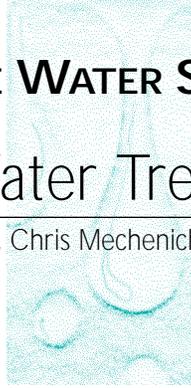


HOME WATER SAFETY

Choosing a Water Treatment Device

by Elaine Andrews, Chris Mechenich and Loretta Trapp



This fact sheet is part of a series designed to help you determine the quality of your home drinking water, and to show you techniques available for improving it. To make the best use of these publications, include them in a household file containing well information and water test results.

Other fact sheets in the series are:

G3558-1 Keeping Your Home Water Supply Safe

G3558-2 Evaluating the Condition of Your Private Water Supply

G3558-3 Evaluating the Condition of Your Public Water Supply

G3558-4 Interpreting Drinking Water Test Results

Extension bulletin G3399 *Maintaining Your Home Well Water System*, can be used with these publications.

This series was developed by the University of Wisconsin Cooperative Extension in cooperation with the Wisconsin Department of Natural Resources and the Wisconsin Department of Industry, Labor and Human Relations.

Most of us take clean drinking water for granted. After all, Wisconsin has regulated construction of private wells for more than 50 years, and enforces strict limits on contaminant levels in public water supplies. That's why it can be surprising—and disturbing—to find that your drinking water isn't as pure as you think. It might be that your water takes on an unpleasant taste or odor, or a routine laboratory test of your water indicates that it is unsafe to drink. Or perhaps you've heard that other homes in the area have experienced drinking water problems.

Whatever the case, when a family's drinking water turns bad, home water treatment is often an option for cleaning it up again. Water treatment can be as simple as putting a small carbon filter on the kitchen faucet or as complex as installing a larger, more costly device that treats all water coming into the house.

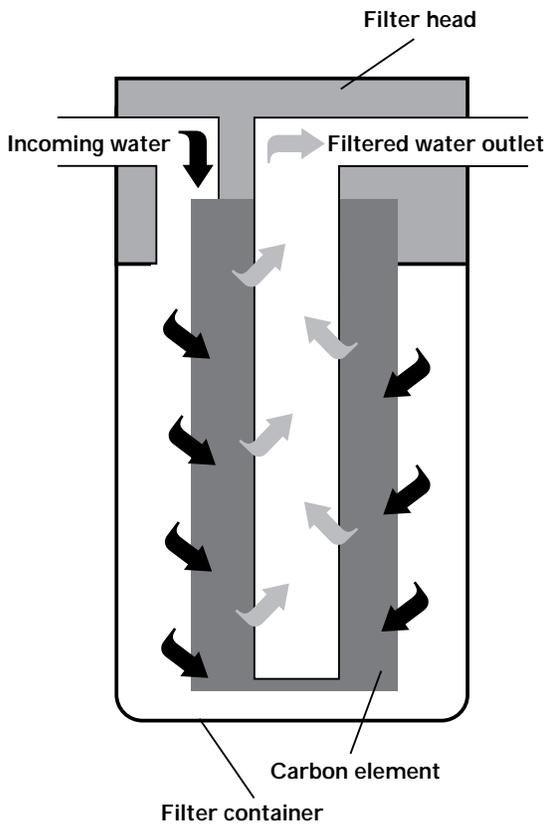
Water treatment can be a satisfactory solution to water treatment problems, but keep in mind that water treatment is never the *only* option. Before investing in a treatment device, have your water tested by a certified laboratory and examine the test results carefully to understand better what contaminants exist in your water, where they come from and what risks they pose (if any). Then consider a range of corrective actions. If you know the cause of the problem (such as a septic system), correcting the cause might be the best long-term solution. In other cases, fixing defects in the well or even drilling a new well might be the best approach. Other publications in the *Home Water Safety* series can help you understand your water supply and make these decisions.

If water treatment seems like the best solution after testing the water and examining a variety of options, this publication will help you chart a path through the maze of treatment devices, sales techniques and government regulations.

What is water treatment?

Any method of changing water quality between its source (in Wisconsin either groundwater or surface water such as Lake Michigan) and your home's plumbing system is considered water treatment. Public water utilities routinely treat water by chlorinating

ACTIVATED CARBON OR CHARCOAL FILTERS



Activated carbon (or charcoal) filters trap particles and adsorb chemicals as water passes through the carbon.

it to prevent bacteria problems or filtering or settling it to remove sediment. Utilities also use many other methods to ensure the safety or improve the taste and appearance of water. Water softeners, which remove calcium and magnesium from water, are a common home water treatment method, though most people probably don't think of softeners as a water treatment device.

Home water treatment devices fall into one of two categories: **point of entry** or **point of use**. Point of entry devices treat most or all water entering the home or building. A water softener installation is a common example. Point of use devices are installed at a single tap or outlet and treat only the water coming from that outlet. A carbon filter that attaches to a faucet is a good example.

Point of entry devices are generally best for water problems that can affect the entire plumbing system or water used throughout the home. Extremely hard water, for example, can lead to scale build-up in pipes and reduced water pressure in the plumbing system. A water softener can help prevent scaling. A high iron concentration can turn water brown, stain laundry and make coffee taste bad. A point of entry device that lowers iron concentrations before water enters the home plumbing system might be appropriate in this case.

Point of use devices are often best for removing a contaminant that affects the water's taste, or that presents a safety concern if the water is used for drinking or cooking. For example, naturally-occurring sulfur can give water an undesirable taste or odor. A point of use device such as a carbon filter on the kitchen faucet might be appropriate in this case.

Water treatment guidelines—how do I choose a water treatment device?

Selecting an appropriate water treatment device begins with knowing exactly what's in the water and what you want to treat. *Therefore, selecting a treatment device begins with a water test.* Water from private wells needs to be tested at a certified laboratory. Test results for water from a public system are available from the water utility or from Department of Natural Resources offices. The other fact sheets in this series (listed on the front) provide detailed information about testing water and interpreting the results.

Note that treatment devices should be used only on water that is free of harmful bacteria. If the water test shows the presence of coliform bacteria, find the bacteria's source and correct this problem first. Usually, coliform bacteria indicate well construction or maintenance defects that let contaminated surface water enter the well.

If, after carefully evaluating your water quality, you determine that treatment is needed, your next step is to review available treatment options.

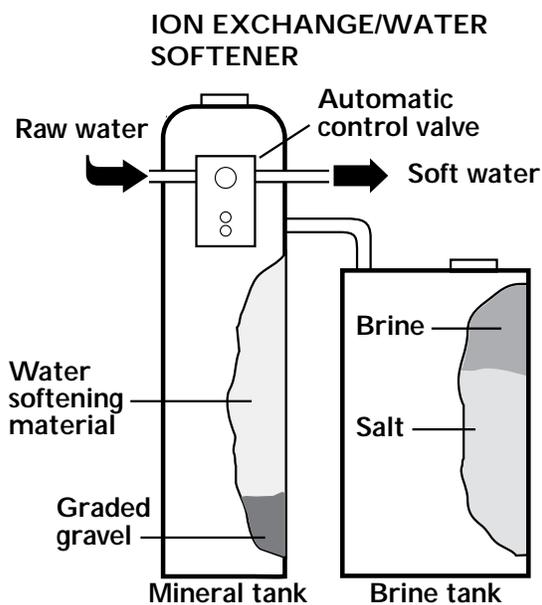
TABLE 1
WATER TREATMENT CHOICES

CONTAMINANT	TREATMENT CHOICES
bacteria¹	Contact DNR for assistance.
chloride	distillation; reverse osmosis
cloudiness/turbidity/sediments	particulate filters; carbon filter (block); reverse osmosis; distillation
color	carbon filters; iron filters; reverse osmosis
fluoride	distillation; reverse osmosis
hardness	distillation; water softener
iron and manganese—particles	particulate filters; pellet chlorinator
iron and manganese—dissolved	iron filters; water softener; air stripper; pellet chlorinator
metals (general)	distillation; reverse osmosis
arsenic	distillation; reverse osmosis; carbon filter (with activated alumina added)
barium	reverse osmosis, distillation; water softener
cadmium	distillation; reverse osmosis; water softener
chromium	distillation; reverse osmosis
copper	distillation; reverse osmosis
lead ²	distillation; reverse osmosis
mercury	distillation; reverse osmosis
zinc	distillation; reverse osmosis
nitrate, nitrite	anion exchange; distillation; reverse osmosis
odors (general)	carbon filter (see individual listings)
chlorine	carbon filters
rotten egg (hydrogen sulfide)	disinfection techniques; iron filters (green sand); ozone generator; pellet chlorinator
gasoline or chemical solvents	eliminate source; contact DNR for assistance
musty or earthy odor	disinfection techniques; ozone generator; pellet chlorinator
pesticides	carbon filters; reverse osmosis (atrazine). Contact DNR for assistance.
pH, high acid (corrosive)	neutralizers
radon	air stripper
radium	distillation; reverse osmosis; water softener
volatile organic chemicals (VOCs)	air stripper; carbon filters; reverse osmosis. Contact DNR for assistance.

¹ Treatment of coliform bacteria requires approval from the Department of Natural Resources.

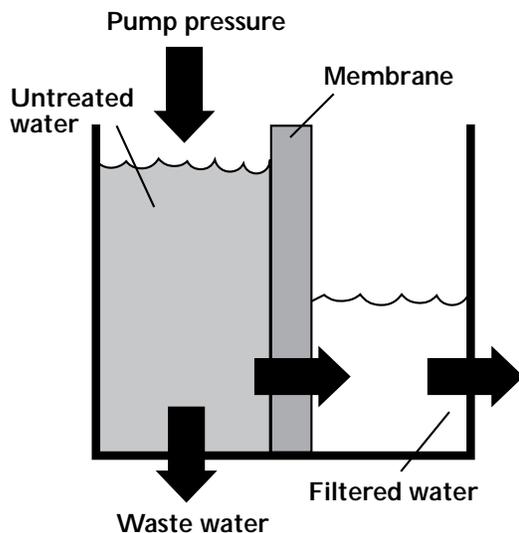
² If lead is your only drinking water problem, you can buy a special filter cartridge for less than \$100 that removes lead. It will last from 6 months to 1 year.

Explanation of treatment choices starts on the next page.



Hard water enters a mineral tank filled with synthetic resin beads which soften water. The ion exchange process takes place inside the mineral tank.

REVERSE OSMOSIS



A reverse osmosis system uses water pressure and a filter system to remove contaminants and microorganisms from water.

What kinds of treatment devices are there?

No device treats all water quality problems. *It is essential to match the treatment system to the contaminants you want to remove.* Basic types of water treatment devices or processes include:

AIR STRIPPER. These units mix water with air by bubbling air through water or spraying water into the air. Aeration precipitates metals that combine with oxygen to form particles and releases dissolved gases such as hydrogen sulfide.

ANION EXCHANGE. Like water softeners, these units have a resin that exchanges chloride for negatively charged ions (such as nitrate or sulfate) in the water.

CARBON FILTERS (ACTIVATED). Activated carbon or charcoal filters trap particles as water passes through the carbon.

DISINFECTION TECHNIQUES. Devices or methods called purifiers that kill or remove bacteria. Adding chlorine to water is the most widely used disinfection technique.

DISTILLATION. Distillation units (stills) boil water to make steam, which is then cooled (condensed) and collected in a separate tank.

IRON FILTERS. (many types). These remove iron as water passes through a filter (usually manganese-treated green sand) or artificial resins.

NEUTRALIZERS. These units increase the alkalinity of acidic water by passing it through granular lime, calcium carbonate or marble.

OZONE GENERATOR. Provides ozone to combine with organic compounds present in unpleasant odors, leaving oxygen gas as a product.

PARTICULATE FILTERS. Water is filtered through diatomaceous earth or screened and settled. A slow sand filter is a common type.

PELLET CHLORINATOR. Adds chlorine to well water to correct aesthetic problems. Requires DNR approval.

REVERSE OSMOSIS. Contaminants and microorganisms are removed as water is forced through a membrane with microscopically small holes.

WATER SOFTENER. Typical home units exchange sodium ions for positively charged ions of calcium and magnesium.

Within each of these basic types, there are many variations of quality, design and construction. You might need to employ two or more devices at the same time to manage your water quality problem. Some equipment may require installation of pretreatment devices to reduce the amount of contaminants such as iron or sediment that could impair the system's ability to function properly. Other treatment devices already incorporate several treatment systems. For example, a reverse osmosis system usually includes a sediment prefilter and a carbon prefilter and postfilter. For advice on choosing water treatment devices, consult the Department of Natural Resources.

Extension publication G3378 *Improving Your Drinking Water Quality* provides a discussion of common Wisconsin water problems, a description of appropriate treatment methods with comments on the

drawbacks of each, and a summary of how each method works. *Consumer Reports* and the Rodale Press *Water Treatment Handbook* can give you details about the construction and efficiency of particular water treatment devices. These and other helpful publications are listed in the “Resources” section of this publication.

Is the design of the treatment device important?

Your water problem dictates the best treatment design for you. Compare the effectiveness of different units with your contamination levels. Then calculate the cost per gallon of treating water with each appropriate device. Customers are reminded to check the DILHR approval letters before purchasing any treatment device so they understand the verified limitations of the device they are considering.

How do I know the device will work?

Because water treatment devices can affect the safety of drinking water and are, in effect, plumbing devices, the state regulates their sale and installation. In addition, some private organizations and the federal government help ensure that treatment devices function properly.

The Department of Industry, Labor and Human Relations (DILHR) approval process and letter

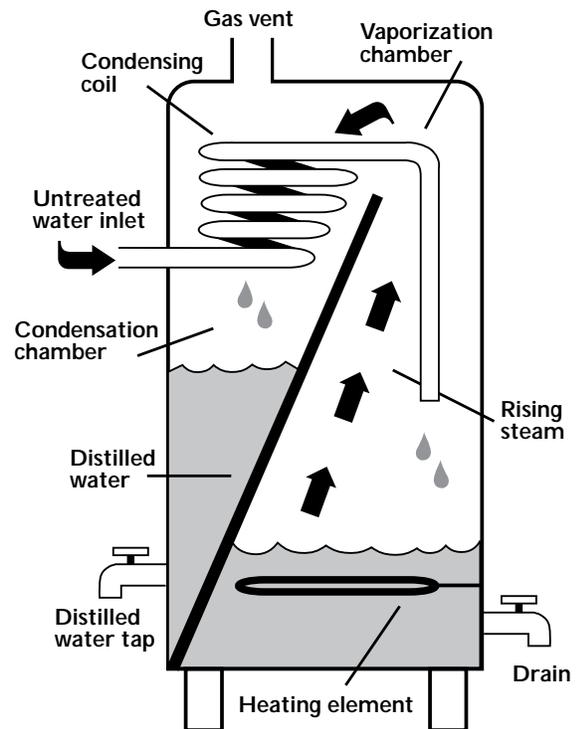
In Wisconsin, anyone selling a water treatment device must be able to show a product approval letter from the Department of Industry, Labor and Human Relations (DILHR) for each device. The letter must specify the model under consideration. Before granting a product approval letter, DILHR evaluates:

- the device’s ability to reduce aesthetic and health related contaminants
- the suitability of the construction materials for use with drinking water
- the ability of construction materials to withstand pressures and temperatures required for appropriate functioning
- the availability of proper installation and operation instructions.

Slightly different features are reviewed if the product injects a chemical such as chlorine into the water supply.

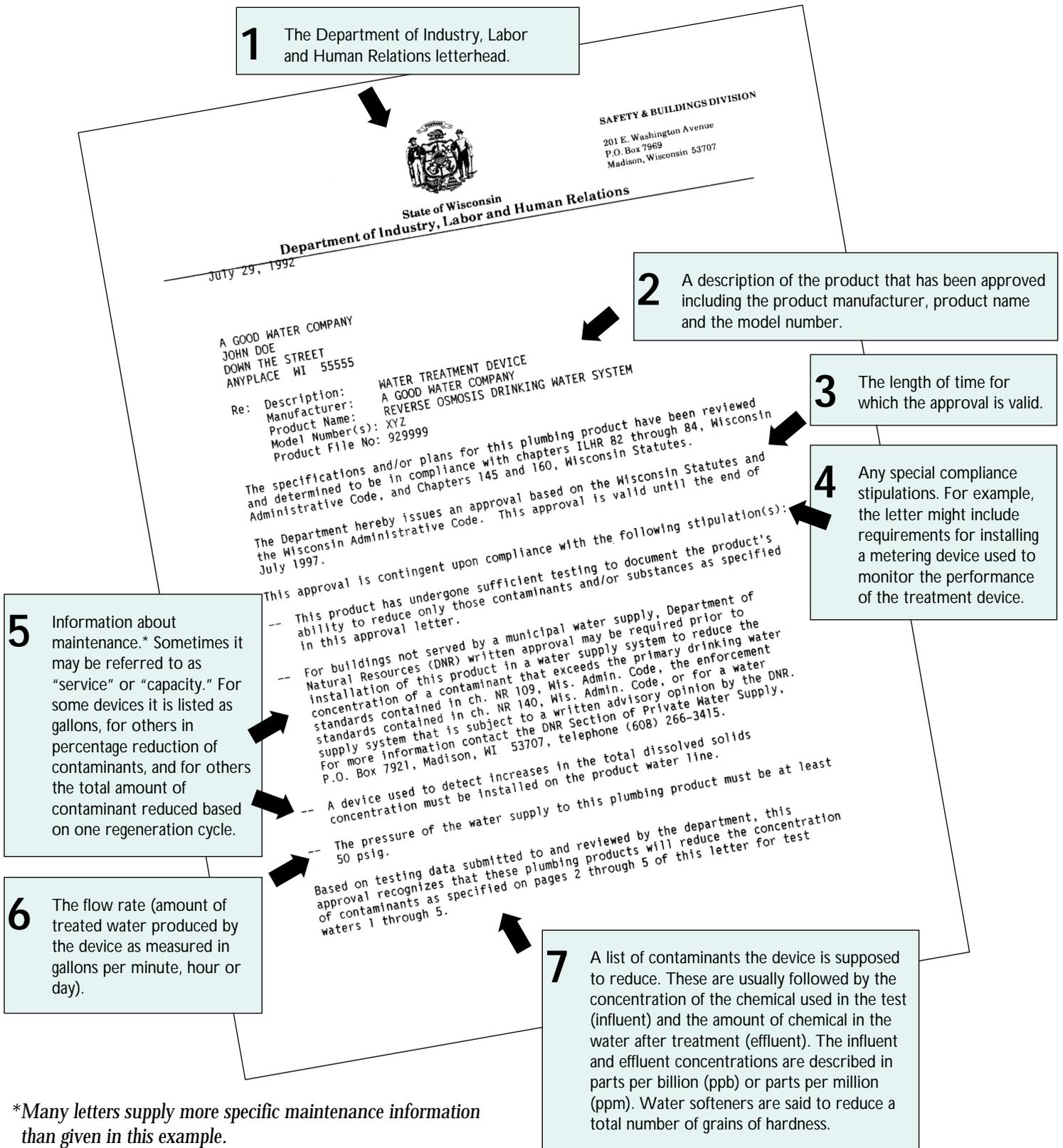
If the product salesperson does not show you the DILHR product approval letter, ask to see it. Then look for the information shown in the diagram on page 6.

DISTILLATION UNIT



A distillation unit boils water, which steams away impurities. The steam containing the impurities condenses in a separate chamber.

The Department of Industry, Labor and Human Relations approval letter



*Many letters supply more specific maintenance information than given in this example.

The DILHR approval letter usually includes the “detection limit” for each chemical tested. If the letters BDL (Below Detection Limit), appear under the effluent heading, the contaminant may still be present in the water, but it can’t be detected with existing technology. **If you are concerned about the health impacts of these chemicals, call the EPA Safe Drinking Water Hotline at 800/426-4791 or the Wisconsin Department of Health and Social Services toxicologists (608/266-7480 or 608/266-0923) for more information.** Water quality standards for common contaminants are given in fact sheet G3558-4 *Testing Your Drinking Water and Interpreting the Results*.

Additional review of treatment devices

The U.S. Environmental Protection Agency (EPA) *does not approve* water treatment devices. However, *water treatment devices that contain silver impregnated activated carbon are required to be registered with the EPA.* The registration indicates that the device does not leach toxic silver into the treated water. An EPA label is not an indication that the device will function as claimed by the manufacturer or retailer. Any EPA labels on a product or in product instructions merely indicate that the product has been registered.

The Water Quality Association (WQA) and National Sanitation Foundation (NSF) are private organizations that test products at the manufacturer’s expense. WQA is the trade organization of the water treatment industry. It tests only for aesthetic claims; that is, claims that a device reduces contaminants affecting taste, odor and appearance.

The NSF certification program includes evaluation of six common treatment systems: activated carbon, softeners, mechanical filtration, distillation, reverse osmosis and ultraviolet disinfection systems. The certification program requires that the device meet four requirements:

- It must meet the manufacturer’s reduction claims
- It must not contribute to contamination of drinking water
- Its design must be structurally sound
- It must be accompanied by literature adequately explaining claims and operation.

The NSF will provide consumers with test results of specific models of water treatment devices (see “Resources” at the end of this publication).

Installation approval by the Department of Natural Resources

Installing a device to treat a health related water contaminant that exceeds the drinking water standard must be approved by the Department of Natural Resources (DNR) when certain conditions apply. Each installation is evaluated in a separate written approval. Treatment of contaminants that do not affect health, such as iron, does not require DNR approval.

INTERPRETING CHEMICAL CONCENTRATIONS

The amount of a chemical present in your water might be described in parts per billion (ppb), parts per million (ppm), milligrams per liter (mg/l), micrograms per liter ($\mu\text{g/l}$), or grains per gallon (gpg). Your water test might provide you with concentrations in one unit while the water treatment device uses another. The units can be converted using the following table:

1 ppm = 1000 ppb

1 ppm = 1 mg/l

1 ppb = 1 $\mu\text{g/l}$

1 gpg = 17.1 mg/l

The Wisconsin DNR requires approval for installing a water treatment device if any of the following conditions apply:

- The treatment device is intended to control bacteriological contamination problems.
- The treatment device will be installed on or within a well, or the water treatment will occur in the well. (For example, a continuous chlorinator, such as a pellet chlorinator, requires approval.)
- The treatment device is intended to control chemical contaminants in a private water system where the chemical contamination exceeds drinking water standards, and exceeds the amount of contaminants that can be handled by the treatment device. **The level of contaminants that can be handled by a treatment device are specified in the DILHR product approval letter.**
- The treatment device is intended to control contaminant levels in a non-community well water system, where the contaminant levels exceed drinking water standards or health advisories. (A non-community water system is one which supplies water to 25 or more nonresidential consumers at least 60 days per year.)
- The DNR informs the water system owner/operator that the water system contamination is complex and DNR installation approval is required.
- The DNR has previously ordered that use of the system be discontinued.
- Fluoride is used in the treatment.

Call a Department of Natural Resources office if you have questions about these requirements.

A note of caution about sales techniques

The Wisconsin Department of Industry, Labor, and Human Relations (DILHR) and the Department of Natural Resources have received complaints that sellers of water treatment devices sometimes use sales techniques that misrepresent a product, or that attempt to pressure consumers into purchasing a device when none is needed, or into purchasing the wrong type of device. Many of these sales techniques were summarized in the July, 1990 issue of *Consumer Reports* magazine.

Misrepresentation usually takes one of three forms:

1. Misrepresenting the quality of the water supply.
 - Salesperson tries to sell a water treatment device without benefit of independent laboratory test results describing the types and quantities of contaminants in your water. If you are on a public water system, contact the water utility for results from routine tests.

-
- Salesperson uses electrolysis or chemical precipitation to form or precipitate solids in your water, and implies that these are dangerous contaminants. Often, they are simply common minerals or created by the precipitation process itself.
 - Salesperson rinses detergent out of a clean washcloth from your home; then implies that your untreated water prevents laundry from getting clean. However, it is normal for cloth to retain some detergent.
 - Salesperson leaves a bottle on your doorstep for you to fill and have tested by his/her business, or leaves other information claiming that your water is dangerously contaminated.
 - Salesperson explains that a water treatment device removes 99% of various contaminants, but does not mention that the contaminants *may not be in your water*, or that the device is efficient only when carefully maintained.
2. Misrepresenting the performance of the treatment device.
- Salesperson claims that the system is designed to provide “pure” water. However, different groups have different interpretations of “pure.” Make sure that you know what the manufacturer’s “pure” means. A claim of purity *must* be supported by evidence that the device removes 100% of disease-causing bacteria.
 - Salesperson claims that the device will treat for a contaminant *not listed* on the DILHR product approval letter, or that the *treatment device will treat a higher level of the contaminant than indicated on the product approval letter.*
 - Salesperson does not provide information about frequency and cost of maintenance.
3. Misrepresenting the approval of the device by public or private agencies.
- Salesperson claims that the product has been approved by the Environmental Protection Agency (EPA). *The EPA does not approve water treatment devices.* In Wisconsin, the dealer must be able to show a product approval letter from DILHR. The Water Quality Association (WQA) and National Sanitation Foundation (NSF) will test products at the manufacturer’s expense. WQA tests for performance related to aesthetic qualities of the water, and NSF tests for health related claims.

The worksheet beginning on page 10 is designed to help you choose the right water treatment device. Following the worksheet (on pages 12-14) is a set of numbered items corresponding to the numbered sections of the worksheet. This information provides additional details and guides you through the worksheet step - by - step.

Worksheet—Purchasing a Water Treatment Device

Use this worksheet to prepare for a visit from a water treatment salesperson. **Steps 1-4 in Part A should be completed in advance of the visit.** Complete the worksheet as you discuss various alternatives for your needs. You may want to have several copies of this worksheet available for notes about different treatment units you are considering. Pages 12-14 provide additional details for each step.

Part A—Review your water treatment needs

1. Review your water test results. List test results below.

alkalinity	_____	iron	_____
bacteria	_____	lead	_____
chloride	_____	nitrate/nitrite	_____
conductivity	_____	pH	_____
hardness	_____	corrosivity index	_____
other tests	_____		

2. Review information about health and appearance impacts of your water contaminants. Note the special concerns.

3. Review treatment choices and list those that might be appropriate for treating your particular water problems.

4. Is the supplier reputable and reliable?

_____ yes _____ no

Part B—Evaluate the quality of the water treatment device

5. Does the DILHR product approval letter for the treatment unit list the types and amounts of contaminants you wish to reduce with the treatment unit?

_____ yes _____ no

6. How much space does the treatment unit need?

Have you measured your available space?

_____ yes _____ no

7. Does your treatment device need specially treated water to function properly?

_____ yes _____ no

8. How many gallons of water does your family need per day? _____

For drinking and cooking, base your estimate on 2 quarts per family member per day. For treating all the water in the home, base your estimate on 60 gallons per family member per day. For treating hot water only, estimate 25 gallons per person per day.

Have you compared the volume of water available from the treatment unit to the volume needed by your family?

_____ yes _____ no

9. Check the rate of water flow that you prefer where your treatment device will be installed. Based on the information in section 9 on page 13, does the flow rate of the device you are considering meet the needs of your family?

_____ yes _____ no

10. Have you reviewed and understood the instructions for operation and maintenance that come with the treatment unit?

_____ yes _____ no

11. How much water can the treatment unit process before replacement parts or maintenance will be needed? _____ gallons

Have you installed a device to monitor your water use? If not, do you understand how to reasonably estimate when maintenance will be needed?

_____ yes _____ no

12. Will you need to hire a technician to replace parts or maintain the treatment unit?

_____ yes _____ no

13. Other comments about this unit:

Part C—Estimate the cost of the treatment device

14. Water device purchase and installation:

Cost of water treatment device _____
Cost of installation _____
Other installation costs _____
Total initial costs _____

15. Replacement costs:

Frequency of replacement/service needs _____

Parts to be serviced or replaced	Cost
_____	_____
_____	_____
_____	_____
Total annual service costs	_____

16. Special design considerations:

Additional electrical costs per month to operate treatment unit _____

Additional water costs per month to operate treatment unit _____

17. **Total annual operation costs** _____

Worksheet guide—Purchasing a water treatment device

Selecting a water treatment device can be an important decision for your family. The purchase might represent a significant financial investment, or mean the difference between healthy and unhealthy water for your family. At the very least, the decision to select a water treatment device means that you are unhappy with your water's quality and want to correct the problem. It is important to do some homework before making a purchase. **The worksheet beginning on page 10 is designed to help you make the right choice. Each numbered section below corresponds to the same number on the worksheet.**

- 1** Carefully reviewing the information in the other *Home Water Safety* fact sheets and the references listed in the “Resources” section of this publication, along with your test results, will help you determine if a water treatment device is needed.
- 2** Background information on various contaminants can be found in the other fact sheets, listed reference publications, or by calling the Department of Health and Social Services or EPA hotline numbers. Consider whether other alternatives, such as well reconstruction or connection to another source of water, would meet your needs better.
- 3** Review information about the types of water treatment systems that are available and determine *which types* can best serve your needs. Determine whether you need a point of entry or point of use water treatment device for your particular water quality problem. Are there other options which would be more cost effective or easier to maintain? For example, you might decide that reconstructing the well would be a more effective long-term solution to a problem. Check other references listed at the end of this publication.
- 4** *Make sure the supplier you choose has a good reputation.* If you have any doubts, ask for references from other customers or contact the Better Business Bureau (414/273-1600) and the Wisconsin Justice Department, Office of Consumer Protection (1/800-362-8189).
- 5** *Be sure to ask the water treatment dealer for a copy of the Department of Industry, Labor and Human Relations (DILHR) **product approval letter** for the particular device you are considering.* The letter should be specific to the model you are considering. Any particular treatment device can be made using a variety of designs and materials. Design choices may influence effectiveness of the device you have chosen. Design choices have been considered in the DILHR review process.

Compare the concentration of contaminants you wish to reduce with the concentrations found to be reduced by the DILHR review process. The contaminants the device will effectively treat and the reduction level for each will be listed in the product approval letter. Will your device do what you need it to do?

For a list of approved devices, contact the Department of Industry, Labor and Human Relations, Division of Safety and Building, P.O. Box 7969, Madison, WI 53707, (608/267-7794). There is a fee of \$7 for one list. For a one year subscription to the list (four issues), the fee is \$20.

- 6 Decide whether you have adequate space to install the treatment device you are considering.
- 7 Determine if pretreating the water is necessary. For example, anion exchange devices, distillation units and reverse osmosis systems should only be served by soft water (low hardness). Some devices require iron-free water or water within certain pH ranges.
- 8 *To determine the volume of water the device can treat in a day, you must consider the capacity of any storage tank used by the treatment device as well as the flow rate of water from the device. A rule of thumb is that each person uses about 2 quarts of water a day for drinking and cooking, so a family of four would need 2 gallons of water per day for drinking and cooking. Will you have an adequate amount of water when you need it?*
- 9 *Determine the water pressure needed to serve the device. For a whole house system, you should expect your device to produce 5-10 gallons per minute. To run household equipment like a dishwasher or a clothes washer you will need water at that volume. Many point of use systems provide ½ gallon per minute. You can see whether that rate is tolerable by turning down your kitchen water stream until it takes one minute to fill half of a gallon milk jug. A faucet stream flowing at that rate is generally about the thickness of a pencil.*

The way water flow rate is measured for different devices gives an indication of what to expect. For example, carbon filters are rated in gallons per minute (GPM), distillation units are rated in gallons per hour (GPH) and reverse osmosis units are measured in gallons per day (GPD).

- 10 *Make sure the device comes with adequate instructions for operation and maintenance. Each type of treatment device has its own regular maintenance schedule necessary to maintain the quality of water described by the DILHR approval letter. The quality of the water from your device depends on your efforts to maintain it.*

-
- 11** *Determine the lifetime or total volume of treated water you will get from the treatment device you are considering.* For example, a reverse osmosis membrane and sediment or carbon filters will be good for only a certain number of gallons of water treatment or for a certain time period. Generally these types of filters need to be changed at least once a year on a private water supply. You can ask the dealer to install a small inexpensive meter to monitor water usage or quality.
- 12** *Determine whether you can perform maintenance procedures yourself or if a technician will be required.* Maintenance includes cleaning the device, replacing membranes and filters and adding salt or other chemicals. Check to see whether new filters are readily available.
- 15** *Calculate the costs of a regular maintenance schedule based on your family's needs for one year.* Consider the cost of the replacement osmosis membrane, sediment or carbon filters or softener salt. Consider the cost of dealer installation of replacements if required by your treatment device. Have you correctly anticipated the amount of money you will need to spend to purchase and maintain your water treatment device?

If you are considering a reverse osmosis system, determine how much water is discarded down the drain each day by the osmosis process. Consider your costs for this unusable water. Will the excess water overload your septic system? *Note:* Newly designed reverse osmosis systems that return discarded water from the osmosis procedure into your hot water tank are now available. Check with your supplier.

If you are considering a distillation unit, determine how much water is lost to the air as steam each day. Consider the cost of the lost water as well as the cost of the electricity needed per gallon of distilled water produced.

Sources of Information

Publications

University of Wisconsin–Extension

G3399 *Maintaining Your Home Well Water System* by Chris Mechenich, George Gibson, Jim Peterson, Byron Shaw and Gary Jackson.

G3378 *Improving Your Drinking Water Quality* by Byron Shaw and Jim Peterson

Available from your county Extension office or from Extension Publications, Rm. 245, 30 N. Murray St., Madison, WI 53715, 608/262-3346.

Wisconsin Department of Natural Resources

Iron Bacteria Problems in Wells PUBL-WS-004 85
Nitrate in Drinking Water PUBL-WS-001-90-REV
Pesticides in Drinking Water PUBL-WS-007-89-REV
Radium in Drinking Water PUBL-WS-008-90-REV
Sulfur Bacteria Problems in Wells PUBL-WS-005 85
Volatile Organic Chemicals in Drinking Water PUBL-WS-009 86

Available from the Department of Natural Resources, 101 S. Webster St., Madison, WI 53707, or from DNR district offices.

Cornell University Cooperative Extension

Drinking Water: Treatment Guidelines (Fact Sheet No. 5 of Water Quality Fact Sheet series) by Judith Stewart, Ann T. Lemley, Sharon I. Hogan and Richard Weismiller.

Water Treatment Notes (a series of fact sheets by Linda Wagenet and Ann Lemley:

Questions to Ask When Purchasing Water Treatment Equipment (Fact sheet No. 1)

Lead in Drinking Water (Fact sheet No. 2)

Activated Carbon Treatment of Drinking Water (Fact sheet No. 3)

Reverse Osmosis Treatment of Drinking Water (Fact sheet No. 4)

Available from Cornell Cooperative Extension, Cornell University, Ithaca, N.Y. 14853.

Government and Trade Publications

Consumer Reports. January 1990. "Creating a Market: The Selling of Water Safety."

Point-of-Use/Entry Treatment of Drinking Water from the Environmental Protection Agency and the American Water Works Association. Noyes Data, Park Ridge, New Jersey. 1990.

Buying a Home Water Treatment Unit from the Federal Trade Commission, Office of Consumer and Business Education, Washington, D.C. 20580, 202/326-3650.

Water Treatment Handbook, available from the Rodale Press Product Testing Department, Emmaus, PA. 1985.

Sources of Assistance

EPA Safe Drinking Water Hotline—1/800/426-4791

Information on water treatment devices—National Sanitation Foundation, 3475 Plymouth Road, P.O. Box 1468, Ann Arbor, MI 48106

Information about water treatment dealers—Better Business Bureau, 414/273-1600
Wisconsin Justice Department, Office of Consumer Protection, 1/800-362-8189

Listing of approved water treatment devices—Department of Industry, Labor and Human Relations, Division of Safety and Building, P.O. Box 7969, Madison, WI 53707, 608/267-7794. There is a \$7 fee for one list.

Toxicity of water contaminants—Wisconsin Department of Health and Social Services toxicologists: 608/266-0923 or 608/266-7480.

Wisconsin DNR District offices

Lake Michigan District	414/492-5800
North Central District	715/362-7616
Northwest District	715/635-2101
Southern District	608/275-3266
Southeast District	414/263-8500
Western District	715/839-3700

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