

Summary of Oregon Source Water Assessment Methodology



State of Oregon
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Environmental
Quality

Water Quality Drinking Water Protection Program

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Background

Amendments made in 1996 to the federal Safe Drinking Water Act provide the means to protect drinking water at its source. In developing the amendments, Congress recognized the need to go beyond traditional emphasis on treatment to address new challenges to provide clean drinking water. The act's amendments mandated that states conduct "source water assessments" for all public water systems. These assessments include delineating contribution zones or source areas for all groundwater and surface water-supplied public water systems and identifying potential sources of contamination for drinking water in each state. Source water assessments are required for all systems with at least 15 hookups or that serve more than 25 people year-round.

To meet the federal requirements, the Oregon Health Authority (formerly the Department of Human Services) and Oregon Department of Environmental Quality formed a partnership to complete source water assessments for public water systems in Oregon. The two agencies formed a citizen's advisory committee which included nine public water system managers and 11 stakeholder representatives. The advisory committee worked for more than a year (1998-99) to develop the Source Water Assessment Plan document to describe the approach for Oregon's work, as well as a template (see [DEQ website](#)) for individual source water assessment reports that are required for every public water system. The U.S. Environmental Protection Agency provided guidelines but encouraged states to develop their own unique approach for meeting the requirements.

EPA approved Oregon's plan in June 1999. The active list in Oregon as of 1999 included 2,656 public water systems. Of those, 1,171 met the federal definition of a public water system, requiring a full assessment and report. Smaller systems received a limited assessment and streamlined report. *All required source water assessments in Oregon were completed between 1999 and 2005.*

Officials prepared a source water assessment report and provided it to each federal-regulated public water system. Each report includes a large-scale map that identifies the geographic area supplying the public water system. These

source water areas were mapped for the surface water intakes by DEQ and the groundwater wells by OHA. DEQ then identified potential sources of contamination within those areas and the agencies prepared a written report for each system. Communities now have both a detailed map of where their water comes from and potential contaminant sources (natural and manmade) that may affect their water quality. The assessments identify potential sources of contamination from both non-point and point sources.

Basic components of a source water assessment include delineation, an inventory of potential contaminant sources, and a susceptibility analysis. More information on each of these components is listed below.

Delineation:

The source water assessment process begins with a "delineation" of the source areas for groundwater wells and surface water intakes. This is done by identifying the surface area that directly overlies that portion of the aquifer that supplies the well, wellfield or springs used for drinking water purposes. In the Oregon procedures, the upgradient extent of the capture zone extended to a specific time-of-travel (TOT) for groundwater through the aquifer. For systems with populations of more than 500, the TOT is 10 years. For systems serving less than 500, the TOT is 15 years because the method of delineation is much less precise.

Within each delineated area, subzones are delineated at two- and five-year TOTs. The goal of the subzones is to provide communities with better data from which to build protection strategies. The area within the two-year time-of-travel represents the "hot zone" for the area: potential contaminant sources within this area will probably present higher risks because of their proximity to the well. The two-year TOT also provides the outer limit from which microbial sources are likely to affect the well.

Individual water systems receive a topographic map with the delineation shown as a function of the time-of-travel in each source water assessment report. As part of the delineation effort, all wells are precisely located with a Geographic Positioning System. The state also consults with U.S. Geological Survey experts in developing the conceptual model and estimating parameters used in the modeling effort for systems that are more geologically complex.

For surface water systems, the drinking water source area delineation process is performed by using the fifth-field hydrologic unit (watershed) boundaries. All intakes are precisely located with Geographic Positioning System. The surface water delineation includes the entire watershed area upstream of the intake structure.

After delineating the entire watershed, sensitive areas within the watershed are identified. These include land adjacent to the stream, high-erosional areas and other natural factors that increase the risk of contamination of the surface water. The result is an identification of a subset of the entire watershed. Sensitive areas are those where potential contamination sources or land-use activities, if present, have a greater potential to affect the water supply. This is analogous to the time-of-travel zones for groundwater systems.

Inventory

Another goal of the source water assessment is to identify land uses and activities that present potential risks to public water systems in each state: this is the “inventory.” A statewide advisory committee determined in 1998-99 what to inventory and how to inventory. A list of all land uses and activities inventoried is available on DEQ’s website. Inventories are valuable tools for local communities because they provide:

- Information on locations of potential contaminant sources, especially those presenting the greatest risks to the water supply
- An effective means of educating the public about potential problems
- Valuable awareness to those who own or operate facilities and conduct land-use activities in the drinking water source area
- A reliable basis for developing a local protection plan to reduce the risks to the water supply.

Inventories are focused primarily on potential sources of contaminants regulated under the federal Safe Drinking Water Act. This includes contaminants with a maximum contaminant level, contaminants regulated under the Surface Water Treatment Rule, and the microorganism *Cryptosporidium*. Based on type of facility and nature of potential contaminants used, these sources represent a lower-, moderate- or higher-relative risk to the water system. The inventory is designed to identify several categories of potential sources of contaminants including micro-organisms (i.e., viruses, *Giardia lamblia*, *Cryptosporidium*, and fecal bacteria); inorganic compounds (i.e., nitrates and metals); organic

compounds (i.e., solvents, petroleum compounds and pesticides) and turbidity/sediments.

Contaminants can reach a water body (groundwater, rivers, lakes) from activities occurring on the land surface or below it. Contaminant releases to water bodies can also occur on an area-wide basis or from a single point source. In completing the inventories, potential sources of contaminants are identified through a variety of methods and resources. DEQ used readily available information including review of nine databases at DEQ, EPA and other agencies with currently listed sites; interviews with the public water system operator; and field observation as a final step in the process.

When identifying potential risks to a public water supply, “worst-case” assumptions were made. Under today’s regulatory standards and environmental awareness, the majority of identified activities and land uses employ “best management practices” in handling contaminants or preventing water quality degradation from their operations. It’s important to note that the assessments list all POTENTIAL risks; many risks listed in the assessment don’t present actual risks to the water system. Environmental contamination is unlikely to occur when contaminants are handled and used properly, or when best management practices are employed. Day-to-day operating practices and environmental awareness varies greatly from one facility or land-use activity to another. Due to time constraints, in-depth analysis or research is not completed to assess each specific source’s compliance status with local, state and/or federal laws.

The state also makes assumptions about what potential contamination sources are included in the various types of land uses. For example, it is assumed that rural residences associated with farming operations have specific potential contamination sources such as fuel storage, chemical storage and mixing areas, and machinery repair shops. Any errors in these assumptions can be easily corrected as the community moves beyond the assessment. Prior to moving forward in the development of a protection plan, it is recommended that an enhanced inventory be conducted to look at site-specific practices. Potential sources listed in the assessment that are actually lower risks can be removed from the list during the next step in the process.

Susceptibility analysis

The susceptibility analysis provides water systems with information on where the greatest risk occurs and where to focus resources for protection. Susceptibility is defined as the potential for contamination in the source area to reach the intake

on the surface water body or the well(s) being used by a public water system for drinking water purposes. Whether or not a particular drinking water source becomes contaminated depends on three major factors: 1) occurrence of a facility or land use that releases contamination, 2) location of the release, and 3) hydrologic and/or soil characteristics in the source area that allow transport of the contaminants to the surface water body.

In conducting a susceptibility analysis for each public water system, the state uses information from the delineation (the most sensitive areas) and inventory. Results of the inventory are more meaningful when proximity to the well or intake is considered, along with the associated risk rating of the source, and whether it is located within a sensitive area. In general, land uses closest to the intake/well and those with the highest risk rating pose the greatest threat to a drinking water supply. The presence and locations of potential contamination sources within sensitive areas will determine where the water system has the highest susceptibility to contamination. The susceptibility analysis cannot predict when or if contamination will actually occur but recognizes conditions that are highly favorable for contamination to occur. If a contaminant release to soils or water should occur in a sensitive area, it's very likely that contamination of the water body would occur if remedial actions are not taken.

When several high- or moderate-risk sources are located within sensitive areas, a public water system may also be said to have a high overall susceptibility to contamination. If a public water system's drinking water source is determined to be of high susceptibility, it is recommended that the system identify those condition(s) that lead to the high susceptibility and take steps to protect the resource (such as reducing soil erosion or working directly with facility operators to

implement sound management practices). Water systems with a low susceptibility should consider all identified factors that could lead to higher susceptibility in the future and prepare a strategy to protect the resource for the future. The end product of a susceptibility analysis is an overlay of inventory results with a map of sensitive areas.

For more information

To obtain a copy of the source water assessment report for your water system:

- Contact your public water system owner/operator to review the full report or get a copy. Information for public water systems, including a contact person, is available at the [Oregon Health Authority Drinking Water Program website](#) (see "Data Online").
- DEQ and OHA also have copies of source water assessment reports. For groundwater system reports, contact Drue Edney, OHA, at 541-726-2587, ext. 25 or by [e-mail](#). For surface water systems, contact Julie Harvey, DEQ, Portland, at 503-229-5664 or call toll-free in Oregon at 1-800-452-4011, ext. 5664, or by [e-mail](#).
- In addition, summaries of completed source water assessments for water systems that get their water from a surface water intake are on DEQ's website at: <http://www.deq.state.or.us/wq/dwp/swrpts.asp>.

Additional information on drinking water protection can be found at:

<http://www.deq.state.or.us/wq/dwp/dwp.htm>

Alternative formats

Alternative formats (Braille, large type) of this document can be made available. Contact DEQ's Office of Communications & Outreach, Portland, at (503) 229-5696, or call toll-free in Oregon at 1-800-452-4011, ext. 5696. People with hearing impairments may call 711.