

Tech Brief

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Source Water Protection

By **Zane Satterfield, P. E.**, NESC Engineering Scientist

Summary

Because source water protection means cleaner water that needs less treatment, drinking water systems should put source water protection at the top of their “to do” lists. Whether your source water is surface or groundwater, all drinking water sources are vulnerable to a variety of contaminants from a variety of activities. This *Tech Brief* discusses some possible contamination sources and feasible ways to address them.

Assessments Already Complete

By now, every drinking water system should have received a source water assessment from their state primacy agency, or at least know where to obtain one. These assessments contain the necessary components for creating a source water protection plan. Find these assessments, dust them off, and become familiar with them. If you cannot find them, check with your state primacy agency. They should have them on file. Source water assessments should include:

- A description of the source water protection area known as a delineation,
- An inventory of potential types of contamination, and
- An evaluation of how susceptible the water system is to being contaminated by the activities or land uses that the inventory identifies.

The assessments may also include the following steps (if not, the plan you develop should):

- Notify and involve the public about the threats that are identified on the inventory list and what they mean to their public water system.
- Implement management measures to prevent, reduce, or eliminate threats.
- Develop contingency plans to deal with water supply contamination or service interruption emergencies.

Most protection plans will identify sewage as a potential or existing contamination source. Contamination can come from central sewer

systems or decentralized wastewater treatment systems, such as, package plants, septic systems, and private sewage systems—as well as onsite residential septic systems, which may be overlooked during assessments.

Consider the Source

What goes down the drain or runs off of urban, residential, or agricultural landscapes could eventually end up in drinking water sources. Because of these issues, a good source water protection plan will include an inventory of potential contaminants and a map of their locations.

Your inventory should include land uses and activities, such as:

- Agriculture (farming) can contribute excess fertilizers, herbicides, and insecticides;
- Logging;
- Mining (surface and below ground) both abandoned and working, and all related holding ponds and underground storage;
- Military bases;
- Industrial/commercial, active and abandoned;
- Manufacturing facilities of all types;
- Transfer or holding stations for any liquid or solids;
- Recycling centers;
- Gas stations with above or below ground fuel tanks (both active and abandoned);
- Energy production;
- Airports;
- Service stations and auto mechanic repair businesses;



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- Dry cleaning operations and laundromats;
- Slaughter houses;
- Funeral homes;
- Solid waste landfills old and new, (particularly the older ones);
- Centralized and decentralized sewage treatment facilities;
- Oil and gas facilities;
- Construction sites (sedimentation occurs when improperly managed);
- Faulty residential septic systems;
- Residential dump sites (before garbage pick-up many rural residents used to dump their garbage in gullies where the water would run through it);
- Storm water runoff from urban areas
- Salt water intrusion from the ocean or sea.
- Forms of transportation that may create avenues for spills:
- Interstate highways (pay attention to the storm water collection and discharge from highways);
- Railroads (usually along rivers and creeks); and
- Rivers with barge traffic.

Contamination is usually divided into point sources, such as pipe outfalls from sewage treatment plants, power plants, or manufacturing facilities from which pollution can be traced, and non-point or dispersed sources, such as agricultural runoff that cannot necessarily be traced. In some cases, water pollution is a combination of both.

What should I include in my plan?

Mapping is important for delineating the watershed or wellhead protection area. U.S. Geological Survey (USGS) topographic maps provide a good starting point. These maps show the contours of the land, an important step in determining watershed boundaries. This mapping should also include the entire distribution system of the drinking water system from the source to the plant to the customers.

But don't stop with the drinking water system. Your final map should include the central wastewater system treatment plant and service areas, point discharges, and the extent of the stormwater system. Eventually, you should add all septic and other decentralized systems, showing areas of concern.

Other maps that should be included are tax-based maps because they can help determine specific land uses as well as who owns the land. These maps can be obtained from the county tax assessment office.

All maps need to include the following information: scale, legend, north arrow, water system name, PWSID number (public water system identification number), town, date the map was created, who making the map, source of the map information, and an area for revision dates with details of the revisions. The maps need to be updated regularly to keep them accurate and useable.

Include other possible water sources in your plan that could be used in an emergency, such as individual wells, ponds, lakes, rivers and creeks, nearby water systems, and possibly abandoned mines filled with water. If your water system has connections with other water systems even if normally closed, these need to be mapped as well.

Some other items you may want to include in your plan are photographs of the water source and surrounding area with date stamp. If there are existing town or county ordinances highlighting source protection efforts, these should also be included in the plan. As-built drawings of the water system or at least the design drawing of the water system show the most detail. Update your plan every three years.

Worst Case Contingency Plan

Say, for whatever reason, a community cannot use its source water. What do you do? First a lot of phone calls need to be made. Keep a list of important phone numbers readily available. Include contact information for:

- Your state primacy agency (the people who regulate your water system);
- All operators who are employed by the system, including emergency back-up operators;
- The county or state emergency management agency;
- The governor's office;
- Local fire departments and emergency response personnel;
- Neighboring water systems;
- Your state rural water association;
- Companies that are permitted to haul potable water; and
- Local newspapers, TV stations, and radio stations.

Mission Impossible? Maybe Not

With all the attention being given to the gas stations, farming operations, and industrial/commercial contamination sources, onsite septic systems have been "slipping under the radar." Why worry about failing onsite septic systems when creating a source water protection plan?

While failing wastewater systems may be the hardest source of contamination to fix in your watershed or wellhead protection area, the task is not impossible. Septic systems can contribute to source water contamination for a number of reasons including improper siting of the system, poor design, faulty construction, incorrect operation, poor or no maintenance, and improper use (flushing items that should not be flushed). Building centralized collection systems for everyone is not practical—financially or environmentally. Onsite systems are here to stay and, when installed and maintained correctly, offer viable wastewater treatment methods.

If an onsite system is failing and nothing is being done, the local (county) health department sanitarian or township sewage enforcement officer needs to be notified, in writing, along with the state health and environmental agencies having jurisdiction.

To ensure that onsite systems do not fail, educate system owners about proper maintenance. Basic steps that your water customers with onsite systems can do to ensure that their systems continue to function properly can include:

- Have the system inspected annually by a certified person.
- Pump the tank regularly (three to five years is recommended for a three-bedroom dwelling with a 1,000-gallon septic tank).
- Keep storm drains, down spouts, and basement sump pumps diverted away from the septic system.
- Channel surface (rain) water away from the septic system.
- Do not use septic system additives.
- Avoid or reduce the use of garbage disposals.
- Don't flush trash; solids can clog the drainfield.
- Don't drive over the septic tank and especially the drainfield. This can compact the soils and can even break the piping.
- Keep an eye out for signs of failure, such as: areas around or downhill from the system that stay wet even during dry times and areas of excessive grass or plant growth. If you suspect something is wrong, schedule an inspection and if there is a problem repair as soon as possible.
- Conserve water; it saves money and your septic system.
- Keep maintenance records for the life of the septic system. If the home is sold, pass this information on to the new homeowners.

The Big Boys

Gas stations, chemical plants, and industrial facilities—activities that can pollute in a hurry and with severe consequences—are sometimes easier to deal with because procedures to address these kinds of acute problems may already be in place.

If there is a situation with an industry or commercial application that could affect the source water, the first thing that water systems need to do is get on the phone. The contact list of phone numbers will be virtually the same as the above worst-case scenario contact list adding numbers for Hazmat incidents.

If a contaminating spill happens, it must be isolated, contained, and cleaned-up as soon as possible. If it is impossible to contain the contaminant, at least divert it away from the source water. However, diversion should be the last resort; it just sends the problem downstream for someone else, or you end up dealing with it later.

Networking Can Be Useful

One good tool for any water system to have is communication with other water systems that may use the same source water. If a water system upstream or upgradient is contaminated from a spill or other problem, having a good communication system with them can be vital in spreading the word. Networking can also help with developing and improving the source water protection plan. You can see what other water systems have done or find items that you might have missed in your system's plan.

Having physical waterline connections with other water systems, even if normally kept closed, would also come in handy. Some water systems throughout the country have connections with neighboring water systems that are invaluable in times of emergency situations. It could be the difference between having potable water or no water.

Contaminated drinking water sources can cause a community significant expense and threaten public health. Many states have set up Water-Wastewater Agency Resource Networks (called WARN) that allow utilities to cross jurisdictional boundaries so that they can share equipment, personnel, and other resources to respond to water-related emergencies.

Get the community involved. Include information about source water protection along with the regular water bill. There may be watershed groups in your area. Ask them to help with

source water protection efforts. These groups may already be involved and may have a lot of information available. Get involved with local planning and zoning decisions. Encourage your local officials to develop or enforce existing erosion and sediment control ordinances. Promote environmental education. Helping educate people in your community about ways in which they can help protect water quality can go a long way in getting cooperation. Encourage the local school boards to educate students about drinking water sources and ways to protect them.

For More Information

In 2008, the National Environmental Services Center (NESC) launched the SMART About Water program. In partnership with the Rural Community Assistance Partnership and with funding from the U.S. Environmental Protection Agency, SMART helps communities with source water and wellhead protection activities. To learn more about SMART, visit www.nesc.wvu.edu/smart/.

NESC has a number of free and low-cost products related to source water protection. Here are five examples:

Protecting Sources of Drinking Water: Selected Case Studies in Watershed Management

U.S. Environmental Protection Agency

This publication presents case studies of 17 water systems that have worked with local watershed management initiatives to restore and protect aquatic ecosystems. Though diverse in their watershed management experiences, the common thread among all the water systems is the importance of cross-program coordination. DWBLMG33/Booklet: 46 pp. (1999)

Community Involvement in Drinking Water Source Assessments

U.S. Environmental Protection Agency

This fact sheet explains the four steps of source water assessments and how communities can participate in the process. It also describes how communities can use assessment information to protect local water sources. DWFSGN53/Fact Sheet: 4 pp. (2000)

Nonpoint Pointers: Understanding and Managing Nonpoint Source Pollution in Your Community

U.S. Environmental Protection Agency

This package contains 11 EPA documents that discuss the different types of nonpoint source (NPS) pollution and how to identify and manage them. Also discussed are community involvement activities (volunteer monitoring of rivers, lakes, and coastal waters); federal control pro-

grams; and the use of wetlands to manage NPS. WWPKGN86/Package: 22 pp. (1996)

Wellhead Protection: An Ounce of Prevention...

Wisconsin Department of Natural Resources

This illustrated brochure outlines a four-step wellhead protection strategy and the reasons for taking this preventive action before problems with groundwater may occur. DWBRGN57/ Brochure: 2 pp. (1999)

How to Conduct an Inventory in Your Wellhead Protection Area

University of Idaho

This training manual is designed to help community volunteers conduct wellhead protection inventories in their local watershed. The manual takes a user step-by-step through the process for training volunteers. DWBKPE95/Book: 117 pp. (1993)

For a more complete list of source water and wellhead protection products, visit www.nesc.wvu.edu/smart/products1.cfm or call (800) 624-8301. To order any of the above listed products, call the same number and mention the product title and number.

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NESC Engineering Scientist Zane Satterfield is a licensed professional engineer and previously worked for the West Virginia Bureau of Public Health, Environmental Engineering Division.

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