add to the equipment cost, for instance changes to your household plumbing?

#### Product Certification

NSF International is a non-profit organization that sets performance standards for water treatment devices. Because companies can make unsubstantiated statements regarding product effectiveness, the consumer must evaluate test results of the device to determine if claims are realistic. Products that have been tested or evaluated by NSF and meet their minimum requirements are entitled to display the NSF listing mark on the products and in advertising literature for products. Manufacturers and models that meet NSF's standard are included in a listing published twice a year. For more information contact NSF at: 800-NSF-MARK (800-673-6275) or <http://www.nsf.org/consumer/>



©istockphoto.com/Tommy Maenhout



©istockphoto.com/ Mike Manzano

### Resources

#### UMass Extension

This fact sheet is one in a series on drinking water wells, testing, protection, common contaminants, and home water treatment methods available on-line at the University of Massachusetts website:

[http://www.umass.edu/nrec/watershed\\_water\\_quality/watershed\\_online\\_docs.html](http://www.umass.edu/nrec/watershed_water_quality/watershed_online_docs.html)  
and Cape Cod Cooperative Extension:  
508-375-6699  
<http://www.capecodextension.org>

#### MA Department of Environmental Protection, Division of Environmental Analysis

Offers assistance, information on testing and state certified laboratories: 617-292-5770  
For a listing of MassDEP certified private laboratories in Massachusetts:  
<http://www.mass.gov/dep/service/compliance/wespub02.htm>

#### U.S. Environmental Protection Agency, New England Office

Information and education on where drinking water comes from; drinking water testing and national laws; and how to prevent contamination:  
<http://www.epa.gov/ne/eco/drinkwater>

#### US Environmental Protection Agency

For a complete list of primary and secondary drinking water standards:  
<http://www.epa.gov/safewater>

#### MA Department of Conservation and Recreation, Division of Water Supply Protection

Maintains listing of registered well drillers, information on well location and construction: 617-626-1409  
<http://www.mass.gov/dcr/waterSupply/welldrill/index.htm>

#### NSF International

The NSF International has tested and certified treatment systems since 1965. For information on water treatment systems: 800-NSF-MARK (800-673-6275)  
<http://www.nsf.org/consumer/>

#### Water Quality Association

The Water Quality Association is a not-for-profit international trade association representing the household, commercial, industrial, and small community water treatment industry. For information on water quality contaminants and treatment systems:  
<http://www.wqa.org>



This publication is adapted from a URI fact sheet by the same name produced by the Rhode Island Department of Health and the University of Rhode Island Cooperative Extension Water Quality Program.

UMass Extension is an equal opportunity provider and employer, United States Department of Agriculture cooperating. Contact your local Extension office for information on disability accommodations or the UMass Extension Director if you have complaints related to discrimination, 413-545-4800.

This project was funded, in part, by a grant from US EPA.

This material is based upon work supported by the Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture, under Agreement No. 2004-51130-03108.

06/01/07

