



State of Ohio
Environmental Protection Agency

Division of Drinking and Ground Waters
Source Water Assessment and Protection Program

Drinking Water Source Assessment and Protection Plan Review Criteria



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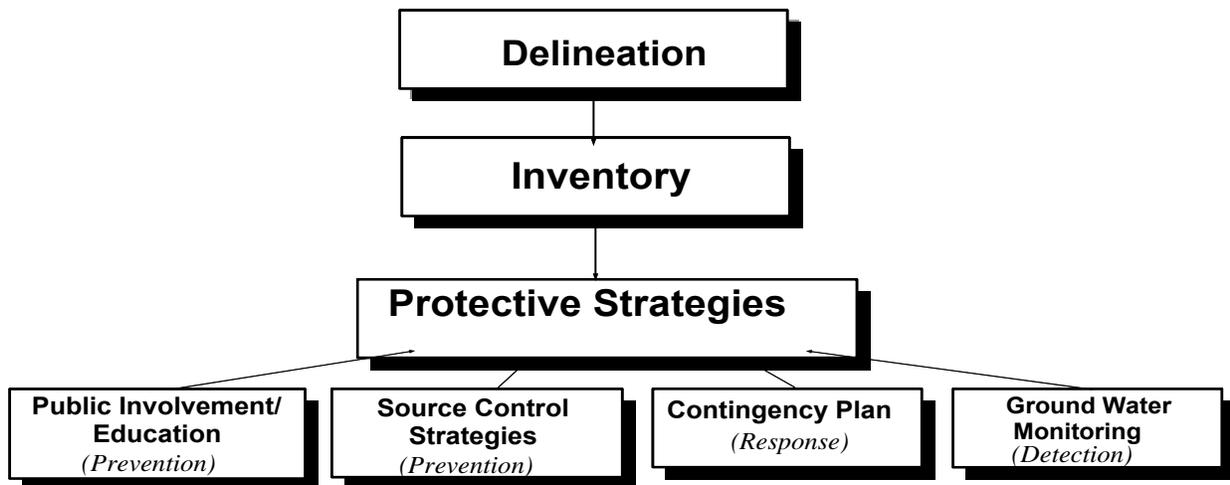
INTRODUCTION

The purpose of this document is to describe the criteria that are used by Ohio EPA staff to determine the acceptability of a local Drinking Water Source Protection Plan. It is intended for two primary audiences: (1) Ohio EPA reviewers, to help them review plans consistently statewide; and (2) local officials and their consultants, who are preparing to complete a Drinking Water Source Protection Plan for a public water system. This document addresses Drinking Water Source Protection Plans **for ground water systems only**.

Background

This document merges procedures and review criteria developed originally for Ohio's Wellhead Protection Program (initiated in 1992), with those developed later for Ohio's Source Water Assessment and Protection Program (initiated in 1999). Originally, under Wellhead Protection, public water suppliers were held responsible for developing a "Wellhead Protection Plan", which involved:

- designating an area around the well(s) to be protected ("Delineation");
- inventorying the potential contaminant sources in this protection area ("Inventory"); and
- creating a plan for protecting the aquifer from these contaminant sources ("Protection Plan").



In 1996 Congress amended the Safe Drinking Water Act to establish the national Source Water Assessment and Protection (SWAP) Program, which provided funding for states to complete Delineations and Inventories for all public water systems. Additionally, states were expected to complete a "Susceptibility Analysis" of each protection area. Collectively these three tasks are known as "assessment". After Ohio's Source Water Assessment and Protection Program was approved in 1999, Ohio EPA staff began to assess Ohio's public water systems (about 5,800), guided by Source Water Assessment Process Manuals that were developed for this purpose.

As new wells and wellfields are proposed, Ohio EPA staff are prepared to assess them. Public water suppliers may choose to complete their own delineations and inventories but if they do not, Ohio EPA staff are responsible for this work. **However, it is still the responsibility of public water suppliers to develop and implement a Protection Plan for their protection area(s).**

Ohio EPA staff will continue to

- **Review for endorsement Protection Plans** submitted by public water suppliers, using the procedures and criteria summarized in this document, which are based on the guidance document titled *Developing Local Drinking Water Source Protection Plans in Ohio* (available on the Ohio EPA Web site).
- **Review for endorsement Delineations and Inventories** that are independently completed and submitted by public water suppliers, using the procedures and criteria summarized in this document, which are based on the manuals that were developed for these steps under the Wellhead Protection Program and the Source Water Protection Program (see back page of this document)
- **Provide Assessments** (delineation, inventory and susceptibility analysis) for any new wells or wellfields that are approved by Ohio EPA (unless the entity wishes to complete its own Assessment), using the procedures in the Source Water Assessment Process Manuals for Delineation and Potential Contaminant Source Inventory (available on the Ohio EPA Web site).
- **Provide a Susceptibility Analysis** of any new protection area, whether it is delineated by Ohio EPA staff or by outside consultants, using the procedures outlined in the Source Water Assessment Susceptibility Analysis Process Manual (available on the Ohio EPA Web site).

SUBMITTAL PROCESS

When submitting a Protection Plan or a Drinking Water Source Assessment Report for endorsement, **two copies** of the report should be sent to Ohio EPA, one to the central office and one to the appropriate district office (see Page 21). A cover letter from the public water supplier (i.e., municipality or private firm) should accompany each copy. Although consultants are often retained to complete portions of the report, it is important that the report reflect the intentions of the entity responsible for protecting the drinking water source, and it should be submitted by that entity to Ohio EPA.

Ohio EPA staff will review the document and respond to the entity within 60 days. The response consists of a cover letter and at least one attachment. If the document is endorsed, Attachment A is a statement of endorsement. If not endorsed, Attachment A comments describe what needs to be done for endorsement. If Ohio EPA reviewers have recommendations for improving the effort, these recommendations will be provided separately as Attachment B.

If the submitted delineation and inventory are endorsable, Ohio EPA will complete a Susceptibility Analysis for the protection area and enclose it with the review or send it within 30 days.

ENDORSEMENT CRITERIA

Endorsement criteria for each component of a Drinking Water Source Protection Plan are provided as a checklist below. An asterisk (*) indicates items that are required. Items without an asterisk are highly recommended and that should be included if available, but are *not* required for endorsement.

A more detailed description of each component follows on pages 7-19.

DELINEATION

An **Introduction** describing the community's water resources and needs, including:

- * a map of the wellfield(s) and the surrounding area;
- * population served;
- * current and expected usage (gallons per day or million gallons per day);
- * number of wells in place and number of wells currently being used.

A **Hydrogeologic Setting** section that includes:

- * a description of regional and local geology;
- * main sources of aquifer recharge (precipitation, upgradient ground water, streams, etc.);
- * identification of aquifer as confined, unconfined or semi-confined;
- * identification of all significant and active pumping centers in the area;
- * identification of all hydrogeologic boundaries;
- * potentiometric map of the aquifer, including locations of wells where the water level was measured;
- * well logs for the public water supply wells;
 - a select number of well logs for other local wells;
- * a discussion of the sources of information on the aquifer (maps, USGS studies, etc.);
- * a discussion of the vulnerability of the aquifer;
 - cross-sections of the aquifer geology.

A discussion of the **Delineation Method** must be included and contain:

- * a rationale for choosing the delineation method used;
- * a description of the method(s)/computer model(s) used for the delineation;
- * the simplifying assumptions of the method(s);
- * the value or range of values for all input parameters used in the model(s);
 - where computer modeling is used, a sensitivity analysis on the input parameters.
- * A **map showing the boundaries of the delineated WHP area, based on a five-year time-of-travel**. Map scale should be no smaller than 1:24,000, which is the scale of USGS 7.5 minute quadrangle maps. However, a larger scale is preferred. It is also recommended that the one-year time-of-travel area be mapped.

POTENTIAL CONTAMINANT SOURCE INVENTORY

- * A narrative of the **methodology** used to conduct the inventory;
- * RCRA, CERCLA and BUSTR **databases** (at a minimum) should have been checked;
- * Discussion of a **visual survey** of the area in and around the wellhead protection area, including the date conducted, with whom, etc.;
- A description of any planned (or completed) site visits;
- A description of historical land use;
- * A **table** of the potential contaminant sources (e.g., Table 1, page 12);
- * A **map** of the potential contaminant sources (e.g., Figure 4, page 11), which must include:
 - * locations of all potential contaminant sources identified, including oil and gas wells
 - * locations of the public water supply wells;
 - * major transportation routes (highways, railroads, etc.);
- * A description of the **land use**;
- A land use map;
- A **zoning map**. If the area is not zoned, this should be noted within the report;
- * A map showing **areas without sanitary sewers** and/or discussion of these areas;
 - Identification of areas with underground fuel oil tanks;
 - Identification of areas with storm drainage wells;
 - Identification of any abandoned water wells;
 - Discussion of how, and how often, the inventory will be updated.

PROTECTION PLAN

Introduction / Executive Summary

- A **brief summary** of the drinking water source assessment report including:
 - A description of the wellfield;
 - A description of the physical and hydrogeologic setting;
 - A description of the aquifer;
 - A summary of the potential contaminant sources;
 - The susceptibility of the aquifer to contamination;
- A summary of how the sources will be addressed;
- An explanation of how these strategies will reduce the risk of ground water contamination;
- A description of how the protective strategies will be evaluated to make sure they are producing the intended results.

Education and Outreach

- * The **membership** of the Drinking Water Source Protection Team (at least by title);
 - How input was collected from individuals, businesses, and other groups in the community;
- * A **description of how the local community will be informed** about source water and how to prevent contamination;
- * The **activities** that are planned;
- * The **target audiences** for each activity.
 - A time line for conducting these activities (for both one-time and on-going activities);
- * A description of the **process for ensuring continuity** of the education activities;
- * How the **effectiveness** of the program will be evaluated.

Drinking Water Shortage/Emergency Response

Drinking water shortage:

- * The short- and long-term **alternative sources** of drinking water that may be available.
- * A discussion of the **financial mechanisms** that could be used to implement those alternatives.
- * A brief discussion of any water supply planning for **future needs**.

Emergency planning:

- * Identify plans for **emergency responses** in the drinking water source protection area.
- * The **method for coordinating** with the local emergency responders.
- * Identify the **chain of command**, telephone numbers, and back-up staff that will address releases in or near the drinking water source protection area.
- * A **copy of the drinking water contingency plan** (as an attachment or appendix).

Potential Contaminant Source Control Strategies

For each type of potential pollution source in the drinking water source area:

- * The **strategies** that will be used for that type of source.
- * How these strategies will be **implemented**.
 - Include strategies based on education or contingency planning focused on a specific type of source.
- * A **time line for implementing** the strategies.
- * **Identify individuals** (by name and/or title) involved in the implementation of the strategies.
- * Address the **rationale** for selecting the particular source control strategy.

Ground Water Monitoring

- * An assessment of the **need** for ground water monitoring.

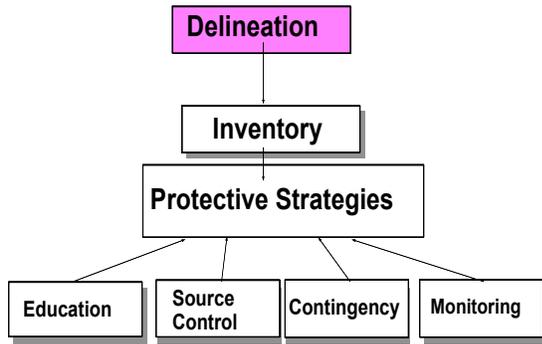
If a public water system decides that ground water monitoring IS NOT needed:

- * A discussion of the **reasons** ground water monitoring is not needed.

If a public water system decides that ground water monitoring IS needed:

- * An **explanation** why ground water monitoring is needed.
- * A **map** of the area showing:
 - The locations of the proposed monitoring wells.
 - The public water supply wells.
 - The drinking water source protection area.
 - The contaminant sources.
- * A **description** of the pollution source and contaminants each well is intended to monitor.
- * The **construction details** of the planned well(s) including:
 - * **Total depth**.
 - * **Screened intervals**.
- * The **sampling schedule** and frequency of monitoring.
- * A **list of parameters** that will be monitored.

Background Information



Delineating Drinking Water Source Protection Areas

The first step in developing a drinking water source protection plan is delineating the area to be protected. The protection area is the area around a public water supply well or well field that contributes water to the well or well field, and that will be the focus of ground water protection efforts. Protection areas range in size from a few acres to a few square miles, depending on the local geologic conditions.

Ohio EPA requires that the protection area be large enough to encompass five years of ground water travel time. In other words, a water molecule at the boundary of the five year time of travel zone (or protection area) should take approximately five years to enter the public water supply well (Figure 1). The five year time of travel zone is used in Ohio to allow for a sufficient warning and response time should ground water contamination be detected at the protection area boundary.

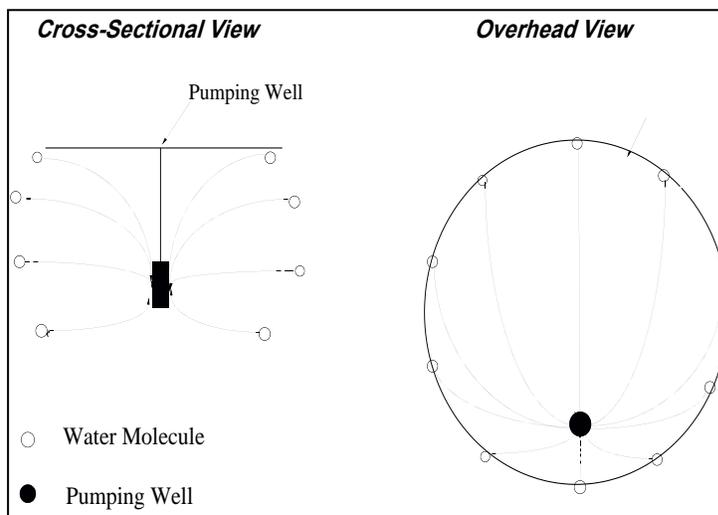


Figure 1. Schematic showing a water molecule moving toward a pumping well in the five-year time of travel zone.

In some cases, a natural flow boundary such as a no-flow boundary (i.e., impermeable bedrock valley wall) or a recharge boundary (i.e., rivers and lakes) will be reached before the five year time-of-travel zone. In these cases, the edge of the protection area may coincide with the natural flow boundary (Figure 2).

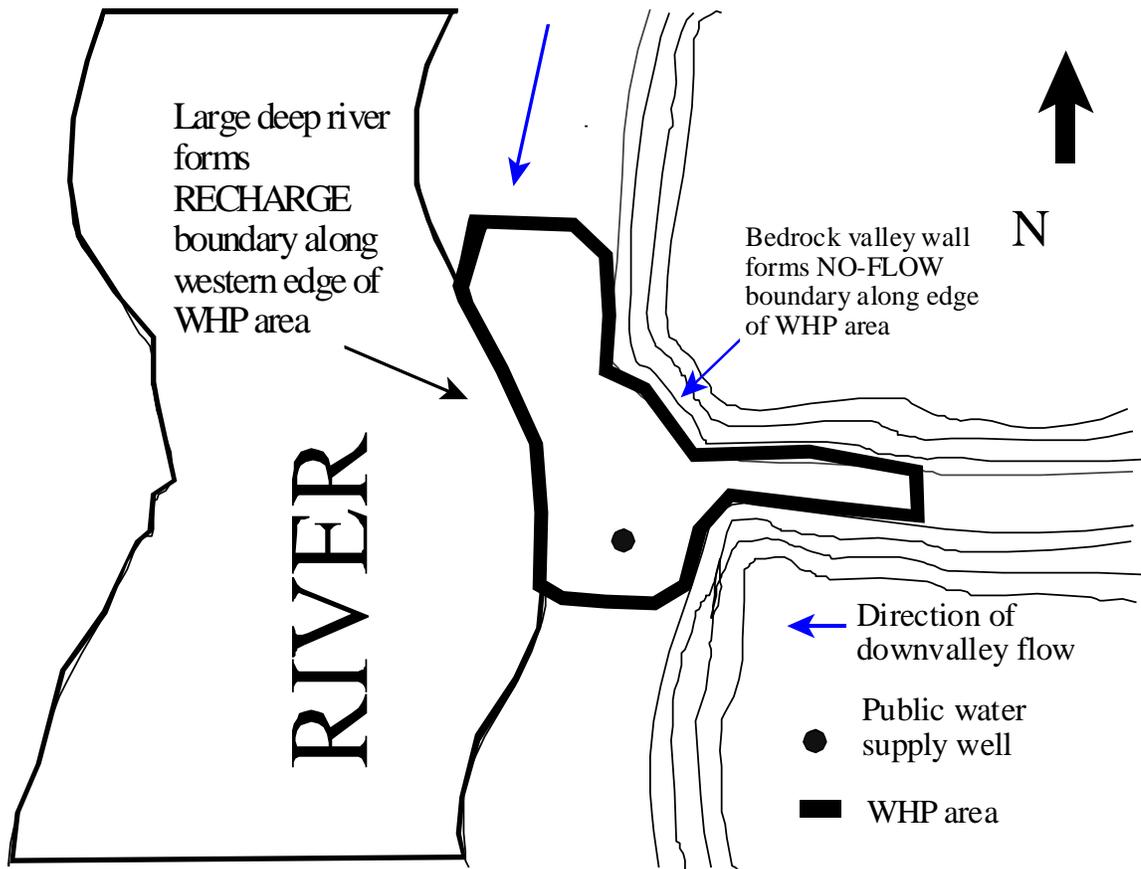


Figure 1. Schematic showing a water molecule moving toward a pumping well in the five-year time of travel zone.

There are several methods that can be utilized to determine the protection area. These range from hand calculated methods to using computer generated models. The complexity of the local geology and hydrogeology, the existing data, and the availability of resources (both financial and technical) will determine what method(s) should be used.

Detailed guidance on this subject, written for environmental consultants, is found in Ohio EPA's "Wellhead Protection Area Delineation Guidance" (1994), which is available on-line at <http://www.epa.ohio.gov/ddagw/swap.aspx>. Because delineating a protection area requires some technical expertise, communities who wish to complete their own delineations typically seek outside assistance with this step. Most commonly the assistance comes from environmental consulting firms, but other options include university students, retired geologists or engineers, or local planning agencies. Whoever is chosen should be fully familiar with hydrogeologic investigations and with Ohio EPA's Source Water Assessment and Protection Program.

Any community intending to complete its own assessment should notify Ohio EPA as soon as possible, preferably shortly after the well or wellfield site is accepted. Otherwise, Ohio EPA staff will make plans to complete the assessment as soon as well locations and planned pumping rates are established.

Review of Protection Area Delineations

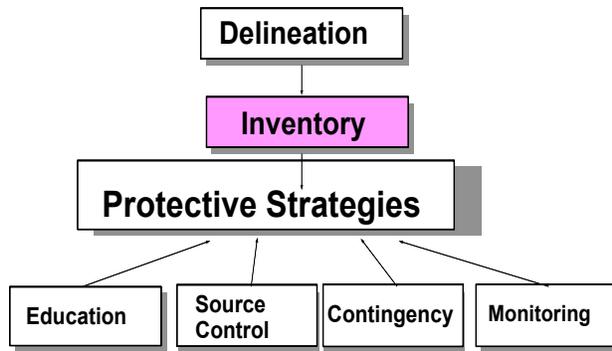
Ohio EPA's review of the delineation focuses on conceptual and technical issues to confirm that the protection area delineated includes the five-year-time-of-travel area. This is the most technical review. Generally the evaluation focuses on "appropriateness" of the method used, and "reasonableness" of the protection area. "**Appropriateness**" of the method refers to the method's sophistication. A more sophisticated delineation method is needed for protection areas that are:

- characterized by *complex hydrogeology* (many layers of aquifer and non-aquifer materials; one or more flow boundaries; multiple pumping centers, etc.); and/or
- *highly vulnerable* (i.e., are characterized by very permeable geologic materials like sand and gravel, that allow surface water to percolate quickly into the ground water; and/or contain numerous high-risk pollution sources).

"**Reasonable**" refers to the size and shape of the protection area. If the protection area is extremely large (for example, five miles in diameter), some of the information used to delineate the area may be incorrect, or the delineation method may have been applied incorrectly. As another example, if the protection area encroaches deeply into no-flow boundaries, such as nearly impermeable valley walls, this suggests errors in the way the model was set up. Because of their experience with reviewing numerous delineation efforts, Ohio EPA reviewers have a feel for the expected size and shape of a five-year time-of-travel area.

To evaluate the appropriateness of the delineation method and whether it was applied correctly, the reviewer needs detailed descriptions of what was done, how it was done, and what judgment calls were made (and why). If the necessary information to evaluate the delineation is not included in the report, the Ohio EPA will request more information, which slows the review process.

Ohio EPA's evaluation also considers the quality and quantity of data used to determine the wellhead protection area. When hydrogeologic data availability is limited or the data available is of uncertain quality, and the resources to acquire additional data are not readily available, more conservative delineation methods are expected to be utilized to compensate for the available data.



Potential Contaminant Source Inventory

The second step in a Drinking Water Source Protection Plan involves identifying and inventorying all of the potential contaminant sources near and within the protection area. The purpose of the potential contaminant source inventory is to identify all past and present activities and possible future land uses that have the potential to impact the public drinking water resource. The potential contaminant source inventory is less technical than the delineation, and consequently the public water supply purveyors or a group of local citizens may choose to do it themselves.

A good way to initiate the inventory is to view the protection area on a USGS topographic map. This provides a good sense for the distribution of major land forms, rivers, and streams, and the approximate degrees of urbanization, in the vicinity of the protection area. The maps also indicate common land use activities. Some examples of land use activities include:

- industrial areas
- residential and commercial areas
- agricultural areas
- roads, highways and railroads
- mining or quarry operations

Land use activities dictate the kinds of potential pollution sources that the inventory will identify. Some of the more common types of potential pollution sources found in Ohio are:

- | | |
|--|--|
| <ul style="list-style-type: none"> • chemical storage • underground storage tanks (Fig 3) • fertilizer/pesticide applications • animal feedlots • road salt usage and storage • sanitary landfills | <ul style="list-style-type: none"> • underground injection wells • septic tanks and drain fields • manufacturing storage and disposal • mines • abandoned wells |
|--|--|



Figure 3. Underground storage tanks.

Leaking underground storage tanks--typically filled with fuel products--have been responsible for numerous ground water contamination incidents. State Fire Marshal regulations now require various types of leak detection and leak prevention devices. However, many tanks have never been reported, and many of these may lie buried and long forgotten.

These sources do not necessarily threaten public drinking water supplies. However, unless managed properly, they have the potential to do so.

Detailed guidance on this subject is found in Ohio EPA's "Guidance for Conducting Potential Pollution Source Inventories in Wellhead Protection Areas" (1997), which is available on-line at <http://www.epa.ohio.gov/ddagw/swap.aspx>. An equivalent document is the "Potential Contaminant Source Inventory Process Manual" (2009), which is also available on-line. This document was developed for Ohio EPA staff completing inventories under the Source Water Assessment and Protection Program. It contains more discussion of processes specific to Ohio EPA's information and computer resources.

The potential pollution source inventory identifies and catalogs basic information about the potential sources within the protection area to provide the necessary information to develop an effective protective strategies plan. Completing the inventory involves several basic activities:

- **search data bases** to collect existing data and records located at local, state, and federal agencies;
- **conduct visual surveys** within and around the wellhead protection area;
- **complete site visits** and **personal interviews**;
- **verify accuracy** of data;
- **summarize information** in a report.

Once all of the potential contaminant sources are identified, they must be located on a map showing their relationship to the wellhead protection area (Figure 4). A table must be included that lists the sources along with other pertinent information. An example of such a table is shown in Table 1.

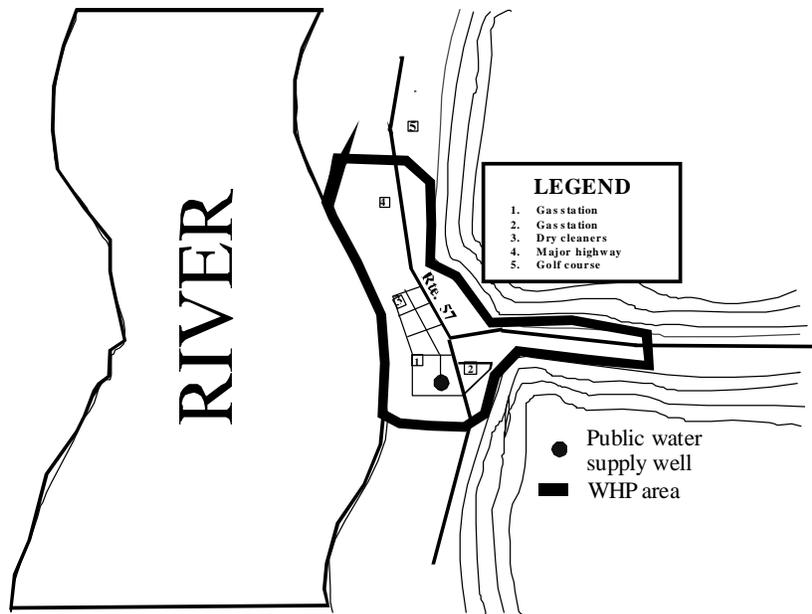


Figure 4. Map showing the potential contaminant sources located within or near the protection area.

Table 1. Table Listing Potential Contaminant Sources Shown in Figure 4

Key No.	Facility name and Address	Land Use Type	County/ Township	Type of Activity	Pollution Source	Distance from well	Source of Information
1	Pop's Gas Station 123 Main Street Anytown, OH 44444 (614) 666-5555	Commercial	Franklin/ Brown	Gas Station	UST's drainage well (petroleum Products)	100 feet	Visual Survey, BUSTR database
2	Buddy's Gas Station 23 Oak Street Anytown, OH 44444 (614) 666-4444	Commercial	Franklin/ Brown	Gas Station	USTs, On-lot septic system (petroleum products, Microorganisms)	120 feet	Visual Survey, BUSTR database
3	Sam's Dry Cleaners Vine and Elm Anytown, OH 44444 (614) 666-3333	Commercial/ Industrial	Franklin/ Brown	Dry Cleaners	Use, storage, transport of solvents	800 feet	Visual Survey
4	Route 57	Transportation	Franklin/ Brown	Transportation	Transport of various potential contaminants in commercial trucks	50 feet of wells at nearest point	Visual Survey
5	Shankers Golf 5500 High Street Anytown, OH 44444 (614) 666-2222	Commercial/ Agricultural	Franklin/ Green	Golf Course	Fertilizers, pesticides	1,500 feet	Visual Survey

Review of the Potential Contaminant Source Inventory

The review for the Potential Contaminant Source Inventory typically focuses on determining if all potential threats to the well field are identified, that sufficient information has been gathered to begin developing effective protective strategies, and that the methodology used to determine the sources is **well documented**.

In many cases, the people developing the protective strategies are not the same people who completed the inventory. Thus, complete documentation of inventory data is critical to the protective strategies developers so that they can quickly evaluate the potential sources of contamination data.

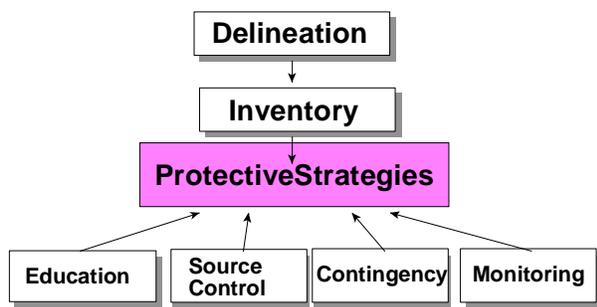
Prioritizing Potential Sources

The inventory identifies *potential* sources, but individual sources may pose little or no actual threat once they have been examined. Thus, all identified potential contaminant sources should be evaluated to assess the likelihood they will impact the public water system. This susceptibility analysis allows a community to direct limited resources to those sources presenting the greatest threat to the wellfield. Potential sources that pose little risk may only need to be considered in the development of long term protective strategies.

Communities have the option of including the prioritization either in the Inventory or in their Protective Strategies. Factors to consider when evaluating risk include:

- Are verified contaminant plumes present within the Drinking Water Source Protection Area?
- Is there a history of spills/releases of contaminants near the Drinking Water Source Protection Area?
- What is the distance that a potential contaminant must travel to reach the public water system wells?
- How sensitive is the hydrogeologic setting of the Drinking Water Source Protection Area? (e.g., depth to ground water; presence of confining layers)
- How mobile and/or toxic are the chemicals used, stored or disposed of in and around the Drinking Water Source Protection Area?
- What material handling practices are already in place?
- Are existing state, federal, or local regulations sufficient to manage the identified sources?

Prioritization of sources requires taking account of site specific conditions. The Ohio Source Water Assessment and Protection Program does not advocate the use of any specific methodology for identifying priority sources in the Inventory.



Developing Protective Strategies

The third and final step required for a complete Drinking Water Source Protection Plan in Ohio is the development of protective strategies. Protective strategies integrate the information collected in the delineation and inventory steps and **provides workable strategies for preventing, detecting, and responding to ground water contamination** within the protection area. These strategies range from local regulations or ordinances to public education and voluntary action. It is important that a community's protective strategies are tailored to the community. It must specifically address the potential contaminant sources that have been identified in the protection area. In addition, it should reflect the community's geologic setting and aquifer vulnerability, its financial and administrative resources, and the needs and desires of its citizens.

The Ohio EPA strongly recommends that the protective strategies be developed by a team composed of representatives of local organizations and individuals citizens (Table 2). Members should include individuals who will play a role in implementing the protective strategies as well as those who could be impacted by its requirements. Local citizens are in a better position to decide what protective options will work best for the community. Local involvement is critical to creating a commitment to implementing the protective strategies. At a minimum, the committee should include the public water supply manager and representatives of those governmental bodies that have authority over land included in the protection area and citizens who own land or operate businesses within the protection area. The goal is to develop protective strategies that not only help protect the source of public drinking water, but also reflect the needs and desires of the community.

Components of Protective Strategies

The goal of protective strategies is to prevent contamination of ground water supplying the public water supply well(s) and to ensure a continuous

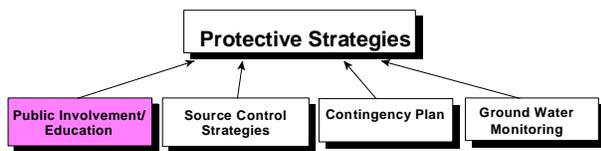
Table 2. Potential members of the Protective Strategies committee.

- Local government representation
- Township government representation
- County government representation
- Regional planning commission
- District emergency management agency coordinator
- (SERC or LEPC)
- State Fire Marshal's office
- Local and township fire department
- Public works director
- State or local health departments
- Public water supplier
- Soil Conservation Service
- Private industry representation
- Local farmers
- Local developers
- Community service organizations
- Local Chamber of Commerce
- Public interest and/or environmental groups
- League of Women Voters
- Local teachers or education professionals
- Senior citizens groups
- Local newspapers
- Local radio stations
- Retired local experts
- Residents

supply of safe potable water. This goal is best realized through a combination of protective approaches. Components that must be discussed as part of an endorsable protective strategies plan include:

- **Public participation and education**
- **Source control strategies**
- **Contingency/emergency planning**
- **Ground water monitoring**

Because it is important that these components are integrated, Ohio EPA recommends that all components be developed and submitted together for endorsement. Developing protective strategies for a particular potential contaminant source may include approaches from several of these protective components. For example, managing septic tanks in a WHP area could consist of regular septic tank inspections by order of a local ordinance (SOURCE CONTROL STRATEGY) and an education program on septic tank maintenance (EDUCATION).



Protective Strategies Component: **Public Involvement and Education**

The overall success of protective strategies depends upon the cooperation of people living and working within the protection area. Citizens in the protection area need to understand that their actions can affect the quality of their drinking water. They also need to understand how they can change their actions to prevent contamination from occurring. Education is the key to ensuring this awareness and therefore it is the cornerstone to effective protective strategies.

Educational programs can be directed at business owners, households, school children, civic organizations, workers or the community at large, depending on which type of potential contaminant source is targeted. Some of the more commonly used educational tools include:

- inserts in water bills about wellhead protection
- signs along streets and highways indicating the presence of a wellhead protection area
- posters in public places informing people about wellhead protection
- public meetings
- employee training on materials handling practices, emergency spill situations, and wellhead protection
- school field trips to the protection area and to potential contaminant source sites
- presentations at businesses, community, and school meetings

This component of protective strategies must not only discuss how the community will be informed about Drinking Water Source Protection and how to prevent contamination, but also how the thoughts, opinions, and expertise of individuals in the community were obtained, considered and incorporated into the protective strategies plan. Through open communication and public involvement, local officials can promote public trust and confidence, and ultimately develop protective strategies that not only help protect the source of public drinking water, but also reflects the needs and desires of the community.

Ohio EPA staff are available to assist in education efforts. In addition to giving presentations, Ohio EPA can provide a variety of tools, including a video, fact sheets, and a sand tank model demonstration that simulates ground water flow and contaminant transport.

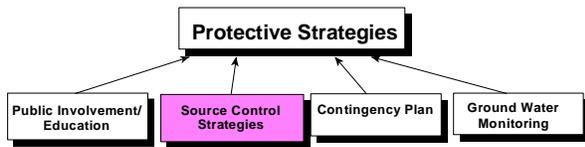
Review Criteria for the Public Participation and Education Component

Ohio EPA will evaluate this component on its effectiveness at educating both specific and general groups of people about things they can do to protect their ground water resources. All plans must include:

- A **description of the activities** that will be undertaken.
- A discussion of **target groups** these activities are designed for (i.e., school children, adults, employees of specific facilities or industries, local government officials, general public, etc.).
- A **process for ensuring continuity** of the education activities.
- A **method for evaluating the effectiveness** of the program, so that activities can be retooled from time to time.

Strongly recommended:

- **Time lines** for conducting various activities on a first-year and on a continuous basis
- Formation of a WHP **Planning Committee**.



Protective Strategies Component: Source Control Strategies

This section of protective strategies describes specific actions or techniques that may be used to reduce the risk of ground water contamination from specific potential pollution sources within the protection area. A few of the more commonly identified strategies, many of which are regulated through current regulations, include:

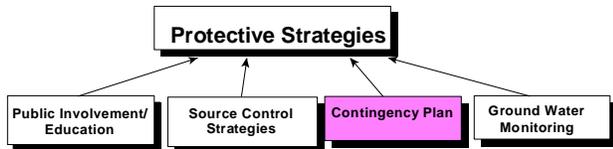
- **Source Prohibitions.** The source (type of facility, land use or specific chemical) is not permitted to exist in the protection area. These are usually achieved through zoning ordinances, but may also be implemented through the purchase of land or development rights, or by obtaining an easement, deed restriction, or restrictive covenant.
- **Source Restrictions.** The source may exist in the protection area in restricted amounts (usually implemented through the same mechanisms as listed for source prohibitions).
- **Design Standards.** The source must meet certain design standards, such as berms, impermeable storage surfaces, overfill protection, leak detection systems, secondary containment systems, etc. (often required through building codes or by overlay ordinance; may be promoted as voluntary practices).
- **Operating Standards.** The source must meet certain operating standards such as periodic inspection, testing and maintenance (often required through an ordinance; may be promoted as voluntary practices).
- **Reporting Requirements and Documentation.** Owners/operators are required to report the types and quantities of chemicals used, stored and disposed of on the property and document source protection efforts with the Drinking Water Source Protection coordinator (often implemented through an ordinance, but may be voluntary).

The type of source control strategies to implement is a local decision that should be based on input from the people affected by the strategies and on the expertise of those individuals responsible for implementing the control strategies. Some communities may choose not to use any additional source control strategies beyond existing state and federal regulations. In cases where no regulations apply, however, the protective strategies plan must explain how the other protective elements (education, contingency planning, and ground water monitoring) adequately address each type of identified contaminant source.

Review Criteria for Source Control Strategies Component

At a minimum, this section must:

- **Describe the strategies** that will be used on potential pollution sources within and near the WHP area and indicate how they will be implemented.
- **Provide a time frame** for implementation and **list by title** those who will be involved in the implementation.
- If specific source control strategies will not be used on the major potential contaminant sources, **describe what other protective components** (education, contingency, ground water monitoring) **will be used to address these sources**.



Protective Strategies Component: **Contingency Planning**

The Ohio Drinking Water Source Protection Program requires that a public water system build on its existing contingency plan (as required by OAC 3745-85 and ORC 3750) to address both water supply planning and emergency spill response.

Water Supply Planning:

Public water systems must identify both short and long term alternative sources of water, and financial mechanisms for implementing those alternatives should the existing water supply become unusable due to contamination. The program further recommends that a system conduct water supply planning to help ensure an adequate supply of water for future population needs. Typical planning options include:

- identifying sites for future wellfields;
- securing land for future wellfield expansion;
- planning the purchase of water from a neighboring community; and
- developing a surface water source.

Spill Response:

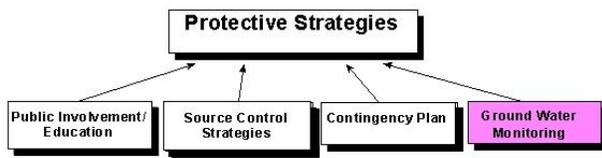
Public water systems must coordinate their contingency plan with emergency planning requirements of the federal Superfund Amendments and Reauthorization Act (SARA) of 1986. Systems need to coordinate with the local emergency planning committee (LEPC) to plan appropriate responses in the protection area. Specialized responses may need to be adapted for spills/accidents occurring within or adjacent to a protection area, particularly one located on a highly sensitive (i.e., very permeable) aquifer. For example, if a facility located in a sensitive setting burns or explodes, spraying it with water may not be the best response, unless there's a reliable way to prevent the water from infiltrating into the aquifer. For wellfields that are susceptible to infiltration of contaminants, emergency response is a critical element of the protective strategies.

Ohio EPA's Division of Drinking and Ground Waters has provided county maps of endorsed WHP areas to each county Emergency Protection Agency (EMA) and each Local Emergency Planning Committee (LEPC) to assist in coordinating emergency response activities within WHP areas. Communities may consider designating an individual to be the WHP coordinator to act as a direct contact to the incident or site coordinator in emergency response situations.

Review Criteria for the Contingency/Emergency Response Component

The main items that must be discussed or included within the Contingency/Emergency Response component include:

- Identification of short- and long-term **alternative sources of drinking water**.
- Identification of **financial mechanisms** that could be used to implement those alternatives.
- An **emergency response plan** with chain of command, telephone numbers (with alternates), and back-up staff to address transportation lines (highways, railways, airports, etc.) within or near the WHP area.



Protective Strategies Component: Ground Water Monitoring

The Ohio EPA requires that public water systems assess the need for ground water monitoring. The need for ground water monitoring is dependent upon the vulnerability of the aquifer being used, the presence of contaminant plumes and point sources, and the protective approaches selected to protect the aquifer. Because of the technical nature of this subject, a community may want some assistance from a ground water professional when drafting this section.

It should be recognized that ground water monitoring is not a preventive strategy; rather, it provides information that may lead to reactive strategies. However, ground water monitoring can serve several important functions:

Early warning. If wells are properly sited, monitoring can provide early warning of contaminant plumes from specific point sources, so that corrective actions can be taken before the public water supply is affected.

Tracking ground water quality trends. In WHP areas where nonpoint sources pose a threat, ground water monitoring may warn of generally rising levels of contaminants, so that corrective actions can be initiated. A common example of this kind of contaminant problem is widespread high levels of nitrates, usually related to agricultural activities.

Evaluating effectiveness of selected protective practices. Every program should be scrutinized for its effectiveness, and Drinking Water Source Protection is no exception. Unfortunately, it is difficult to evaluate the effectiveness of preventive programs. Ground water monitoring enables this kind of evaluation in some cases. For example, if high nitrate levels are a problem, specific actions may be taken to lower nitrate levels (such as upgrading septic systems and encouraging Best Management Practices for agricultural use of fertilizer). By monitoring nitrate levels in the ground water throughout the affected area, the effectiveness of these protective strategies can be evaluated.

If a community decides that it does not need ground water monitoring wells, this decision must be explained in this element of the protection plan. If it is decided that a ground water monitoring network is necessary, the network must be designed to provide early warning of ground water contamination from high priority sources. Any proposed monitoring well network should be located and constructed in a fashion dictated by local ground water flow patterns, hydrogeologic conditions, and potential contaminant threats. Wells should be sampled at a frequency that will allow for adequate response time to implement remedial actions should contamination be detected. Detailed information on how to design a ground water monitoring plan for drinking water source protection purposes is available in a document titled “*Ground Water Monitoring Guidance for Wellhead Protection*” (1999), which can be obtained in hard copy by calling an Ohio EPA office (see back page of this document).

Review Criteria for the Ground Water Monitoring Component

Ohio EPA review of the ground water monitoring component will focus initially on whether the need for a monitoring plan has been assessed accurately. If it determined that a ground water monitoring network is necessary, the monitoring plan must include:

- A **map of the area** showing locations of the proposed monitoring wells, the public water supply wells, the WHP area, and the contaminant sources.
- A discussion of **what pollution source and contaminants each well is intended to monitor**.
- A description of planned **well construction details**, including total depths and screened intervals.
- A **sampling schedule** showing frequency of monitoring and a list of parameters that will be monitored.

Additional Information

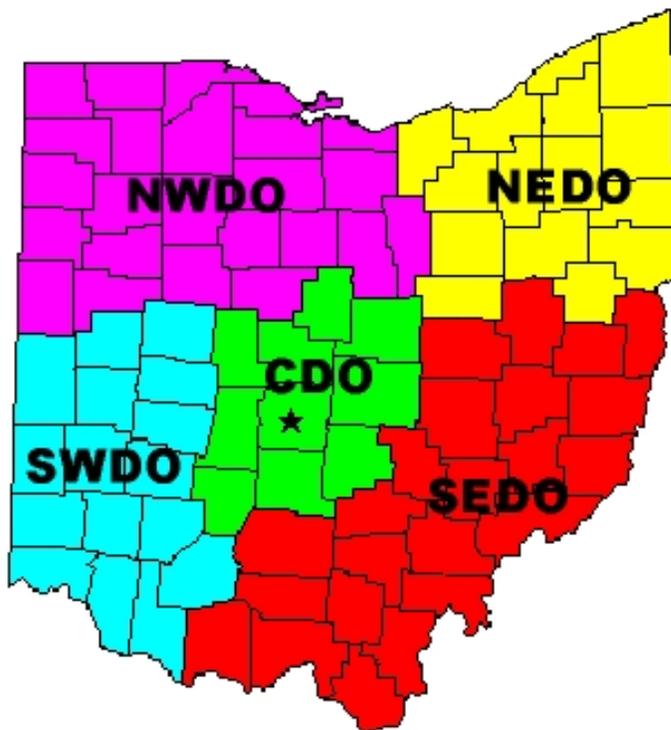
To obtain additional information on Ohio EPA's Drinking Water Source Assessment Program, to receive any guidance documents or fact sheets, borrow a video, or to request technical assistance in developing a protection plan, please contact your district (see map), or the Central Office at:

**Ohio Environmental Protection Agency
Division of Drinking and Ground Waters**

P.O. Box 1049
50 West Town Street
Columbus, OH 43216-1049
Phone: (614) 644-2752

E-mail: whp@epa.state.oh.us

Internet: <http://www.epa.ohio.gov/ddagw/swap.aspx>



Northeast District Office

2110 E. Aurora Road
Twinsburg, OH 44087
(330) 963-1200
1-800-686-6330

Northwest District Office

347 North Dunbridge Road
Bowling Green, OH 43402
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50 West Town Street
Columbus, OH 43216-1049
(614) 728-3778
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Southeast District Office

2195 Front Street
Logan, OH 43138
(740) 385-8501
1-800-686-7330

Southwest District Office

401 East Fifth Street
Dayton, OH 45402-2911
(937) 285-6357
1-800-686-8930

List of Available Information Sources

GUIDANCE DOCUMENTS

[Wellhead Protection Area Delineation Guidance \(1994\)](#)

[Guidance for Conducting Potential Pollution Source Inventories in Wellhead Protection Areas \(1997\)](#)

[Guidance for Ground Water Monitoring in Wellhead Protection/Source Water Protection Areas \(1999\)](#)

[State of Ohio Source Water Assessment and Protection Program \(1999\)](#)

[Developing Local Drinking Water Source Protection Plans in Ohio \(for public water systems using ground water\) \(2003\)](#)

[Developing Source Water Protection Plans for Public Drinking Water Systems using Inland Surface Waters \(2006\)](#)

FACT SHEETS

[Ground Water in Ohio \(2003\)](#)

[Source Water Protection in Ohio \(2009\)](#)

[Ohio's Source Water Environmental Education Teams \(SWEET\) \(2009\)](#)

VIDEO

[Ground Water and the Ohio Wellhead Protection Program \(1995, 20 minutes\)](#)

This video (in DVD or VHS format) is designed for viewing by a general audience, from schoolchildren to community officials who may be initiating local Wellhead Protection Plans. The video follows two children as they learn about the source of their drinking water (an explanation illustrated by vivid 3-dimensional computer graphics). They learn how ground water flows through the subsurface to the wells that pump it into a water treatment plant. They also learn how ground water can be polluted by pollution sources. Finally, they are introduced to Ohio's Wellhead Protection Program, and learn how to prevent contamination of the drinking water source.

COLORING BOOK

[Once Upon A Wellfield or ... The Adventures of "Dew"](#)

This 24-page storybook/coloring book tells the story of a good-natured drop of water named "Dew" and her journey through the water cycle. While moving through the subsurface as ground water, Dew has a close encounter with a street-wise drop of benzene ("Bennie") who teaches her about pollution sources. He also tells her about community-led efforts to protect the ground water that is used for public drinking water.