

# WELLHEAD PROTECTION FACT SHEET

Oregon Health Division and Department of Environmental Quality  
July, 1994

This FACT SHEET has been prepared in order to provide answers to the most often asked questions about Wellhead Protection. If you have additional questions, please contact one of the agency representatives listed at the end of the text.

**What is Wellhead Protection?** Wellhead protection (WHP) is a plan designed to protect groundwater resources of Public Water Systems (PWS) from contamination. WHP involves the determination of the area around the well most susceptible to contamination, the inventory of potential contaminant sources within that area, and the implementation of management strategies to reduce the risk associated with those sources. WHP is an investment in the future. A community's source of drinking water is an extremely important resource, contributing to both the human- and economic health of the area.

**What is groundwater?** Groundwater contributes most or all of the water that is derived from wells or springs. It occurs in the natural open spaces (e.g. fractures or pore spaces between grains) in sediments and rocks below the surface. The water table separates the shallow zone where the openings are filled with air from the deeper zone(s) where the openings are filled with water. If the openings in a geologic formation are filled with water and the water can be extracted by a well, then the formation is referred to as an aquifer. Aquifers are not underground rivers, lakes or veins, rather they are geologic materials including old river sediments and fractured volcanic rocks such as basalt.

**Where does groundwater come from?** Groundwater originates as precipitation that sinks into the ground. Some of this water percolates down to the water table and recharges the aquifer. For shallow wells, for example less than 50-75 feet, the recharge area is often the immediate vicinity around the wellhead. The same is true for some deeper wells, however others are recharged in areas that may be some distance from the well itself.

**How can the groundwater from my well become contaminated?** If the downward percolating precipitation encounters any source of contamination, at the surface or below it, the water may dissolve some of that contaminant and carry it to the aquifer (see the attached figure). Groundwater moves from areas where the water table is high to where the water table is low. Consequently, a contaminant may enter the aquifer some distance upgradient from you and still move towards your well. When a well is pumping, it lowers the water table in the immediate vicinity of the well, increasing the tendency for water to move towards the well.

**What are the potential sources of contamination?** Contaminants can be conveniently lumped into three categories: microorganisms (e.g. bacteria, viruses, *Giardia*, etc.), inorganic chemicals (e.g. nitrate, arsenic, metals, etc.) and organic chemicals (e.g. solvents, fuels, pesticides, etc.). Although it is common practice to associate contamination with highly visible features such as landfills, gas stations, industry or agriculture, potential contaminants are widespread and are often associated with common everyday activities: septic systems, lawn and garden chemicals, pesticides applied to highway rights-of-way, storm water runoff, auto repair shops, beauty shops, dry cleaners, medical institutions, photo processing labs, etc. Importantly, it takes only a very small amount of some chemicals in drinking water to raise health concerns. For example, one ounce of pure trichloroethylene, a common solvent, will contaminate approximately 2 million gallons of water to a level of possible health concern.

**What are the various parts of a Wellhead Protection program?** Wellhead protection programs will vary from community to community, owing to different land uses and aquifer conditions. All programs should have the following key elements:

- a. Public Education. The general public needs to be informed regarding the source of their drinking water and its vulnerability to contamination.
- b. Delineation of the Wellhead Protection Area (WHPA). The WHPA is the area on the surface that overlies that portion of the aquifer that supplies water to the well. A contaminant released within the WHPA may eventually migrate to the well.
- c. Inventory of Potential Contaminants. An inventory of potential sources of contaminants within the WHPA provides an assessment of the potential threats to groundwater.
- d. Managing the Wellhead Protection Area. Developing strategies for existing and future activities within the WHPA designed to reduce the risk of their contaminating the aquifer.
- e. Contingency Planning. Water systems should develop options to deal with both short- and long-term loss of their drinking water source(s). Systems should also incorporate the existing emergency response framework into their wellhead protection program.
- f. New Wells. Procedures should be adopted that address the addition of new wells to the system. These include aspects of well construction and preliminary delineations to evaluate potential sites for the new wells in terms of well yield and potential contamination and to focus implementation strategies to protect the recharge areas of those sources.

**How large is the Wellhead Protection Area?** This depends on several key issues, including the pump rate and the characteristics of the aquifer. In Oregon it is recommended that an area large enough to encompass 10 years of groundwater travel time be delineated so that if the aquifer becomes contaminated upgradient, there will be sufficient time to devise a plan to deal with the contamination. Delineations such as above may extend in excess of several thousand feet away from the wellhead.

**Why not just protect the entire aquifer instead of having a separate WHP program for each community?** Protecting all groundwater in the state to the level recommended for wellhead protection would be great, and in fact in areas where several communities are in proximity to one another, they might pool their resources to develop a single regional protection strategy. In most cases, however, management of the aquifer is not practical. The area is very large and resources are small. Consequently, the WHP program allows us to focus limited resources on the critical areas of the aquifer, those that supply us with our drinking water.

**Doesn't "Managing the Wellhead Protection Area" mean telling people what they can and cannot do on their property?** To a certain extent yes, however groundwater belongs to the general public in Oregon and groundwater protection is in everyone's best interest. Everyone drinks it and the community's economic viability may depend on having a safe drinking water supply. Further, the management strategies are not designed to necessarily preclude activities in the WHPA, rather they are designed to take advantage of common sense and prudent practices to reduce the risk of groundwater contamination. There are certain facilities that you would not want in your WHPA, e.g .

landfills or large-scale chemical storage, however, there is no reason why farming cannot occur in a WHPA, as long as best-management-practices, developed by the agricultural community, are followed. There is no reason why industry cannot be within the WHPA, again as long as practices are in place that will minimize risk to the aquifer. Importantly, the management plan is developed locally, and is therefore tailored to the community's own needs and risks.

**Who is responsible for doing wellhead protection?** Wellhead Protection should be a community effort. In Oregon it is envisioned that the public water supply would be responsible for delineation of the wellhead protection area and serving as the lead in the potential contaminant survey. Development of the management strategies will likely evolve from a community planning team, representing the diverse interests of the community as well as local government officials. Implementation of the management plan will fall to the local land use authority in the jurisdiction.

**What are the costs and who pays for Wellhead Protection?** Estimating the entire cost of developing and implementing a WHP program is difficult because of the diverse situations and long-term nature of the effort. The cost of delineation will vary from less than \$1,000 to \$20,000 for most systems. Some systems have been able to reduce the inventory costs by using volunteers. Management costs will vary depending on the staff requirements for developing new land use regulations, conducting inspections, developing education programs, etc. Although there are limited sources of funding for wellhead protection, the cost of protecting the drinking water supply will likely be borne by those that directly benefit from that protection, i.e. the residents served by the PWS. The cost of protection, however, is less than the costs associated with having a contaminated drinking water supply.

**What will be the State's role?** Members of various state agencies worked with the Citizen Committee to develop Oregon's Wellhead Protection program. Guidance documents dealing with delineation, contaminant inventory and management strategies are in various phases of completion. State agencies will also provide technical assistance throughout the process. Contact individuals for wellhead protection in Oregon are:

Dennis Nelson, Drinking Water Program, Oregon Health Division, 731-4010

Sheree Stewart, Groundwater Section, Department of Environmental Quality, 229-5413