Drinking Water Protection Bulletin

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DHS Oregon Department of Human Services

Public Health Division Drinking Water Program: technical assistance for groundwater sources, public water supply data, drinking water standards.

www.oregon.gov/DHS/ph/dwp

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DEQ State of Oregon Department of Environmental Quality

Department of Environmental Quality: technical assistance for surface water sources, drinking water protection planning, GIS coverages, Best Management Practices.

www.deq.state.or.us/wq/dwp/dwphome.htm

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Changing our fOCUs

This issue of "DWP BULLETIN" marks a change in the focus of individual bulletins. We will continue to report the successful implementation of protection strategies from communities in Oregon and elsewhere; each issue, however, will focus primarily on a single potential contaminant source.

In this issue we discuss septic systems and their potential impact on drinking water quality. As in the past, we will provide information and resources to help communities and their water systems protect their drinking water sources from the potential impacts of that contaminant source.

The respective drinking water programs of the Public Health Division and the Department of Environmental Quality continue to offer assistance and support to communities engaged in protection. We plan to formally acknowledge their protection efforts so that communities/water systems can report their efforts to customers, for example in the annual Consumer Confidence Report.

To that end, we have included in this bulletin a form that can be used to describe ongoing protection efforts, which can be mailed to the agencies. Once that has been accomplished, we will add the community's name to the list of those that have implemented protection efforts.

The Bulletin will continue to go out in hard copy; however, we are encouraging recipients to choose an electronic version instead. If you would like to receive your copy electronically, please contact Nancy Vierra at nancy.l.vierra@state.or.us and provide your e-mail address.

In this Bulletin you will find the following articles:

Septic system operation basics: *Educating homeowners*

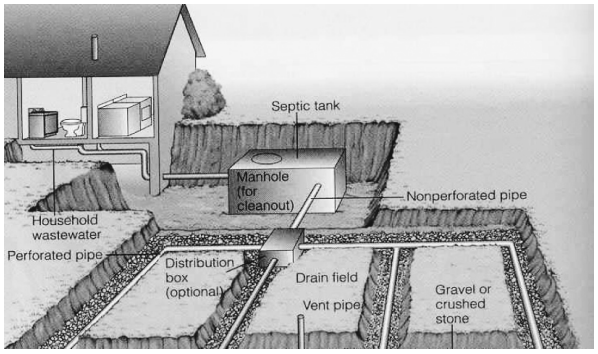
Septic (onsite) systems are designed to treat and dispose of sanitary waste in rural areas, or in some small communities or developments. As in all wastewater treatment systems, including those in larger communities, the primary targets of the treatment are pathogenic (disease producing) organisms, and not potential contaminants, such as nitrate, household chemicals, pesticides, drugs and personal care products.

In contrast to larger communities where wastewater treatment plants discharge "treated effluent" to surface waters, the primary function of a properly operating septic system drain field is to discharge effluent to groundwater. Therefore, the improper use of an onsite system, in particular the disposal of improper substances or the lack of maintenance, can lead to groundwater pollution.

Household septic systems generally have three main components: a septic tank, a distribution box (optional), and a drain field (see diagram). Wastewater flows into the septic tank, where solids settle to the bottom of the tank and grease, oil and fats float to the top forming a "scum layer." The partially clarified wastewater that resides between the solids at the bottom and scum layer is discharged to the drain field.

As illustrated, the drain field usually consists of a network of perforated pipes in gravel filled trenches. As the effluent from the septic tank travels through these pipes, it drains into the gravel layer and from there into the surrounding soil.

Nearly one in four households in the United States depends on an individual septic system (referred to as an onsite system) or small community large capacity septic system to treat wastewater.



From: www.co.thurston.wa.us/health/ehoss/inspect_septic.html#step1

The bulk of the microbial treatment of the effluent occurs within the soil as it percolates down under the force of gravity. Soil particles bind and hold pathogenic organisms until they either die or are destroyed by other microorganisms. This treatment functions best if the soils tend to be aerated and well drained.

Even properly functioning septic systems are designed to discharge to groundwater.

Septic systems serve a much-needed service, and are generally effective for what they are designed to do, i.e., remove pathogenic organisms. If not used correctly, however, problems can occur. One effective method of preventing groundwater contamination is education and outreach directed toward septic tank owners. Informing local residents of the potential problem of disposal of household chemicals, prescription and over-the-counter drugs, personal care products and other chemicals through the septic system can significantly reduce the risk to local groundwater. In addition, homeowners need to know best practices for maintenance and operation of their system. Outreach materials are available (see Web resources below) to provide to individual homeowners.

Other strategies for protecting your water supply from septic systems are also presented in this bulletin.

Additional Web resources:

http://cfpub.epa.gov/safewater/sourcewater/sourcewater.cfm?action=Publications&view=filter&document_type_id=103. An EPA fact sheet on managing septic systems.

www.epa.gov/ppcp/. Information regarding pharmaceuticals and personal care products in the environment.

http://inspect-ny.com/septbook.htm. A compilation of information regarding septic systems.

www.montana.edu/wwwpb/pubs/mt9401.html. Fact sheet from Montana State University.

www.nsf.org/consumer/wastewater_treatment_systems/wastewater_septic.asp?program=WastewaterTreSys. National Sanitation Foundation.

http://egov.oregon.gov/DHS/ph/ophs/docs/FloodSepticTanks.pdf. Oregon Department of Human Services fact sheet.

www.deq.state.or.us/wq/onsite/onsite.htm. Oregon Department of Environmental Quality fact sheet.

http://groundwater.oregonstate.edu/protect/septic. Oregon State Extension Service fact sheet.

Conventional septic systems are designed to remove disease producing (pathogenic) organisms, not nitrate, household chemicals or prescription drugs.

Managing drinking water and climate change[1]

The American Water Works Association Research Foundation (AwwaRF) recently issued a report "Climate Change and Water Resources: A Primer for Municipal Water Providers" (see http://awwarf.org/research/TopicsAndProjects/orderReports.aspx and enter "Climate Change" in the search box). The report summarizes the climatic responses anticipated as a result of future increases in temperature and their potential impacts on drinking water quality and supply. The climatic responses include:

- Global rain and snowfall will likely increase as temperature rises. These increases will not be uniform in all areas.
- Global precipitation will likely be less frequent but more intense, leading to a higher risk of flooding.
- As temperature increases, more precipitation will fall as rain rather than snowfall. Snowpacks will decline.
- Warmer temperatures will cause the melt season to start earlier, leading to greater levels of runoff and may trigger additional flooding.
- As the planet warms, drought periods will increase, leading to a greater risk of forest fires.
- Increased temperatures will likely lead to rising sea levels.

Climate change has the potential of becoming one of the most serious challenges to the management of drinking water resources in the future.

The potential impacts of the above climatic conditions include:

- Droughts, flooding and forest fires can significantly affect drinking water quality by leading to increased levels of sediment being delivered to streams.
- Decreasing snowpack and an earlier melt season can lead to greater deficiencies in storage capacity as runoffs become greater.
- Rising sea levels will likely lead to increased salt-water intrusions into coastal aquifers.
- Higher sea levels will lead to increase in flooding and damages to infrastructure during storm surges.
- Warmer temperatures could lead to an increased demand for water.

AwwaRF currently is supporting research to find activities that would lessen the impact of the above results on water systems.

Oregon communities may wish to consider incorporating climate change concerns into the Water Master Plan. They may also wish to implement protection strategies now in order to preserve the quality of their existing water supplies. To learn more about climate change activities in Oregon, go to the following link to view Governor Kulongoski's climate change strategy (http://governor.oregon.gov/Gov/sos2008/climatechange.shtml).

[1]. Summarized from the Winter 2007 issue of "The Aquifer," a publication of The Groundwater Foundation, www.groundwater.org.

Focusing on the future:
The McKenzie River Septic System Assistance Project

The McKenzie River is the sole source of drinking water for more than 200,000 residents in Eugene, Oregon. Approximately 4,000 homes in the McKenzie River watershed upstream of Eugene Water & Electric Board's (EWEB's) drinking water intake at Hayden Bridge rely on septic systems to dispose of their wastewater and sewage. According to the Environmental Protection Agency (EPA), 10–25 percent of onsite systems fail. Improperly maintained septic systems can release untreated wastewater into underlying groundwater or nearby surface water, potentially impacting individual or community water systems.

Residential development along the McKenzie River

While EWEB's water-filtration plant is designed to continually treat the raw water from the McKenzie River, increases in contaminants from failed septic systems could result in higher water treatment costs, increased production of disinfection by-products, and reduced drinking water quality and taste. In addition, water-filtration plants may not remove all household chemicals, prescription and over–the-counter drugs, personal care products, and other chemicals from the water.

The goal of EWEB's McKenzie River Septic System Assistance Project is to

maintain this high level of quality in the McKenzie River for future generations of customers. EWEB received grant funding from the Oregon Department of Environmental Quality (DEQ) and the Department of Human Service's Drinking Water Program to implement the project. Project goals include:

Provide education and outreach to homeowners to increase awareness of the importance of septic system maintenance and how it can affect the quality of domestic drinking water, as well as larger municipal sources;

- Evaluate the impacts of septic system clusters in the McKenzie River watershed; and
- Offer free septic system inspections and pump-outs (as needed) for homeowners in "higher risk" areas.

The McKenzie River Septic System Assistance Project is a voluntary program for homeowners living in "higher risk" areas, which meet the following criteria:

- Clustered with other septic systems on smaller lots;
- Located adjacent to ditches, streams or rivers; and
- Located on thin or excessively permeable soils.

EWEB has contracted with A&B Septic Service to perform the inspections and pump-outs for homeowners. EWEB will provide participants with the inspection report, an aerial photo of their properties with the location of their septic systems and drain fields indicated, and other educational materials. Septic system inspections will begin in late spring and continue throughout the summer and fall, depending on participation levels. EWEB hopes to assist between 200 and 300 homeowners in the watershed.

Residential development along the McKenzie River

EWEB recently held public meetings in Leaburg and Blue River to give an overview of the project, explain the participation process, and answer questions from residents. As of mid-May, more than 150 residents had expressed interest in participating.

During December, EWEB conducted shallow groundwater sampling for approximately 20 domestic wells located in the higher risk septic cluster areas. Most of the wells sampled ranged from 20 to 60 feet in depth. Nitrates were detected in most samples, with the highest level detected at 2.05 mg/L (upgradient wells ranged from nondetect to 0.16 mg/L). Trace amounts of metals and coliform bacteria also were detected in some wells (highest total coliform level averaged 66.3 organisms/100ml). Surface water samples were collected upstream and downstream of two septic cluster areas (Leaburg and Deerhorn). These surface water samples indicate a general increase in total coliform and E. coli bacteria from upstream to downstream locations, but this

Because groundwater adds to stream flow via baseflow, impacts on groundwater may also affect surface water.

trend needs verification from more intensive monitoring.

A second round of well and surface water sampling is planned for fall 2008. Depending on monitoring results, EWEB may do additional sampling for pharmaceuticals in selected areas where a potential impact from septic system clusters is indicated. EWEB is looking for homeowners with shallow wells (ideally less than 30 feet deep) who would like free well water testing.

Addressing potential impacts from septic systems is one element of EWEB's broader source protection program designed to protect and maintain the excellent water quality of the McKenzie River. EWEB also has evaluated potential impacts from agriculture, forestry and urban runoff. To learn more about EWEB's source protection program, visit www.eweb.org/Home/water_quality/watershedprotection.htm.

To learn more about the septic system project, visit www.eweb.org/Home/water_quality/septic/ or contact Karl Morgenstern, 541-341-8552, karl.morgenstern@eweb.eugene.or.us or Nancy Toth, 541-344-6311, ext. 3318, nancy.toth@eweb.eugene.or.us.

Alternative wastewater treatment technologies now available

Alternative Treatment Technology (ATT) systems not only reduce nitrate contamination, they are less intrusive to the landscape than above-ground treatment systems.

In the past, sand filters were the primary and sometimes the only option for sites that could not adequately treat wastewater with a standard septic system. However, DEQ has now approved five Alternative Treatment Technology (ATT) systems, (see www.deq.state.or.us/wq/onsite/att.htm) offering viable options for sites with reduced drain field capacity and/or groundwater quality concerns, where conventional septic systems are not appropriate.

What are the benefits of ATTs? Aesthetics, reduced footprint and effectiveness of treatment are the most obvious advantages of these systems. ATTs are installed level with the ground surface, removing the landscaping challenges presented by above-ground sand filters. In addition, ATTs are capable of treating effluent as good, if not better, than a sand filter and there are add-on products available to offer enhanced treatment of nitrate.

Normal septic tank effluent has a nitrate concentration of 55–70 ppm. Some ATTs are able to reduce this by more than 50 percent, a significant benefit in areas where groundwater is high in nitrate. ATTs accomplish this nitrate reduction by using special filter media and/or increased aeration. Many ATTs also treat bacteria more efficiently and effectively than conventional septic systems or sand filters.

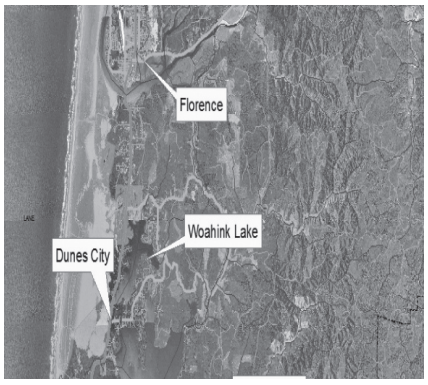
Currently there are no tax incentives for installing an alternative treatment technology system in Oregon, though it may be addressed in the future.

ATTs are comparable in cost to sand filters. Homeowners with ATT installations must have an Operations and Maintenance (O&M) contract, or receive proper O&M training, to ensure that the system performs adequately.

Addressing potential contamination: *Dunes City update*

For more information on Oregon's onsite program, including specifics on the ATTs approved for use in the state, visit www.deq.state.or.us/wq/onsite/onsite.htm.

Dunes City is a coastal community in Lane County (see map). Although not a centralized public water system, the community is providing an excellent example of how to take steps to address potential contamination of local drinking water supplies from septic systems.



In 2007, the council passed an ordinance requiring ongoing maintenance and repair of septic systems including an inspection every five years.

Initial steps to implement the ordinance included 1) public meetings to inform residents of the environmental issues associated with aging or poorly maintained septic systems, 2) supplying informational letters and fliers to residents, and 3) distributing a community newsletter twice per year.

This ordinance, along with other protection measures for phosphorus reduction, stormwater reduction and erosion control will help guide residents toward maintaining good water quality and the longevity of Woahink and Siltcoos lakes.

Septic system installers have now evaluated all 11 commercial businesses in Dunes City and almost all of the older septic systems that surround Siltcoos Lake. Some of these systems had tanks that were made of now disintegrating metal or concrete. For septic systems installed prior to 1974, the site evaluation included preparation of a plan for the property that was submitted to Lane County Environmental Health. The next step will be to evaluate systems farther from the lake.

To promote community pride and involvement in natural resource protection, Dunes City sponsors a number of free events for the public including the Festival of the Lakes. This popular family event is advertised by community leaders as a "day of stewardship" with restoration activities, information booths and a wide variety of vendors.

To read a copy of Dunes City's septic system ordinance, see http://dunescity.com/ord_docs/ordinance_173.htm.

Frequently asked questions about the effect of deodorizing RV chemicals on campground septic tanks

While traveling, many RV owners find the odors that arise from gray water and black water holding tanks to be rather unpleasant. There are commercially available chemicals designed to reduce those odors. Questions arise, however, regarding the effect some of these chemicals may have on water resources and on the long-term operation of individual septic systems. Some of the more common questions are answered below. Additional resources are provided at the end of this article.

RVs are a home away from home for many Oregon travelers

1. What information is available on chemicals commonly used by RV'rs to treat, sanitize, hold or deodorize septage holding tanks on RVs and campers?

Answer: Most sellers of RV sanitation chemicals on the Internet provide limited information about them other than whether they contain formaldehyde and if they are 100 percent biodegradable.[2] MSDS (Material safety data sheets) for the known hazardous products formaldehyde and methanol are available on some sites. Most sellers offer 100 percent biodegradable products with enzymes and without formaldehyde.

In the article by Walker et al.[3] the following active ingredients in such chemicals are mentioned: formaldehyde, quaternary ammonium, the steroid saponin, zinc and aluminum sulphates, enzyme formulation, and a mixture of benzyl ammonium chloride. The table at the end of this article might give further insight.[1]

2. Is there any information concerning the impact of such compounds when dumped into a septic tank or on the surrounding ground surface?

Answer: In the article by Walker et al. (1991) it seems the following problems can occur:

"(1) active ingredients in the additives can impair sewage degradation in septic tanks, causing sludge buildup and overflow of solids into the drain field, (2) additive chemicals might enter the drain field and, in high enough concentrations, reduce the drain field's ability to degrade waste, or (3) toxic additive chemicals might migrate from the drain field to ground or surface water."

The three articles[3,4,6] mention that even with shock loading of a preservative, most septic systems stabilize within a couple of days depending on the concentration of the chemical. And when observing the proper conditions (e.g., using the correct dosage on the bottle) an individual should only unload a full tank. With proper usage, RV septage is diluted by other wastewater, allowing many septic tank systems to handle the chemicals.

3. We are concerned what the impact of such activity in an OSWWTS may be on a high water table/aquifer in an area of porous soils. Are there any data or studies out there on this or guidance on what "marker" type chemicals a study could be limited to which could reduce the laboratory work/costs and still be able to track the process?

Answer: No information about the effect on aquifers or porous soil was found. The chemicals most used at the moment seems to be formaldehyde or enzyme based products. However, it seems prudent to look up the labels for these preservatives because there are more active substances known.

In addition, communities that have RV parks in their drinking water source areas that do rely on septic systems may wish to consider the following steps:

- Notify the owner or manager of their location within your Drinking Water Source Area and send the following fact sheets, which can be found at www.deq.state.or.us/pubs/factsheets.htm#WQ:
  * "Groundwater Basics"
  * "Managing Septic Systems"
  * "Septic System Management — Landscaping and Other Activities on Your Property"
- Verify with the campground or RV park manager that the septic system (if present) is maintained regularly and properly permitted. To verify the permit status of the septic system, contact a DEQ regional office.

If an RV park is present, verify that it has policies in place regarding auto maintenance and wastewater disposal.

Additional recommendations for other chemical use:

- Also send the "Healthy Lawns, Healthy Families" fact sheet.
- Identify and document any pesticides used to maintain the site and areas where applied.
- Minimize or eliminate the use of pesticides and fertilizers.

References

[1.] University of Arizona fact sheet on "RV holding-tank treatments and deodorizers in septic systems." http://ag.arizona.edu/pubs/water/az1233.pdf

[2.] Sellers' sites at www.thetford.com, www.odorlos.com, www.valterra.com, www.dyersonline.com, www.jcwhitney.com

[3.] "Effects of deodorants on treatment of boat holding-tank waste" Walker WR, Haley CJ, Bridgeman P, Goldstein SH,; Environmental management 15 (3): 441-449 MAY-JUN 1991

[4.] "Pilot scale septic tank treatment of preservative-laden waste " Pearson FH, McLean HR, Klein SA; Research journal of the water pollution control federation, 63 (7): 999-1011 Nov-Dec 1991

5. "Dealing with holding-tanks at BLM-sites" Flemming, Pat; BLM-NSTC Resource notes N0. 38 (Hazardous materials) 2000

6. "The effect of boat holding-tank chemicals on treatment plant performance" Novak, JT, McDaniel, CR, Howard, SC; Research journal of the water pollution control federation 62(3), 288-295 (1990)

Table 1. Active ingredients you should avoid using in your RV holding tank deodorizers.

Active Ingredient	Threats to Human and Environmental Health
Bronopol (chemical name: bromo-nitropropane-diol)	bacterial pesticide
Dowicil (chemical name: 1-(3-chlorallyl)-3,4,7-triaza-1-azoniaadamantane chloride)	bacterial pesticide (EPA states "Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority.")
Formaldehyde (also known as Formalin; degradate of bronopol)	kills or retards bacterial growth, recognized by EPA as probable carcinogen[1]; moderately toxic to humans[2]
Glutaraldehyde (also known as embalming fluid)	Retards bacterial growth and covers sewage odor, eye/inhalation irritant
Paraformaldehyde (polymerized formaldehyde)	very toxic to humans[3] (see formaldehyde)
Para-dichlorobenzene (common ingredient in mothballs, urinal cakes, and toilet bowl fresheners)	known carcinogen[1] and drinking water contaminant; moderately toxic to humans[2]

[1] a carcinogen causes cancer
[2] lethal dose for 150 lb person is between 1 ounce to 1 pint
[3] lethal dose for 150 lb person is between 1 teaspoon to 1 ounce

The above-mentioned chemicals are either harmful to people or to bacteria required for good septic tank functioning. For more information, look up the ingredient list on the back of these kinds of supplies.

Implementing drinking water protection strategies: Septic systems

Public water systems that have had septic systems identified in their Source Water Assessment as a potential contaminant source can significantly reduce the risk of potential impact by implementing simple outreach measures.

Many residents using onsite (septic) systems do not understand the connection between surface activities and water quality. Decisions regarding the use, storage and disposal of household chemicals often are made without considering how these practices might affect water quality, either surface water or groundwater. However, at least some of those people will modify their practices once they learn about how susceptible drinking water is to what goes on at or near the surface.

The table on the next page provides direction to communities or water system operators so that they may help customers become better informed about the proper use of home-related chemicals. Simply making the outreach material listed below available to their residents can go a long way toward protecting the resource.

DEQ and DHS would like to acknowledge the protection efforts made by public water systems. Many communities and water systems benefit by being able to tell residents

that the agencies have formally recognized the community/water system for protecting their drinking water (e.g., in their annual Consumer Confidence Report). If you would like to take part in this effort, simply fill in the "Date Completed" portion of the form below and send it to DHS at the address provided in this Bulletin (see "Key Oregon Contacts").

A template letter for residential land uses can be found at www.deq.state.or.us/wq/dwp/assistance.htm under "General Assistance" then "Management Strategies for Residential Land Uses"

Groundwater Basics: www.deq.state.or.us/wq/pubs/factsheets/drinkingwater/gwbasics.pdf

Healthy Lawns, Healthy Families: www.healthylawns.org/how/print.pdf

Managing Septic Systems: www.epa.gov/safewater/sourcewater/pubs/fs_swpp_septic.pdf

Household Hazardous Waste: www.epa.gov/msw/hhw.htm#options

Household pharmaceutical waste disposal: www.deq.state.or.us/lq/pubs/factsheets/sw/HoldPharmaceuticalWasteDisposal.pdf

Recycle Used Motor Oil: www.epa.gov/epaoswer/hazwaste/usedoil/campgn/en-dumpbr.pdf

Drinking Water Protection for shallow injection well owners and operators: www.deq.state.or.us/wq/pubs/factsheets/uic/shallowinjwell.pdf

Twelve Simple Things You Can Do to Protect Your Well Water: http://extension.oregonstate.edu/catalog/pdf/em/em8651-e.pdf

Managing Small-acreage Horse Farms: http://extension.oregonstate.edu/catalog/pdf/ec/ec1558.pdf

Potential Contaminant Source Type	**Completed Actions for Drinking Water Protection** (check off any strategies you have completed)	**Date Completed**
Residential Land Uses including Septic Systems	• Notify the residents of their location within your Drinking Water Source Area and send the following fact sheets or links: (see below for references and an example transmittal letter):	
	- "Groundwater Basics"	
	- "Managing Septic Systems to Prevent Contamination of Drinking Water"	
	- "What is Household Hazardous Waste"	
	- "Household Pharmaceutical Waste Disposal"	
	- "Healthy Lawns, Healthy Families"	
	- "Recycle Used Motor Oil"	
	- "Drinking Water Protection for shallow injection well owners & operators"	
	- "Twelve Simple Things You Can Do to Protect Your Well Water"	
	Additional Recommendations: • For residents with horses, send "Managing Small-acreage Horse Farms" fact sheet. Contact Drinking Water Protection staff if you need copies. • Work with local government to implement required inspection program on property transfer	

Would you like to receive this newsletter electronically?

e-mail: nancy.l.vierra@state.or.us

DHS Oregon Department of Human Services

DEQ State of Oregon Department of Environmental Quality

Drinking Water Protection Bulletin

Drinking Water Protection Resources

GIS coverages of drinking water source(s), drinking water source area(s) and potential contaminant sources are available for your community by contacting Steve Aalbers, DEQ, at 503-229-6798 or aalbers.steven@deq.state.or.us.

Source Water Assessment reports should be available from your PWS. If not, contact Nancy Vierra, 541-726-2587, ext. 25; nancy.l.vierra@state.or.us) for groundwater systems and Sheree Stewart for surface water systems (503-229-5413; stewart.sheree@deq.state.or.us)

Drinking Water State Revolving Fund: provides funds in the form of loans and small grants for drinking water protection Roberto Reyes-Colon at 971-673-0422 or roberto.reyes-colon@state.or.us.

Oregon Association of Water Utilities: Assistance for small public water systems. Shawn Stevenson at 503-873-8353 or sstevenson@oawu.net.

Oregon Water Resources Department: Information on water rights, conservation and water law. Contact your local watermaster. See www.wrd.state.or.us/OWRD/offices.shtml.

Department of Land Conservation and Development: Assistance in land use planning and drinking water. Doug White at 541-318-8193 or doug.white@state.or.us.

U.S. Environmental Protection Agency: A series of fact sheets on best management practices for drinking water protection. See www.epa.gov/safewater/protect/swpbull.html.

Smart Growth: A program for planned development designed to meet community needs while protecting the environment, including water quality. www.epa.gov/watertrain/smartgrowth/resources/index.htm. See also www.smartgrowth.org.

The Trust for Public Land: has multiple tools to help keep drinking water clean. See "Publications" at www.tpl.org.

DEQ's Toxic Use/Waste Reduction Assistance Program: www.deq.state.or.us/wmc/hw/tuwrap/tuwrap-contacts.html.

Ecological Business Program: www.ecobiz.org.