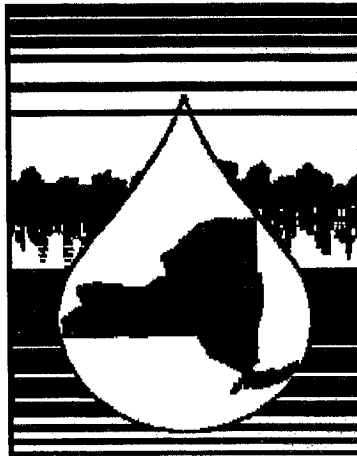


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**NEW YORK STATE**  
**SOURCE WATER ASSESSMENT PROGRAM PLAN**

FINAL



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## New York State Source Water Assessment Program Plan Overview

Congress amended the Safe Drinking Water Act in 1996 and added a new program that requires states to evaluate the sources of water that are used to supply public drinking water. This new program is called the Source Water Assessment Program. The New York State Department of Health (DOH) is implementing the program for New York State. With help from the New York State Department of Environmental Conservation, County Health Departments, other state and federal government agencies as well as private and public interest groups, the DOH developed a plan to carry out this new program.

The Safe Drinking Water Act requires that each source of water (e.g. well, stream, lake, reservoir) used by a public water system be evaluated to identify possible contaminant threats to the source water quality. This evaluation is called a Source Water Assessment and the elements that will be completed for each source water assessment are described below.

- **Delineate the source water assessment area.** This involves determining where the public drinking water originates. In New York, most public drinking water systems draw water from wells. However, some of New York's largest systems use water from streams, lakes and reservoirs. The assessments will identify an area of land surrounding the well, stream or other water body that likely contributes water to each source of public water.
- **Complete the contaminant inventory.** This involves identifying and listing potential sources of contamination that could adversely affect the quality of the source of water.
- **Conduct a susceptibility analysis.** This involves evaluating the likelihood that a source of public drinking water could become contaminated.

The Source Water Assessment Program is a program to compile and organize information for making better decisions regarding source water protection. The information compiled for the assessments will assist the State in overseeing public water systems and the completed assessments will provide a rational basis to support future local and state source water protection activities. The Source Water Assessment Program does not impose any new mandates or regulations on owners or operators of public water systems. Funding for the Source Water Assessment Program is from a single \$5.9 million federal grant which will be spent over four years (1998 - 2001).

## Previous Assessment Efforts Related to the Source Water Assessment Program

The Source Water Assessment Program will integrate on-going source water assessment and protection efforts. Federal, state and local pollution prevention regulations provide the baseline protection to public water systems. Some water sources are protected through regional programs such as those for an entire watershed or aquifer. There are also programs aimed at the particular protection needs of an individual source of public water. For the major water sources in the state, source water protection efforts are already underway. The Source Water Assessment Program will document the status of existing source water protection efforts for a particular water source. Some source water assessments, by identifying significant threats of contamination to sources of public water, may help focus source water protection efforts.

## New York's Source Water Assessment Program

There are more than 9,000 public water systems in New York that have their own water source. Some public water systems use more than one source of water, therefore, statewide there are more than 14,000 water sources to be evaluated under the Source Water Assessment Program.

About one eighth of New York's public water systems include municipal systems that serve villages, towns and cities. However, the majority of public water systems in New York State are smaller systems that are owned and operated by apartment complexes, mobile home parks, schools, workplaces, and businesses that serve water to the public, such as motels and restaurants.

New York's approach to completing source water assessments will follow a step-by-step process that builds upon existing information to focus the assessments on relevant water quality issues. New York's approach to source water assessments is based on three guiding principals: 1) maximize use of existing information; 2) emphasize use of a statewide Geographic Information System; and 3) emphasize state and local partnerships. The main elements of New York's source water assessment process are summarized below.

### 1. Gather Existing Information on the Source of Public Water

The DOH will work with County Health Departments, the Department of Environmental Conservation and other local entities to collect the information that already exists for a source of public water. The information will be put into a Geographic Information System (GIS), a computer program that organizes information and displays it on a map. In areas that can provide local support and/or already have assessments or protection efforts underway, the DOH's assessment will complement the ongoing work.

### 2. Determine the Area of Land that Contributes Water to the Source of Public Water

Sources of public drinking water include surface water bodies (e.g., streams, lakes, rivers or reservoirs) and ground water (e.g., wells or springs). The land that contributes to the source of public water is the assessment area. The area of land that contributes water to a surface water body is defined differently than the area of land that contributes water to a well. Some

water sources that supply public water systems have been delineated during previous assessment efforts and the DOH will build on these earlier delineations.

There will be two zones delineated for public water supplies served by wells. These two zones will be the boundaries within which possible contaminant sources will be evaluated. The area immediately surrounding the well is called the Inner Well Zone and the Outer Well is Zone a larger, more broadly delineated area. Defining the area of land that contributes water to a ground water source involves reviewing information about the soil and rock through which water flows. The dimensions of these zones will be determined on the amount of information about the soil and rock in which the well is constructed, as well as the type of water system.

If a source of public water is a surface water body then the assessment area is defined as the topographic boundary of the watershed or sub-watershed. A watershed is a geographical area within which the water drains to a particular river, stream, etc.

### 3. List the Sources of Possible Contamination

The DOH will identify all significant potential sources of contamination located within the Inner and Outer Well Zones or within the watershed boundaries. A potential source of contamination is considered to be significant if there is a possibility that contamination from that source could reach the area where the public water system takes water into its system, and could pose a threat to people who drink the water. Whether a source of possible contamination is considered significant will vary, depending on several factors. Some of the significant potential sources of contamination that will be evaluated as part of the source water assessment process include:

- sewage treatment plants;
- facilities that store or handle large quantities of chemicals;
- petroleum and hazardous material spills; and
- landfills.

Additionally, information about the ways the land is used in an assessment area will be included in this inventory. Fifteen different types of land use will be evaluated in the assessment process; some examples of land cover types are:

- residential;
- pasture;
- forested; and
- commercial.

For both the individual sources of contamination and different land use categories, the DOH will determine where the sources of contamination exist, as well as the type of contamination likely to be associated with that source or land use. Specific chemicals and other types of contamination (such as viruses and sediment) have been grouped into fourteen different

categories. The categories are based on similar properties of the contaminant, common origins, or if the contaminants have similar impact on the source of public drinking water. A rating system was developed to determine the likelihood that a specific type of land cover will contribute to the contamination of a source of water with a specific contaminant. Each type of land cover has been combined with each contaminant category and has been given a rating of "high", "medium", "low" or "negligible". Each category of individual contaminant sources when combined with each contaminant category has been given a rating of "possible" or "not possible". Land uses and contaminant categories rated as "high" or "medium" are of greatest concern. Individual contaminant sources which are rated "possible" are of greatest concern. This information is used in the next phase of the assessment which is to determine how susceptible a source of water is to contamination.

4. **Determine How Susceptible the Source of Public Water is to Contamination**

Once the contaminants of concern have been identified and prioritized for a source water assessment area, the DOH will evaluate the likelihood that the source(s) of contamination will affect the public drinking water supply. This will be done by evaluating information about the source water relative to possible sources of contamination. The DOH will determine which source(s) of contamination pose the greatest threat to the source of public water.

This phase of the assessment process will also include a quality check called the Susceptibility Review/Refinement. The results of this assessment quality check, any changes that were made and why they were made will be discussed in this section.

5. **Public Availability of the Assessments**

Once an assessment has been completed it will be made available to the public. At a minimum, the assessments will be available from the state and local health departments. Where there is interest, the assessments may be made available through other sources, such as local libraries or municipal offices. In addition, a Public Summary of the Source Water Assessment may be created for certain community water systems, such as all municipal public water systems and those systems determined to have a high susceptibility to source water contamination. These summaries can be more widely distributed if there is a particular local interest. The assessments are expected to be completed in 2002 and 2003.

## 1.0 Introduction

### 1.1 Program Background

Congress, in the 1996 Amendments to the Safe Drinking Water Act, placed an emphasis on the protection of surface and ground water sources used for public drinking water. To obtain the authority created in the Act to reduce monitoring, states must develop a Source Water Assessment Program and complete assessments of public drinking water sources and make these assessments available to the public. In New York State, the Source Water Assessment Program is being developed and implemented by the New York State Department of Health (DOH) with input from other government agencies and private and public interest groups.

### 1.2 Program Demographics

In New York State, there are 10,758 public water systems of which over 9,000 have their own sources of water. A water system which provides piped water to the public for human consumption is considered a public water system if it has at least five service connections or regularly serves an average of at least 25 individuals daily for at least 60 days out of the year. These 9,000 public water systems are served by approximately 14,000 sources of water in New York State. The source waters serving a public water system may consist of ground water, surface water, or a combination of both ground and surface water.

There are several different types of public water systems in New York State: community water systems, non-community water systems, and non-transient non-community water systems. There are 3,418 community water systems in New York State. A community water system is a public water system which serves at least five service connections used by year-round residents or regularly serves at least 25 year-round residents. Community water systems include: municipal water systems (1,195 systems in New York State); investor owned water companies which serve residential populations (357 systems); county authorities and major wholesalers (8 systems); and mobile home parks, apartment complexes and permanent residential institutions such as nursing homes (1,735 systems). It is estimated that 87 percent of the population of New York State is served by approximately 151 community water systems.

There are 6,584 non-community water systems in New York State. These non-community systems are further divided into whether they serve regular (non-transient) or variable (transient) consumers. A non-transient non-community water system (e.g., schools, commercial/industrial facilities) maintains its own drinking water sources and regularly serves at least 25 of the same people, four or more hours per day, for four or more days per week for 26 or more weeks per year. There are 756 non-transient non-community water systems in New York State. All other types of non-community water systems are transient, non-community water systems (e.g., restaurants, motels). There are 5,828 such systems in New York State that maintain their own source and provide water to transient populations.

In 1974, the New York State Health Department was granted authority for implementation of the Public Water System Supervision Program established in the 1974 Federal Safe Drinking Water Act. While being centrally administered, the regulatory oversight of the public water supply program in New York State is provided through 45 local health departments (36 county health departments and 9 state district offices; see Appendix A), located throughout the state. Under the Safe Drinking Water Act and its amendments, national limits on contaminant levels in drinking water have been established to ensure that public drinking water is safe for human consumption. In New York State, drinking water standards are established in 10 NYCRR Section 5-1, State Sanitary Code.

The requirements of the 1996 Safe Drinking Water Act Amendments to complete assessments of source waters serving public water systems applies only to those public water systems which meet the federal definition of a public water system. The federal definition of a public water system, from the Safe Drinking Water Act, is any system that has 15 service connections or regularly serves at least 25 individuals. New York regulates a number of smaller systems which do not meet this definition. The distinction between the state and federal definition of a public water system primarily exists for community water systems which have between 5 and 15 service connections and serve between 15 and 25 individuals. Therefore, formal source water assessments need not be completed for approximately 400 community water systems which meet the New York State public water supply definition, but not the federal definition. These small systems will continue to be assessed through sanitary surveys, which can also identify significant source contaminant threats. Assessments will be completed for all public water systems which meet the federal definition of a public water system, including community water systems (both municipal and non-municipal), transient non-community water systems and non-transient, non-community water systems.

Under federal regulations, transient (e.g., restaurants, motels) non-community water systems are not subject to the Maximum Contaminant Level (MCL) requirement for contaminants with chronic health concerns. However, under New York State regulations, all public water systems are required to meet maximum contaminant levels, including most of those with chronic health concerns. Monitoring by transient, non-community systems for these contaminants is only required at State discretion, that is, where the State believes a contaminant is likely to be present.

### 1.3 Program Goals and Outcomes

The goal of the Source Water Assessment Program is to complete assessments of the source waters serving New York's public drinking water systems and to make the assessment information available to the public. There are approximately 14,000 raw water sources serving the State's public water systems. Each source water assessment will delineate the boundaries of the assessment area(s), identify significant potential sources of contamination within the assessment area, and assess the susceptibility of the public water system(s) to contamination within the assessment area. Once the Source Water Assessments are complete, information from the assessments will be made available to the public.

This program is not a source water protection program, rather it is a program to compile and organize information in order to make more informed decisions regarding source water evaluation

and the delivery of safe public drinking water. The Source Water Assessment Program does not impose any new mandates or regulations for protecting sources of public drinking water. However, information from completed source water assessments may be used to direct local and state protection efforts and oversight of public drinking water systems. The completed assessments will provide a rational basis for future source water protection activities.

### 1.4 Program Funding

A Drinking Water State Revolving Fund was created in 1996 as a result of New York State's enactment of Chapter 413 of the Laws of 1996 (Clean Water/Clean Air Bond Act) and the passage of the 1996 Amendments to the Safe Drinking Water Act. The Drinking Water State Revolving Fund provides a significant financial incentive for public and private drinking water systems to finance needed infrastructure improvements (e.g., treatment plants, distribution mains, storage facilities). The Drinking Water State Revolving Fund receives funds from federal Safe Drinking Water Act Capitalization Grants and the State's Clean Water/Clean Air Bond Act.

The 1996 Amendments to the Safe Drinking Water Act also authorized the States to take up to 10% of the federal Capitalization Grant for federal fiscal year 1997 to complete assessments of source water areas that serve public water systems. Funding for the Source Water Assessment Program was only available in federal fiscal year 1997, but the monies can be spent over four federal fiscal years. In the *Final Intended Use Plan - Drinking Water State Revolving Fund* dated October 22, 1997, the State proposed to set aside the maximum amount of 10% of the total annual federal Capitalization Grant for federal fiscal year 1997 (\$5,916,770) to develop and implement the Source Water Assessment Program. A work plan describing the DOH's intended objectives and expenditures totaling \$1,540,620 for the first year of the Source Water Assessment Program (federal fiscal year 1998) was approved by the EPA in May 1998. A work plan describing the objectives and expenditures totaling \$1,580,895 was developed for the second year of the program (federal fiscal year 1999) and was approved in July 1999 by the EPA as part of the State's Drinking Water State Revolving Fund Capitalization Grant request for FFY'99 funding. The State has estimated the following expenditures for the remaining two years: \$1,600,000 (federal fiscal year 2000) and \$1,100,000 (federal fiscal year 2001). Work plans and budgets for these funds will be developed annually.

### 2.0 Source Water Assessment Program Development Process

This Source Water Assessment Program plan was developed using the *State Source Water Assessment and Protection Programs - Final Guidance* published by the EPA in August 1997. As discussed in Section 2.2, the DOH conducted an extensive outreach effort to gather input for the plan's development. Prior to disseminating a draft plan to the public, a working draft of this document was submitted to the Source Water Protection Coordinating Committee (the Citizen Advisory Committee established by the DOH) and its various technical Working Groups, the DOH and local health unit staff for review and comment. Additional input is being sought at public hearings and in writing during the public comment period. The DOH believes that the process of

involving as many parties as possible throughout the state, will result in a plan that serves a variety of purposes, including the improvement of source water protection.

## 2.1 Existing Activities Related to Source Water Assessment and Protection

Many aspects of source water protection have been practiced in New York State for decades. The authority for State promulgated Watershed Rules and Regulations has existed since 1885. Specific protection programs have been developed for numerous ground water and surface water sources across the state, particularly for the sources serving the largest public water systems. Although specific approaches implemented at the local level have varied throughout the century-long history of Watershed Rules and Regulations, virtually all approaches have included the basic concepts of delineation and inventory of potential contaminant sources.

Source water protection has also been provided by numerous environmental quality programs in New York State, implemented primarily by the New York State Department of Environmental Conservation and county health departments. These programs, including both point and non-point source pollution controls (e.g., waste discharges, solid and hazardous waste, bulk storage, pesticides, etc.), are designed to protect both ground and surface waters of New York State on the basis of their classifications and water quality standards. The water quality standards were developed to protect ground water and surface water used as public drinking water sources. Although these environmental quality programs generally address broader geographic areas than the Source Water Assessment Program, they are a key component of source water protection.

Nassau and Suffolk Counties have a long history of ground water management programs beginning with the Nassau-Suffolk Comprehensive Development Plan (1972) which focused primarily on water quantity, but also examined water quality issues such as salt water intrusion and contamination by heavy metals and other toxics. The 208 Plan (1978) was the first comprehensive attempt at water quality management on Long Island. The 208 Plan delineated eight major hydrogeologic zones on Long Island based on ground water flow patterns and determined which areas contribute recharge to the upper glacial and Magothy aquifers which are used as sources of public drinking water. The Long Island Comprehensive Special Groundwater Protection Area Plan (1992) established nine special groundwater protection areas which were deemed critical for the maintenance of good water quality in the upper glacial and Magothy aquifers.

Various levels of source water assessment have also been completed for ground water sources by the New York State Department of Environmental Conservation. The comprehensive New York State Groundwater Management Program recommended key policies and program initiatives endorsing geographic targeting and critical protection areas on Long Island (1986) and Upstate New York (1987). Principal and primary aquifers were defined and mapped through a cooperative program with the United States Geological Survey. These concepts were forerunners of the Safe Drinking Water Act's Wellhead Protection Program which is a pollution prevention program designed to protect ground water sources that are relied upon by public drinking water systems.

The New York State Department of Environmental Conservation was initially responsible for the implementation of New York's Wellhead Protection Program which was approved by the EPA in September 1990. In 1998, New York's Governor Pataki designated the DOH as the state agency responsible for continued implementation of New York's Wellhead Protection Program. Two key components of the Source Water Assessment Program, delineation and potential contaminant source inventory, were addressed for public water systems using ground water by the New York State Wellhead Protection Program. Although many of the municipal community public water supplies in New York State made valuable progress under the Wellhead Protection Program (often with the support of county or regional planning agencies, water authorities, or the New York Rural Water Association), the Wellhead Protection Program did not evaluate water supply susceptibility to contamination or provide for public disclosure of the assessments.

The delineation policies of the Wellhead Protection Program established a "baseline" two zone wellhead protection area for all public water systems (community and non-community) using ground water supplies and allowed broad flexibility for locally-initiated refinements or revisions. The baseline delineation policy emphasized regional aquifer management for wells in unconsolidated aquifers, and fixed radius delineations for bedrock wells. Many of the local community refinements utilized an intermediate fixed radius (e.g., one mile) delineation approach and hydrogeologic modeling has been utilized for certain systems.

Although the basic concepts of the Wellhead Protection Program delineation policy (e.g., multiple zones, emphasis on aquifer assessments) can be used in the Source Water Assessment Program, some revisions are needed to make the program more practical. First, our understanding of the significance of microbial contamination and its migration may necessitate an expansion of the first Wellhead Protection Program zone for many systems. Second, in order to conduct a meaningful evaluation of the susceptibility of wells to contamination, the second Wellhead Protection Program zone (regional aquifer) may have to be narrowed, especially where such aquifers may extend for many miles. Finally, delineations outside of New York's Primary Aquifers will need to be clarified because the available aquifer maps are not of sufficient scale or accuracy to support reasonable contaminant source inventories or to provide for public disclosure of the final assessments.

The inventory of potential contaminant sources under the Wellhead Protection Program was undertaken only for selected municipal community water systems, and was generally not completed for non-municipal or non-community water systems (except where they were encompassed within a municipal wellhead protection area). The contaminant source inventories completed for the Wellhead Protection Program were typically more generalized because they were not designed to support the contaminant susceptibility analysis that is a key goal of the Source Water Assessment Program. Although this component of the local Wellhead Protection Program projects will be a useful foundation for the Source Water Assessment Program, the Source Water Assessment Program will need to better focus the contaminant inventories to support susceptibility assessments, and expand the inventories to include all public water systems served by ground water.

In addition to the Wellhead Protection Program, several watershed programs have been established in New York State. These watershed programs are intended to protect surface waters that are used



for sources of public drinking water and detailed delineations and contaminant inventories have been completed. Most notable of these watershed protection programs are those addressing the Croton/Catskill/Delaware Reservoirs (New York City), Tomhannock Reservoir (City of Troy), Skaneateles Lake (City of Syracuse), and several other Finger Lakes' sources. Source water assessment and protection activities have also been initiated in some areas by New York's County Water Quality Coordinating Committees, Environmental Management Councils, and county health departments.

The DOH has, over the years, worked with many other programs as well as several state and federal agencies toward protecting drinking water sources. The DOH has actively participated on numerous committees, emphasizing the importance of considering those contaminants which may pose health threats when present in drinking water. The committees include the statewide Non-point Source Coordinating Committee and the New York State Soil and Water Conservation Committee. The Non-point Source Coordinating Committee focuses on coordination among state and local agencies and institutions to improve the management of non-point sources for watershed and aquifer protection. The New York State Soil and Water Conservation Committee developed the *Guide to Agricultural Environmental Management*. Agricultural Environmental Management is a voluntary program which assists farmers in evaluating their farming practices, especially those which may negatively affect drinking water sources. Once identified, Best Management Practices can then be implemented, specifically those which are beneficial for source water protection.

The Upper Susquehanna River Coalition, in conjunction with the Water Resources Institute of Cornell University, initiated a pilot project in the Upper Susquehanna River Basin to conduct source water assessments of several public drinking water systems. The pilot project which was completed in August 1998, included areas both within New York and Pennsylvania. As part of this pilot project, source water assessments were completed in four study areas: Pierce Creek in Binghamton (Broome County, New York); Village of Afton (Chenango County, New York); Ouleout Creek Watershed (Delaware County, New York); and that portion of the river basin known as Great Bend which passes through Susquehanna and Tioga Counties (Pennsylvania). The goal of this pilot project was to implement an integrated watershed management program for the Upper Susquehanna River Basin based on New York's Source Water Assessment Program. The outcome of this pilot project included a one day workshop on August 25, 1998. The workshop included presentations on the results of the source water assessment efforts and integrated the federal, state and local perspectives related to conducting source water assessments.

## 2.2 Public Participation

The DOH developed an aggressive public participation plan to fully involve the public in the development and implementation of the Source Water Assessment Program plan. The public participation plan (Appendix B) exceeds the requirements of both the Safe Drinking Water Act and the EPA's *State Source Water Assessment and Protection Programs - Final Guidance*. Many elements of the public participation plan are quite innovative. For example, the DOH held focus group meetings, a satellite broadcast and worked with the New York State Department of Environmental Conservation and the New York State Soil Conservation Committee to provide funding for County Water Quality Coordinating Committees (local organizations) to hold public

meetings to discuss the Source Water Assessment Program and how it can be integrated into existing programs and local water quality strategy plans. The DOH also established a statewide citizen advisory committee called the Source Water Protection Coordinating Committee. The Committee formed five technical and advisory working groups to provide the DOH with ideas, suggestions and comments on specific aspects of the methodology for conducting assessments and making them available to the public. These and other aspects of the public participation effort for the Source Water Assessment Program are summarized below.

The Source Water Assessment Program public participation effort began in November 1997, with two focus group meetings held in Albany and Ithaca (New York). Each meeting followed a similar format and was attended by individuals representing various interests, such as public health, agriculture, business, local government, state and federal government and public water suppliers. The purpose of the focus group meetings was to provide the DOH with guidance on: who would use the assessments; how the assessments would be used; how the State should reach different constituencies; and what the conflicting wants and needs were within and between constituencies. Approximately 60 individuals attended the focus group meetings.

In January 1998, the State convened the Source Water Protection Coordinating Committee. The initial goal of this statewide citizen advisory committee was to provide the DOH with advice and guidance on developing the Source Water Assessment Program Plan. After the plan is complete, the committee will provide feedback on the technical guidance documents that will be developed for implementation of the Source Water Assessment Program. The Committee has a broad membership similar to the focus group attendees and meets quarterly. A listing of the Committee's members is included in Appendix C. The Committee first met on January 12, 1998 and has also met on April 1, 1998, June 10, 1998, September 28, 1998, December 10, 1998, June 8, 1999, and September 8, 1999.

At the first Source Water Protection Coordinating Committee meeting, five subcommittees, called working groups, were established to address the following aspects of the Source Water Assessment Program: Delineation Issues, Contaminant Inventory/Significance, Public Participation/Assessment Format, Geographic Information Systems/Data Collection, and Aquifer/Watershed and Inter-jurisdictional Issues. The working groups were tasked with advising the DOH on technical issues and development of the Source Water Assessment Program plan. The working groups have convened a total of 28 meetings and the main sections of this plan are based on discussions and guidance provided to the DOH by the working groups. A listing of working group participants is included in Appendix C.

On June 16, 1998, Cornell University sponsored a video teleconference on the Source Water Assessment Program that was broadcast via satellite to approximately 50 downlink sites. Most of the downlink sites were in New York State; however, some were in other states and at EPA headquarters in Washington, D.C. The purpose of the video conference was to provide local entities with the following information: a description of the Source Water Assessment Program; how the DOH will conduct source water assessments; a historical perspective on past and on-going source water assessment efforts; and an overview of the Source Water Assessment Program's past, present, and future public participation efforts. A video tape of the satellite conference is available for viewing by interested parties.

The DOH publicized the video conference with the help of New York's County Water Quality Coordinating Committees. The County Water Quality Coordinating Committees were asked to sponsor downlink sites and hold public meetings in conjunction with the satellite broadcast. The committees were also asked to provide the DOH with feedback from the participants on the Source Water Assessment Program. The DOH has estimated that approximately 1,000 individuals viewed the satellite broadcast in conjunction with a public meeting to discuss elements of New York's Source Water Assessment Program.

In September 1998, the DOH held regional workshops in five areas of New York State (Albany, Lake Placid, Long Island, Syracuse, Batavia). The purpose of these workshops was to ask the interested public for guidance on specific issues in the plan that needed to be resolved. The plan was revised based on the feedback received during the regional workshops and the September 28, 1998 meeting of the Source Water Protection Coordinating Committee.

The draft plan was distributed for public comment. The public comment period was from November 10 until December 18, 1998. During that time, three public hearings were held, one each in Albany, Rochester and Long Island. Public comments received during the comment period and at the public hearings are included in a responsiveness summary (Appendix H) in this plan. The revised plan will be distributed to all commentors and involved parties. After EPA approval, the final plan will be redistributed to all interested parties and made widely available to the public.

The New York Rural Water Association received an EPA Source Water Assessment Program public participation grant. As part of the grant, the New York Rural Water Association conducted five seminars in November 1998 for small water suppliers, local government officials and educators. The goal of these seminars was to provide these groups with detailed information about the Source Water Assessment Program and encourage the attendees to make comments and suggestions on the draft Source Water Assessment Program plan. The New York Rural Water Association worked closely with the DOH to coordinate these seminars with other program-related public participation activities.

### 2.3 Data Collection During Plan Development

The DOH plans to use reasonably available information for completing assessments. This will be accomplished primarily by establishing a geographic information system (GIS). Much of the data needed to complete assessments is available in a variety of formats and in many locations across the state. In developing the methodology for conducting assessments, DOH has identified some GIS data coverages (Table 1) which provide at least an introductory level of information for the whole state. Knowledge of what information is readily available helped to drive the contaminant inventory planning. For example, the EPA Region II Land Cover Data Set (covering New Jersey and New York) has recently become available. This gives land use information on the basis of 30 meter pixels, or colored squares on the map. Previously available data was not fine enough to be helpful when determining what types of non-point source contamination might be present. With this data we can estimate what types of contamination may reach an intake based on land use.

The largest amount of data associated with contaminant source identification is available through the New York State Department of Environmental Conservation. The DOH is actively working with the Department of Environmental Conservation to make additional source water assessment data available and to improve the quality of the existing data. A list of data coverages helpful in

conducting assessments is included as Table 1. This list is the starting point of data compilation and should not be considered complete. The extent of data across the state is not uniform and some of the data needs to be corrected to improve accuracy. Statewide coverages will be supplemented by local data sets where available. While some locally available data sets have been identified, others will be identified during implementation of the Source Water Assessment Program.

One resource for data acquisition and distribution is the New York State GIS Data Sharing Cooperative. The DOH is a member of this data sharing cooperative and will be able to use any available GIS data to maximize the quality of assessment information. Other members include state and federal agencies, counties, and localities, as well as the state of Vermont. GIS data generated by the DOH will be made available to other members of the cooperative.

## 3.0 New York State's Approach to Source Water Assessments

### 3.1 Source Water Assessment Objectives

The EPA's *State Source Water Assessment and Protection Programs Guidance* acknowledges that states may vary assessment efforts based on the objectives set for particular water systems. For example, a state may target some systems for comprehensive protection activities while other systems may be targeted for more focused protection from specific contaminants (e.g., microbial) or situations (e.g., spills). Further, states may target certain systems for alternative monitoring or for maintaining filtration avoidance, and may conduct different levels of assessments for these types of systems. Described below are three overall program objectives, any of which may apply at a particular public water system.

**Objective:** During the initial assessment determine whether a sophisticated source-specific protection program is needed, taking into consideration whether a protection program already exists or is being formed.

- Efforts will consider the major issue(s) of both the assessment and the local program(s), the level of detail of information (e.g., mapping scale) and roles of all participants. The assessment methodology detailed in Section 4.5 discusses how these factors will be incorporated into the assessment process.

**Objective:** Contribute to the protection and benefit of source waters through greater public water system operator awareness of contaminant threats (possibly in conjunction with an ancillary effort to provide technical assistance on Best Management Practices) and increased recognition by local governments of the potential threats to drinking water sources.

- Based on the extent and nature of past, locally-driven source water protection efforts, and the overwhelming numbers of small, privately owned drinking water systems, it is likely that most public water systems will not become actively involved in sophisticated source water protection programs such as described in Chapter 3 of the EPA's *State Source Water Assessment and Protection Programs Guidance*. Most water systems are ancillary to the primary business of the operator (e.g., mobile home park, restaurant) and the lack of management capacity of these supplies makes sophisticated protection programs impractical.

The remoteness of many systems (these businesses would not have their own source if they were located in developed areas) lessens the need for a sophisticated protection program.

**Objective:** Increase assessment information for critical drinking water program decisions, especially regarding future regulations.

- The efforts of the EPA, the states and other stakeholders, accentuated by the intent of Congress in the 1996 reauthorization of the Safe Drinking Water Act to base drinking water regulations on public health priorities, affirm the need for informed regulatory decision-making based on source water assessments. The following paragraphs highlight three examples of how these source water assessments may be used in New York State.
  - ▶ **Monitoring requirements:** The Safe Drinking Water Act legislation allows states to use source water assessment information to target monitoring requirements. The Source Water Assessment Program will review the existing vulnerability determinations previously made for a limited number of systems, and will update and refine that information and analysis. The Source Water Assessment Program will also provide a comprehensive review of all systems subject to the monitoring requirements (i.e., community and non-transient non-community water systems), to effectively use the monitoring flexibility allowed by the Safe Drinking Water Act.
  - ▶ **Future Ground Water Rule:** The EPA has discussed the conceptual basis of the Ground Water Rule with states and other stakeholders for the past five years. The EPA's schedule for promulgation of the Ground Water Rule overlaps the implementation of the Source Water Assessment Program. The EPA plans to propose the Ground Water Rule in the Spring of 2000 and have the final Ground Water Rule promulgated by November 2000. The concepts for the Ground Water Rule being discussed by the EPA, center on a determination of ground water source susceptibility to microbiological contamination. The Source Water Assessment Program may provide preliminary information about this susceptibility.
  - ▶ **Interim Enhanced Surface Water Treatment Rule:** In November 1997, the EPA repropose the Interim Enhanced Surface Water Treatment Rule, which included a treatment technique requirement for *Cryptosporidium*, and Stage I of the Disinfection Byproduct Rule. Stage I of the Disinfection Byproduct Rule would lower the maximum contaminant levels for total trihalomethanes from 100 to 80 micrograms per liter (ug/l), set a new maximum contaminant level for total haloacetic acids of 60 ug/l, and set treatment techniques for systems with high levels (over 2.0 ug/l) of total organic carbon. The EPA also requested comments on a schedule for a Long Term Enhanced Surface Water Treatment Rule which may base treatment requirements on the risk of source water contamination to *Cryptosporidium*, and a Stage II Disinfection Byproduct Rule which would set stricter maximum contaminant levels for disinfection byproducts. These rules highlight the need for source water assessments and would help direct the priorities for certain surface water sources. Unfortunately, the evolving nature of this rulemaking activity will affect the Source Water Assessment Program susceptibility determinations, particularly with respect to judging the significance of a potential source of contamination. The Long Term

Enhanced Surface Water Treatment Rule and Stage II Disinfection Byproduct Rule will probably not be promulgated until 2002.

### 3.2 State Strategic Approach to Source Water Assessments

Consistent with EPA's *State Source Water Assessment and Protection Programs Guidance*, New York's approach to source water assessments will be to establish priorities on the basis of factors such as:

- type and extent of threats;
- type, size and management capacity of a public water system; and
- local support for individual source or regional water resource protection.

Resources to determine the level of effort needed to conduct an assessment for each public water system will be apportioned according to these priorities.

New York's approach to the assessments will follow an evaluation process (See Figure 5) that goes through multiple iterations building upon existing information (see Table 3) to narrow the focus of the assessments to major issues related to the protection and benefit of public water systems. The DOH refers to this multi-phase sequential evaluation process as an "iterative priority-based approach." This approach also recognizes the differences among public water systems, their sources and previous assessment efforts. The "iterative priority-based approach" can cost-effectively target Source Water Assessment Program resources, coordinate local protection efforts and provide useful information for all public water systems.

Due to the large number of public water systems for which source water assessments must be created, grouped assessments may be performed to encourage comprehensive resource management within selected watersheds or aquifers. This approach will also lead to a more efficient use of resources. Grouped source water assessments will most likely be performed in areas of high hydraulic sensitivity or where other uniform conditions or situations exist, such as: areas where multiple public water system wells exist close to each other or which draw water from the same remotely recharged aquifer; areas where a strong regional group effort is underway; when there are multiple public water systems with intakes in the same lake; watersheds that contain multiple intakes for public water systems; areas with heavy developmental pressure; and areas where land use is uniform and there is a limited likelihood for potential contaminant sources within the source water assessment area.

#### 3.2.1 Type and Extent of Threats

Existing source water monitoring data can be used to provide an indication of the type and extent of contaminant threats to a public water system, as well as, define susceptibility and quantify the significance of potential sources of contamination. However, threats to source water quality are neither static nor completely predictable based on previous trends and the Source Water Assessment Program will look beyond the present to anticipate potential future source water quality problems. The Source Water Assessment Program will help identify those sources of drinking water that are

unusually susceptible and require more extensive assessment, protection and/or drinking water regulatory control on the basis of the following priorities:

- Existing Contamination Problems - Source waters with documented drinking water quality problems (e.g., elevated nitrates) will be given the highest priority and will be addressed first.
- Naturally Sensitive Hydrologic Regime - Source waters which are determined to be naturally susceptible to contamination because of the hydrologic setting will also be given priority under the Source Water Assessment Program (e.g., shallow alluvial wells which are susceptible to microbiological contaminants and volatile organic compounds).
- Potential Land Use Coverage - The Source Water Assessment Program will consider dynamic conditions such as changes in land or chemical use and alterations of hydrologic conditions (e.g., increased pumping of an aquifer). Areas that are experiencing or most probably will experience development pressures or other changes in contaminant generation will also be considered under this priority.
- Potential for Surface Water Contaminants - Surface waters tend to be most susceptible to microbiological contaminants such as *Cryptosporidium* and contaminants which directly or indirectly result in the formation of disinfection byproducts (total organic carbon and phosphorus).

### 3.2.2 Type and Size of System

As noted in the EPA guidance, the Source Water Assessment Program can employ different assessment approaches for each of the three regulatory classifications of public water systems: community, non-community, and transient non-community (see Section 1.2). The methodology that will be used to perform a source water assessment for public water systems will not vary except with regard to the type of delineation that is conducted (see Section 4.2). The delineation approach utilized will be determined by the type of public water system.

The Source Water Assessment Program will consider differences in the type and size of public water systems for establishing priorities for completing assessments. The type, size and management capacity of a public water system will be a factor with regard to the availability of existing information. The level of detail in an assessment of a larger public water system will most likely be greater than that for a small public water system. Typically, public drinking water sources which serve large populations have been given greater attention by the State and have received more resources for assessment and protection activities. Additionally, the public health significance of possible adverse impacts to a public water system is determined, in part, by the type and size of the water system. More detailed assessments may be completed for public water systems serving larger populations due to the significance of identifying possible health risks within the source water assessment area.

### 3.2.3 Local Support

In many locations, wellhead and watershed protection efforts are underway. Support for these local and regional source water efforts will be evaluated and, where possible, the DOH will coordinate source water assessments with these ongoing programs. In some cases, public water systems in these areas will have a more detailed assessment. Areas with assessment or protection efforts underway will be given a higher priority for detailed assessments because federal, state and county agencies, and local entities (e.g., local government, volunteer groups) may provide resources and/or assistance to make a more detailed assessment possible.

### 3.2.4 Setting Priorities

The "iterative, priority-based" approach to assessments will consider the factors discussed in Section 3.2 (i.e., type and extent of threats; system size, type, and management capacity; and local support for individual source or regional protection) to focus on the major issue(s) of probable contamination for a particular public drinking water source.

As noted in the previous discussion on the interaction with the drinking water regulatory program, decisions often need to be made with less than ideally complete information. Professional judgment and experience can help compensate for scientific uncertainty. The advantage that the comprehensive statewide Source Water Assessment Program will have over some isolated assessment efforts will be the perspective gained through the systematic accumulation and organization of available information. This knowledge-based approach could outline general priorities for systems in the state. It would also suggest an order for assessing particular drinking water sources and the relative distribution of the Source Water Assessment Program resources. This approach is detailed in Section 4.5, Methodology for Completing Assessments.

Assessments of ground water sources will consider potential sources of microbiological contamination as a priority. Current and pending regulations requiring ground water disinfection reflect the concern about the risk from microbial pathogens. Ground water sources are, however, generally afforded greater protection from microbiological contamination than are surface water sources. Filtering and adsorptive characteristics of the soil, as well as longer travel times due to slower-flowing ground water, reduce the transport of viable pathogens.

New York's diverse geology results in an assortment of wells with differing degrees of surface water influence. At one end of the spectrum are the ground water sources determined to be under the direct influence of surface water. These sources are the most sensitive to microbiological contamination, including protozoan contamination. Therefore, assessments for these sources will consider potential sources of *Cryptosporidium*, *Giardia*, bacteria, and viruses as a priority. As surface water influence becomes less likely and there is more opportunity for natural filtration, the likelihood of microbiological contamination of the ground water decreases. As a result, assessments of ground water sources will differ in how high a priority they give microbiological contaminants and their potential sources.

Priorities for specific assessments of ground water sources for community water systems are described in Section 4.2.2. The source water areas for community water systems are primarily contained within the county's jurisdiction. For transient non-community water systems, the major

issue will be Ground Water Rule susceptibility determinations. Transient non-community water systems that already disinfect would probably have the lowest overall priority because these assessments are least likely to yield results of public health significance.

Source Water Assessments for surface water sources will focus primarily on microbiological contamination. *Cryptosporidium* will be the central contaminant of concern, because of its severe health ramifications (particularly for immunocompromised populations), the difficulty in effectively treating water contaminated with *Cryptosporidium*, and its persistence in the environment. Although much remains to be learned about the sources and behavior of *Cryptosporidium* in the environment, the greatest concern would be given to rivers with direct sewage discharges located within short travel times of public drinking water system intakes. The next ranking of risk would be assigned to large multi-use lakes. The least concern would be for lakes and reservoirs free of wastewater discharges and manure runoff.

Another major issue which will be used to rank surface water risk is the likelihood that sources of contaminants will reach source waters as disinfection byproduct precursors. Ranking of sources will include those water systems which have disinfection byproducts above the proposed Stage I and II maximum contaminant levels and those on the Priority Waters List because of excessive nutrient levels. In addition, surface water risk will also be ranked based on the presence of detectable chemical contaminants, including sources where intermittent low-levels of pesticides have been detected.

The priorities given to microbiological contaminants and disinfection byproduct precursors in surface water supplies will not necessarily preclude consideration of other contaminants in assessments of surface water sources. Assessments will also give priority to contaminants that have been detected in the supply, or contaminants with significant potential sources in the assessment area. For example, recent monitoring in New York State has detected pesticides in surface runoff from some agricultural lands at the beginning of the growing season. Based on these findings, surface water assessments will give pesticides and herbicides a high priority when assessment areas include significant cropland cover.

#### 4.0 New York's Approach for Conducting Assessments and Reporting Results

The EPA's Guidance on *State Source Water Assessment and Protection Programs* describes three elements which must be included in a source water assessment for a public water system: a delineation of the source water assessment area; an inventory of significant potential sources of contamination within the delineated area; and a determination of the susceptibility of the public water system to the potential contaminant sources that were inventoried. In performing these tasks, states are charged with collecting all reasonably available information for delineations and utilizing this information to the extent practical for completing the contaminant inventory. Once these elements of the source water assessment are complete, states must evaluate the potential for water systems to draw water that contains contaminants at levels which could pose a public health concern. States are also required to involve the public in the development of their Source Water Assessment Program plan and make the results of completed source water assessments available to the public.

Previous sections of this plan present information on the program background, public participation, plan development, and New York's overall approach to meet the goals set forth in the EPA's

guidance document. The purpose of this section of the plan is to present New York's approach for collecting available information, executing the three technical program requirements (delineation, contaminant inventory, and susceptibility determination), and presenting source water assessment results to the public.

#### 4.1 Data and Information Collection

Information that will be used to conduct source water assessments includes: public water system data; natural source water characteristics; source water locations; delineation history; contaminant inventory; regulatory issues; source water protection; and additional information that will be determined during refinement of the susceptibility analysis. The types of data needed to conduct source water assessments are presented in Table 2. Some of the data categories have an asterisk next to them because these pieces of information are considered essential for completing initial source water assessments. The significance of these data types to the assessment process are being further evaluated by the DOH through several pilot projects. Additional data categories may be added or removed from Table 2 as determinations about the most critical data for completing assessments are made.

Available information for the source water assessments can come from many sources. The DOH is planning to work, or in some cases has already started working, with other State agencies and local entities to gather available information. The DOH is aware that at the watershed, county and town level, assessment efforts in many locations have been completed or are underway. The DOH will establish a local point person to coordinate data collection from local sources of information, including public water systems. The coordinator may represent a county or watershed organization. Involvement of local representatives in the collection of data is critical for the completion of accurate and representative source water assessments. The DOH will work with each County and District Health Department to determine the unique factors that need to be considered when collecting the available information for each county's source waters.

The level of accuracy and completeness of the data will vary because of its many sources. To compensate for this, metadata will be attached to the dataset to note the quality of the data used for the assessment. Metadata is information on where the data came from so that the user can determine how useful it is for a particular project. The DOH will review the quality of data compilation used in assessments for various source waters around the state to ensure consistency and high quality. Depending on the issues which may arise, minor changes may be needed in the way the data is used.

##### 4.1.1 Collecting Available Information on Public Water Systems

The amount and level of detail of the available information will vary for each assessment. This will affect the level of detail that will be completed for an assessment. Initial assessments will be based on available data, and will follow the methodology outlined in Section 4.5 of this plan. At the core of the available information is data from sanitary surveys, vulnerability assessments and public water systems. Sanitary surveys and vulnerability assessments are performed by either the County or District Health Departments.

- Sanitary Surveys - The purpose of a sanitary survey is to evaluate and document the capabilities of a public water system to continually provide safe drinking water and

identify any deficiencies related to operation of a particular public water system. The surveys are conducted by County or District Health Departments and include a review of the source water and the presence of activities in the source water area that could adversely affect the drinking water supply. Other aspects of the survey include evaluations of the intake construction, water treatment operation, and the water distribution system. The surveys are an ongoing field review of significant, basic assessment information. Copies of surveys are kept on file in local health departments and key aspects of the surveys are entered into the DOH's Safewater Database. This database is maintained by local health units and the DOH. Some of the information entered into the Safewater Database is reported to the EPA. Some sanitary surveys emphasize a system's source water while others may contain very little detail about the source water. As the DOH moves towards utilizing the EPA's State Safe Drinking Water Information System (SDWIS) database, sanitary survey information will be more readily available.

- Vulnerability Assessments - A vulnerability assessment evaluates factors which could contribute to the contamination of a public water supply by chemicals. A vulnerability assessment is performed by the County or District Health Department in order to determine the monitoring frequency required for a public water system. Vulnerability assessments are performed on systems that have 3,300 or fewer customers. The methodology for conducting a vulnerability assessment for volatile organic chemicals is presented in Appendix D (Technical Reference PWS-72).
- Public Water System Data - Every public water supply is required to monitor for certain contaminants. This monitoring data will be used in the assessments. Additionally, some water sources have had delineations completed under a watershed initiative or the State's Wellhead Protection Program. In such cases, this information will be used when conducting the assessments. To ensure that there are no omissions or errors, the DOH will provide public water suppliers with an opportunity to review assessments of their system(s) before they are finalized.

Information from the sanitary surveys, vulnerability assessments (where applicable), and the public water system are considered the minimum amount of information necessary to conduct a source water assessment. If this information is not complete, the DOH will work with County and District Health Departments to acquire information about the public water system and source waters.

#### 4.1.2 Collecting Available Information from Other Data Sources

The DOH will be trying to use data that has been collected for purposes other than analyzing a public water supply. For example, the assessments will try to utilize available statewide data which include: land use data; discrete potential contaminant sources; details shown on digitized aerial photographs (i.e., digital orthophotos); topography of the watershed; hydrography information; observed contaminants at the water source; and census data. The DOH will be responsible for collecting and analyzing those databases that are maintained at the State level and which will be useful in conducting assessments.

In some parts of the state, detailed information such as tax map information has been collected which would allow for more accurate assessments. When these information sources are believed to be reliable, they will be used in addition to or instead of the statewide coverages. In cases where there is uncertainty about the reliability of smaller scale data, the statewide coverages would be used. In the event that there is disagreement between the entities involved with the assessment process, the DOH will determine which data sets are appropriate to use.

In some counties, watershed and/or aquifer protection activities may have been initiated for some source waters serving public water systems. Additionally, there may be active County Water Quality Coordinating Committees or other water resource protection groups involved with water quality assessment and/or protection. Information from these existing organizations and efforts may be useful for conducting assessments and the DOH wants to use these resources. However, there is great variation between counties and it would not be efficient to establish one method of collecting local data for the entire state. Throughout the assessment process, the DOH plans to work as needed with local organizations and people who provide information and resources for conducting assessments. These involved parties will have an opportunity to review the assessment before it is finalized to ensure there are no errors or omissions.

Where source water assessments have been completed, for example in the New York City and the City of Syracuse (Skaneateles Lake) watersheds, these assessments will be used to fulfill Source Water Assessment Program requirements. These existing assessments likely exceed the EPA's Source Water Assessment Program requirements for contaminant inventory and susceptibility determinations. Given the extensive state involvement in these protection efforts, the Source Water Assessment Program requirement remaining for these two watersheds would be to assure that the assessment information is made available to the public. However, it should be noted that separate assessments will need to be completed for small public water systems which are nested inside the Skaneateles and New York City watersheds.

The regional aquifer systems on Long Island have been investigated and assessed and many protection and management programs are already in place. The 208 plan (1978) delineated eight major hydrogeologic zones based on ground water flow patterns. Three areas were identified as contributing to the deep recharge of the Magothy aquifer. The Long Island Comprehensive Special Ground Water Protection Area Plan (1992) was a further refinement toward managing the Long Island aquifers in a comprehensive manner with the establishment of Special Groundwater Protection Areas. The 1992 plan made use of geographic information systems to map the locations of contaminant plumes, wells, land use cover, and other information to facilitate the protection of the drinking water supplies. The Source Water Assessment Program will build on these significant efforts by reviewing these assessment efforts for completeness, and will concentrate on further evaluating the contaminant inventory or susceptibility analysis of a particular contaminant group, such as viruses, and facilitating public access to the vast amount of information already collected.

## 4.2 Delineation of Assessment Areas

### 4.2.1 General Approach for Delineation of Source Water Assessment Areas

Consistent with the 1996 Safe Drinking Water Act Amendments, each source water assessment that is completed for a public water system will include the element of delineation. It is important to recognize that the delineated areas will not constitute source water *protection* areas. Since, in many cases, the delineated areas will be based on a minimum amount of available hydrogeological information, the defined assessment areas may not be suitable for establishing a sophisticated source water protection strategy. Rather, the delineated area(s) around any public water supply well(s) or intake(s) will comprise a source water *assessment* area that has been established for the purpose of completing the other required program elements of contaminant inventory and susceptibility analysis. However, consistent with the Source Water Assessment Program principles, the delineations will approximate the source water contributory areas based on reasonably available information. The size and extent of the delineated source water assessment area will vary depending on the source type (i.e., surface water or ground water) among other factors.

For many public water systems, the delineation will be an early step for completing the other required Source Water Assessment Program elements (contaminant inventory and susceptibility). However, in some cases the delineation approach will be determined, in part, by the susceptibility of the public water system to a potential contaminant source. In areas with known source water problems, the accuracy of new delineations will be given special priority. The goals of delineating the boundaries of source water areas are two-fold: (1) define the assessment area for public water systems served by surface waters or ground waters and (2) target the areas that include significant potential contaminant sources that may pose a potential threat to a public water system.

Consistent with the overall guiding principles for New York's Source Water Assessment Program, delineations of assessment areas will maximize use of existing information and emphasize the use of a statewide GIS. Delineations of source water areas completed as part of previous assessment efforts will be reviewed for completeness, and information will be incorporated into source water assessments, as appropriate. GIS-based maps will be developed which identify the boundaries of the source water assessment areas as well as other information (e.g., locations of surface water drainage areas, aquifer recharge areas, public water system intakes and wells, and significant potential contaminant sources) relevant to the source water assessment.

### 4.2.2 Ground Water Delineations

The DOH recognizes that there is a variety of standard and accepted methods used to delineate zones around a ground water supply well and that each of these methods varies in degrees of complexity, cost, and the level of technical expertise necessary for implementation. Furthermore, the extent and availability of existing hydrogeologic information is a significant factor in determining the type of delineation that will be completed. Where sufficient hydrogeological information exists or delineations have already been completed as part of local wellhead assessment and protection efforts, the source water assessment delineation will attempt to maximize the use of this information.

## Previous Assessment Efforts

Prior to completing delineations of source water assessment areas, the DOH will undertake a comprehensive review of reasonably available, existing information to evaluate delineations that have been completed as part of previous assessment efforts for public water systems. New York's Source Water Assessment Program will build upon earlier delineation efforts completed by others including the New York State Department of Environmental Conservation, the United States Geological Survey, local health units, universities, New York Rural Water Association, New York Regional Councils, and others. As a minimum effort, the DOH will review all state and county health department files for well logs and other relevant information. The DOH will also request the same information from public water systems and the other entities listed above. Where appropriate, previous delineation efforts may be expanded or modified. For example, reasonably available information may indicate remote recharge areas for bedrock or confined aquifers, or that an aquifer is under direct influence of surface water.

Wellhead Protection Program: The EPA's *State Source Water Assessment and Protection Programs Guidance* supports continued use of the delineation approach established by the Wellhead Protection Program. The delineation approach established under New York's Wellhead Protection Program recognizes the diversity of geological conditions and aquifer uses across New York State and acknowledges the need for flexibility when selecting ground water delineation approaches to address site-specific conditions. Under the Wellhead Protection Program, the aquifer system on Long Island and bedrock aquifers are treated differently than unconsolidated aquifers elsewhere in New York State.

The delineation approach for the glacial aquifer on Long Island is based on a simplified variable shape, with a radius of 1,500 feet for areas upgradient of a well and a radius of 500 feet for areas downgradient of a well. The delineation approach for the Magothy and Lloyd Aquifers on Long Island is based on the boundaries of the Deep Flow Recharge Area as recognized by the Department of Environmental Conservation and the Suffolk County Sanitary Code.

Upstate, unconsolidated aquifer boundaries have been delineated as part of wellhead protection activities, on a series of maps developed by the United States Geological Survey. These maps serve as the baseline delineation for unconsolidated aquifers in Upstate New York. In some cases, more detailed delineations have been completed. For bedrock aquifers in Upstate New York, the Wellhead Protection Program delineation approach used a fixed radius of 1,500 feet from the wellhead. Chapter 3, "Wellhead Protection Area Delineation", of the 1990 submittal to the EPA on the New York State Wellhead Protection Program is included as Appendix E.

Public Water Supply Permit Program: In New York State, the siting of new public water supply wells must be approved through the New York State Department of Environmental Conservation's Public Water Supply Permit Program. Under this program, specific permit conditions have been developed for the protection of new public water system wells, including the designation of strict protection zones in a delineated area that generally encompasses an area within a minimum radius of 200 feet around the well.

## Ground Water Delineation Approach for Source Water Assessment Areas

As indicated previously, where existing information is reasonably available, it will be used to delineate the source water assessment area for a public water system. However, the DOH anticipates that in many cases, especially for non-community water systems, there will be limited information about the ground water resources serving a public water supply well. Furthermore, assessment efforts are made even more difficult, because both the quantity and quality of information will be highly variable among different public water supply wells and regions of the state. The ground water delineation methodologies set forth in this section attempt to address these difficulties, while producing delineations that are reasonably accurate and useful in attaining the goals the Source Water Assessment Program. When appropriate and practical, additional information will be used to enhance the delineation methodologies described in this section to meet the goals of the Source Water Assessment Program.

The two primary considerations in selecting a delineation methodology are the availability of information and the inherent sensitivity of a well's hydrogeologic setting. If a delineation exists that is considered to be scientifically sound and at least as protective as the delineation approaches described in this document, it will be utilized in the Source Water Assessment Program. When there is sufficient evidence that a well (or a group of wells) is located in a sensitive hydrogeologic setting, such as fractured bedrock, the nature of the source water assessment area delineation will rely heavily on the quantity and quality of the available information and professional judgement. Furthermore, available information may indicate the presence of a confining layer and remote hydraulic recharge. In such cases, professional judgement will be the basis for identifying the probable areas which contribute to remote recharge of the well(s) and for defining the source water assessment areas.

In all instances where there is limited information about the local hydrogeological conditions for public water systems using ground water wells, the delineation approach will be based on the type of public water system. This delineation approach builds upon the minimum delineations completed for wells under New York's Wellhead Protection Program and vulnerability determinations as required under the Safe Drinking Water Act. This approach establishes a base level of information from which future source water assessment and protection efforts can be refined.

For public water supplies served by ground water wells, there will be two delineated zones for source water assessments: an area immediately surrounding the well called the Inner Well Zone and a larger, more broadly delineated area called the Outer Well Zone. Schematics of these delineation zones are depicted in Figure 1. These delineations will be the boundaries within which the inventory of potential contaminant sources are completed. Source water assessment area delineations may be modified to include potentially significant contaminant sources which are located near, but not within, areas defined by the ground water delineation methodologies.

## Community Water Systems and Non-Transient, Non-Community Water Systems

### Inner Well Zone - Calculated Fixed Radius

The delineation for the Inner Well Zone will be consistent with the current approach as outlined in the DOH's Technical Reference 72 (see Appendix D) for determining vulnerability to contamination by volatile organic chemicals. This Technical Reference calculates a radius based on five years' hypothetical pumpage. The pumping rate for a particular well will be estimated based on existing information collected by the DOH's Safewater Database or received from the water supplier. If information about the pumping rate is not available, then the pumping rate will be estimated, consistent with the approach outlined in Technical Reference 72. In all cases, the Inner Well Zone will be assigned a minimum radius of at least 500 feet.

### Outer Well Zone - Modified Arbitrary Fixed Radius

A reasonable estimate of the ground water flow towards a supply well will be made using available information. Once the direction of ground water flow has been estimated, a semicircular area upgradient from the public water supply well(s) will be delineated, using a radius of one mile or existing hydrogeologic barriers (e.g., ground water and/or surface water divides, aquifer boundaries), whichever is smaller. The extent of the upgradient area may be modified should information indicate that there are obvious limits to the probable recharge area. If a reasonable estimate of the ground water flow direction towards a supply well can not be made, then the delineation of the Outer Well Zone will be a fixed radius of up to one mile in all directions around the well.

### (Transient) Non-Community Water Systems

#### Inner Well Zone - Arbitrary Fixed Radius of 500 feet

#### Outer Well Zone - Arbitrary Fixed Radius of 1,500 feet

Delineations of source water areas for springs determined to be solely supplied by ground water, will follow the approach described in Section 4.2.2 for ground water supply wells. However, for springs, any land areas below the spring collection device will be eliminated from the assessment area, unless a remote recharge area has been defined. Delineations for springs influenced by surface water, will follow the approach outlined in Section 4.2.5 for conjunctive delineations.

### 4.2.3 Surface Water Delineations

Topographic watershed boundary delineation is the only methodology widely used to identify land areas which drain to surface waters. While New York will use this method for all of its source water assessments, subdividing the watershed may also be useful for identifying contaminant sources which have the greatest potential to impact particular public water supply intakes. As in the overall



source water assessment effort, the use of existing information and GIS will be emphasized to complete surface water delineations.

### **Previous Assessment Efforts**

Surface water delineations for the Source Water Assessment Program will utilize, to the extent practical, work performed during other surface water assessment efforts in New York State. The state will use the United States Geological Survey watershed Hydrologic Unit Codes and available stream order codes (e.g., reach files), to the extent appropriate, in creating new delineations and in georeferencing and cataloging source water assessment data. New York's Source Water Assessment Program will utilize information from and share information with the EPA's 305(b) and 303(d) water programs. In New York, these programs are administered by the New York State Department of Environmental Conservation. The 305(b) water program has historically been (and often still is) called the Priority Waters List. This list categorizes and describes use impairments of waterbody segments taking into account both the amount and quality of the available information. Recently, water body segments without problems have been included under the 305(b) program in New York State and the Priority Waters List has become a subset of this listing. The 303(d) water program is a list of the priority waters which are targeted for the development of water quality based effluent limits (also called total maximum daily load analysis). Furthermore, the Source Water Assessment Program will utilize delineations made under the EPA's Clean Lakes Program and other regional and local water quality assessment and management efforts.

### **Surface Water Delineation Approach for Source Water Assessment Areas**

Consistent with the guiding principles for the overall Source Water Assessment Program effort, surface water delineations will rely heavily on existing information. Many of the surface waters in New York State with public water system intakes have already had their watersheds delineated. For the purposes of the Source Water Assessment Program, these delineations will be used in digital GIS format, when they are available. Where delineated watershed borders have not yet been digitized, decisions will be made on a case-by-case basis. In some cases, the GIS-based methodology described below may be used to create new delineations. These decisions will be based on the quality of existing watershed maps, the magnitude of the digitizing efforts required, and the availability of state and local resources to perform this task.

All new watershed delineations created under the Source Water Assessment Program will be based on natural topographic boundaries and take into account water diverted into or outside of the natural watershed. In addition to geographic boundaries, time-of-travel determinations from potential contaminant sources to intake structures will be made where appropriate and practical.

A GIS-based Digital Elevation Model will be used to create new delineations of topographic boundaries. These delineations will then be visually checked for accuracy against topographic contours and the accuracy limitations of this methodology will be noted in the final assessment. Where fine-scale delineations are needed, use of more detailed or additional data coverages such as storm sewer maps and field checks will be necessary. As described above, the final methodology choice will be made on a case-by-case basis.

With the exception of the Great Lakes system described below, the entire watershed of surface water sources will be assessed for significant potential sources of contamination. A surface water assessment area may be further delineated into sub-watersheds when it is necessary to effectively conduct the contaminant inventory portion of an assessment or where needed to focus additional susceptibility determination efforts. Figure 2 depicts a delineation of a surface water watershed and sub-watersheds. In the cases of the Great Lakes, St. Lawrence, and Niagara Rivers, a highly detailed contaminant inventory will not be developed for the entire watershed. Instead, the DOH will first review available water quality data for the waterbody as a whole and take note of regional characteristics (e.g., topography). Next, a water-supplier survey will be used to identify local potential impacts on source water quality. This survey will identify intake characteristics (e.g., depth, distance from shore), potential sources of water quality fluctuations (e.g., seasonal fluctuations, nearby rivers), and other potential risks (e.g., nearby ports and shipping lanes). Individual assessment area delineations will be tailored to address the concerns of each particular intake.

A similar approach will be used to focus efforts in other watersheds which extend over wide geographic areas and have long detention times, such as the Finger Lakes. In these cases, sub-watersheds within the overall delineated assessment areas will be ranked into higher and lower priority zones. This will be particularly important when additional delineation efforts will be useful to address fate and transport issues.

### **4.2.4 Assessment Areas Which Extend Beyond State Boundaries**

The DOH will make use of reasonably available information when delineating assessment areas that extend beyond its borders. In general, potential contaminant sources in other states are unlikely to impact source waters in New York because most trans-boundary waters flow away from New York. Numerous studies, agreements, organizations, and commissions exist to facilitate the transfer of information across state and international borders when needed (e.g., National Water Quality Assessments for the Hudson and Delaware Rivers and Lake Erie, Lake Champlain Basin Program, Upper Susquehanna Coalition, International Joint Commission, New England Interstate Water Pollution Control Commission, Delaware River Basin Commission). In many cases, trans-boundary delineations and digital hydrologic unit code borders already exist. In addition, the GIS-based methodology for creating new ground water delineations utilized in the Source Water Assessment Program does not depend on GIS coverage information from bordering states.

### **4.2.5 Conjunctive Delineations**

Delineating the zone of surface water and ground water contribution to a public water system is termed "conjunctive delineation". The concept of conjunctive delineations is important to completing a source water assessment that evaluates all possible contributions of contaminants to a public water system. This concept is particularly significant for ground water under the direct influence of surface water. Where information is reasonably available, New York's Source Water Assessment Program may evaluate ground water under the direct influence of surface water, ground water otherwise influenced by surface water, and surface water influenced by ground water which originates from areas beyond the topographical watershed boundary. The latter case is considered to be of less importance in New York, and surface water under the influence of ground water will

only be evaluated where the available evidence indicates that there is a significant potential for contamination.

Under the Source Water Assessment Program, efforts to complete conjunctive delineations will be prioritized based on whether the public water supply is currently being disinfected, the proximity of a ground water supply source to surface water(s), the local hydrogeological setting, and the presence of potential significant microbial contaminant sources within the source water area. For example, non-disinfected shallow public water system wells, and those wells in certain geological settings, will be a priority, particularly when surface waters are nearby or existing information suggests that surface and ground waters are hydraulically connected.

Under New York's Source Water Assessment Program, detailed conjunctive surface water delineations will only be created where there is strong evidence that ground water sources are being impacted by surface waters. Where surface water influences are only suspected, the potential surface water impact will only be described in the assessment narrative. These conjunctive delineations will include both ground water and surface water components (as described in Sections 4.2.2 and 4.2.3 of this plan, respectively) for all ground water sources that are known or determined to be under the direct influence of surface water. For those ground water sources where surface water influence determinations have not been made by the time their source water assessment is conducted, the potential for surface water influence will be made on a case-by-case basis. For example, in cases where an inner zone ground water assessment area delineation is intersected by surface water, the potential that these drinking water sources are surface influenced will be evaluated.

### 4.3 Contaminant Inventory

Consistent with the federal Source Water Assessment Program guidelines, New York State will complete an inventory of significant potential contaminant sources within the delineated source water assessment areas for each public water system. The approach to this effort will be based on two of New York's guiding principles for the Source Water Assessment Program: maximize use of existing information and emphasize use of a statewide GIS system. The focus of this effort will be to identify possible sources of EPA and New York State contaminants of concern that could enter a public drinking water system and pose a subsequent public health threat.

#### 4.3.1 Contaminants of Concern

The contaminants of concern addressed by source water assessments will include those raw water contaminants regulated under the Safe Drinking Water Act (contaminants with a Maximum Contaminant Level, contaminants regulated under the Surface Water Treatment Rule, and the microorganism *Cryptosporidium*) as well as those which the DOH has determined may present a concern to public health. Among these additional contaminants are organic chemicals and other substances currently regulated by New York State's drinking water regulations and the State's ambient water quality standards and guidance values. These compounds comprise most synthetic contaminants of public health concern that are not currently regulated by the Safe Drinking Water Act.

The inclusion of additional contaminants in an assessment will be determined based on the likelihood that the contaminants will affect the particular source water being assessed. Some

examples of other additional contaminants that may be addressed in certain situations are: radon, microbes likely to be addressed by the Ground Water Rule, contaminants on the EPA's Contaminant Candidate List, and phosphorus.

In most instances, contaminants will be grouped and addressed by category (e.g., pesticides, protozoa, halogenated solvents). This approach avoids burdensome listing of individual contaminants, yet addresses contaminants that are likely to originate from a common land cover or point of origin. In addition, some contaminants have been grouped based on similar fate and transport characteristics. A list of the contaminants considered in each contaminant category is provided in Appendix F. However, some contaminants will be addressed individually, based on unique contaminant characteristics or particular resistance to conventional drinking water treatment techniques.

Assessments will prioritize contaminants of concern. Contaminant prioritization will be based on the existence of potential sources of contamination and the susceptibility of the source water to contaminants. Prioritization will depend on the characteristics of individual or regional source water assessment areas. Statewide, there will be a more general prioritization of contaminants based on whether a source is a ground water or surface water source. This dual approach addresses different contaminants, regulatory concerns and different contaminant transport characteristics.

#### 4.3.2 Significant Potential Sources of Contamination

To identify significant potential sources of contamination, New York's Source Water Assessment Program will use a method which uses information that is readily available, pertains to drinking water quality, and is likely to be used during future protection efforts. Initially, New York will use previously collected information to identify locations of potential sources of contamination. Available mapped coverages include Department of Environmental Conservation permitted facilities (RCIS), Toxic Release Inventory (TRI) facilities, solid waste sites, and bulk storage facilities. Table 1 provides a more complete list of mapped coverages currently available for all of New York State. Completeness and access to several additional statewide coverages (e.g., petroleum and hazardous material spill locations) are also being investigated.

New York will also use land cover information to assess potential sources of contamination that could result primarily in what is referred to as "non-point source pollution." Fourteen land cover categories have been mapped for the entire state by the Department of Environmental Conservation. Land use maps consist of pixels representing areas 30 meters square.

Table 4 summarizes the ratings assigned to each land cover category for each contaminant category. These ratings reflect the potential for a particular contaminant category to occur in ground water associated with the area of a particular land cover. These land cover ratings are intended to reflect where contaminants are generated or enter hydrologic systems. Similarly, Table 5 summarizes the ratings assigned to each land cover category based on the potential for a particular contaminant category to occur in surface water. Tables 4 and 5 assign ratings of "negligible", "low", "medium", or "high" to each of the fifteen land use categories for each of the 14 contaminant categories of concern. These ratings reflect the likelihood that a land cover category will be a source of a particular contaminant category. For example, in Table 4 the likelihood of "high intensity commercial" being a potentially significant source of petroleum products in ground water has been

assigned a rating of "medium/(high)", whereas the likelihood of petroleum products coming from "evergreen forest" has been rated "negligible". On some occasions, as in the previous example, two ratings will be given for a particular land cover and contaminant category. When this is the case, the rating given in parentheses is considered to reflect the worse case scenario. The rating not in parentheses is considered to be the more common situation. These ratings could be refined as more information becomes available. Tables 4 and 5 differ primarily on the basis of the mobility of the contaminant. Sediment and phosphorus, for example, do not move through ground water as easily as through surface water. Therefore, the ground water table (Table 4) has a lower risk rating for these contaminants than the surface water table (Table 5).

In order to account for the presence of septic systems in an assessment area, it has been assumed that homes included in the "low intensity residential" land use category use septic systems to dispose of their sewage. This generalization overestimates septic system usage since there will be occasions when some of the homes in "low intensity residential" areas will be connected to a public sewage collection system. However, during the assessment process if it appears that there is a significant potential for contamination as a result of failing septic systems, an attempt will be made to collect additional information regarding septic system locations and densities.

Tables 6 and 7 assess whether or not each discretely mapped potential source of contamination other than land use, could be a potential source of a particular contaminant category. Discrete contaminant sources have been assigned a rating of "possible" or "not probable" for each contaminant category. Table 6 addresses the potential for ground water contamination, and Table 7 addresses the potential for surface water contamination.

It should be clearly noted that the ratings provided in Tables 4 - 7 do not refer to the susceptibility of water sources to those contaminant groups. Susceptibility determinations must consider other variables, such as the proximity of the source water to the point or non-point sources of contaminants, and the geological and locational characteristics of the ground or surface water source. The ratings provided in the tables are meant to help narrow down and prioritize the contaminants of concern in an assessment area, independent of the sensitivity of the source water to the contaminants. For example, if an assessment area's land use consists entirely of forest and row crops, and the only discretely mapped location found is a petroleum spill, the presence of chlorinated solvents in the assessment area will probably not be a significant issue.

#### 4.4 Susceptibility Analysis

Once the contaminants of concern have been prioritized for an assessment area, the susceptibility of the water supply to those contaminants will be evaluated. The susceptibility analysis will evaluate the potential for the water supply to draw water contaminated by inventoried sources at concentrations that would pose a human health threat. The susceptibility analysis takes into account hydrologic and hydrogeologic factors, intake or well location and integrity, unique characteristics of the contaminants, and characteristics of potential contaminant sources. In addition, the susceptibility analysis takes into account the prevalence of contaminant sources within the assessment area.

#### 4.4.1 Estimating Contaminant Prevalence from Land Cover

Using the matrices provided in Tables 4 and 5, each of the fourteen land cover categories will be assigned a stated rating for each contaminant category. When two ratings are provided for a given land cover contaminant category combination, the worse case scenario (rating in parentheses) will initially be used.

This approach will allow GIS maps to be generated which depict the relative likelihood of contamination from a particular contaminant category based on the mapped land use. For example, when assessing the potential for protozoan contamination of surface water (Table 5), areas that are "pasture" will be mapped as "high", and areas that are "other grasses" and "woody wetlands" will all be mapped as "medium". In this way, a map of the delineated area could be generated showing the distribution and frequency of land cover which pose low, medium, or high potential for protozoan contamination. Carrying this example further, the map could be used to calculate percentages of land cover within the delineated area which pose low, medium, or high potential for protozoan contamination.

The next step in determining the extent to which land use increases the potential for contamination is to rate the land use based on its frequency and location. Table 8 will be used to assign these ratings. Table 8 may need to be adjusted for different contaminant categories based on differing toxicities and/or fate and transport characteristics. Using Table 8, land covers assigned a "medium" potential for contamination and land covers assigned a "high" potential for contamination will be rated based on the amount of that land cover within the assessment area(s) and the hydrologic proximity of the land cover to the water source.

When a delineated area contains both land cover assigned a "medium" potential for contamination and land cover assigned a "high" potential for contamination, the approach described above will produce two ratings. When this is the case, the higher rating of the two will be used to characterize the potential for contamination from the particular contaminant category due to land use in the delineated area.

#### 4.4.2 Estimating Contaminant Prevalence from Discrete Sources

Tables 6 and 7 list the discrete potential sources of contamination that will be considered for all source water assessments. Using Tables 6 and 7, each of the discrete potential sources of contamination will be assigned a rating of "possible" or "not probable" for each contaminant category. This will allow an evaluation by GIS to show the possibility of contamination from a particular contaminant category based on the locations of these mapped potential sources. For example, when assessing the potential for protozoan contamination of a surface water source, wastewater treatment plant discharges would be shown on the map, because they are possible sources of protozoan contamination. Petroleum spill locations, on the other hand, would not be shown on this map, because they are not considered probable sources of protozoan contamination.

Mapped potential sources of contamination will vary significantly with respect to the amount of chemical and microbial contaminants and how well such contaminants are contained and/or controlled. Therefore, the procedure for assessing the risk of contamination from each of these discrete sources will have some flexibility. Technical Reference PWS-72 provides an example for

assessing the risk of contamination for volatile organic chemicals (including halogenated solvents and petroleum products) in watershed and ground water recharge areas. A general rating system is provided in Table 9 which provides room for judgement about characteristics of discrete sources of contamination. Guidance will be developed for distinguishing between minor and major discrete potential sources of each contaminant category with respect to various source water conditions. For example, the significance of a bulk storage facility as a discrete potential source of contamination will differ depending on the size of the water source.

If the contaminant prevalence rating due to land cover differs from the contaminant prevalence rating due to discrete sources for a particular contaminant category, the higher rating will generally be used to make the susceptibility determination. When this approach results in a "high" contaminant prevalence rating for a contaminant category, the assessment will be considered in greater detail to see whether the "high" rating accurately describes conditions in the assessment area.

#### 4.4.3 General Description of Susceptibility Zones

As is described in Section 4.2, Delineation of Assessment Areas, the source water assessment area for ground water systems may be comprised of two delineated zones. The subdivided assessment areas will constitute the different susceptibility zones. Susceptibility Zone 1 will incorporate the more hydrologically significant area, and Susceptibility Zone 2 will incorporate the larger area of contribution. Table 10 provides a general description of what areas constitute Susceptibility Zone 1 and Zone 2 based on source type and delineation. For example, for many wells, the Inner Well Zone (see Section 4.2) generally has a shorter time-of-travel, less opportunity for natural filtration of contaminants, and less dilution. Therefore, the Inner Well Zone will comprise Susceptibility Zone 1, and potential sources of contamination within this zone will be weighed more heavily when evaluating the source's susceptibility. Potential sources of contamination in the Outer Well Zone will be considered, but will be weighed less heavily. This area will constitute Susceptibility Zone 2.

When the assessment area of a surface water source is a single delineated watershed, the entire watershed will constitute Susceptibility Zone 1. When the assessment area of a surface water source includes sub-watersheds within a larger watershed area, Susceptibility Zone 1 will contain subwatersheds near the intake that have shorter travel times and a more immediate influence on the water system. Susceptibility Zone 2 will contain the remainder of the watershed. In the susceptibility analysis, Susceptibility Zone 1 and Susceptibility Zone 2 will be mutually exclusive from one another. That is, when contaminant inventories are being compiled for zone 1, they will not be included in the contaminant inventory for Zone 2, and vice versa.

In certain cases, susceptibility zones will be combined in order to compile a single contaminant inventory for multiple sources in close proximity to each other. In situations where a lake has multiple water intakes, some or all of the intakes may fall within a common assessment zone depending on the size of the lake and its accompanying watershed. In these cases, intakes which lie within the same susceptibility zone may be grouped together for assessment purposes. In an aquifer setting, individual wells may be grouped for a susceptibility analysis if there is substantial overlap in their source water assessment area delineations. In a few instances, Inner Well Zones (Susceptibility Zone 1) will overlap when wells are closely clustered and draw ground water from similar depths in the source aquifer. More frequently, several wells may share a common Outer Well

Zone (Susceptibility Zone 2) consisting of the aquifer recharge boundary, but each well will have distinct inner well zones (Susceptibility Zone 1).

After completing the steps described above, the following pieces of information will have been generated: (1) contaminant categories of significant concern in the delineated area; (2) land uses with the potential to contribute significantly to the identified contaminant categories; (3) discrete potential sources within these identified contaminant categories; and (4) areas that comprise susceptibility Zones 1 and 2, when applicable.

Ground water sources with significant recharge from surface waters will have a conjunctive delineation. This additionally delineated area will be assessed for contaminants of concern believed to persist in water moving through the watershed, streambank (or lake bottom), and/or aquifer, and that could then enter the well. Nitrates, pesticides and microbiological pathogens (protozoa, bacteria, and viruses) are three contaminant categories where this contamination route has been observed. These situations will be evaluated on a case-by-case basis.

#### 4.4.4 Estimating Sensitivity and Susceptibility of the Water Supply

Ground Water Sources: A key component of an accurate susceptibility analysis is determining the sensitivity of the drinking water source to contamination. Ground water sources in unconfined aquifers or conditions of high hydraulic conductivity (e.g., fractured bedrock, karst geology) are likely to provide less of a physical barrier to contamination, and therefore may be more sensitive, than supplies that are in deep, confined aquifers.

Figure 3 provides a general scheme for determining the sensitivity of a ground water source to contamination. Information that is collected during the early stages of the assessment process will be used to support decision making associated with evaluating a public water supply's sensitivity. Along with considering well characteristics, this approach also addresses the situation when little is known about the hydrogeological characteristics of a well area. When this is the case, the source will be assigned the rating of "unknown sensitivity". The category of "unknown sensitivity" has been assigned a priority that will fall between "medium sensitivity" and "high sensitivity".

Based on the sensitivity analysis for ground water systems presented in Figure 3, systems that fall into one of the following three categories will be assigned a "high" sensitivity rating:

- 1) wells in which significant levels of contaminants have been detected;
- 2) wells that draw from fractured bedrock with no overlying lower permeability layer; and
- 3) wells that draw from unconfined aquifers of high hydraulic conductivity.

When carrying out a source water assessment of a ground water source, the sensitivity of the source will be characterized using Figure 3. Another factor that will be considered when evaluating the sensitivity of the source to contamination is the integrity of the well(s). Additional guidance will be developed to supplement Figure 3 for evaluating the sensitivity of ground water sources. This sensitivity rating will be used to estimate the susceptibility of the supply to contamination by applying the matrix presented in Figure 4. Figure 4 weighs the sensitivity of the ground water source against the contaminant prevalence in the source assessment area. The prevalence of different contaminant categories will already have been estimated using Tables 9 and 10, using the method

described in Sections 4.4.1 and 4.4.2. Areas that have a medium or high potential for contamination will be considered for all ground water sources irrespective of their sensitivity rating.

The DOH has determined that the susceptibility of ground water sources with high sensitivity is worth noting, even if contaminant prevalence in the assessment area is minor. Therefore, water sources assigned a "high" sensitivity rating with assessment areas containing "low" contaminant prevalence will be assigned a susceptibility determination of "medium to high". High sensitivity water sources with only negligible contaminant prevalence in the assessment area will not be assigned a susceptibility determination, but will nonetheless be noted due to the high sensitivity of the water source.

**Surface Water Sources:** Surface water sources provide fewer physical barriers from contamination than ground water sources. Surface water sources are protected somewhat by dilution, time of travel, settling, volatilization, and contaminant deterioration due to environmental stresses. Contaminant reduction resulting from some of these natural influences is reflected in the ratings assigned to the different land use types in Table 5. Surface water sources do not, however, share the benefits of filtration and adsorption.

Furthermore, as is described in Section 4.2 (Delineation of Assessment Areas), delineations of surface water assessment areas will be made with the intention of identifying the area most likely to directly influence the water source. As a result, the surface water delineation will usually define a zone of contribution to which the supply is highly sensitive.

Therefore, in most assessments, contaminant prevalence in surface water assessment areas will not be adjusted to reflect the amount of physical protection afforded by the water source. Instead, contaminant prevalence ratings obtained by applying Tables 5, 7, 8 and 9 will be adopted as the susceptibility ratings for surface water sources. These susceptibility ratings may be refined by more detailed, contaminant-specific fate and transport analyses.

**Sensitivity and Susceptibility of Assessment Areas With Conjunctive Zones:** As discussed in Section 4.2, Delineation of Assessment Areas, the evidence for surface water influence on ground water sources can vary. Therefore, the susceptibility analysis will take into account the weight of evidence when evaluating whether a ground water source could be impacted by potential sources of contamination in the conjunctive watershed. For sources with little information, estimating the likelihood of contamination due to land cover will be general, and based on the sum of estimates made for the 11-digit Hydrologic Unit Codes comprising the upgradient watershed. All upgradient State Pollution Discharge Elimination System (SPDES) permitted discharges, however, will be considered as potential sources of pathogens.

Sources that meet the regulatory definition of ground water under the direct influence of surface water will be considered to behave more like surface water. The evaluation of these sources will consider the surface watershed to be the more hydrologically connected zone and will use the ratings provided in Tables 5 and 7 for the initial contaminant inventories and estimates of contaminant prevalence. In these cases, contaminant properties will be considered with respect to ease of transport through soil or water to the water system well, persistence in the environment, and whether contaminants change after being released into the environment. Additional consideration will be given to the characteristics of potential contamination sources, such as the likelihood that

contaminants will be released from the source, the size of the potential contaminant release, and the effectiveness of any pollution prevention measures in place to mitigate the threat.

#### 4.4.5 Susceptibility Review and Refinement

Contaminant prevalence and natural sensitivity of a water source will be combined to determine the potential susceptibility of a drinking water source to a particular contaminant category. A rating will be assigned by the susceptibility matrix as described in Section 4.4.4. At this point in the assessment process, the susceptibility determination will be reviewed to ensure that the objective(s) of the assessment are met. A susceptibility determination will be refined under the following conditions:

1. when contaminant categories rate high in an assessment area;
2. when information is available to allow detailed evaluation of the potential release, fate and transport characteristics of contaminants, and;
3. when refinement would be consistent with the objectives of the assessment.

Using the iterative approach, additional data sets may be used to provide greater detail for the assessment and to refine susceptibility determinations. For example, if an assessment area includes a significant amount of agricultural land, and contaminants that could be of agricultural origin have been detected in the water source (e.g., nitrates, pathogens), then it would be appropriate to use Agricultural Environmental Management data, if available. Agricultural Environmental Management data can provide more detailed information about watershed-wide farm management practices, cropland acreage, and farm animal numbers that could benefit susceptibility refinement. In addition, where pesticides have been detected in large surface watersheds, the pesticide reporting data set can be used to identify areas of greatest concern.

As another example, the "low intensity residential" land cover assumes that the homes contained in this category use septic systems for their waste disposal. Compliance with the future Ground Water Rule may warrant that the DOH take a closer look at sources whose assessment areas contain a substantial amount of "low intensity residential" land cover and which, as a result of the predominance of this land cover in their assessment areas, are determined to be highly susceptible to microbiological contamination. Additional information about septic system location and abundance can be obtained from tax parcel data and census tract information. In such situations, it would be appropriate to consider more detailed information and refine susceptibility determinations.

When a surface water assessment initially yields a high susceptibility determination for a contaminant category, and the assessment area addressed covers a large geographical area, it may be appropriate to refine the susceptibility determination by considering segments of the surface water assessment area more closely. Those geographical portions of the assessment area that are thought to be the origins of most of the contaminant category of concern will be evaluated in greater detail. For example, if the assessment of a river source determines that the source is highly susceptible to phosphorus, and phosphorus contamination in the assessment area most likely originates from one tributary to the river, then the drainage area of that tributary may be evaluated in greater detail to identify potential sources of phosphorus contamination. Existing setback and buffer zone delineations may also be evaluated. This detailed information will help to prioritize protection efforts within the assessment area.

In addition, the iterative approach will utilize a field review process to confirm and refine the data collected (e.g., source data, natural characteristics of the source, location of the source, contaminant inventory, delineations, etc.). As an example, on-going sanitary surveys provide a mechanism to refine and confirm existing data. This will primarily be done when ratings for potential significant sources of contamination are "high".

#### 4.5 Methodology for Completing Assessments

The decision making process associated with the methodology for completing assessments is illustrated in Figure 5. This section describes the steps used to conduct an assessment, as well as indicates where additional information will be used to conduct a more detailed assessment when required. A step by step discussion of the assessment methodology as outlined in Figure 5 is presented below.

**Box A - Collect Available Information:** The DOH is planning to work with State agencies and local entities to gather available information on water sources. The available data is comprised of information from sanitary surveys, vulnerability assessments, public water systems and statewide GIS coverages. The DOH will also work to gather information that has been collected for purposes other than evaluating public water systems, but that may be useful when conducting the assessments. The DOH plans to work with interested parties throughout the assessment process and to avoid errors and omission, those entities that provide data will have an opportunity to review the assessment before it is finalized. Data collection is discussed in detail in Section 4.1.

**Box B - Evaluate System Specifics to Determine Approach:** The purpose of this step in the methodology is for the staff working on the assessment to review the available information to determine if an enhanced (i.e., more detailed) assessment is needed. Determining which source waters warrant a more detailed assessment will be based on discussions between the local involved organizations and the DOH. For the majority of assessments this step is too early in the process to make that determination. Box I (Susceptibility Refinement) of this methodology will be the place where the assessment will be reviewed to determine if an enhanced assessment is needed.

However, in certain situations assessments will be completed in greater detail. These determinations will be based on several criteria. The primary criterion that will be used to determine if an enhanced assessment is warranted, is the presence of source contamination. If contamination of high public health significance is found in the source water(s) then an enhanced assessment will be completed, if necessary. Ongoing contamination from human activities will be weighed more heavily than isolated contamination events or the presence of naturally occurring contaminants.

Secondary criteria that will be considered to support an enhanced assessment are as described below.

- Ground water sources that are hydrogeologically sensitive may be considered for enhanced delineation efforts because they inherently have a greater risk of becoming contaminated.
- Where on-going local efforts to protect sources of drinking water may be leveraged, enhanced assessments will be considered. Local support from government agencies and volunteers can provide the resources and assistance necessary to complete more thorough assessments.

- The rate of development in an area will be considered during the assessment process. While source water assessment information alone may not be detailed enough to plan source protection efforts, it can provide advance warning to local decision makers about the potential susceptibility of drinking water sources within their jurisdictions.
- Assessment information will be used to set monitoring requirements under drinking water regulations. Drinking water program decisions, of greater public health significance, such as those related to the future Ground Water Rule, the Long Term Enhanced Surface Water Treatment Rule, and the Disinfection Byproduct Rule can be aided by the source water assessments. The DOH or County or District Health Department will work with the owner/operator of public water systems to gather more information to refine these regulatory decisions. Proposed changes to existing Watershed Rules and Regulations or promulgation of new locally drafted drinking water source protection rules would also be indications that more detailed assessments may be warranted.

The majority of public water system sources serve transient, non-community systems. Most of these systems have no recorded contamination, are located in remote areas, are privately owned, and operate only to support the primary business (such as a restaurant). Well log and detailed information about the aquifer(s) will most likely not be available. Detailed assessments will not be performed for these sources.

**Box C - Determine Delineation Method:** After the assessment level is determined, the delineation method will be selected. For ground water sources, the delineation will be based on detailed information where available, or the standard delineation procedure described in Section 4.2.

For surface water sources, the size of the system, the size of the source water body, the detention time of the water body, and the location of the intake will be used to decide whether to select a multiple zone delineation (i.e., nested watershed) or to make a single delineation of the entire watershed. Section 4.2.3 describes the process for delineating surface water source areas.

The decisions made in Boxes D, F and G will be made concurrently with those decisions made in Box E.

**Box D - Delineate Source Water Assessment Area:** The source water assessment area delineation method will be selected based on the criteria described in Box C. Delineations will be completed to the extent possible, based on available information. A delineation may be revised at any time during the assessment process if more detailed information becomes available.

**Box E - Sensitivity Analysis:** A key component of an accurate susceptibility analysis is determining the sensitivity of the drinking water source to contamination. Figure 3 provides a general scheme for determining the sensitivity of a ground water source. Hydrogeological factors and well characteristics are considered. This sensitivity analysis tends to be protective, since it ranks sources where little information is available as having sensitivities between "medium" and "high". If further investigation provides the appropriate information, the sensitivity of these sources can be reevaluated and reclassified.

Surface water sources provide fewer physical barriers to contamination than ground water sources. Therefore, in most assessments, surface water sources will be considered to be highly sensitive to contamination.

Once the sensitivity of a source has been determined, that sensitivity rating will be used, along with the contaminant prevalence rating (see Box G), to determine the susceptibility of the source to contamination.

**Box F - Contaminant Inventory:** Two groups of available information will be used to carry out most contaminant inventories of assessment areas. A GIS database containing land cover information will be used to map out land cover in assessment areas. The rating systems provided in Tables 4 and 5 assign ratings to the different contaminant categories for each type of land cover. These ratings refer to the likelihood that a land cover will be associated with a particular contaminant category.

The second group of information that will be used are the GIS databases listing discrete potential sources of contamination. The rating systems provided in Tables 6 and 7 assess whether or not each of these discrete sources could be a potential source of a particular contaminant category.

Once the land cover and discrete potential sources of contamination have been mapped for an assessment area, the contaminant categories associated with those land covers and discrete sources will receive higher priority during the assessment. These contaminant categories will comprise the assessment area's contaminant inventory.

**Box G - Determine Contaminant Prevalence:** Using the contaminant categories that have been identified and given priority in an assessment area, GIS maps will be generated to determine the prevalence of the potential sources of those contaminant categories. Contaminant prevalence will be determined by considering percent land cover that is likely to contribute contamination (using Table 8) and by considering the location and abundance of discrete potential sources of contamination (using Table 9) in the assessment area.

**Box H - Susceptibility Matrix:** The susceptibility matrix (Figure 4) uses the results of the sensitivity analysis (Box E) and the results of the contaminant prevalence determination (Box G) to determine the susceptibility of a drinking water source to a particular contaminant category. The susceptibility matrix will be used to develop susceptibility ratings for the drinking water source for the contaminants that have been assigned a high priority within the assessment area of that water source (see Box F).

**Box I - Susceptibility Refinement:** At this point in the process, there may be a need to review and refine a susceptibility determination to ensure that the objective(s) of the assessment are met. The susceptibility determination will be refined under the following conditions:

- 1) when contaminant categories rate high in an assessment area;
- 2) when information is available to allow detailed evaluation of the potential release, fate and transport characteristics of contaminants; and
- 3) when refinement would be consistent with the objectives of the assessment.

Additional data sets may be used to provide greater detail for the assessment and to refine susceptibility determinations. In addition, the iterative approach will utilize a field review process to confirm and refine the data collected.

**Box J - Summary of Significant Findings:** After the refinement step is completed (Box I), information from the assessment process will be compiled to emphasize the significant assessment findings. Those contaminant categories ranked as having a medium or high potential to impact the drinking water source from either the land use or discrete source categories will be summarized for the source water assessment. The summary of significant findings for each assessment will include a source area map to present the key assessment information.

## 4.6 Assessment Format and Availability

One of the overall objectives of State Source Water Assessment Program, as outlined in the 1996 amendments to the Safe Drinking Water Act is the emphasis of strong public involvement and support for the protection of public drinking water system source water areas. Source water assessments will be completed for all public water systems in the State and made available to the public. In addition, a Public Summary of the Source Water Assessment may be created for certain community water systems, such as all municipal public water systems and those systems determined to have a high susceptibility to source water contamination. A discussion of the format and contents of the Source Water Assessment and the Public Summary, as well as the proposed methods for dissemination of these documents, is provided below.

The overall level of detail for a particular assessment will depend on the type of system, the type and extent of threats, and the level of local interest. In most cases, source water assessments for non-community water systems will be reported by town or by a watershed area. These reports could also include information on community water systems located within the specified jurisdictional/watershed area. The presentation of assessment information in a single report will highlight source water protection issues for local decision makers and will facilitate the report generation process.

### 4.6.1 Assessment Format

The purpose of this section is to provide a description of the format and content of the Source Water Assessment and the Public Summary. The DOH realizes that not all source water assessments will be able to conform to one specific format. The presentation of this basic information may vary for an assessment of a complicated system (i.e., multiple sources).

#### Source Water Assessment

A Source Water Assessment will be a technical document that will include information that was determined to be significant as a result of conducting the assessment. Portions of the document will be presented in a narrative format and portions will be displayed as charts, tables, or graphs to depict the data used in conducting the assessment. The Source Water Assessment will include an *Assessment Summary, Methodology Description, Description of Appendices, and Appendices.*

Assessment Summary: This section will be presented in a narrative format and will summarize the information gathered during the assessment process. For those public water systems where a Public Summary has been prepared, it will generally be used as the Assessment Summary. In all other cases, the summary of significant findings (Box J) will be used as the Assessment Summary.

Methodology Description: This section will be in a narrative format and will describe the DOH's methodology for conducting this Source Water Assessment (the methodology is described in detail in Section 4.5 of this plan). Each step of the assessment that was performed will be discussed in adequate detail to inform the reader of what was completed and why it was done. Each assessment will contain a description of the delineation approach taken, why it was taken and the confidence level associated with how well it represents the contributory area, and an evaluation of the reliability of the contaminant source inventory, based on any recent field verification.

Description of Appendices: The assessment process will require the use and generation of a significant quantity of raw data which will be included as an Appendix to the Source Water Assessment. This section will give a narrative description of each Appendix, summarize the information used, and describe how that information was used to complete the assessments.

It should be noted that the data included in the Appendices may not be standard for all assessments, but will be dependent on the assessment's level of detail. Standard appendices for inclusion in the Source Water Assessment include: *List of Available Information, Contaminant Inventory, Susceptibility Summary, and Maps*. Descriptions of the standard appendices are detailed below.

- List of Available Information - A list of the available information the DOH used to compile the assessment.
- Contaminant Inventory - This appendix will present the results of the contaminant inventory in a matrix format and will also include a table listing the discrete contaminant sources within the assessment area.
- Susceptibility Summary - This appendix will describe the susceptibility analysis that was completed for the potential contaminant sources, as well as the information that was reviewed as part of the susceptibility review and refinement. Much of the assessment process will be automated; however, each assessment will go through a quality check called the Susceptibility Review/Refinement. The results of this assessment quality check, any changes that were made and why they were made, will be discussed in this section.
- Maps - Land cover maps will be generated, and pertinent maps will be included in the Source Water Assessment.

## Public Summary

The Public Summary will be used to present the most important aspects of the assessment in an easily understandable manner. The findings presented in each Public Summary will highlight areas where additional information can be obtained from the assessment. The Public Summary for a source water assessment will include the following sections: *Introduction; What is the Source of Your Drinking Water?; Map of Source Water Assessment Area; Source Water Quality and Water Treatment Information; Evaluation of Significant Potential Sources of Contamination; Ongoing Watershed Protection Activities; Source Water Protection Needs; and How to Obtain Additional Information*. The information included in the *Evaluation of Significant Sources of Potential Contamination* section will be presented in a tabular format while the remaining sections will be presented in a narrative format. To the extent possible, each Public Summary will be no longer than three pages (two pages of text and a one page map). Three hypothetical source water assessments (one depicting a large surface water source, one depicting a small ground water source, and one for a small system where little information is available) are presented in Appendix G. A description of the proposed contents for the Public Summary is presented below.

Introduction: The language included in the *Introduction* will be standard for all assessments. The *Introduction* will include a statement indicating why the source water assessment is being completed and the name of the parties who have performed the assessment. This section will explain the purpose of the assessment while emphasizing that the purpose of the assessment is to evaluate source water, not tap water. A reference will also be made to the public drinking water system's Consumer Confidence Report (Annual Water Quality Report) including how one can be obtained.

What is the Source of Your Drinking Water?: This portion of the Public Summary will include a description of the drinking water source (e.g., ground water, surface water), the population served by the system, and a description of the source water assessment area (e.g., watershed, aquifer). Information presented in this section may include: size of watershed; drainage patterns; size of population within the watershed; depth of groundwater well(s); geologic conditions associated with well(s); the location of the water intake; the location of the wellhead(s); how much water is withdrawn from the source per day; and a description of the land use within the delineated watershed/wellhead area. This section will also include a reference to a map of the assessment area.

Map of Source Water Assessment Area: Each source water assessment Public Summary will be accompanied by a map of the source water area being assessed. Information depicted on the map will include the delineated source water assessment areas (e.g., watershed boundaries or well delineations) and may also include the intake or well location(s), the aquifer recharge area(s), land cover types and contaminant sources.

Source Water Quality and Water Treatment Information: This section will begin with a general statement explaining how and why the water is treated (e.g., disinfected, filtered, not treated). This statement will be followed by a summary of any significant finished water sampling results for the past twelve months, a discussion of any exceedances of any maximum contaminant levels during this time period, and the presence or absence of other significant unregulated source water contaminants (i.e., Cryptosporidium, radon).



Evaluation of Significant Potential Sources of Contamination: The language for the first paragraph of this section will be standard in all assessments. This paragraph will begin with a general statement explaining that the assessment focuses on evaluating the susceptibility of the public water system to those contaminants which may enter the water source. This will be followed by a statement indicating that the contaminants being evaluated are those regulated under the federal Safe Drinking Water Act as well as those which the DOH has determined may present a concern to public health. The remainder of this paragraph introduces the *Significant Potential Sources of Contamination Table* and will briefly explain that contaminant sources in the assessment area have been analyzed and prioritized (negligible, low, medium, and high) in accordance with their potential to impact the water supply. Although all contaminant sources will be included in the source water assessment, the *Significant Potential Sources of Contamination Table* will only address potential sources of contamination which have been assigned a medium or high priority.

This table will include the following four columns: Potential Sources of Contamination, Contaminants of Concern, Description, and Potential Impact to the Water Supply. The Potential Sources of Contamination column will list land use areas and/or discrete sources of potential contamination. Where applicable these areas/sites will be exhibited on the map. The Contaminants of Concern column will include a description of the contaminants of concern associated with each land use and/or discrete source listed in the previous column. For example, gasoline stations (potential source of contamination) would have petroleum hydrocarbons and solvents listed as the contaminant of concern. The description column will include any reasonably available information about the potential source. Using the gasoline station example, this column may include a location of the gasoline station in reference to the source water area, a description of the station's underground storage tanks (e.g., age, size, contents), and reference to any spills or remedial actions which may have taken place at the gasoline station. The final column in this table, Potential Impact to the Water Supply, will provide a rating of the contaminant source's potential to impact the water supply from medium to high. This rating will be derived from the Susceptibility Analysis methodology described in Section 4.4 of this plan and will take into account hydrologic and hydrogeologic factors, intake or well location, fate, transport and toxicity characteristics of the contaminants, and the characteristics of the potential sources of contamination.

The table will be followed by a more detailed description of the contaminants of concern and the likely potential sources of contamination. This section may also discuss the relative health significance of the contaminants of concern. For example, if *Cryptosporidium* is listed as a contaminant of concern this section would include information on the risks associated with *Cryptosporidium* for specific at-risk populations and the general population and measures that at-risk populations may take to protect themselves.

The *Evaluation of Significant Potential Sources of Contamination* section will conclude with a description of other potential sources of contaminants that were evaluated as part of the source water assessment, but were not determined to pose a significant threat to the public drinking water source. The purpose of this paragraph is to assure the public that all potential sources of contamination located within the assessment area have been evaluated.

Ongoing Watershed Protection Activities: A section may be added that would begin with a concise statement explaining the federal and state watershed protection programs applicable to the watershed area. The section may also include other local watershed protection activities in place such as a local

watershed management plan, Agricultural Environmental Management practices, overlay zoning, or the presence of Watershed Rules and Regulations.

Source Water Protection Needs: A section may be added that would contain a brief discussion regarding the need for additional source water protection efforts based on the findings of the source water assessment. Examples of additional source water protection needs may include: development of a wellhead protection program, public education programs, the names of agencies and organizations which could assist with source water protection efforts, or the evaluation of particular pollution prevention facilities or management practices. The purpose of this section is to identify areas where source specific protection may be needed, not design a program to implement protection.

How to Obtain Additional Information: A description of how the public can obtain additional information regarding the source water assessment will be included in this portion of the Public Summary. This section will also reference the New York State DOH Source Water Assessment Program telephone number and website address. It may also reference a telephone number for a local health department, a local municipal office, and/or the water supplier, as well as the location of the nearest document depository (i.e., local library). Additionally, a reference will be made to the availability of the Source Water Assessment.

#### **4.6.2 Procedures for Making Assessments Available to the Public**

The purpose of this portion of the plan is to describe the procedures for making the Public Summary and Source Water Assessment available to the public. The DOH solicited public comments on this matter during the Focus Group meetings held in November 1997, the Cornell Cooperative Extension June 16, 1998 Source Water Assessment Satellite Broadcast Video-Conference, and from the Public Participation/Assessment Format Working Group and the Source Water Protection Coordinating Committee.

##### **Source Water Assessment**

Source Water Assessments will be available at local health departments and the New York State DOH's Central Office in Albany, New York. Source Water Assessments will be distributed based on local needs and by the least expensive method that provides the greatest number of people with access to the document. The County Water Quality Coordinating Committees were asked to gather local input regarding the appropriate depositories for the Source Water Assessments. Possible depositories include: local municipal offices, Association of Regional Council offices, Soil and Water Conservation District offices, public libraries or State Document depositories.

##### **Public Summary**

The methods used to distribute the Public Summaries will consider several avenues. The Consumer Confidence Report rule, promulgated by the EPA in August 1998, requires community water systems to include a brief summary of the susceptibility of the drinking water sources, using language provided by the primacy agency (or water operator). In addition, a public summary of the source water assessment may be created for certain community water systems, such as all municipal public water systems and those systems determined to have a high susceptibility to source water contamination. The DOH will provide a copy of each Public Summary to the appropriate local health department. Public Summaries will also be kept on file at the DOH's Central Office in

Albany, New York. In addition, the DOH may use one or more of the following methods to distribute the Public Summary to interested parties: availability through local municipal offices, local water suppliers, Regional Council offices, Soil and Water Conservation District offices, public libraries and State Document depositories; posting in a public area; the DOH and other websites; and publishing in the local media.

## 5.0 Program Implementation

Implementation of the Source Water Assessment Program in New York State will result in numerous benefits, both directly and indirectly related to the protection and benefit of public water systems. In the development of this plan, New York State has strived to create a functional framework which will produce tangible products that will assist water suppliers, local officials, and citizens in their efforts to protect the source waters from which they drink. Also, during the creation of this plan (and implementation of this program) numerous relationships have been forged between organizations and individuals which will ultimately facilitate inter-agency information transfer and unification between environmental and public health programs.

### 5.1 Administration

#### 5.1.1 Delegation

The State will delegate Source Water Assessment Program efforts to qualified and willing County Health Departments as it does for the drinking water regulatory program. County Health Departments are partially reimbursed for drinking water program activities according to a state aid agreement. County Health Departments participate in County Water Quality Coordinating Committees which have developed water quality strategies for implementing non-point source controls and other source water protection efforts. The state does not contemplate delegating Source Water Assessment Program responsibilities to public water systems, although it will welcome partnerships for conducting these assessments.

A memorandum of understanding exists between the DOH and the Department of Environmental Conservation to enable the organizations to work cooperatively to share the Source Water Assessment Program duties, resources, and information. The State also plans to allocate a portion of its Source Water Assessment Program set-aside funds to contract with local, regional and national interests to develop, assemble and analyze information for the Source Water Assessment Program. These partnerships will increase the effectiveness of the Source Water Assessment Program for the protection and benefit of public water systems. However, the DOH will retain the ultimate responsibility for completing the source water assessments. To maximize coordination with local efforts, the Source Water Assessment Program will consider each partner's information, opinions and suggested approaches, but to maintain consistency for state needs in priority setting and regulatory decision making, the DOH working in conjunction with delegated County Health Departments, will have final discretion.

#### 5.1.2 Coordination

The DOH will continue to work with its partners as the Source Water Assessment Program is implemented, to encourage ongoing work towards source protection. These partners include many federal and state agencies, regional and local governmental agencies, as well as voluntary organizations at the local and regional levels. The DOH's partnership with several federal agencies is further strengthened by the implementation of the Clean Water Action Plan, which establishes a cooperative approach among several federal agencies to assess, restore and protect drinking water quality within an integrated watershed framework.

Several federal agencies, including the United States Geological Service and the National Resource Conservation Service, are represented on the Source Water Protection Coordinating Committee. The DOH also coordinates activities with these agencies and other federal and state agencies through ongoing participation on the Department of Environmental Conservation's Water Management Advisory and Nonpoint Source Coordinating Committees, the New York State Soil and Water Conservation Committee, and its subcommittee, the Agricultural Environmental Management Steering Committee.

The DOH is currently working with the Natural Resources Conservation Service of the United States Department of Agriculture on a pilot project to apply the National Agricultural Pesticide Risk Analysis model to two drinking water watersheds in western New York State. The model evaluates the likelihood of pesticide run off after application under local soil and precipitation conditions for those pesticides likely to be used in the study areas. The results of the model will be used by crop consultants in selecting pesticides for agricultural use on land within the watersheds. Such information and the general results of the assessments will be provided to the New York State Department of Environmental Conservation for consideration in development of statewide management plans for certain pesticides.

Data from the United States Geological Survey, Natural Resources Conservation Service and the EPA will be important to completing source water assessments. Some of the data is currently available through the Internet, but other data sets will be compiled during implementation of the Source Water Assessment Program. As many of these data sets are dynamic, they will be accessed at the time that an assessment or group of assessments is completed to ensure that the most recent data is used.

For certain regulatory programs, where New York State does not have primacy, the EPA is the lead agency for program implementation and regulatory oversight within the state. One such regulatory program is the Underground Injection Control program for which the EPA is the lead agency in New York State. The DOH will coordinate information and data collection efforts that are relevant to the Source Water Assessment Program with the appropriate EPA program representatives. Certain types of underground injection control wells, known as Class V wells, may pose a particular concern to shallow ground water systems. The EPA is in the process of establishing a regulatory framework and evaluating additional data to identify various types of Class V underground injection wells that pose a high risk to ground water (e.g., large capacity septic systems, motor vehicle waste disposal wells). For New York State, the EPA has established inventories of underground injection well locations and closures and has also initiated efforts to identify those underground injection wells

which pose a high risk for soil and ground water contamination. The DOH has already initiated efforts to coordinate information collection with the EPA on the locations and types of underground injection wells in New York State. This information will be evaluated as assessments are developed.

As described previously, some assessment work will be delegated to local partners which may include County Health Departments, other county agencies, watershed associations, the New York Rural Water Association, and other groups, as appropriate. Agreements to complete assessment work will be made on a case by case basis. In addition to the local expertise available through delegation of assessment activities, such as an understanding of local hydrogeological conditions, ensuring local involvement in the assessment process will enhance overall source water protection efforts. The DOH will encourage broad outreach from the delegated agencies to ensure genuine local involvement.

The DOH extended several invitations to all of the American Indian tribal organizations to participate with development of the Source Water Assessment Program through the Focus Group Meetings and the Source Water Protection Coordinating Committee. In New York State, there has been no formal involvement by tribal organizations in the process of developing the Source Water Assessment Program Plan. Data collected for the purpose of the Source Water Assessment Program will be made available to the interested tribal organizations. Where available, the DOH will incorporate relevant information from tribal organizations related source water assessment areas which extend on or near tribal lands.

### **5.1.3 Progress Reporting**

The DOH will report relevant progress on program implementation to the EPA in the Performance Status Report as required under the terms and conditions of the Capitalization Grant as well as through the Biennial Wellhead Protection Program Reports. This reporting will include information about the number of public water systems, categorized by type of source and a summary of the number and types of public water systems with completed delineations, contaminant source inventories, and susceptibility determinations. The number of completed assessments which have been made available to the public and how this was accomplished will also be reported. In addition, the report will include information about the number of systems with designated source water protection areas and the populations served by those systems.

### **5.2 Schedule**

The DOH submitted a workplan as part of the Drinking Water State Revolving Fund's Intended Use Plan to the EPA in October 1997 for initial work on the Source Water Assessment Program. Most of the Source Water Assessment Program efforts to produce assessments (i.e., delineation, containment inventory, initial susceptibility analysis) will occur during the years 2000 and 2001. The two-year timetable requirement for completion, after the EPA's approval of the State Source Water Assessment Program plan will not be adequate for review and refinement of the assessments before public release. Thus, New York State is requesting the eighteen month extension through May 2003.

Furthermore, coordination of New York's Source Water Assessment Program approach with locally-driven or other source water protection programs requires the longer time frame of three and one half years allowed by the Safe Drinking Water Act to fully complete those assessments. For those sources for which a more detailed assessment will be performed, the Source Water Assessment Program will produce an interim assessment that would suffice for targeted monitoring requirements and may be applicable for other regulatory decisions (e.g., monitoring waivers). The interim assessments would be finalized within the extension period.

### **5.3 Updating**

The completion of the Source Water Assessment Program is anticipated to establish a framework for information exchange that continues independently between the various stake holders. The Source Water Assessment Program should be a bridge between national databases (the EPA's Index of Watershed Indicators, Basins, and Surf Your Watershed) and local databases. The Source Water Assessment Program will have an interactive role with the Department of Environmental Conservation efforts for Clean Water Act reporting (305(b), 304(d) and Priority Waters Listing). Other Safe Drinking Water Act activities such as capacity development, water resource allocation, and regulatory programs will benefit from the systematic collection of information under the Source Water Assessment Program and will also contribute towards providing updated source water assessment information. The DOH may update the assessments (and make them available to the public) as necessary to meet the originally defined or evolving objectives of the assessment for each public water system source.

The Unified Watershed Assessment Report, issued October 1, 1998, under the lead of the New York State Department of Environmental Conservation and the United States Department of Agriculture Natural Resource Conservation Service, with input from the DOH and other conservation partners, is part of a continuing process. Although it categorizes eight digit Hydrologic Unit Codes and lists certain watershed priorities for restoration, it reflects New York stakeholders input in recognizing the importance of protecting other watersheds. It envisions further refinement and specifically presents a five year schedule to develop aquifer protection strategies for the Long Island ground water system and each of the eighteen primary aquifers upstate. The New York State Department of Environmental Conservation will work with the DOH to coordinate development of the strategies with the Source Water Assessment Program.

Additionally, the DOH is working with other advisory members of the New York State Soil and Water Conservation Committee to develop a comprehensive watershed management strategy which will attempt to integrate local watershed planning and water quality management actions into the overall scope of local, regional, state or national watershed concerns. The Source Water Assessment Program will provide the framework for updating assessments of drinking water concerns on a watershed basis for assembling with other natural resource concerns.

**Glossary**

## Glossary

**Agricultural Environmental Management (AEM).** An environmental initiative developed by farmers, farm conservation professionals, and government officials to protect or improve water quality in New York State. It consists of an environmental assessment, planning and implementation process that farmers undertake voluntarily, with help and support from a team of agricultural and environmental professionals.

**Annual Water Supply Statement.** An annual report to consumers on the current quality of their drinking water which is required by New York State Public Health Law for all community water systems serving 1,000 or more service connections. The reports must contain analytical testing results of source water samples and tap water, and list violations. Information regarding water treatment, conservation practices, water use restrictions, capital improvements and a discussion of the risks associated with *giardia* and *cryptosporidium* are also included in reports.

**Aquifer.** A geologic formation composed of rock, till, sand, gravel and/or sediment that is capable of storing and transmitting water in usable quantity to a spring or well.

**Biosolids.** The fecal and urinary defecations of livestock and poultry (manure), or humans (treated sewage sludge). Biosolids are typically spread upon or tilled into the soil to improve fertility.

**Community Water System.** A public water system with at least 5 service connections used by year-round residents of the system or which regularly serves at least 25 year-round residents. Examples include municipal water systems, mobile home parks, and private water supply companies.

**Confined Aquifer.** An aquifer saturated with water and bounded above and below by a soil layer or rock formation that restricts the passage of ground water.

**Consumer Confidence Report.** The Safe Drinking Water Act mandates that all community water systems provide an annual report to consumers on the source and quality of their drinking water beginning in October, 1999. The reports must contain technical definitions, listings of all violations, and information on possible health effects from contaminants such as radon and *cryptosporidium*.

**Contaminant Source Inventory.** A list of possible contaminant sources with the delineated source water assessment area(s). The inventory process includes: reviewing existing data on the locations of potential contaminant sources, of identifying likely sources for further information, and verifying the accuracy and reliability of data sets.

**County Water Quality Coordinating Committee.** A committee composed of volunteers that advise the water quality and pollution control programs of various county, state, and federal agencies on coordinated and comprehensive approaches to water issues at the county level.

**Cryptosporidium.** Short for *Cryptosporidium parvum*, a parasitic protozoan that can be transmitted to humans via contaminated drinking water. The organism can cause an intestinal illness called *cryptosporidiosis* which may be life threatening to people with weak immune systems. The most common symptom is watery diarrhea but there may also be cramps, fever, nausea, vomiting, and loss of appetite. There is no specific medical treatment for *cryptosporidiosis*.

**Data Coverages.** Describes the manner in which data sets are used in a Geographic Information System (GIS). Different types and sources of data are shown as individual "layers". These layers of data can be stacked over other data layers to show how the different data sets relate to each other.

**Delineation (delineate).** The process of defining or mapping a boundary that approximates the areas that contribute water to a particular water source used as a public water supply. For surface waters, the land area usually consists of the watershed for a reservoir or stream. For groundwater sources, the boundary typically approximates the surface area that contributes water to the aquifer.

**Discrete Source.** A discernible contamination source such as a landfill, hazardous waste site, or conveyance such as a pipe or drainage ditch from a facility. Discrete sources can be mapped as clearly defined points or areas.

**Drinking Water State Revolving Fund.** A Drinking Water State Revolving Loan Fund was created in 1996 as a result of New York State's enactment of Charter 413 of the Laws of 1996 (Clean Water/Clean Air Bond Act) and passage of the 196 Amendments to the Safe Drinking Water Act by the U.S. Congress. This program provides a financial incentive for public and private water systems to undertake needed infrastructure improvements (e.g. treatment plants, distribution mains, storage facilities).

**Geographic Information System (GIS).** A computerized database/mapping system that may be used to store, retrieve, and analyze information based on geographic location.

**Giardia.** Short for *Giardia lamblia*, a parasitic protozoan that can be transmitted to humans via contaminated drinking water. The organism can cause an intestinal illness called *giardiasis* of which the main symptom is mild or severe diarrhea. *Giardia* can be treated with anti-parasitic drugs.

**Ground Water.** Water that has reached an underground zone where all the openings in the soil or rock are filled with water.

**Ground Water Rule.** A proposed federal regulation that will address technical issues related to disinfection of public water systems that use ground water as a source of drinking water. Under section 107 of the Safe Drinking Water Act Amendments of 1996, the statute reads, ". . . the Administrator shall also promulgate national primary drinking water regulations requiring disinfection as a treatment technique for all public water systems, including surface water systems, and, as necessary, ground water systems."

**Hydrologic Unit Code.** A geographic, numbering system developed by the United States Geological Survey to identify and differentiate particular watersheds. The numbering system is somewhat akin to zip codes in that digits are added to further refine location (i.e., an eleven digit code denotes a much smaller watershed area than an eight digit code). Hydrologic Unit Codes are often referred to simply as "HUC" codes.

**Inner Well Zone.** An area immediately surrounding a well or well field of a public water supply that has been defined for the purpose of determining the susceptibility of a well to contamination. Potential sources of contamination within the inner well zone are given a higher level of scrutiny when determining the overall susceptibility of a well source.

**Local Health Department.** A state funded district health office or county health department that provides oversight of public drinking water systems.

**Maximum Contaminant Level (MCL).** In the Safe Drinking Water Act, a MCL is defined as "the maximum permissible level of a contaminant in water which is delivered to any user of a public water system."

**Metadata.** Simply defined, metadata is "data about data." Metadata describes the origins of a dataset and discuss the changes made to the dataset by any user of the data for a particular application. For digital geospatial data, metadata can be used to provide background information about the origin, content, quality, condition and availability of a particular dataset.

**Monitoring.** To systematically sample and analyze public drinking water to ensure that the water meets New York State standards for drinking water quality. Monitoring can also be used for watching trends in water quality.

**Non-community Water System.** A public water system that provides water to people in places other than their residences (i.e., places of business, schools, restaurants, and motels).

**Nonpoint Source Pollution.** Pollution that enters a water body or aquifer from diffuse origins on the land surface. This in contrast to a discrete source, where there is a discernible contamination source such as a landfill or conveyance such as a pipe or ditch.

**Non-Transient Non-Community Water System.** A public water system that does not serve a resident population but serves at least 25 of the same persons, four hours or more per day, for four or more days per week, for 26 or more weeks. Examples of non-transient non-community systems include schools, offices, and businesses which have their own drinking water source.

**Outer Well Zone.** An area surrounding the inner well zone which has been delineated for the purpose of determining the susceptibility of a public water supply well to contamination. Ground water within the outer well zone is assumed to take a longer period of time to reach the wellhead than the ground water within the inner wellhead zone.

**Pesticide.** Any synthetic or naturally occurring substance or mixture of substances that is used to destroy, repel or mitigate any

pests, including insects, weeds, nematodes, fungi, bacteria and rodents.

**Priority Waters List.** This list categorizes and describes use impairments to water body segments taking into account both the amount and quality of available information. The New York State Department of Environmental Conservation and other state agencies use the rankings to allocate funding for pollution prevention projects and set watershed management strategies.

**Public Drinking Water System.** A community, non-community, or non-transient non-community water system which provides piped water to the public for human consumption. The system must have at least 5 service connections or regularly serve at least 25 individuals daily for at least 60 days.

**Recharge area.** A section of land that receives precipitation and allows it to infiltrate an aquifer.

**Safe Drinking Water Act.** The federal law which authorizes the U.S. Environmental Protection Agency and states to oversee public water systems and set standards for drinking water.

**Sensitivity.** The existing hydrogeologic conditions of a drinking water source and the integrity of the water system's well(s) or intake(s) which makes a particular drinking water system susceptible to influence by contamination.

**Significant Potential Source of Contamination.** A facility or activity that has the potential to release contaminants in sufficient amounts to a public drinking water source as to contravene water quality standards.

**Source Water or Water Source.** Any aquifer, surface water body, or watercourse from which water is taken either periodically or continuously by a public water system for drinking or food processing purposes.

**Source Water Assessment.** A source water assessment provides information on the potential contaminant threats to surface and ground water sources that are used to supply public water systems. Each source water assessment consists of a delineation of the source water assessment area, an inventory of possible contamination sources, and an evaluation of the susceptibility of the water supply to contamination.

**Subwatershed.** A topographic boundary that is the perimeter of the catchment area of a tributary of a stream.

**Surface Water(s).** Lakes, ponds, streams, rivers, and other water bodies which lie on the surface of the land. Surface waters may be partially or fully supplied by groundwater.

**Surface Water Treatment Rule.** The rule specified maximum contaminant level goals for *Giardia lamblia*, viruses and *Legionella*, and promulgated filtration and disinfection requirements for public water systems using surface water sources or ground water sources under the direct influence of surface water. The regulations also specified water quality, treatment, and watershed protection criteria under which filtration may be avoided.

**Susceptibility Analysis.** An evaluation of conditions in the source water area to determine the potential for contaminants to impact water quality.

**Total Maximum Daily Load (TMDL).** The sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources that a waterbody can receive and still meet water quality standards. The calculation must include a margin of safety to ensure that the waterbody can be used for the purposes the State has designated (e.g., swimming, fishing, drinking) and must also account for reasonable variation in water quality.

**Transient Non-Community Water System.** A public water system that serves 25 or more transient consumers per day for fewer than 26 weeks per year; examples of transient non-community systems include restaurants, parks, and motels that have their own drinking water source.

**Treatment Technique.** A process intended to remove contaminants or improve the taste, odor, or clarity of drinking water before it reaches the consumer.

**Unconsolidated Aquifer.** An aquifer that is comprised of loosely formed geologic materials, such as sand and gravel. Unconsolidated aquifers can occur near the ground surface or at depth.

**Unconfined Aquifer.** A shallow aquifer that occurs immediately below the ground surface. Also known as a water table aquifer because the upper boundary of the saturated portion of the aquifer is formed by the ground water table.

**Watershed.** The geographic region within which water drains to a particular river, stream, or body of water. Large watersheds may be composed of several or many subwatersheds.

**Watershed Approach.** A watershed approach is a coordinating framework for environmental management that focuses public and private sector efforts to address the highest priority problems, taking into consideration both ground water and surface waters.

**Watershed Rules and Regulations.** Public Health Law that authorizes the New York State Department of Health to make rules and regulations to protect water sources used for public water systems within the state from contamination.

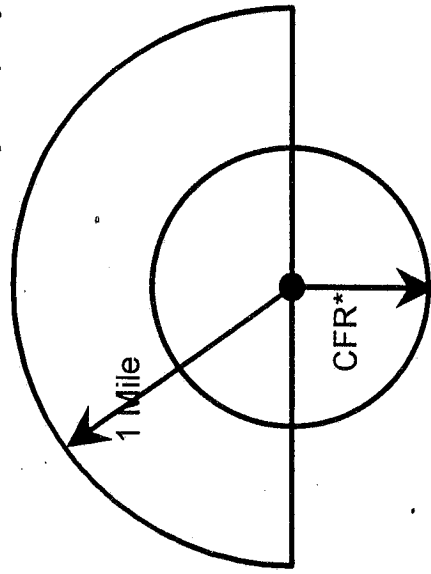
**Wellhead Protection Area.** The surface and subsurface area surrounding a well or well field, supplying a public water system, through which contaminants are reasonably likely to move toward and reach a well or well field.

**Wellhead Protection Program.** A state implemented program for protecting ground water resources that are used for public drinking water as mandated under section 1428 of the Safe Drinking Water Act. New York State received EPA approval in 1990 for its Wellhead Protection Program

**Figures**



Community Water Systems and  
Non-Transient Non-Community Water Systems



\*Calculated Fixed Radius  
(minimum distance 500 feet)

Transient Non-Community Water Systems

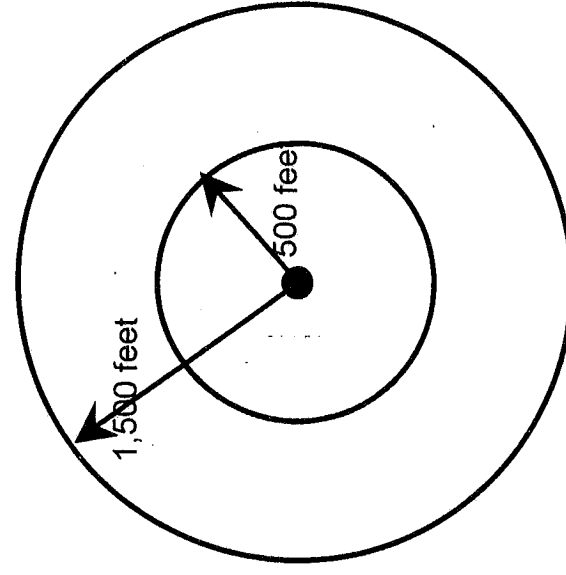


Figure 2 - Surface Water Delineation Approach - Nested and Sub-watershed Borders

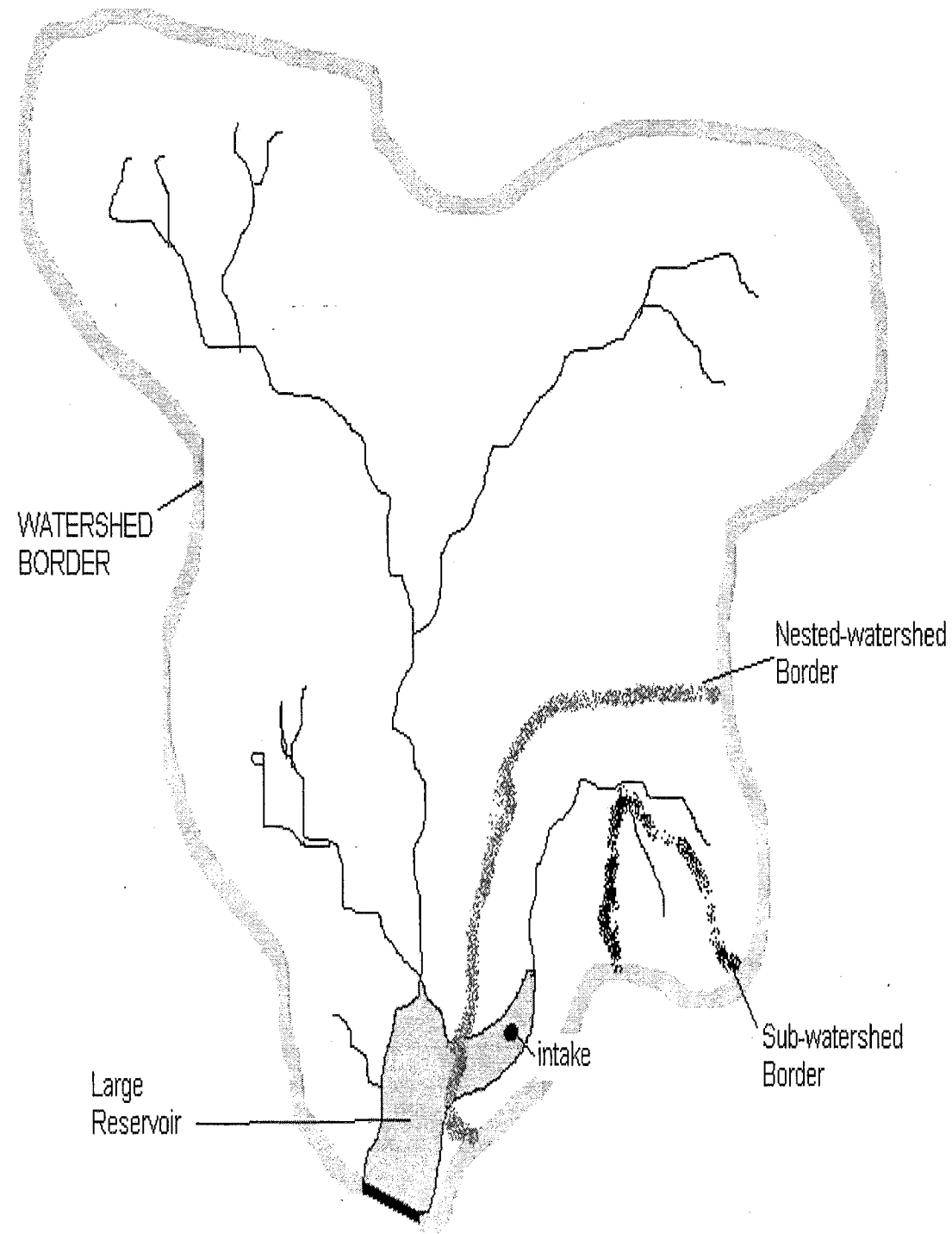
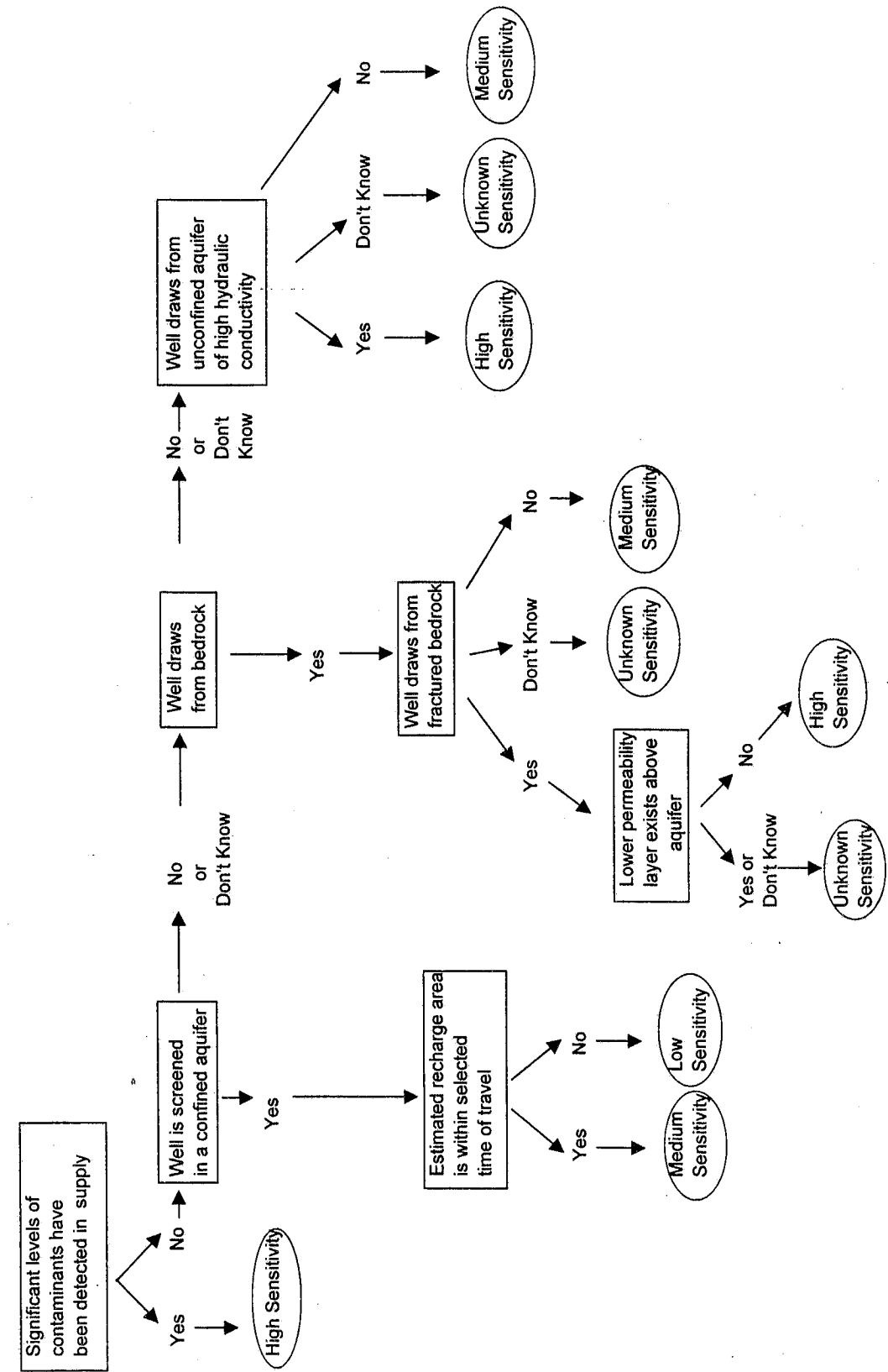


Figure 3 - Sensitivity Analysis for Ground Water Supplies



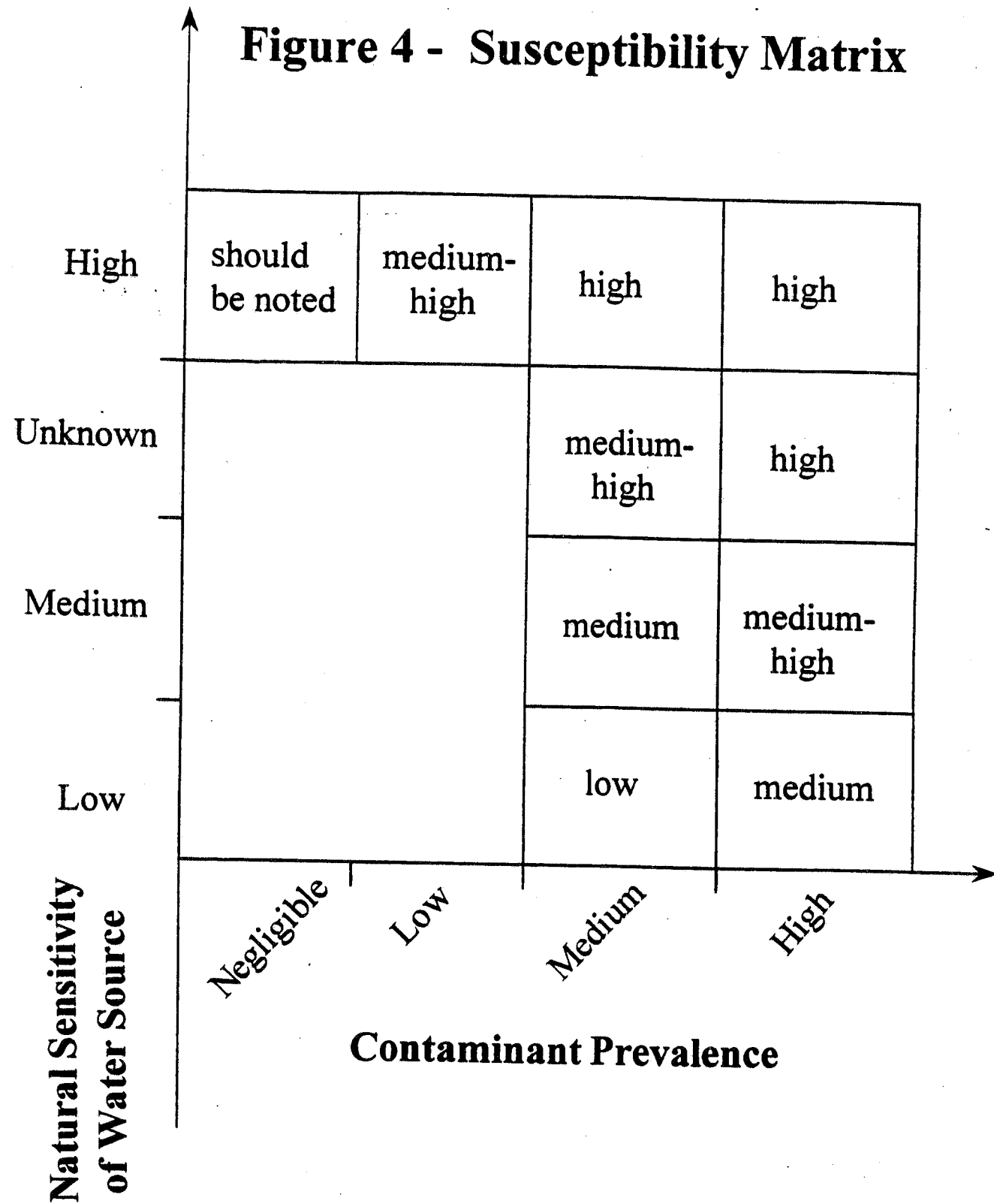
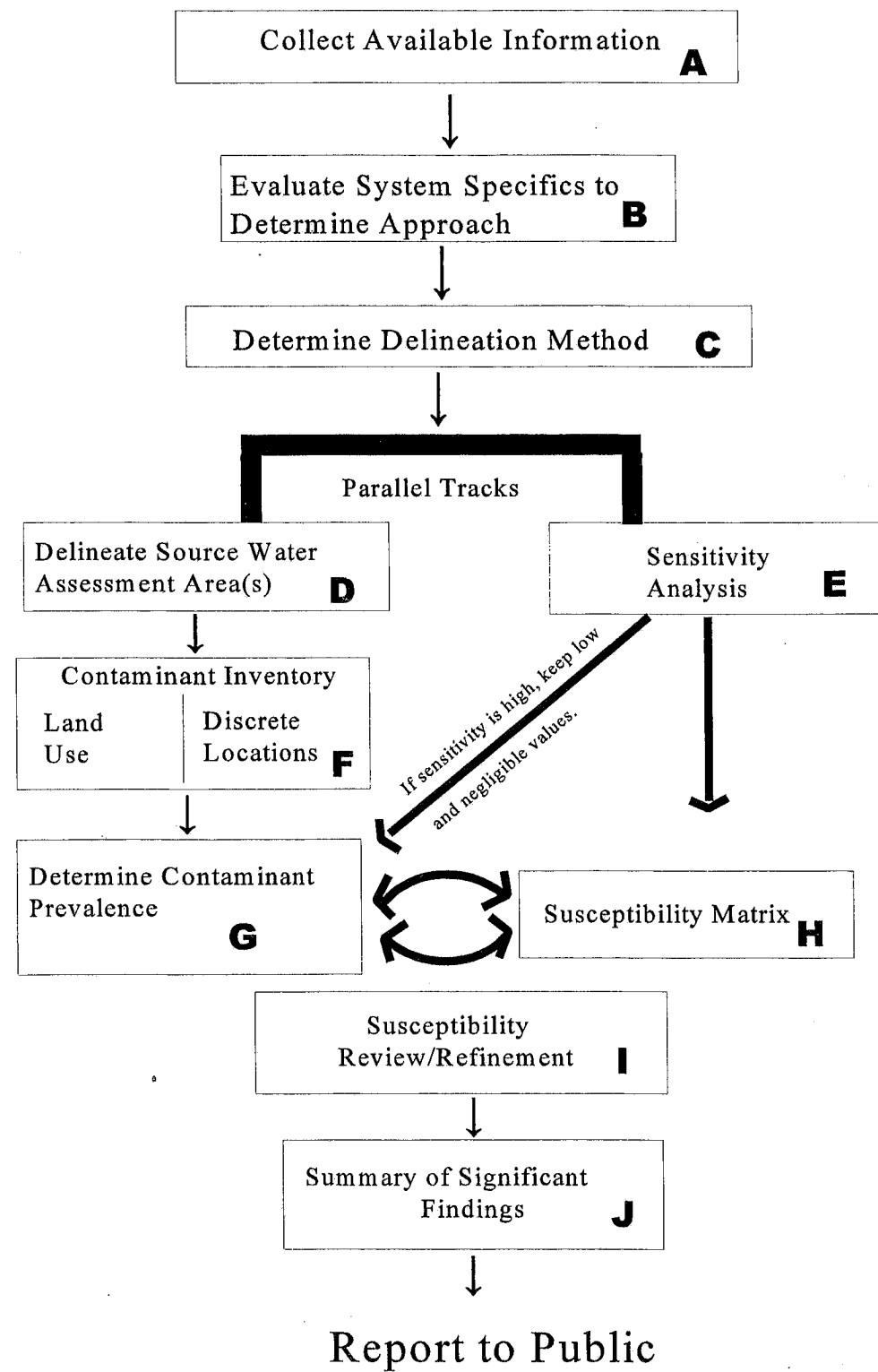


Figure 5 - Methodology for Conducting Assessments



**Tables**

Table 1 - GIS Coverages for the Source Water Assessment Program <sup>1</sup>					
Data File	Source	Spatial Type	Coordinate System	Scale	Coverage Availability
Agricultural Districts	Cornell Univ.	Polygon	None	1:24,000	Not Yet
Aquatic Pesticide Permits	DEC	Point	None		Not Yet
Census Tracts	US Census Bureau				Available
Chemical & Petroleum Spills <sup>2</sup>	DEC/DOH	Point/Polygon	None		Limited
Chemical Bulk Storage (Aboveground)	DEC	Point	NYTM <sup>3</sup>	1:24,000 (GPS)	Available
Chemical Bulk Storage (Underground)	DEC	Point	NYTM <sup>3</sup>	1:24,000 (Geocode)	Available
Digital Orthophotos (aka Digital Orthophoto Quarter Quadrangles, DOQQs)	DEC/US Geological Service				Forty counties available, others pending
Digital Elevation Models	DEC			1:24,000	Not Yet
Geology from United States Geological Survey (USGS) and NY State Files	USGS/NYSGS	Point	Lat/Long	Variable	Available
Drainage Basin, unconsolidated aquifer	DEC/USGS	Polygon	Lat/Long		8-digit HUC Available, 11-digit Not Yet
Hazardous Waste Treatment, Storage & Disposal Facilities (RCIS)	DEC	Point	Lat/Long		Limited
Hydrography Data	DEC	Line	NYTM <sup>3</sup>	1:24,000	Not Yet
Inactive Hazardous Waste Sites	DEC	Point	Lat/Long	1:250,000	Available (Draft)
Land Application & Composting Facilities, including Sewage Sludge Facilities	DEC	Point	None	Variable	Not Yet
Landfills(Active)	DEC	Point	NYTM <sup>3</sup>	Variable	Not Yet
Land Cover Data Set 1988-1993 Landsat	USEPA/USGS	Polygon	NYTM <sup>3</sup>	30 meter pixels	Available
Natural Heritage Program (Significant plant/wildlife areas)	DEC	Point/Polygon	NYTM <sup>3</sup> , Lat/Long	1:24,000	Available
Mines	DEC	Point/Polygon	Lat/Long	1:24,000	Available

Table 1 - GIS Coverages for the Source Water Assessment Program <sup>1</sup>					
Data File	Source	Spatial Type	Coordinate System	Scale	Coverage Availability
NYSDOH Public Water Supply (PWS) Database, PWS Intake locations, Local HD PWS Data, Sanitary Surveys, Monitoring Waiver Data	DOH	Point		Variable	Some areas complete, others limited or not yet
Oil and Gas Wells (Active)	DEC	Point	Lat/Long	1:24,000	Available
Petroleum Bulk Storage	DEC	Point	NYTM <sup>3</sup>		NY City only (geocoded) others in progress
Primary Aquifers	DEC	Point/Line/ Polygon	Lat/Long	1:24,000	Available
Priority Water List	DEC	Line/Polygon	None		Available
Radioactive Materials Discharge Permits (RCIS)	DEC	Point	None		Not Complete
Regulatory Compliance Information Systems (RCIS)	DEC	Point	NYTM <sup>3</sup>	1:24,000	Available
River Water Quality Monitoring	EPA/USGS	Point	Lat/Long		EPA STORET
Soil Surveys	NRCS/Local	Polygon	Some are digitized	1:12,000	Some areas
				1:250,000	Statewide
SPDES Permitted Discharge Facilities including Publicly Owned Sewage Treatment Works	DEC	Point	Lat/Long		Some, coverage improvement underway
State GIS Data Sets (Adjacent States)	NY GIS Data Cooperative, States				Not Yet
Tax Assessment Maps	Office of Real Property Services	Polygon			Some, except Warren and Westchester Counties
Toxic Chemical Release Inventory <sup>2</sup> (TRI)	DEC/DOH	Point	Lat/Long		Available
Underground Injection Wells	EPA	Point			Not Yet

Table 1 - GIS Coverages for the Source Water Assessment Program <sup>1</sup>					
Data File	Source	Spatial Type	Coordinate System	Scale	Coverage Availability
United States Geological Survey Quadrangles	USGS	Image	Lat/Long	1:24,000	Available
USGS Well Data	USGS	Point	Lat/Long	Variable	Limited
Waste Oil Storage, Reprocessing, and Rerefining Facilities	DEC	Point		Variable	Not Yet
Other locally available coverages: These include county, regional, and local data sets		Pt/Line/Poly	Varies	Variable	Not Yet

- Notes: 1 These data coverages are considered helpful in conducting assessments. They are a starting point of data compilation and should not be considered complete. The extent of data is not consistent across New York State. Some coverages need correction to improve accuracy. The Coverage Availability column indicates whether "Available" (with no warranty of completeness or accuracy), whether coverage is "Limited" to certain areas of the state, or whether it is "Not Yet" available. Some coverages not now available, are currently being corrected and should be available for use during the SWAP program.
- 2 Data coverages partially or wholly created at NYSDOH or NY Local Health Units
- 3 NYTM= New York Transverse Mercator Projection

Table 2 - Data Needs to Perform Assessments
<p><i>Standard Assessment Data Indicated by *</i></p> <p><u>System Data</u></p> <ul style="list-style-type: none"> <li>*Whether purchased, if so, whether system has own reservoir</li> <li>*Category of system, (e.g., Community; Non-transient or transient non-community)</li> <li>Population served</li> <li>*Production capability and actual production</li> <li>*Disinfection use and type</li> <li>*Any known quality violation</li> <li>*Any known contamination</li> <li>Ownership</li> <li>*Whether Source Water Protection in place, kind of protection</li> <li>Whether owner has jurisdiction over some or all of the source areas</li> <li>Public perceptions of water source quality and contaminant source impacts</li> <li>*Date of last sanitary survey/inspection</li> <li>*Significant findings from sanitary survey/inspection</li> <li>*Monitoring waiver in force</li> <li>*Disinfection waiver in force</li> <li>*Justification for monitoring waiver(s)</li> <li>*Justification for disinfection waiver(s)</li> <li>Type and availability of more detailed information</li> </ul>
<p><u>Natural Characteristics of the Source</u></p> <p>An initial determination would be made as to what kind of source it is, then further decisions would follow from there.</p> <ul style="list-style-type: none"> <li>*Ground water source</li> <li>*Surface water source</li> <li>*Ground water source under the direct influence of surface water</li> <li>Ground water source otherwise affected by surface water</li> <li>Surface water source directly impacted by ground water</li> </ul>
<p><u>Location of Well/Ground Water Sources</u></p> <ul style="list-style-type: none"> <li>Aquifer source</li> <li>Consolidated or unconsolidated aquifer</li> <li>Confined or unconfined aquifer</li> <li>*Other known geological, soils, or aquifer characteristics data</li> <li>What is the hydraulic conductivity of hydrogeologic units</li> <li>Well production capacity</li> <li>Actual production of the well/how much water is used</li> <li>*Proximity of other wells (within the cone of influence of the system well)</li> <li>Depth to aquifer</li> <li>Depth of screen, if any</li> </ul>
<p><u>Ground Water Sources Influenced by Surface Water</u></p> <ul style="list-style-type: none"> <li>Is the influence direct</li> <li>How confirmed</li> <li>Characteristics of the contributing surface water body(ies)</li> <li>Proximity of well to surface water body</li> </ul>

Table 2 - Data Needs to Perform Assessments
<p><i>Standard Assessment Data Indicated by *</i></p> <p><u>Surface Water Sources</u></p> <ul style="list-style-type: none"> <li>*Source flow data- quantity, direction of flow, time-of-travel</li> <li>*Source type, name</li> <li>*Intake location relative to water body</li> <li>*Source water quality data</li> <li>Detention time</li> </ul>
<p><u>Delineation History</u></p> <p><i>Ground Water</i></p> <ul style="list-style-type: none"> <li>*Has source been delineated</li> <li>Has delineated area been digitized</li> <li>Whether single or multiple aquifers</li> <li>Type and accuracy of delineation</li> </ul> <p><i>Surface Water</i></p> <ul style="list-style-type: none"> <li>*Has watershed been delineated</li> <li>Scale of delineation</li> <li>Known time of travel from parts of watershed</li> </ul>
<p><u>Delineations done by DOH</u></p> <p><i>Surface Water</i></p> <ul style="list-style-type: none"> <li>Criteria for area of Great Lakes watershed or other large watershed (bigger than 1 8-digit HUC code)</li> <li>Delineation process used</li> </ul> <p><i>Ground Water</i></p> <ul style="list-style-type: none"> <li>Delineation method selected and why selected</li> <li>Whether done as conjunctive delineation</li> <li>Whether regional delineations were used</li> <li>Whether this delineation is lumped into a larger delineation</li> </ul>
<p><u>Contaminant Inventory</u> (Note: Inventory Categories found in the delineated water source assessment area(s) will be considered in each inventory, not all categories will be present in each)</p> <ul style="list-style-type: none"> <li>*LandUse/Land Cover Data (Landsat) - statewide or more specific</li> <li>Septic Use Data Source - how proportioned</li> <li>More detailed information on septic use available</li> <li>*Toxic Release Inventory - facility location</li> <li>*Agriculture Environmental management data available <ul style="list-style-type: none"> <li>Type of potential contaminants present</li> <li>Whether known contaminant releases and where</li> </ul> </li> <li>*Solid Waste/Biosolids Sites <ul style="list-style-type: none"> <li>Known release of contaminants</li> <li>Size of facility</li> <li>Year of operation</li> </ul> </li> </ul>

**Table 2 - Data Needs to Perform Assessments**

*Standard Assessment Data Indicated by \**

Contaminant Inventory (continued)

\*Wastewater Treatment Plants

- Size of facility
- Discharge quantity and quality requirements
- Types of contaminants permitted
- Any data indicating significant noncompliance with permit conditions

\*Other State Pollution Discharge Elimination System (SPDES) Permitted Facilities

- Size of facility
- Discharge quantity and quality requirements
- Types of contaminants permitted
- Any data indicating significant noncompliance with permit conditions

\*Bulk Storage Facilities

- Type of product stored
- Type of contaminant
- If release is known - when did it occur, type of material and quantity released

\*Petroleum or Hazardous Material Spills

- Type of contaminant
- Quantity spilled
- Remediation efforts completed
- Known problems related to spill

\*New York State Inactive Hazardous Waste Disposal Sites

- Type and quantity of contaminants present
- Whether contaminants migrating from site
- Status of remediation
- Whether site is a known to have contaminated a source of public drinking water

\*Comprehensive Environmental Response Compensation Liability Act (CERCLA) Information

System sites

- Type and quantity of contaminants present
- Whether contaminants migrating from site
- Status of remediation
- Whether site is known to have contaminated a source of public drinking water

\*Major Transportation Routes: Roads, Railroads, Water Transport Routes, Pipelines

- Known significant contaminant materials transported via transportation route

Significant storage or use of fertilizers

- Known quantity and composition

Underground Injection Well Locations

- Activity Status
- Years Utilized
- Known Chemical Composition of Injected Material
- If release is known - when did it occur, type of material and quantity released

Regulatory Issues

- Whether there are any of particular relevance to the system
- Monitoring Waivers granted
- Ground Water Rule
- Long Term Enhanced Surface Water Treatment Rule/Disinfection Byproduct Rule

**Table 2 - Data Needs to Perform Assessments**

Source Protection

- \*Watershed rules and regulations in effect/proposed
- Ongoing source protection activities
- Type of organization for source protection, municipal, voluntary, etc.
- Whether source protection would reduce a particular threat to the source

Susceptibility Review/Refinement

- Location of contaminant sources relative to drinking water source
- Likelihood/Timing of Release
- Effectiveness of pollution prevention activities
- Special impacts of local soils/geology (Soil infiltration groups A- D)
- Karst or fractured rock
- Presence/sources of Spring(s)
- Potential of local vegetation to affect contaminant transport
- Steepness of slopes
- Contaminant Fate and Transport issues of persistence and mobility



Table 3 - Criteria for Consideration when Completing Source Water Assessments
<u>Source Type</u> Surface Water Ground Water Ground Water Under Direct Influence of Surface Water Ground Water Otherwise Influenced by Surface Water Surface Water influenced by Ground Water (i.e. gaining streams)
<u>Natural Sensitivity of Source</u> Aquifer permeability/confinement Time-of-Travel Contributory Area
<u>Source Characteristics</u> Aquifer Type (unconfined, confined, bedrock, consolidated, unconsolidated) Surface Water Body Type (e.g., river, lake, reservoir)
<u>Extraction Characteristics</u> Well location and depth Intake location and depth Extraction type: well, caisson, infiltration gallery, spring Integrity of extraction device (e.g., well casing, intake structure)
<u>Existing Assessment Information</u> Accuracy/timeliness Completeness Level of detail
<u>Water System Classification</u> Type: Community Non-Transient Non-Community Water System Transient Non-Community Water System Size
<u>Type of Ownership</u> Municipal Investor-Owned Utility Private/Ancillary
<u>Management Capacity</u> Whether source water protection in place Whether source water area within system owner jurisdiction
<u>Jurisdiction of Source Water Assessment Areas</u> Coincides with Municipal Public Water System Town/County where Public Water System is located Multiple municipalities

Table 3 - Criteria for Consideration when Completing Source Water Assessments
<u>Land Use</u> Past Current Near-term change Projected/Anticipated (e.g., zoning) Percent ownership by supplier Percent ownership by governments
<u>Multiple Use Waterbodies</u> Human Wildlife Industrial/Commercial
<u>Locations of Major Sources of Contamination</u> Local Regional Transboundary
<u>Public Perceptions</u> Water Quality Land Use Contaminant Sources
<u>Existing Source Water Protection/Management</u> local (public water system, town, non-governmental organization) regional water resource (county, coalition, state, etc.)
<u>Potential for Upgrading Source Water Protection</u> local regional
<u>Safe Drinking Water Act Regulatory Issues</u> Monitoring Flexibility Ground Water Rule Long Term Enhanced Surface Water Treatment Rule/Disinfection Byproducts Rule

**Table 4 - Potential for Ground Water Contamination Based on Land Cover**

Contaminant Category	Land Cover Types							
	Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial	Pasture	Row Crops	Other Grasses	Evergreen Forest
Halogenated Solvents	N	L(M)	L(M)	M (H)	N (L)	L	L	N
Petroleum Products	N	L	L(M)	M (H)	N (L)	L	L	N
Pesticides/Herbicides	N	L (M)	M	M	L	M	L	N
Other Industrial Organics	N	L	M	L (M)	N (L)	L	L	N
Metals	N	L	L	M	N (L)	L	L	N
Nitrates	N	M	M (H)	M	L (M)	M (H)	L	N
Phosphorus	N	N	N	N	N	N	N	N
Sediments/Turbidity	N	N	N	N	N	N	N	N
Protozoa	N	M	M (H)	L (M)	M	L (M)	L (M)	L
Enteric Bacteria	L	M	M (H)	L (M)	M	L (M)	L (M)	L
Enteric Viruses	L	H	M (H)	L (M)	M	L	L (M)	L
Cations/Anions (Salts, Sulfate)	N (L)	L (M)	M (H)	M (H)	L	L	L	N
Industrial Radionuclides	N	N	N (L)	N (L)	N	N	N	N
Disinfection Byproduct Precursors	N	N	N	N	N	N	N	N

Contaminant Category	Land Cover Types						
	Mixed Forest	Deciduous Forest	Woody Wetlands	Emergent Wetlands	Barren (Quarries, mines, pits)	Barren (Bare rock and sand)	Barren (Transitional, clearcut)
Halogenated Solvents	N	N	N	N	N	N	N
Petroleum Products	N	N	N	N	L	N (L)	N (L)
Pesticides/Herbicides	N	N	N	N	N	N	N
Other Industrial Organics	N	N	N	N	N	N	N
Metals	N	N	N	N	N	N	N
Nitrates	N	N	N	N	L	L	L
Phosphorus	N	N	N	N	N	N	N
Sediments/Turbidity	N	N	N	N	N	N	N
Protozoa	L	L	L	L	L	L	M
Enteric Bacteria	L	L	L	L	L	L	M
Enteric Viruses	L	L	L	L	L	L	M
Cations/Anions (Salts, Sulfate)	N	N	N	N	L	L	L
Industrial Radionuclides	N	N	N	N	N	N	N
Disinfection Byproduct Precursors	N	N	N	N	N	N	N (L)

**Definitions:**

**Negligible (N):** Land use type results in minimal, if any, presence of the contaminant category

**Low (L):** Land use type results in detections that are expected to be rare and, if detected, contaminant concentrations are expected to be below levels of concern for drinking water.

**Medium (M):** Land use type results in detections that are expected to be uncommon but, if detected, contaminant concentrations could be expected to be at or above levels of concern for drinking water.

**High (H):** Land use type results in detections that may occur frequently at levels of concern for drinking water.

**Notes:**

When two ratings are given, the rating in the parentheses "(" is considered to reflect the worse case scenario, and the rating not in the parentheses is considered to be the more common situation.

**Table 5 - Potential for Surface Water Contamination Based on Land Cover**

Contaminant Category	Land Cover Types							
	Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial	Pasture	Row Crops	Other Grasses	Evergreen Forest
Halogenated Solvents	N	N (L)	L	M	N	N	N	N
Petroleum Products	N (L)	L	L	M	N	N	N	N
Pesticides/Herbicides	N	M	M (H)	M (H)	M	H	M	L
Other Industrial Organics	N	L	M	M (H)	L	L	L	N
Metals	N	L	M	M (H)	L	L (M)	L	N
Nitrates	L	L	M	M	L (M)	M (H)	L	N
Phosphorus	L	M	M (H)	M (H)	M	M (H)	L	N
Sediments/Turbidity	L (M)	M	M (H)	M (H)	L	L (M)	N	N
Protozoa	L	M (H)	H	M (H)	H	M (H)	L (M)	L
Enteric Bacteria	L	M	H	M (H)	M (H)	M (H)	L (M)	L
Enteric Viruses	L	M	H	M (H)	M (H)	M (H)	L (M)	L
Cations/Anions (Salts, Sulfate)	N	L	M	M	L	L	L	N
Industrial Radionuclides	N	N	L	M	N	N	N	N
Disinfection Byproduct Precursors	L (M)	M	M (H)	M	M (H)	M (H)	L	L (M)

Contaminant Category	Land Cover Types						
	Mixed Forest	Deciduous Forest	Woody Wetlands	Emergent Wetlands	Barren (Quarries, mines, pits)	Barren (Bare rock and sand)	Barren (Transitional, clearcut)
Halogenated Solvents	N	N	N	N	N	N	N
Petroleum Products	N	N	N	N	N	N	N
Pesticides/Herbicides	N	N	L	L	N	N	N
Other Industrial Organics	N	N	L	L	N	N	N
Metals	N	N	N (L)	N (L)	N	N	N
Nitrates	N	N	L	L	N	N	L
Phosphorus	N	N	L	L	L	L	M (H)
Sediments/Turbidity	N	N	L	L	M	M	H
Protozoa	L	L	L (M)	L (M)	L	L	M (H)
Enteric Bacteria	L	L	L (M)	L (M)	L	L	M (H)
Enteric Viruses	L	L	L (M)	L (M)	L	L	M (H)
Cations/Anions (Salts, Sulfate)	N	N	L	L	L	L	L
Industrial Radionuclides	N	N	N	N	N	N	N
Disinfection Byproduct Precursors	N (L)	N (L)	L (M)	L (M)	N	N	L (M)

**Definitions:**

**Negligible (N):** Land use type results in minimal, if any, presence of the contaminant category.

**Low (L):** Land use type results in detections that are expected to be rare and, if detected, contaminant concentrations are expected to be below levels of concern for drinking water.

**Medium (M):** Land use type results in detections that are expected to be uncommon but, if detected, contaminant concentrations could be expected to be at or above levels of concern for drinking water.

**High (H):** Land use type results in detections that may occur frequently at levels of concern for drinking water.

**Notes:**

When two ratings are given, the rating in the parentheses "(" is considered to reflect the worse case scenario, and the rating not in the parentheses is considered to be the more common situation.

**Table 6 - Potential for Ground Water Contamination from Discrete Sources**

Contaminant Category	Discrete Sources							CERCLIS
	TRI Facilities	Solid Waste Sites	WWTPs	Other SPDES Facilities	Bulk Storage Facilities	Petroleum Spills	Hazmat Spills	
Halogenated Solvents	P	P	P	P	P	NP	P	P
Petroleum Products	P	P	P	P	P	P	P	P
Pesticides/Herbicides	P	P	P	P	P	NP	P	P
Other Industrial Organics	P	P	P	P	P	NP	P	P
Metals	P	P	P	P	P	NP	P	P
Nitrates	P	P	P	P	P	NP	P	P
Phosphorus	P	P	P	P	P	NP	P	P
Sediments/Turbidity	NP	NP	NP	NP	NP	NP	NP	NP
Protozoa	NP	P	P	P	NP	NP	NP	NP
Enteric Bacteria	NP	P	P	P	NP	NP	NP	NP
Enteric Viruses	NP	P	P	P	NP	NP	NP	NP
Cations/Anions (Salts, Sulfate)	P	P	P	P	P	NP	P	NP
Industrial Radionuclides	P	P	P	P	P	NP	P	P
Disinfection Byproduct Precursors	P	P	P	P	P	NP	P	P

**Definitions**

**Possible (P):** Potential contamination source is considered a possible source of the contaminant category, irrespective of aquifer or watershed characteristics

**Not Probable (NP):** Potential contamination source is not considered a probable source of the contaminant category, irrespective of aquifer or watershed characteristics

**Table 7 - Potential for Surface Water Contamination from Discrete Sources**

Contaminant Category	Discrete Sources							CERCLIS
	TRI Facilities	Solid Waste Sites	WWTPs	Other SPDES Facilities	Bulk Storage Facilities	Petroleum Spills	Hazmat Spills	
Halogenated Solvents	P	P	P	P	P	NP	P	P
Petroleum Products	P	P	P	P	P	P	P	P
Pesticides/Herbicides	P	P	P	P	P	NP	P	P
Other Industrial Organics	P	P	P	P	P	NP	P	P
Metals	P	P	P	P	P	P	P	P
Nitrates	P	P	P	P	P	NP	P	P
Phosphorus	P	P	P	P	P	NP	P	P
Sediments/Turbidity	P	P	P	P	P	P	P	P
Protozoa	NP	P	P	P	NP	NP	P	NP
Enteric Bacteria	NP	P	P	P	NP	NP	P	NP
Enteric Viruses	NP	P	P	P	NP	NP	P	NP
Cations/Anions (Salts, Sulfate)	P	P	P	P	P	NP	P	P
Industrial Radionuclides	P	P	P	P	P	NP	P	P
Disinfection Byproduct Precursors	P	P	P	P	P	NP	P	P

**Definitions**

**Possible (P):** Potential contamination source is considered a possible source of the contaminant category, irrespective of aquifer or watershed characteristics

**Not Probable (NP):** Potential contamination source is not considered a probable source of the contaminant category, irrespective of aquifer or watershed characteristics

<b>Table 8 - Evaluation of Contaminant Prevalence Associated with Mapped Land Cover for a Particular Contaminant</b>				
	Land Cover with Contaminant Category Rated "Medium"		Land Cover with Contaminant Category Rated "High"	
	Susceptibility Zone 1	Susceptibility Zone 2	Susceptibility Zone 1	Susceptibility Zone 2
<b>P e r c e n t  L a n d  C o v e r</b>	100%	<b>Medium</b>	<b>Medium</b>	<b>High</b>
	75 %			<b>High</b>
	50%	<b>Low</b>	<b>Medium</b>	<b>Medium</b>
	40%			<b>Medium</b>
	30%	<b>Low</b>	<b>Medium</b>	<b>Medium</b>
	20%			
	10%			
	5%	<b>Low</b>	<b>Low</b>	<b>Low</b>

<b>Table 9 - Evaluation of Contaminant Prevalence Associated with Discrete Potential Sources of Contamination</b>		
<b>Characteristics of Contaminant Source</b>	<b>Location of Discrete Contaminant Source Relative to PWS Source</b>	
	<b>Susceptibility Zone 1</b>	<b>Susceptibility Zone 2</b>
<b>Major</b>	<b>High</b>	<b>Medium</b>
<b>Minor</b>	<b>Medium</b>	<b>Low</b>
<b>None Present</b>	<b>Negligible</b>	

<b>Table 10 - General Description of Susceptibility Zones</b>		
	<b>Susceptibility Zone 1 (more hydrologically connected zone)</b>	<b>Susceptibility Zone 2 (broader area of contribution)</b>
<b>Ground Water</b>		
Wells (unless known to be remotely recharged)	Inner well zone (see Section 4.2.2)	Outer well zone (see Section 4.2.2)
Remotely recharged wells	If available, hydrologically established recharge area or best estimate of remote recharge area based on available information	To be determined based on available information
Springs	Topographic catchment area	To be determined based on available information
<b>Surface Water</b>		
Surface water sources with significant travel times	Catchment areas within the immediate vicinity of the intake	Remainder of watershed
Other surface water sources	Entire watershed	Not applicable

## References

## References

New York State Department of Environmental Conservation. *New York State Wellhead Protection Program* (submittal to United States Environmental Protection Agency), September 1990.

New York State Department of Health. *Final Intended Use Plan - Drinking Water State Revolving Fund*, October 22, 1997.

New York State Department of Health, Center for Environmental Health. *Technical Reference; Item No. PWS184; Guidance for Conducting Sanitary Surveys* (7/20/93).

New York State Department of Health, Center for Environmental Health. *Technical Reference; Item No. PWS72; Determining Vulnerability to Contamination by Volatile Organic Chemicals* (6/25/90).

United States Environmental Protection Agency, Office of Water. *State Source Water Assessment and Protection Programs - Final Guidance* (EPA816-R-97-009), August 1997.

**Appendices**

**Appendix A**  
**Listing of Local and State Health Department Offices**



**Listing of Local and State Health Department Offices**

County Health Departments		
County	Address	Phone
Albany	S. Ferry & Green Streets, Albany, NY 12201	518/447-4620
Allegany	Court House, Belmont, NY 14813	716/268-9254
Broome	1 Wall Street, Binghamton, NY 13901-2795	607/778-2887
Cattaraugus	1701 Lincoln Ave., Suite 4010, Olean, NY 14760	716/373-8050
Cayuga	PO Box 219, 160 Genesee St., Auburn, NY 13021	315/253-1405
Chautauqua	Health & Social Services Bldg., Mayville, NY 14757	716/753-4481
Chemung	103 Washington St., PO Box 588, Elmira, NY 14902	607/737-2019
Chenango	County Office Bldg., Norwich, NY 13815	607/337-1673
Clinton	133 Margaret Street, Plattsburgh, NY 12901	518/565-4870
Columbia	71 North Third St., Hudson, NY 12534	518/828-3358
Cortland	PO Box 5590, 60 Central Ave., Cortland, NY 13045	607/753-5035
Dutchess	County Office Bldg., 387 Main Mall, Poughkeepsie, NY 12601	914/486-3472
Erie	Rath Office Bldg., 95 Franklin St., Buffalo, NY 14202	716/858-7677
Genesee	3837 W. Main Street, Batavia, NY 14020	716/344-8506
Livingston	2 County Campus, Mt. Morris, NY 14510	716/243-7280
Madison	County Office Bldg., Wampsville, NY 13163	315/366-2526
Monroe	111 Westfall Road, Rochester, NY 14692	716/274-6067
Nassau	240 Old County Road, Mineola, NY 11501	516/571-3691
Niagara	Shaw Bldg., 5467 Upper Mountain Rd., Lockport, NY 14094	716/439-7444
Oneida	520 Seneca Street, Utica, NY 13502	315/798-5064
Onondaga	PO Box 15190, Syracuse, NY 13215-0190	315/435-6623
Orange	124 Main St., Goshen, NY 10924	914/291-2332
Orleans	14012 Rt. 31 West, Albion, NY 14411	716/589-3251
Oswego	70 Brunner Street, Oswego, NY 13126	315/349-3567
Putnam	4 Geneva Road, Brewster, NY 10509-9809	914/278-6130

**Listing of Local and State Health Department Offices**

County Health Departments (continued)			
County	Address	Phone	
Rensselaer	1600 Seventh Ave., Troy, NY 12180	518/270-2664	
Rockland	Sanatorium Road, Pomona, NY 10970	914/364-2609	
Schenectady	107 Nott Terrace, Suite 306, Schenectady, NY 12308-3170	518/386-2818	
Schoharie	PO Box 667, 342 Main Street, Schoharie, NY 12157	518/295-8382	
Seneca	31 Thurber Drive, Waterloo, NY 13165	315/539-5331	
Suffolk	415 Oser Avenue, Suite 3, Hauppauge, NY 11788	516/853-2251	
Tioga	231 Main Street, Owego, NY 13827	607/687-8566	
Tompkins	401 Harris B. Dates Drive, Ithaca, NY 14850	607/274-6688	
Ulster	300 Flatbush Ave., PO Box 1800, Kingston, NY 12401	914/340-3010	
Westchester	145 Huguenot Street, New Rochelle, NY 10801	914/637-4901	
Wyoming	338 North Main Street, Warsaw, NY 14569	716/786-8894	
New York City Health Departments			
New York	125 Worth Street, New York, NY 10013	212/788-4646	
New York	2 Lafayette Street, 11 <sup>th</sup> Floor, New York, NY 10013	212/676-1520	
New York State Department of Health			
Albany	Center for Environmental Health 2 University Place Albany, NY 12203	518/458-6400 or 800-458-1158	
District Offices			
Counties	State District Offices	Address	Phone
St. Lawrence	Canton	58 Gouverneur Street Canton, NY 13617-3200	315/386-1040
Ontario, Wayne, Yates	Geneva	624 Pre-Emption Road Geneva, NY 14456-1334	315/789-3030
Saratoga, Warren, Washington	Glens Falls	77 Mohican Street Glens Falls, NY 12801-4429	518/793-3893
Fulton, Herkimer, Montgomery	Herkimer	5665 State Rt. 5 Herkimer, NY 13350	315/866-6879

**Listing of Local and State Health Department Offices**

District Offices			
Counties	State District Offices	Address	Phone
Schuyler, Steuben	Hornell	107 Broadway Hornell, NY 14843-0430	607/324-8371
Sullivan	Monticello	50 North Street, Suite 2 Monticello, NY 12701-1171	914/794-2045
Delaware, Greene, Otsego	Oneonta	28 Hill Street, Suite 201 Oneonta, NY 13820-9804	607/432-3911
Essex, Franklin, Hamilton	Saranac Lake	11-15 St. Bernard Street Saranac Lake, NY 12983-1839	518/891-1800
Jefferson, Lewis	Watertown	317 Washington Street Watertown, NY 13601-3741	315/785-2277
State Regional Offices			
Western (2 offices)	584 Delaware Ave., Buffalo, NY 14202		716/847-4530
	Bevier Bldg., 42 S. Washington Street, Rochester, NY 14608		716/423-8069
Metropolitan	5 Penn Plaza, 4 <sup>th</sup> Floor, New York, NY 10001-1800		212/613-2442
Capital	2 University Place, Rm. 410, Albany, NY 12203		518/458-6731 or 458-6445
State Field Offices			
Syracuse	217 South Salina Street, 3 <sup>rd</sup> Floor, Syracuse, NY 13202		315/426-7608

**Appendix B**  
**Public Participation Plan**

**Source Water Assessment Program  
Public Participation Plan for Development of  
the Source Water Assessment Program Plan**

**Final**

- 1. Wellhead Protection Coordinating Committee Video Conference**  
**Purpose:** Meet with the committee to talk about the Source Water Assessment Program, the Source Water Assessment Program public participation plan and the idea of a focus group meeting(s).  
**Completed:** May 22, 1997
- 2. County and District Health Departments' Conference**  
**Purpose:** Meet with the city, county and district Department of Health (DOH) staff to discuss the Source Water Assessment Program, the Source Water Assessment Program public participation plan and the outcome of the Wellhead Protection Coordinating Committee meeting.  
**Completed:** September 16, 1997
- 3. Focus Group Meetings**  
**Purpose:** To provide the DOH with guidance on who will use the assessments, how they will use them and how the DOH should conduct outreach activities so that we obtain comments from the affected public prior and during the development of the Source Water Assessment Program plan.  
**Completed:** November 19 & 20, 1997
- 4. Convene Source Water Protection Coordinating Committee**  
**Purpose:** The committee's first task is to provide the DOH with input on the Source Water Assessment Program plan development. The committee's membership has a broad based representation. There are five working groups to help develop different sections of the plan. The working groups are: public participation/assessment format; delineation; GIS/data collection; contaminant inventory/significance; and aquifer/watershed and interjurisdictional perspectives. The Committee meets quarterly.  
**Completed:** January 12, April 1, June 10, September 28, and December 10, 1998  
June 8, September 8, 1999
- 4a. Establish and begin discussions with working groups**  
**Purpose:** Each working group will provide the DOH with input on the Source Water Assessment Program plan contents as it pertains to their specific working group topic.  
**Completed:** February 1998

- 4b. Write discussion draft of the Source Water Assessment Program plan.**  
**Completed:** April 1, 1998
- 4c. Set-up Listserve**  
**Purpose:** Provide participants of the Source Water Protection Coordinating Committee and affiliated working group members with an avenue to exchange information regarding source water assessment and protection.  
**Completed:** April 7, 1998
- 4d. Consult with Source Water Protection Coordinating Committee and review initial draft of the Source Water Assessment Program plan.**  
**Completed:** April 17, 1998
- 5. Put Source Water Assessment Program information on NYS DOH Web Site**  
**Purpose:** Provide citizens with access to information about the Source Water Assessment Program and a mechanism to ask the NYS DOH questions about the program.  
**Completed:** September 10, 1998
- 6. Work with County Water Quality Coordinating Committees**  
**Purpose:** Involve active local entities in the development of the Source Water Assessment Program Plan.
- 6a. NYS Soil & Water Committee Water Quality Symposium**  
**Purpose:** Conducted a session at the symposium to inform and educate local groups that we would like to work with at the local level. The session covered: overview of Source Water Assessment Program, historical perspective, state and local approach to Source Water Assessment Program and how the public can be involved.  
**Completed:** March 5, 1998
- 6b. Cornell Cooperative Extension Source Water Assessment Program Satellite Telecast**  
**Purpose:** Provide local interested parties information about the Source Water Assessment Program, how they can be involved in developing the program plan and receive feedback on specific planning questions. Downlinks of the broadcast in almost each county with meetings on the Source Water Assessment Program held in conjunction with the broadcasts. Provided each facilitator with a packet of information to help support setting up, holding and running these meetings. Provided multiple copies of fact sheets, public summaries of the plan and questions to guide the meeting discussion.  
**Completed:** June 16, 1998
- 6c. Update of County Water Quality Strategies**  
**Purpose:** Integrate the Source Water Assessment Program into each County's Water Quality Strategy Document.  
**Ongoing**
- 6d. Review responses from the meetings held in conjunction with the satellite broadcast.**  
**Completed:** August 1998
- 7. Distribute a draft of the Source Water Assessment Program plan to workshop attendees.**  
**Purpose:** Distribute the draft and an overview of the workshop questions to prepare people for the workshops.  
**Completed:** August 26, 1998
- 8. Hold Regional Workshops**  
**Purpose:** Refine draft plan and gather comments from different areas of the state on issues related to implementing the Source Water Assessment Program.  
**Completed:** September 10, 14, 18, 22 & 23, 1998
- 9. Distribute public comment draft of the Source Water Assessment Program plan .**  
**Purpose:** As required in the Safe Drinking Water Act, the Source Water Assessment Program plan will go through a public review and comment period.  
**Completed:** November 10 - December 18, 1998
- 9a. Hold public hearings on the plan.**  
**Purpose:** As required in the Safe Drinking Water Act, public hearings were held for the Source Water Assessment Plan.  
**Completed:** November 23, December 1 & 3, 1998
- 9b. Prepare a responsiveness summary**  
**Purpose:** Address the comments that were received from the public on the draft plan.  
**Completed:** February 6, 1999
- 9c. Revise document**  
**Purpose:** Based on the comments received during the public comment period, the draft plan was revised as necessary.  
**Completed:** February 6, 1999
- 10. Submit plan to the Environmental Protection Agency.**  
**Completed:** February 4, 1999
- 10a. Revise draft as needed**  
**Purpose:** To address significant EPA review comments as appropriate.
- 10b. Receive EPA approval of plan**  
**Completed:** November 6, 1999

**Appendix C**

**List of Source Water Protection Coordinating  
Committee Members**

## LIST OF SOURCE WATER PROTECTION COORDINATING COMMITTEE MEMBERS

Name	Affiliation	Committee Member, Alternate or Working Group Member*
Albeck, Dale	Broome County Health Department	Working Group Member
Ash, Albert	NYS Department of Environmental Conservation	Working Group Member
Babbitt Myers, Kyle	Cornell Cooperative Extension of Sullivan County	Working Group Member
Babcock, Kirk	Miller Environmental Group	Working Group Member
Banks, Eric	Southern Tier AIDS Program Inc.	SWPCC Alternate
Boria, William	Chautauqua County Health Department	Working Group Member
Breiten, Jessica	Herkimer-Oneida Regional Planning	Working Group Member
Brink, Ron	Broome County Health Department	Working Group Member
Brown, Diane	Southern Tier AIDS Program	SWPCC Member
Brown, Craig	U.S. Geological Survey	Working Group Member
Burns, Laurie	Council of Community Services	SWPCC Member
Cavalcoli, Mona	NY Section American Water Works Association	Working Group Member
Chartier, Gerry	NYS Environmental Facilities Corp.	SWPCC Member
Church, David	NY Planning Federation	SWPCC Member
Denz, Robert	Conference of Environmental Health Directors	SWPCC Member
DePinto, Joe	Great Lakes Program	Working Group Member
Dirlam, H. Kier	Southern Tier West Regional Planning & Dev. Board	SWPCC Alternate
DiTella, Katrie	TXA Water Quality Program	Working Group Member
DuBois, Marilyn	Leg. Comm. on Toxic Substances & Hazardous Waste	SWPCC Alternate
Eckhardt, David	U.S. Geological Survey	Working Group Member
Esser, Anthony	U.S. Department of Agriculture (NRCS)	Working Group Member
Fais, Jennifer	Southern Tier Central Regional Planning & Development	SWPCC Alternate
Ferrara, Rocco	Capital District Regional Planning Commission	SWPCC Alternate
Ford, Libby	NY Water Environment Organization	SWPCC Member
Fullmer, Jeff	Citizens Campaign for the Environment	Working Group Member
Garry, James	NYS Department of Environmental Conservation	Working Group Member
Gilberto, Donna	NYS Conference of Mayors & Municipal Officials	SWPCC Member
Goodale, Bruce	Rural Community Assistance Program	SWPCC Member
Grantham, Deborah	Cornell University	Working Group Member
Guerin, Thomas	NYS Association of County Health Officials	SWPCC Member
Hanle Younge, Lee	NYS Association of Environmental Mgmt Council	SWPCC Member
Hayes, Gary	NYS Association of Regional Councils (NYSARC)	SWPCC Member
Heinz, Erica	Leg. Comm. on Toxic Substances & Hazardous Waste	SWPCC Member
Heminway, Diane	Citizens Environmental Coalition	SWPCC Alternate
Hinchcliff, Diana	Alliance of Chemical Industries of NYS	SWPCC Member
Hoffman, Rick	NYS Department of State	Working Group Member
Hoxsie, Ed	Dutchess County Soil and Water Conservation District	Working Group Member
Hullar, Ted	Cornell Center for the Environment	SWPCC Member
Jones, Barbara	Council of Community Services of NYS, Inc.	SWPCC Alternate
Karimipour, Shohreh	NYS Department of Environmental Conservation	Working Group Member
Kauffman, Kevin	Intermunicipal Water Commission	Working Group Member
Kay, David	Upstate Chapter - American Planning Association	SWPCC Member
Kendall, Dan	NYS Department of Environmental Conservation	Working Group Member
Kendall, Barbara	Local Cornell Cooperative Extension Agents	SWPCC Member
Kepple, Dan	Federation of Lake Association	SWPCC Member
Landre, Betsy	Finger Lakes-Lake Ontario Watershed Protection Alliance	SWPCC Member
Lee, Cara	Scenic Hudson	SWPCC Member
Letourneau, Patrick	AIDS Network of Western New York Inc.	SWPCC Member
Lewis, Rich	NYS Soil and Water Conservation Committee	SWPCC Alternate
Lubin, Rebecca	NY Planning Federation	SWPCC Alternate
MacBeth, Lee	City of Syracuse Water District	Working Group Member
Mapstone, Greg	Ulster County Health Department	Working Group Member
Markussen, Ken	NYS Department of Environmental Conservation	Working Group Member
McCardell, Jim	NYS Soil and Water Conservation Committee	SWPCC Member
Medd, David	NY Water American Water Company	SWPCC Member

LIST OF SOURCE WATER PROTECTION COORDINATING COMMITTEE MEMBERS

Name	Affiliation	Committee Member, Alternate or Working Group Member*
Medovich, Mike	Southern Tier East Regional Planning Development Board	SWPCC Alternate
Meyland, Sarah	Citizens Campaign for the Environment	SWPCC Member
Miklasz, Cally	NYS Soil and Water Conservation Committee	Working Group Member
Miller, David	Rural Utilities Service	Working Group Member
Miller, Todd	U.S. Geological Survey	SWPCC Alternate
Milligan, Michael	State University of New York - Fredonia	SWPCC Alternate
Mirando, John	Long Island Water Corporation	SWPCC Member
Mithen, Lori	Association of Towns of the State of New York	SWPCC Member
Moore, L. Grady	U.S. Geological Survey	SWPCC Member
Morse, Rick	Legislative Commission on Water	SWPCC Alternate
O'Mally, Pam	NYS Association of Regional Councils	Working Group Member
O'Neil, Charles	New York Sea Grant	SWPCC Member
Ortiz, Lisa	Long Island Water Corporation	SWPCC Alternate
Ossont, Jack	Citizens Environmental Coalition	SWPCC Member
Pacenka, Steve	Water Resources Institute - Cornell University	Working Group Member
Patterson, Joseph	Herkimer-Oneida Regional Planning	Working Group Member
Pike, Howard	NYS Department of Environmental Conservation	Working Group Member
Pokalsky, Kenneth	Business Council of NYS	SWPCC Member
Porter, Mary Jane	NYS Water Resources Institute	Working Group Member
Porter, Keith	NYS Water Resources Institute	Working Group Member
Posten, Steve	NYS Chemical Alliance	Working Group Member
Rabe, Ann	Citizen's Environmental Coalition	SWPCC Member
Rice, Gary	Tioga County Health Department	SWPCC Alternate
Robbins, Sy	Suffolk County Department of Health	Working Group Member
Rowe, Don	New York State Association of County Health Officials	Working Group Member
Rynkiewicz, Peter	Cortland County Health Department	Working Group Member
Scalera, Pat	NY Rural Water Association	Working Group Member
Schranz, Brian	Southern Tier West	Working Group Member
Silberstein, Barry	NYS Chemical Alliance	Working Group Member
Simroe, Theodore	New York City Department of Environmental Protection	SWPCC Member
Skaley, James	Tompkins County Planning Department	Working Group Member
Smith, Steve	Cornell University GIS Program Leader	Working Group Member
Smith, Kevin	Tug Hill Commission	SWPCC Member
Smith, Libby	NYS Department of Environmental Conservation	Working Group Member
Soderberg, John	Farrell, Fitz, Caemmerer, Cleary, Barnosky	SWPCC Member
Squires, Joy	Statewide Association of Citizen Advisory Council	SWPCC Member
Stack, Keith	NYS Department of State	SWPCC Member
Stallman, Claudia	NYS Association of Environmental Mgmt. Council	SWPCC Alternate
Stewart, Kyle	NY Farm Bureau	SWPCC Member
Stoner, Scott	NYS Department of Environmental Conservation	Working Group Member
Swenson, Richard	U.S. Department of Agriculture (NRCS)	SWPCC Member
Their, Audrey	Environmental Associates	Working Group Member
Vahue, David	NYS Rural Development Council	SWPCC Member
Wagenet, Linda	Cornell University	Working Group Member
Waivada, Teri	Hudson Valley Regional Council	SWPCC Alternate
Waldron, Steve	Central New York Health Systems Agency, Inc.	SWPCC Member
Washington, Val	Environmental Advocates	SWPCC Member
Webb, William	Northeast Rural Community Assistance Program	SWPCC Alternate
Whalen, Mildred	League of Women Voters of NY State	SWPCC Member
Williamson, Karen	NYS Soil and Water Conservation Committee	Working Group Member
Wilson, Mike	State University of New York - Fredonia	SWPCC Member
Winkley, Steven	NY Rural Water Association	SWPCC Member
Young, Walter	Lake Champlain-Lake George Regional Planning	SWPCC Alternate
Zimmerman, Rich	NY Farm Bureau	SWPCC Alternate
Zorn, David	Genesee/Finger Lakes Regional Planning Council	Working Group Member

\*Some members are on the Coordinating Committee and a working group. In these cases the member will only be identified as being a member (or alternate) on the Coordinating Committee.

**Appendix D**  
**New York State Department of Health Technical References**



NEW YORK STATE DEPARTMENT OF HEALTH OFFICE OF PUBLIC HEALTH  CENTER FOR ENVIRONMENTAL HEALTH  TECHNICAL REFERENCE	ITEM NO: PWS 72      DATE: 6/25/90  SUBJECT: Determining Vulnerability To Contamination By Volatile Organic Chemicals  Page 1 of 11
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#### DEFINITION

Volatile organic chemicals (VOCs) as used in this manual item are vinyl chloride and the 52 Principal Organic Contaminants (POCs) that are listed on Table 9A of Part 5.

#### POLICY

It is the policy of the New York State Department of Health (NYSDOH) to conform with U. S. Environmental Protection Agency (EPA) "Guidance to Determine Vulnerability of Public Water Systems to Contamination by VOCs", published November 13, 1985. Consequently, COMMUNITY WATER SYSTEMS SERVING POPULATIONS OF 3300 OR MORE ARE CONSIDERED VULNERABLE. It is also NYSDOH policy that nontransient noncommunity (NTNC) systems serving populations of 3300 or more are considered vulnerable. Also, sources at which VOCs have been detected are considered vulnerable.

As required by Part 5, Table 9, the State or Local Health Department (LHD) must determine that a source of water supply is invulnerable to contamination in order to reduce VOC monitoring requirements for systems with 150 or more service connections. It is NYSDOH policy not to reduce the initial monitoring requirement from four quarters for surface water sources, except as noted below in this section.

NYSDOH policy requires that the LHD determine the vulnerability of sources for those community and NTNC systems with fewer than 150 service connections in order to increase the initial and repeat monitoring of these systems where required.

Those systems serving fewer than both 25 persons and 15 service connections are not covered by EPA regulations. NYSDOH policy is that these systems are invulnerable to VOC contamination, unless the LHD makes a special determination that the system is vulnerable. Thus, these systems need collect only one initial sample even for surface sources. If the LHD suspects an unusually high vulnerability for one of these systems, the LHD should contact the Bureau of Public Water Supply Protection to arrange for surveillance sampling.

Attachment 1 summarizes the need to determine vulnerability and the dates by which these determinations should be made. For systems using groundwater sources with fewer than 150 service connections, the LHD should determine vulnerability by September 30 of the year prior to the scheduled initial monitoring. Vulnerable systems should then be notified that they must monitor for four quarters during the scheduled initial year, that is 1991 for community and 1992 for NTNC systems, respectively.

NEW YORK STATE DEPARTMENT OF HEALTH OFFICE OF PUBLIC HEALTH  CENTER FOR ENVIRONMENTAL HEALTH  TECHNICAL REFERENCE	ITEM NO: PWS 72      DATE: 6/25/90
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NYSDOH policy requires all determinations of invulnerability to be based on a field survey of the watershed or recharge area. The LHD resources devoted to making a determination of invulnerability should be commensurate with the avoided cost of additional VOC monitoring, usually about \$200 per analysis. However, review of vulnerability factors and field surveys could have the added benefit of contributing to the overall awareness of the need for source protection, and occasionally discover previously unknown VOC contamination before it affects a source of water supply. The vulnerability analysis will also provide useful information for the development of Watershed Rules and Regulations. The Statewide Water Resources Management Strategy strongly recommends adoption of Watershed Rules and Regulations for each public water system.

The vulnerability of all systems with surface water sources determined to be invulnerable must be periodically reviewed. The LHD must review vulnerability of those systems with 500 or more services every three years and those systems with fewer than 500 services every five years, or when an obvious change that affects vulnerability occurs.

#### VULNERABILITY FACTORS

The State and EPA's evaluation of available occurrence data has shown that no single factor can perfectly predict the presence or absence of VOCs in a water supply. However, size and proximity of a water source to VOC use increases the probability of contamination. If VOCs have been detected in the water source from previous monitoring, the source is considered vulnerable.

In Part 5, footnote 12 to Table 9 lists five factors that must be considered by the State or LHD in determining the vulnerability of a source of water supply to contamination by VOCs. Each of these five factors are discussed in a separate section below.

#### 1. Previous monitoring results

As stated above, a source where VOCs have been detected is considered to be vulnerable. Detections of VOCs in other sources in the same water system or in the distribution system also strongly suggest that each source would be vulnerable, although the remaining four factors discussed below may be considered. VOC detections in the upgradient ground or surface water also indicate vulnerability as discussed in the subsection below on Proximity to VOC use, etc.

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It is more difficult to use the lack of detection to demonstrate an absence of vulnerability. Source-specific monitoring data would carry the most weight, provided that the monitoring was representative of current conditions and was properly performed. Monitoring which meets Part 5 requirements for method, analytes, detection limit and approved laboratory is most acceptable. Previous monitoring which meets the criteria discussed in Technical Reference PWS 70, Monitoring for Volatile Organic Chemicals, may also be considered. Monitoring should cover a range of hydrological conditions. For example, a well should be monitored during both the low groundwater periods, usually during autumn and winter, and high groundwater, usually in the spring.

Distribution system monitoring such as that done by the State for the "Report of Statewide Surveillance of Organic Compounds In Selected Community Water Systems" (Phases 1, 2 and 3) may be used if it is likely that the distribution system water is representative of a particular source or sources. Important considerations would be a predominant use of a particular source, configuration of the distribution system or a proximity of sources that would indicate similar vulnerability.

Likewise, monitoring data from nearby wells can be used if it was obtained within five years of when the source is to be monitored and it represents the upgradient groundwater to the source for which the vulnerability determination is being made. The monitoring data should be from wells within the cone of influence of the well under review and screened at a similar depth or aquifer stratum. Monitoring of ambient surface water or of public water systems using the same surface water source can be used as long as it was completed within three years of when the source is to be monitored and the previous monitoring is representative of seasonal changes. The location of the previous monitoring must also be subject to the same overall vulnerability determination as the source under review. Previous monitoring results are more applicable for determining the vulnerability of reservoirs and lakes than of rivers.

#### 2. Number of persons served by the public water system

The number of persons served by the water system has been strongly linked to the occurrence of VOC contamination in many drinking water supplies. All community and NTNC systems serving 3300 or more persons are considered by definition vulnerable to VOC contamination.

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Smaller systems are seen to be less vulnerable to contamination since the sources for these systems generally are remote, less susceptible to changing conditions and have smaller watersheds. Monitoring evidence has confirmed this. State surveys show that 23 percent of public water supplies serving over 3300 population have detectable VOCs, whereas only 11 percent of those systems serving fewer than 500 persons have detectable VOCs.

3. Proximity of a smaller system to a larger system

Proximity of a smaller system to a larger system or community may increase the vulnerability of the smaller system, because nearby discharges into surface waters or into groundwater recharge areas can contaminate the source of drinking water. Proximity to large urban industrial and commercial areas also increases the possibility that improper waste disposal could contaminate local drinking water sources with VOCs.

Proximity of a surface water source to a large community can be defined in terms of the flow rates between the community and the monitoring point. Proximity is harder to define for groundwater systems, although it may be possible to roughly estimate the hydraulic gradients and travel times between a well and the large community. A more thorough discussion of proximity is presented in the section titled, DETERMINING PROXIMITY TO SOURCE.

Proximity to a large community can also be defined statistically, by means of Standard Metropolitan Statistical Areas. The State or LHD may also categorically declare all systems within a certain jurisdiction to be vulnerable because of its population or general state of development, for example a county with a population greater than 150,000 or a town with a population of over 10,000.

4. Proximity to VOC use, etc.

The watershed area or the groundwater recharge basin tributary to a well should be surveyed for nearby commercial or industrial use, disposal or storage of VOCs. A hierarchy of use can be established for a watershed area or groundwater basin.

- High volume VOC uses include:
- metal fabricators,
- solvent producers,

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- refineries,
- petroleum or solvent bulk storage facilities,
- electroplating plants,
- airfields,
- military bases,
- hazardous waste (Superfund) sites, and
- contaminated wells.

Any of the high volume VOC uses are indicators of the potential for significant presence of VOCs in or near drinking water sources.

Low volume VOC use can also indicate some potential for VOC contamination. Low volume uses include:

- electronic component processors,
- dry cleaners,
- sanitary landfills, dumps and junkyards,
- small commercial users such as print shops, and
- gasoline stations and vehicle-servicing facilities.

The Department of Environmental Conservation (DEC) in regulating discharges, maintains an Industrial Chemical Survey which has useful information on use, storage and disposal of VOCs. DEC also maintains a computerized data base on spills and registration of petroleum and chemical storage facilities.

Other potential sources of VOCs less apparent are buried fuel tanks at homes or farms, and subsurface wastewater disposal systems. Certain VOCs, such as trichloroethylene, have been used for degreasing septic systems. Subsurface wastewater disposal systems also represent a concealed point of VOC contamination to the ground water.

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Because of the high probability of VOC use in close proximity, wells serving certain NTNCs systems should be considered vulnerable. These vulnerable NTNCs include:

- any industrial facility,
- shopping centers or commercial buildings with dry cleaners, or print shops, and
- highway rest areas with automotive service facilities.

#### 5. Protection of water source

The source may be protected by natural factors or legal controls. To offer protection, Watershed Rules and Regulations must be modern enough to control VOC uses, and the rules must be enforced. Some watersheds are protected by strict access and land use laws.

Ground water sources can be protected naturally by geological formations above the aquifer that are impermeable to VOCs used or stored near the surface. However even geologically invulnerable formations can be polluted by improper well construction or discharges into existing wells. Modern Watershed Rules that employ the three-zone concept to control VOC uses would also be effective, but it is unlikely they exist for the smallest systems that would be reviewed for vulnerability.

To conclude that a natural hydraulic barrier protects a well in a confined aquifer, adequate records on well construction must demonstrate that it is properly cased and sealed through the strata above the aquifer. Lack of well records would suggest the possibility of the well being vulnerable.

Rating the vulnerability of ground water systems will often require simultaneously considering aquifer protection and nearby use of VOCs. It is important to characterize the recharge areas by:

- locating all industrial, commercial or municipal facilities that handle wastes or use solvents,
- identifying geological materials that are porous, fractured or have solution openings near VOC uses that overlap the cones of influence of drinking water wells, and
- locating abandoned wells. Abandonment may indicate faulty well construction, an opportunity for improper dumping, or the existence of a contaminated well.

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#### DETERMINING PROXIMITY TO SOURCE

The approach to assessing proximity should depend on the type of water source. The recommended approach for five types of source are discussed below.

##### 1. Wells

Ideally, the area of proximity would be based on a hydrogeological assessment of the wellhead recharge area extending upgradient from the well for an estimated groundwater travel time of five years. It is unlikely, however, that the field-verified information necessary to assess the area and travel time are available for most small water systems. General aquifer mapping exists for the primary aquifers, but by definition the primary aquifers serve large populations, so the primary aquifers are probably located in vulnerable areas.

A simplified, but conservative approach is needed to define proximity for the smallest wells for which there is little hydrogeological information. A rough estimation of the area around a well which could affect it within five years is to equate the total well pumpage during the five years to an imaginary cylinder in the aquifer. Attachment 2 develops the mathematics of this approach. Briefly, the volume of water pumped over five years is the average pumpage multiplied by the five years. The equivalent aquifer volume is the depth of the aquifer multiplied by the area of proximity and the porosity of the aquifer. The depth of the aquifer can be estimated from the length of the well screen. If the natural flow gradient of the aquifer is ignored, the area of proximity can be assumed to be a circle around the well. Solving for the radius of the circle then gives the distance away from the well that should be used for proximity.

This roughly defined area of proximity may suffice for evaluation of vulnerability resulting from low volume VOC uses. The flow gradient of the aquifer should be taken into account for evaluation of the vulnerability from high volume VOC uses. For systems with 150 or more service connections, all upgradient areas should be reviewed for high volume VOC use, unless available hydrogeological information can help to establish the area within a 3-year travel time to the well. For systems with fewer than 150 service connections, review of the area within a semicircle of one-mile radius upgradient of the well should be adequate, unless there is evidence of extremely high groundwater velocities in the aquifer, such as within a fractured bedrock. Attachment 2 graphically depicts these areas.

Other potential contributors to VOC vulnerability such as large septic systems, underground fuel tanks or a large community (3300 population or

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more) should be considered if they appear to be upgradient of the well and within the circle of proximity.

2. Springs

All of the area upgradient of the springs should be reviewed for both high and low volume VOC uses. Any upgradient high volume VOC uses would probably make the spring source vulnerable to contamination. Geological and travel time information, if available, may be used to offset the impact of low volume VOC uses, and large communities located upgradient.

3. Streams and rivers

Any high volume VOC uses or large communities on the watershed of a stream or river makes that source vulnerable to contamination. Travel time and dilution of groundwater base flow with surface runoff may be used to offset the impact of low volume VOC uses on the watershed.

Because of the enormous flow of the St. Lawrence River, the procedure for assessing vulnerability of large lakes and reservoirs described below may be more appropriate for protected intakes on that river.

4. Small lakes and reservoirs

Lakes and reservoirs are considered small in this context if their minimum water retention time is less than three months, derived by dividing the minimum volume by the average flow. VOCs would tend to volatilize from the surface of the reservoir in a matter of weeks, unless inhibited by ice cover so a retention time of three months would be a conservative protective barrier.

Any high volume VOC uses or large communities on the watershed would make the source vulnerable. Travel time, dilution, retention time and other hydrologic factors may be used to offset the impact of low volume VOC uses on the watershed.

5. Large lakes and reservoirs

If no high volume VOC uses or large communities are located within five miles of the intake, and no low volume VOC uses within one mile, the source may be considered as invulnerable to VOC contamination. If VOC uses are located within those distances, travel time and other hydrologic factors may be used to offset the vulnerability.

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VULNERABILITY ANALYSIS

Rating vulnerability factors

In general, some of the vulnerability factors carry more weight than others. Some of the factors also act to mitigate other vulnerability factors. The various factors are rated as:

1. Factors that by policy define a source as vulnerable:
  - a. population of 3300 or more, or
  - b. previous detection of VOCs in the source;
2. Factors indicating that a source is probably vulnerable:
  - a. detections of VOCs in the distribution system or other sources, or
  - b. proximity to high volume VOC uses, or
  - c. proximity to a large community, or
  - d. close proximity of several low volume VOC users, or septic systems;
3. Factors indicating that the source is possibly vulnerable:
  - a. proximity to limited low volume VOC uses, or
  - b. proximity to septic systems or buried fuel tanks (groundwater only), or
  - c. presence of highly permeable aquifer (groundwater only);
4. Strongly mitigating factors:
  - a. VOCs not detected in more than one source sample, or
  - b. demonstrated hydrogeological barriers for wells, including evidence of proper well construction and absence of discharges to other wells;
5. Other mitigating factors:
  - a. no VOC detections in other sources, the distribution system and ambient sources, or
  - b. appropriate and well-enforced Watershed Rules, or
  - c. other evidence of hydrological barriers.

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Collecting information

The LHD should assemble all available information on the system and sources under review, and document the determination. Attachment 3 is a sample worksheet for the groundwater sources. Attachment 4 is a sample worksheet for surface water sources.

Population and service connection records for the system should be reviewed for accuracy. Recent production records should be obtained for the source. If none are available, estimates should be derived from relative time of use, capacity and population served.

Population of the local municipality, county and other communities should be obtained from census records or county planning estimates.

The LHD should outline the the watershed of small streams, lakes and reservoirs, and the recharge area for groundwater sources on a USGS quadrangle. The LHD should calculate the radius of the area of proximity for wells and include it on the map. The LHD should then review office and DEC records for high and low volume VOC uses in the appropriate areas. The location of any of these VOC uses should be noted on the map.

The LHD should also assemble information on source protection such as Watershed Rules and Regulations if they exist. For a well, construction records, the well log and other geological information should be obtained.

At any point while assembling or reviewing the above information, the LHD may conclude that sufficient reason exists to determine that the source is vulnerable to VOC contamination. The LHD can conclude the process by documenting the reasons.

If the assembled information is equivocal or suggests that the source may be invulnerable, the LHD should survey the appropriate areas. The field survey should include the entire watershed (except for large lakes and the St. Lawrence River) by driving all accessible roads. The surrounding countryside should be observed for VOC uses. An on-site inspection should be done for the area of proximity to wells, noting the location of all structures, septic systems and wells. A detailed map at a more appropriate scale should be prepared. Available aerial photographs at a scale of 1 inch to 200 feet could be a useful base map. Any additional VOC uses and contributing factors should be noted on the maps and worksheet.

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Interpreting vulnerability factors

As noted above, any source with VOC detections or that is in a system with a population of 3300 or more must by policy be determined to be vulnerable. However, factors that indicate that a source is probably or possibly vulnerable may be offset by mitigating factors. More evidence is needed to discount "probable" than "possible" factors. The process of interpreting vulnerability factors should involve professional judgement to weigh the degree of risk associated with the various factors in each particular situation.

For a surface source, initial monitoring may not be reduced, but no detections in the initial monitoring may be cause for classifying the source as invulnerable for repeat monitoring requirements. For certain surface sources, it may be prudent to condition the determination of invulnerability on the continued absence of VOC detections in a sample taken once every three or five years. The sample should represent the most conservative hydrological conditions, such as during winter with low flow and ice cover. For these cases, the LHD would determine that the source was invulnerable, but would require repeat monitoring by State discretion, as described in Technical Reference PWS 70.

REFERENCES

- A. 10 NYCRR, Part 5: Drinking Water Supplies
- B. Environmental Health Manual Item, Technical Reference PWS 70, Monitoring for Volatile Organic Chemicals.
- C. Environmental Health Manual Item, Procedure PWS 100, Adoption of Rules and Regulations for the Protection of Water Supplies.

ATTACHMENT 1

REQUIRED DETERMINATIONS OF VULNERABILITY

System Size Population/Service Connections	Vulnerability Determination	Effect on Required Monitoring	Schedule
Fewer than 3300 persons, and 150 or more services	Optional	Groundwater: reduce initial monitoring if invulnerable  Surface: only reduce repeat monitoring	By mid-1990 to be useful  by 1992 to be useful
25 to 3299 persons, and fewer than 150 services; or fewer than 3300 persons and 15 to 149 services	Required	If groundwater sources are vulnerable, initial monitoring increased to four quarters  If surface sources are vulnerable, repeat monitoring of four quarters every 5 years is required	Groundwater sources in Community systems by 9/30/90  Groundwater sources in NTNC systems by 9/30/91  Surface sources in Community systems by 9/30/95  Surface sources in NTNC systems by 9/30/96
Fewer than 25 persons and fewer than 15 services	As necessary	If unusually vulnerable, contact BPWSP	Anytime

ATTACHMENT 2

DETERMINATION OF VULNERABILITY  
ESTIMATE OF THE AREA OF PROXIMITY TO A WELL

It is possible to equate the volume of water pumped by a well over a given period of time to a portion of aquifer by the expression:

$$\bar{Q} t = p h \pi r^2$$

Where the first term is the volume of pumped water, expressed by,

$\bar{Q}$  is the average pumping rate in cubic feet per year

$t$  is the time in years

The second term is the imaginary cylinder of the aquifer, and is expressed by:

$p$  is the porosity of the aquifer

$h$  is the average depth of the aquifer in feet (can use length of well screen)

$r$  is the radius of the cylinder in feet

Solving for  $r$ , the equation can be rearranged to:

$$r = \sqrt{\frac{\bar{Q} t}{p h \pi}}$$

Substituting in conversion factors so that  $Q$  is expressed in gallons per day and using values of 5 years for time and .15 for porosity, the equation can be further simplified to:

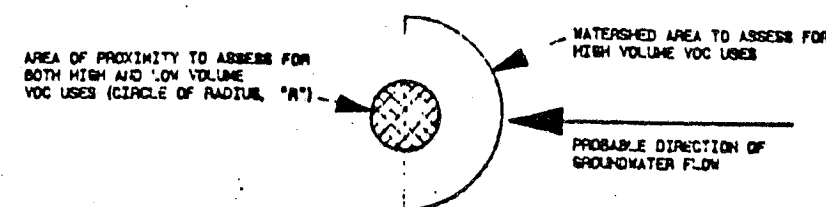
$$r = \sqrt{500 \frac{Q}{h}}$$

The radius,  $r$ , can be used to define proximity for low volume VOC uses. It should be combined with a consideration of upgradient area to assess the impact of high volume VOC uses.

For systems with 150 or more service connections:



For systems with fewer than 150 service connections:



NEW YORK STATE DEPARTMENT OF HEALTH PUBLIC WATER SYSTEM VOC VULNERABILITY DETERMINATION

PROG CODE: \_\_\_\_\_ STATION NO: \_\_\_\_\_ SUPPLY NAME: \_\_\_\_\_  
 COUNTY: \_\_\_\_\_ TYPE CODE: \_\_\_\_\_ LOCATION(C,V,T): \_\_\_\_\_  
 LAST INSP DATE: \_\_\_\_\_ POP'N SERVED: \_\_\_\_\_ NO SERVICES: \_\_\_\_\_  
 SUPPLIERS SERVED: \_\_\_\_\_ AVE DAY PRODN(GPM): \_\_\_\_\_ AVE DAY CONSTN(GPD): \_\_\_\_\_  
 MAX DAY PRODN(GPD): \_\_\_\_\_

SOURCE NO	SOURCE NAME	SAFE YIELD	SOURCE TYPE	TREAT NO	BASIN	LATITUDE	LONGITUDE
_____	_____	_____	_____	_____	_____	_____	_____

LOCAL NAME OF SOURCE, IF DIFFERENT \_\_\_\_\_ STREET ADDRESS(NEAREST ROAD IN RURAL AREA) \_\_\_\_\_  
 SOURCE LOCATED IN:(C,T,V) \_\_\_\_\_ CITY, TOWN, VILLAGE POPULATION: \_\_\_\_\_  
 SOURCE LOCATED IN COUNTY: \_\_\_\_\_ COUNTY POPULATION: \_\_\_\_\_

IS THIS SOURCE LOCATED IN A STANDARD METROPOLITAN STATISTICAL AREA? YES \_\_\_ NO \_\_\_

1. Have VOCs BEEN Detected in this source of water supply?
2. If VOCs were not detected, list monitoring dates:


3. Have VOCs been detected in the distribution system?
4. Have VOCs been detected at nearby wells or sources?

PROXIMITY TO VOC USE

For wells, calculate r to define area of proximity.

5.  $r = \sqrt{500 \frac{Q}{h}}$  =  $\sqrt{500 \times \frac{\text{_____}}{\text{_____}}}$  = \_\_\_\_\_ (feet)

r = radius of proximity (distance in feet from well)  
 Q = average daily pumpage from well in gallons per day  
 n = length of well screen in feet (to approximate average depth of aquifer)

6. Alternative method of determining proximity attached: \_\_\_\_\_
7. What is general direction of groundwater flow? \_\_\_\_\_
8. Are there any high volume VOC users upgradient of well (or spring)?  
 (High volume VOC uses include: metal fabricators, solvent producers, refineries, petroleum or solvent bulk storage facilities, electroplating plants, airfields, military bases, hazardous waste (Superfund) sites, and contaminated wells.)



9. If yes, describe type, direction and distance from well (or spring): \_\_\_\_\_

10. Are there any low volume VOC uses within distance, r, of well (or upgradient of spring)?  
(Low volume VOC uses include: electronic component processors, dry cleaners, other landfills, dumps and junkyards, small commercial users such as print shops, and gasoline stations and vehicle servicing facilities.)

11. If yes, describe type, direction and distance from well (or source) \_\_\_\_\_

12. Were any other conditions observed that could make this source vulnerable to VOCs?

13. If yes, describe: \_\_\_\_\_

14. Date of field survey \_\_\_\_\_ field survey by: name, title \_\_\_\_\_

SOURCE PROTECTION

15. Can adequate hydrogeological barriers be demonstrated?

16. Do other hydrogeological barriers exist?

17. If yes, describe: \_\_\_\_\_

18. Is the source adequately protected by Watershed Rules and Regulations or other land controls?

19. Do records indicate that the well (or spring) was properly constructed and sealed?

20. Can it be shown that the well under review is not adversely affected by abandoned wells?

DETERMINATION

21. Based on the above information, this source of water supply is determined to be \_\_\_\_\_ vulnerable

22. Explanation \_\_\_\_\_ invulnerable

23. Determination by: \_\_\_\_\_ Name, title \_\_\_\_\_ Local Health Unit \_\_\_\_\_ Date \_\_\_\_\_

NEW YORK STATE DEPARTMENT OF HEALTH PUBLIC WATER SYSTEM VOC VULNERABILITY DETERMINATION

PROG CODE: \_\_\_\_\_ STATION NO: \_\_\_\_\_ SUPPLY NAME: \_\_\_\_\_

COUNTY: \_\_\_\_\_ TYPE CODE: \_\_\_\_\_ LOCATION(C,V,T): \_\_\_\_\_

LAST INSP DATE: \_\_\_\_\_ POP'N SERVED: \_\_\_\_\_ NO SERVICES: \_\_\_\_\_

SUPPLIERS SERVED: \_\_\_\_\_ AVE DAY PRODN(GPM): \_\_\_\_\_ AVE DAY CONSPTN(GPD): \_\_\_\_\_

MAX DAY PRODN(GPD): \_\_\_\_\_

SOURCE NO	SOURCE NAME	SAFE YIELD	SOURCE TYPE	TREAT NO	BASIN	LATITUDE	LONGITUDE
_____	_____	_____	_____	_____	_____	_____	_____

LOCAL NAME OF SOURCE, IF DIFFERENT \_\_\_\_\_ STREET ADDRESS(NEAREST ROAD IN RURAL AREA) \_\_\_\_\_

SOURCE LOCATED IN: (C,T,V) \_\_\_\_\_ CITY, TOWN, VILLAGE POPULATION: \_\_\_\_\_

SOURCE LOCATED IN COUNTY: \_\_\_\_\_ COUNTY POPULATION: \_\_\_\_\_

IS THIS SOURCE LOCATED IN A STANDARD METROPOLITAN STATISTICAL AREA? YES \_\_\_\_\_ NO \_\_\_\_\_

PREVIOUS MONITORING RESULTS

1. Have VOCs been detected in this source of water supply?
2. If VOCs were not detected, list monitoring dates:
3. Have VOCs been detected in the distribution system?
4. Have VOCs been detected at other systems using this source?


PROXIMITY TO VOC USE

For lakes or reservoirs attach calculation of minimum retention time in lake or or reservoir.

5. Are there any high volume VOC uses or communities with population of 3,300 or more on the watershed (within 5 miles of the intake on a large lake reservoir or the St. Lawrence River)? (High Volume uses include metal fabricators, solvent producers, refineries, petroleum or solvent bulk storage facilities, electroplating plants, airfields, military bases, hazardous waste (Superfund) sites, and contaminated wells.)
6. If yes describe type and location with respect to intake: \_\_\_\_\_
7. Are there any low volume VOC uses on the watershed (with 1 mile of the intake on a large lake, reservoir or the St. Lawrence River)? (Low volume uses include electronic component processors; dry cleaners; other landfills, dumps and junkyards; small commercial users such as print shops; and gasoline stations and vehicle servicing facilities.)
8. If yes, describe type and location with respect to intake: \_\_\_\_\_

9. Date of field survey \_\_\_\_\_ field survey by: name/title \_\_\_\_\_

SOURCE PROTECTION

10. Are there hydrological barriers such as travel time, dilution etc. between low volume VOC uses and intakes?
11. If yes, Describe \_\_\_\_\_
12. Is the source adequately protected by Watershed Rules and Regulations or other land controls?

DETERMINATION

13. Based on the above information, this source of water supply is determined to be: \_\_\_\_\_ vulnerable \_\_\_\_\_ invulnerable
14. Explanation: \_\_\_\_\_
15. Determined by: name/title \_\_\_\_\_ Local Health Unit: \_\_\_\_\_  
Date \_\_\_\_\_

ENVIRONMENTAL HEALTH MANUAL

NEW YORK STATE DEPARTMENT OF HEALTH OFFICE OF PUBLIC HEALTH CENTER FOR ENVIRONMENTAL HEALTH TECHNICAL REFERENCE	ITEM NO: PWS 184      DATE: 7/20/93
	SUBJECT: Guideline For Conducting Sanitary Surveys  Page 1 of 10

PURPOSE

The purpose of this Technical Reference is to provide guidance as to what must be included in a Sanitary Survey of a Public Water System. This guidance incorporates the findings and recommendations of the 1991 Ad Hoc Sanitary Survey Committee, as well as the guidance and recommendations as established by the U.S. EPA for the Total Coliform Rule and the Surface Water Treatment Rule.

POLICY

Sanitary Surveys at Public Water Systems are to be conducted at a frequency based on the type of water system (Procedure PWS 180), and whether or not the system is in compliance with the requirements of Part 5, State Sanitary Code.

IMPLEMENTATION

The Sanitary Survey will be conducted, at the frequency stated in Procedure PWS 180, using form DOH 164, previously called the GEN 200, for all systems, except permitted noncommunity systems. If there are significant changes in the system since the previously performed Sanitary Survey, or if a new system comes on line, Forms DOH 1022, DOH 1033 or DOH 3380, as applicable, must be used in addition to the DOH 164.

CONDUCTING THE SURVEY

The Sanitary Survey consists of three phases, planning for the survey, conducting the survey, and compilation of the survey final report. The pertinent components of each of these phases are delineated as follows:

1. Planning the Survey

A review of recent past sanitary surveys and correspondence pertaining to the water system is the necessary first step. Particular attention should be given to operational problems, violations and subsequent enforcement actions, water quality analysis results, and any changes in the system since the last survey. This initial background should enable the surveyor to become familiar with the system's past and present problems.

The system's monitoring records should be reviewed for compliance with the monitoring, reporting and maximum contaminant level requirements of Part 5 of the State Sanitary Code.

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The pre-survey data review should generate a list of items to check in the field, and a list of questions about the system. It will also help to plan the format of the survey and to estimate how much time it may take. The next step is to make the initial contact with the system operator to establish the survey date(s) and time. Any records, files or people that will be needed during the survey should be requested ahead of time.

2. Conducting the Survey

The on-site portion of the survey is the most important and will involve interviewing those in charge of operating/managing the water system, as well as other technical people. The survey will also review all major system components from sources and treatments to the distribution system. Use the appropriate Sanitary Survey form so that all major components and aspects of the system are thoroughly reviewed. As the survey progresses, any deficiencies that are observed should be brought to the attention of the water system operator and the problem and the corrective measures should be discussed.

Consideration should be given to the competency of the operator(s), whether there is adequate testing and quality control equipment and instruments, the adequacy and maintenance of system operation records and the necessity of surveillance sampling.

Specific components of the system that should be reviewed are:

a. Source

- 1) Description: based on field observations and discussion with the operator, a general review of the watershed should be included.
- 2) Sources of contamination within the watershed or sensitive areas surrounding wells or well fields should be identified. Not only should this be determined by physically touring and observing the watershed and its daily uses, but the surveyor should also actively question the water system operator/manager about adverse and potentially adverse activities in the watershed.

3) Source Construction

a) Surface Intakes

1. Is the source adequate in quantity?

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2. Is the best quality site or location in that source being used?
3. Is the intake protected from icing problems if appropriate?
4. Is the intake screened to prevent entry of debris, and are screens maintained?
5. Is animal activity controlled within the immediate vicinity of the intake?
6. Is there a raw water sampling tap?

b) Infiltration Galleries

1. Is the source adequate in quantity?
2. Is the best quality source being used?
3. Is the lid over the gallery watertight and locked?
4. Is the collector in sound condition and maintained as necessary?
5. Is there a raw water sampling tap?

c) Springs

1. Is the source adequate in quantity?
2. Is there adequate protection around the spring such as fencing to control the area within 200 feet?
3. Is the spring constructed to best capture the spring flow and exclude surface water infiltration?
4. Are there drains to divert surface water from the vicinity of the spring?
5. Is the collection structure of sound construction with no leaks or cracks?
6. Is there a screened overflow and drain pipe?
7. Is the supply intake located above the floor and screened?
8. Is there a raw water sampling tap?

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d) Catchment and Cistern

1. Is source adequate in quantity?
2. Is the cistern of adequate size?
3. Is the catchment area protected from potential contamination?
4. Is the catchment drain properly screened?
5. Is the catchment area and cistern of sound construction and in good condition?
6. Is catchment constructed of approved non-toxic, non-leaching material?
7. Is there a raw water tap?

e) Pumps, Pumphouses, and Controls

1. Are all intake pumps, booster pumps, and other pumps of sufficient capacity?
2. Are all pumps and controls operational and maintained properly?
3. Are check valves, blow off valves, water meters and other appurtenances operated and maintained properly?
4. Is emergency power backup with automatic start-up provided and does it work (try it)?
5. Are underground compartments and suction wells waterproof?
6. Is the interior and exterior of the pumphouse in good structural condition and properly maintained?
7. Are there any safety hazards (electrical or mechanical) in the pumphouse?
8. Is the pumphouse locked and otherwise protected against vandalism?
9. Are water production records maintained at the pumphouse?

f) Transmission Mains

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1. Which source do they serve?
2. What is their size: length and diameter?
3. Are they protected from freezing?
4. Blowoffs at low points, relief valves at high points?
5. What is cleaning frequency and method of cleaning?
6. Do construction materials meet AWWA or equivalent standards?

4) Treatment

a) Disinfection:

1. Is the disinfection equipment and disinfectant appropriate?
2. Are there back-up disinfection units on line?
3. Is there auxiliary power with automatic start up in case of a power outage?
4. Is there an adequate quantity of disinfectant on hand and is it properly stored?
5. Is there automatic switch over equipment when cylinders expire?
6. Are critical spare parts on hand to repair disinfection equipment?
7. Is disinfectant feed proportional to water flow?
8. Are daily records kept of disinfectant residual near the first customer from which to calculate CTs?
9. Are production records kept from which to determine CTs?
10. Are CTs acceptable based on the level of treatment provided?
11. Is a disinfectant residual maintained in the distribution system?
12. Are adequate safety precautions followed, including design?

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b) Chemical Feed

1. What is the treatment objective?
2. Where is the chemical feed located?
3. Is there adequate storage?
4. Are dust control/safety precautions procedures in place?

c) Aerators

1. What is the treatment objective?

d) Rapid Mix

1. What type of units are installed?
2. What chemical is used?
3. Is there proper mixing?

e) Flocculation

1. What type of units are installed?
2. What is the energy gradient?
3. Is there adequate detention time?

f) Clarification

1. What type of clarifier is installed?
2. Is there adequate detention time?
3. Is there short circuiting?
4. Is there floc carryover?

g) Filters

1. What type of filters are installed?
2. Is the backwash adequate?
3. What type of media is used?

h) Distribution System

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1. Are other treatment processes appropriate?
2. Are pumps, chemical feeders, and other mechanical equipment in good condition and properly maintained?
3. Are controls and instrumentation adequate?
4. Are accurate records maintained?
5. Are adequate supplies of chemical on hand and properly stored?
6. Are adequate safety devices available and precautions observed?

5) Systems granted "filtration avoidance"

The on-site inspection must indicate whether the watershed protection program and disinfection treatment process are adequately designed and maintained.

The on-site inspection must include:

- a) A review of the watershed control program. Is the watershed control program effective?
- b) A review of the physical condition of the source intake. Is the source intake adequately protected?
- c) A review of the system's equipment maintenance program and an inspection of the disinfection equipment for physical deterioration. Is there a low probability for failure of the disinfection process?
- d) A review of operating procedures. Is the system being operated properly?
- e) A review of data records. Are all tests being conducted and recorded properly? Is disinfection being effectively practiced.
- f) What if any improvements are needed in the equipment, system maintenance and operation, or data collection?

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6) Storage

a) Gravity

1. Are storage reservoirs covered?
2. Are overflow lines, vents, drainlines, or cleanout pipes turned downward and screened?
3. Are reservoirs inspected regularly?
4. Is there sufficient pressure throughout the system?
5. Are coatings in good repair and acceptable for potable water contact?
6. Is the tank watertight and locked?
7. Is the reservoir isolated from the system?
8. Is there adequate safety equipment?
9. Is the site fenced, locked, protected against vandalism?
10. Is the storage reservoir disinfected after repairs?
11. Is there a scheduled program for cleaning?

b) Hydropneumatic

1. Is the storage capacity adequate?
2. Are instruments, controls, and equipment adequate?
3. Is the interior and exterior surfaces in good condition?
4. Is there adequate pressure throughout the system?
5. Is the pump cycle rate acceptable?

7) Cross Connections

- a) Is the system free of known uncontrolled cross connections?
- b) Is there a program for the annual testing of backflow prevention devices?

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- c) Are backflow prevention devices installed at all appropriate locations?

8) Distribution System

- a) Are proper pressures and flows maintained, especially fire flows?
- b) Is an up-to-date map maintained showing all pipe sizes and valve locations?
- c) Do construction materials meet AWWA or equivalent standards?
- d) Are all services metered and are meters read?
- e) Are blowoffs and relief valves installed where required?
- f) Are replacement parts available?
- g) Are mains protected from freezing?
- h) Is there an adequate maintenance program?
  - Is there evidence of leakage in the system?
  - Is there a pressure testing program?
  - Is there a regular flushing program?
  - Are valves and hydrants regularly exercised and maintained?
  - Are AWWA standards for disinfection followed after all repairs?
  - Describe the corrosion control program.
  - Is the system interconnected with other systems?

When the survey is completed, it is always preferable to briefly summarize the survey with the operator(s) and management. The main findings of the survey should be reviewed so it is clear that there are not

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misunderstandings about findings/conclusions.

3. Reporting the Survey

A final report of the survey should be completed within 45 days to formally notify the system of the findings. Since the report may be used for future compliance actions and inspections, it should include as a minimum: 1) the date of the survey; 2) who was present during the survey; 3) the findings of the survey; 4) the recommended improvements to identified problems; and 5) the dates for completion of any improvements.

REFERENCES

- EHM Procedure PWS 180 - Sanitary Surveys of Public Water Supplies
- Form DOH 164 - Public Water System Sanitary Survey
- Form DOH 1022 - Small Water System Sanitary Survey - Ground Water Sources
- Form DOH 1033 - Sanitary Survey Public Water System
- Form DOH 3380 - Sanitary Survey - Springs, Surface Sources, Additional Treatments.
- Part 76 - Public Health Administrative Tribunal

Appendix E  
Wellhead Protection Program Delineation



**NEW YORK STATE  
WELLHEAD PROTECTION PROGRAM**

**SUBMITTAL  
TO  
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
IN  
APPLICATION FOR IMPLEMENTATION FUNDS**

**NEW YORK STATE  
DEPARTMENT OF ENVIRONMENTAL CONSERVATION  
DIVISION OF WATER  
ALBANY, NY**

**SEPTEMBER 1990**

## CHAPTER 3

### WELLHEAD PROTECTION AREA DELINEATION

#### 3.1. Introduction and Institutional Processes

##### 3.1.1. Introduction

The comprehensive New York State Groundwater Management Program, developed in the early 1980's and published in revised and final documents in 1986 (for Long Island) and 1987 (for Upstate), recommended key policies and program initiatives endorsing geographic targeting and critical area protection. These concepts were forerunners of the Safe Drinking Water Act's Wellhead Protection Program. Significant progress has been made in different aspects of geographic targeting of programs and in different parts of New York State. New York acknowledges these accomplishments as an integral part of its overall Wellhead Protection Program.

Delineation determines geographic areas for which different levels of groundwater protection activities are to be instituted. The Wellhead Protection Program in New York State is intended to accomplish a wider recognition of targeting objectives by all levels of government, by citizens in general, and to begin an evolutionary process toward improved targeting and protective program implementation.

The basic wellhead protection delineation approach in New York State recognizes aquifers as the fundamental geographic unit for targeting management efforts. This approach must be modified where aquifers are broad regional systems (DEC considers this case to occur only on Long Island), or where aquifers are not well characterized (considered to be the case for bedrock aquifers, in general). Elsewhere, the unconsolidated aquifers of New York tend to be of limited areal extent and they generally include the important recharge areas within their boundaries. These unconsolidated aquifers also are the source of the large majority of groundwater-derived public water supply systems.

The New York State Wellhead Protection Program proposes that unconsolidated aquifer boundaries (the land surface overlying the aquifer) serve as the baseline definition for the overall wellhead protection area (WHPA). For the baseline definition, both confined and unconfined unconsolidated aquifers are grouped together. Revisions are allowable based on site-specific evaluations. This aquifer boundary approach is proposed to be modified on Long Island and for wells in bedrock aquifers as described in Section 3.2. For all public water supply wells, specific proposed WHPA delineation policies are described in Section 3.2.

The aquifer boundary approach for the overall WHPA has several distinct advantages. It takes advantage of considerable recent and ongoing work in mapping and detailed assessments of aquifer boundaries. Incorporating this work directly into the Wellhead Protection Program provides a practical way for more effective targeting to move forward rapidly rather than being constrained by the need to perform modeling to delineate protection areas.

The aquifer approach also encompasses other non-public wells and potential future well sites, and places major focus on the high-yielding groundwater resources which are most important and most vulnerable. This last aspect is considered very important in the education component of wellhead protection, both for local officials and for the general public.

Wellhead protection area delineation is an evolutionary process. The first need for refinement is the further subdivision of the total wellhead protection area, as required for differentiated management objectives. A second area for potential refinement is delineation of the overall WHPA in the Glacial Aquifer on Long Island and in bedrock aquifers. Issues related to these topics are reviewed in both Sections 3.2 and 3.3. Flexibility for refinement or revision is very important due to the wide variability in

hydrogeologic settings, data availability, and local degree of contamination threat in New York State.

### 3.1.2. Institutional Processes for Overall Delineation Policies

Advisory committee and work group input into the original comprehensive Groundwater Management Program was substantial. The basic concept of geographic targeting was set forth in that program. The groups included:

- ◀ Federal Agencies (EPA, USGS)
- ◀ State Agencies (DEC, DOH, DOT, Agriculture & Markets, Energy Office, Geological Survey)
- ◀ Cornell University
- ◀ County Agencies (Health, Planning)
- ◀ Associations (Conference of Mayors, American Water Works Association, Business Council)
- ◀ Citizen Groups (NRDC, League of Women Voters)

DEC reconvened most of the original contributors into an advisory committee to assist in guiding the Wellhead Protection Program, with particular emphasis on delineation issues. Added to the original group have been:

- ◀ State Agencies (Department of State)
- ◀ County Agencies (a wider range of county participants)
- ◀ Regional Agencies and Commissions (additional planning and legislative commissions)
- ◀ Associations (Association of Towns, American Water Resources Association)

The new group, the Wellhead Protection Advisory Committee, has also included additional participation from the U.S. Geological Survey and DEC geological staff.

The delineation approach proposed in this submittal was recommended by the DEC Groundwater Management Section (responsible for developing the program) and agreed to by the Wellhead Protection Advisory Committee (members listed in front of submittal). The delineation approach directly conforms with the policies in the formally adopted Upstate New York Groundwater Management Program and Long Island Groundwater Management Program.

The DEC has also established a Memorandum of Understanding (MOU) with the DOH concerning the development of the Wellhead Protection Program. Additional MOU's will be developed as needed to institutionalize interagency working arrangements.

To support the technical needs of DEC and of local governments in carrying out and refining delineations, DEC plans to convene an ongoing Delineation Technical Workgroup consisting of geologists and groundwater management staff of DEC, DOH, State Geological Survey, USGS, and local governments. This group would consider revisions or improvements in the overall delineation approach, and would essentially be concerned with hydrogeologic aspects of the program rather than administration or contamination source control. The mission of this group is to provide recommendations to the DEC staff responsible for the overall Wellhead Protection Program. It will be convened upon EPA approval of New York State's submittal and will meet on at least a semi-annual basis or as needed.

Local authorities involved in wellhead protection may vary, as discussed elsewhere in this submittal. Therefore, uniform institutional processes at the local level will not be proposed across the entire state. Local agencies may act according to their own needs and authority. However, in all cases where Watershed Rules and Regulations are utilized as the local wellhead protection approach, the existing requirements of the New York State Department of Health (DOH) will be followed. Similarly, for all new wells, the institutional requirements of the New York State Department of Environmental Conservation's (DEC) Water Supply Permit Program will apply.

The proposed responsibility for initiating refinements of the baseline delineations described in this submittal will depend upon the regulatory approach adopted. Delineation refinements to be incorporated in Watershed Rules and Regulations approaches will be initiated and performed by water purveyors. Delineation refinements to be incorporated in county, town, village or city ordinances (including local public health ordinances) will be initiated and performed by the corresponding political authority. Delineation refinements to be incorporated in state-level regulatory programs will be performed by DEC.

In practice, most local activities will involve coordination with the State DEC and DOH. Each Department routinely reviews local activities to ensure that there are no conflicts with respect to policies and procedures and advises on the availability of technical information for delineation purposes. The overall coordination for aspects specifically related to the WHPP is the responsibility of DEC.

Other institutions, particularly the U.S. Geological Survey and Cornell and other universities, may be involved in special projects or case studies, as coordinated by DEC.

### 3.2. Delineation Criteria, Thresholds and Methods

#### 3.2.1. Background - Existing Geographic Targeting

The existing, and still evolving, geographic targeting framework for groundwater protection provides a priority system for managing risks to groundwater. Following is a brief summary:

#### ◀ Groundwater Classification - 6 NYCRR Part 703

Ambient water quality standards and guidelines apply to all Class GA (fresh) groundwaters. Class GA groundwaters are defined as having best use as a source of drinking water and must meet New York State's drinking water standards in addition to the ambient standards. State management programs use this framework for

protection of all fresh groundwaters in New York State.

#### ◀ Unconsolidated Aquifers

Mapping of unconsolidated aquifers has progressed significantly including State-defined primary and principal aquifers which are subsets of the unconsolidated aquifers. Site-specific detailed mapping is still in progress.

Primary and principal aquifers are generally similar geologically (both are highly productive unconsolidated deposits); primary aquifers are those which have large populations using them as drinking water sources. Primary aquifers have high priority for mapping additional hydrogeologic data through the DEC/USGS cooperative program, and in special Long Island programs.

These delineations are used in the process for siting new waste disposal facilities.

#### ◀ Long Island Hydrogeologic Zones

Eight hydrogeologic zones have been delineated, covering all of Long Island. Three of these together comprise the Deep Flow Recharge Area. Management program initiatives (e.g., hazardous substance storage) are based on this Deep Flow Recharge Area.

#### ◀ Special Groundwater Protection Areas

Nine Special Groundwater Protection Areas have been delineated within the Deep Flow Recharge Area in both Nassau and Suffolk Counties and are currently the subject of a planning project by the Long Island Regional Planning Board.

#### ◀ Other Geographic Targeting Approaches

Suffolk County has specifically defined "Water Supply Sensitive Areas" which include zones 500 feet downgradient to 1,500

feet upgradient of public wells in the Upper Glacial Aquifer.

Watershed Rules and Regulations are promulgated by the NYS Department of Health upon initiation by local water purveyors. These include delineations of protection management zones for public water supply wells. The WRR delineations do not conflict with the wellhead protection area delineation policies proposed in this submittal.

The NYS Solid Waste Management Program, in 6 NYCRR Part 360, has defined "public water supply wellhead area" as the surface and subsurface area between a public water supply well or wellfield and the 99% theoretical maximum extent of the stabilized cone of depression of that well or wellfield considering all flow system boundaries and seasonal fluctuations. New landfills are banned in these areas, in addition to all primary and principal aquifers in the Upstate area. Special provisions are defined in law for Long Island siting. As with the Watershed Rules and Regulations, there is no conflict in terminology between the Part 360 public water supply wellhead area and the overall wellhead protection area proposed in this submittal. The overall protection area includes, and is larger than, the Part 360 wellhead itself. For landfill siting, Part 360 regulations will prevail. Part 360 determinations are made only for proposed landfill siting cases.

Other setback requirements have been utilized in various state or local management programs. When used, such as for pesticides (e.g., aldicarb) or septic tanks, the setbacks apply to all wells, public or private. As with the other targeting approaches, such setbacks do not conflict with the proposed wellhead protection area policies.

#### Well Construction Specifications

Direct protection of the wellhead itself is achieved through adoption of construction specifications and standards. These are administered by the New York State Department of Health and follow the "Recommended Standards for Water Works" (NYS Health Department Bulletin #42, 1982). They apply to public water supply wells.

#### 3.2.2. Wellhead Protection Area Delineation Objectives

The USEPA guidance for development of wellhead protection programs (Guidance for Applicants for State Wellhead Protection Program Assistance Funds under the Safe Drinking Water Act, EPA 440/6-87-011) contains the expectation that proposed programs will be designed to provide protection from three types of threats: direct introduction of contaminants in the immediate well area, microbial contaminants, and chemical contaminants. The first is dealt with through well construction and completion standards to be applied at the wellhead itself. The second is managed by delineating a zone to keep potential sources sufficiently distant from the well to allow die-off of the microorganisms. Establishing a minimum distance by measurement or by time-of-travel is the most common procedure for delineating areas for protection against microbial contamination.

To achieve protection against chemical contamination, EPA suggests three delineation approaches: delineation of wellfield management areas, contamination attenuation zones, or remedial action zones. Since chemicals can travel long distances, all or part of the recharge area for a well becomes the zone to be delineated for protection efforts.

The overall goals of New York State's delineation approach are essentially a combination of the wellfield management and remedial action zone goals described by EPA.

Wellfield management is used to define areas where heightened levels of protection will be

emphasized. A number of different zones may be delineated for a single water supply to provide different levels of management. The management options may range from selected land use prohibitions to specialized design specifications, enhanced facility inspections, or increased monitoring and education.

The remedial action area approach excludes high risk activities from a specifically defined zone but still allows them in more distant recharge areas. This may be refined by varying exclusions in different zones according to risk or the importance of the activity. The remedial action area concept is best applied to new or changing land uses, whereas wellfield management may be applied to existing or new land uses.

The contamination attenuation zone approach described by EPA is difficult to strictly apply due to limited capabilities to accurately predict chemical migration and persistence. In addition, the New York State groundwater standards apply to all fresh groundwaters, reducing the utility of an attenuation zone approach.

#### 3.2.3. Delineation Policy

The underlying objective of delineation is to use different degrees of management to control risks to water supplies. The significant diversity in geological conditions, aquifer use, and in local government capabilities across New York State indicates that the approach to delineation can not be uniform and rigid for all locations.

The ideal technical goal of wellhead delineation is to have sufficient knowledge of the hydrogeology of each public water supply well or wellfield to allow precise determination of the catchment area along with accurate times-of-travel for the entire flow system. Such information is not uniformly available across the state. New information will become available unevenly as funding from various local, state and federal sources is applied to specific priority areas.

In this setting, the New York State Wellhead Protection Program proposes general recognition of high-yielding aquifers (both confined and unconfined) as the fundamental wellhead

protection area units. As described in Section 3.2.4., this policy recognizes that more targeted delineations will be necessary on Long Island because it is entirely an aquifer. Also, bedrock aquifers are not adequately characterized now to allow this approach; however, most of the major, high-yielding aquifers in New York are in unconsolidated deposits. Within the wellhead protection area, delineation of an area designated as the remedial action area is proposed, as described in Section 3.2.5.

This policy is intended to reinforce public and management program recognition of the need to protect high-yielding aquifers. It takes advantage of considerable past and ongoing work on aquifer mapping and delineation and will permit further progress in communities which have already delineated aquifer boundaries and protection areas. These communities may directly proceed to management implementation or may utilize available funds on more advanced hydrogeologic evaluations within the WHPA, depending on local needs and goals.

Within this framework, utilization of alternative delineation approaches (such as time-of-travel) is allowed and encouraged. In most cases, such alternative approaches would be applied to subdividing the WHPA within the unconsolidated aquifer boundaries for applying different levels of management. The WHPA itself would remain the area defined by aquifer boundaries. In some cases, such as for bedrock aquifers, the alternative approaches may be used to redefine the WHPA itself. The Department of Environmental Conservation will be responsible for providing guidance for such alternative approaches.

#### 3.2.4. Wellhead Protection Area Delineations

The wellhead protection area delineation approach is summarized in Table 3.1. It recognizes that the aquifer system on Long Island and bedrock aquifers in Upstate New York must be treated differently than the unconsolidated aquifers in Upstate. The unconsolidated aquifer boundaries for the wellhead protection areas are those delineated on a series of maps titled

TABLE 3.1. WELLHEAD PROTECTION AREA DELINEATION SUMMARY		
Geographic Region	Aquifer Area	Wellhead Protection Area Baseline Delineation
Long Island	Magothy & Lloyd Aquifers	Deep Flow Recharge Area
	Glacial Aquifer	Simplified Variable Shape:  1,500 ft. radius upgradient 500 ft. radius downgradient
Upstate	Unconsolidated Aquifers	Aquifer Boundaries (land surface)
	Bedrock Aquifers	Fixed Radius: 1,500 ft. radius

"Potential Yields of Wells in Unconsolidated Aquifers in Upstate New York" by the U.S. Geological Survey. Specifically, these maps, distributed for sale by the U.S. Geological Survey, are as follows:

1. Bugliosi, E.F., et al., 1988. Potential Yields of Wells in Unconsolidated Aquifers in Upstate New York - Lower Hudson Sheet. Water Resources Investigations Report 87-4274. U.S. Department of the Interior, Geological Survey, Albany, NY.
2. Bugliosi, E.F., et al., 1988. Potential Yields of Wells in Unconsolidated Aquifers in Upstate New York - Hudson Mohawk Sheet. Water Resources Investigations Report 87-4275, U.S. Department of the Interior, Geological Survey, Albany, NY.
3. Bugliosi, E.F., et al., 1988. Potential Yields of Wells in Unconsolidated Aquifers in Upstate New York - Adirondack Sheet. Water Resources Investigations Report 87-4276, U.S. Department of the Interior, Geological Survey, Albany, NY.
4. Miller, T.S., 1988. Unconsolidated Aquifers in Upstate New York - Finger Lakes Sheet. Water Resources Investigations Report 87-4122, U.S. Department of the Interior, Geological Survey, Albany, NY.
5. Miller, T.S., 1988. Potential Yields of Wells in Unconsolidated Aquifers in Upstate New York - Niagara Sheet. Water Resources Investigations Report 88-4076. U.S. Department of the Interior, Geological Survey, Albany, NY.

The boundaries illustrated on these maps serve as the total wellhead protection areas for public water supplies utilizing those aquifers. In certain cases, more detailed aquifer boundary maps or determinations for primary or principal aquifers (subsets of the full range of unconsolidated aquifers) have been or will be made by the U.S. Geological Survey or NYS Department of Environmental Conservation. These more detailed boundary determinations will generally supersede boundaries illustrated on the above referenced

maps as "revised" delineations of wellhead protection areas.

Both unconfined and confined unconsolidated aquifers are included on these maps and both are included in this definition of the overall wellhead protection area.

For all public water supplies utilizing groundwater, the overall wellhead protection area (WHPA) delineation will be subdivided into two parts. The innermost zone is referred to as the Remedial Action Area. The remainder of the WHPA is referred to as the Wellfield Management Area. The terminology is derived from the EPA guidance referenced earlier. Depending on local management objectives for groundwater protection, local hydrogeology, and data availability and resource availability, the Wellfield Management Area may be further subdivided. This further subdivision of the Wellfield Management Area would be considered a refinement of the "baseline" delineation. Methodologies, criteria and thresholds used for such revisions are flexible. Approaches proposed by local water purveyors will be evaluated and approved or disapproved upon submittal to the New York State Department of Environmental Conservation.

The term "baseline" delineation, as used in this submittal, is intended to represent the initial WHPA delineation advocated by the Department of Environmental Conservation. The delineation may be directly utilized in implementing management activities for groundwater protection. However, if site-specific conditions suggest that alternative delineations are appropriate (including the further subdivision of the Wellfield Management Area already cited), those delineations may be accepted by the Department of Environmental Conservation. The evolution of improved delineation techniques, the growing availability of hydrogeologic information, and the longer-term enhancements of groundwater protection programs may lead to a redefinition of the baseline delineations by the Department of Environmental Conservation.

These baseline delineations apply to public water supply wells. Applicants for new public water supply wells may be required to perform

alternative site-specific delineations according to conditions stipulated through the Water Supply Permit Program (refer to Chapter 7).

The proposed WHPA delineations are described according to the following geographic and hydrogeologic settings. They are also summarized in Table 3.1.

#### ◀ Unconsolidated Aquifers - Upstate New York

##### 1. WHPA Definition:

The boundaries of wellhead protection areas for public water supplies in unconsolidated aquifers in Upstate New York are the land surface boundaries of the aquifers as illustrated on the five-aquifer sheet maps for Upstate published and distributed by the U.S. Geological Survey (see earlier reference). These boundaries may be revised in accordance with more detailed primary and principal aquifer maps and boundary determinations as approved by the Department of Environmental Conservation. The maps provide definition for both unconfined and confined aquifers. Revisions of these boundaries may be made, pending approval by the Department of Environmental Conservation.

##### 2. Rationale:

The delineations proposed above are hydrogeologically-based and are consistent with the policies and goals of the Upstate Groundwater Management Program already adopted and certified by the Governor of New York as an element of the New York State Water Quality Management Plan.

##### 3. Mapping and Case Studies:

Mapping of these areas is already completed and published. Case studies are not considered appropriate, as the maps have been reviewed and approved by the U.S. Geological Survey and the Department of Environmental Conservation as part of the publication process.

#### 4. Public Water Supply Significance:

The large majority of public water supplies using groundwater, particularly for municipal and community systems, are located in unconsolidated aquifers. It is expected that a significant proportion of additional future supplies will also tap these systems.

#### ◀ Bedrock Aquifers - Upstate New York

##### 1. WHPA Definition:

The baseline boundaries of wellhead protection areas for public water supplies in bedrock aquifers are fixed radius areas with a radius of 1,500 feet from the wellhead. Revisions based on site-specific information are desirable, with the goals being to identify and delineate principal recharge areas. Revisions may be developed, pending approval by the Department of Environmental Conservation.

##### 2. Rationale:

The fixed radius approach for the initial WHPA is not based on estimated times-of-travel or drawdown. It provides a substantial increase in protection over more commonly existing protection zones (typically 100 feet or 200 feet). The principal rationale is that the baseline delineation gives a basis for immediate action on wellfield management without requiring expensive site-specific delineations. Revisions based on local conditions are encouraged, particularly for municipal community systems, of which there are relatively few in the State. The geographic targeting benefits of uniformly delineating substantially larger fixed radius areas for all bedrock wells are very questionable. Many of the bedrock public water supply wells are among the approximately 10,000 non-community public wells (e.g., isolated public buildings, roadside rest areas, etc.). There will be little geographic targeting advantage for groundwater protection programs if

numerous 3 to 12 square mile WHPA's (1-2 mile radius) for non-community wells intersect or nearly intersect across the State. It must be recognized that all fresh groundwaters in bedrock aquifers are classified as GA groundwaters and thus are already protected by substantial statewide protection programs which use rigorous ambient water quality standards in their design.

##### 3. Mapping and Case Studies:

Mapping will be performed according to the phasing priorities described in Section 3.3. Case studies of fixed radius approaches are not considered to be of significant benefit. As proposals for revisions based on alternative approaches are submitted to the Department of Environmental Conservation, they will be evaluated for potential use as models for comparable hydrogeologic conditions.

##### 4. Public Water Supply Significance:

Relatively few municipal community systems utilize bedrock aquifers in New York State and those that do are generally with low population dependence. Public water supplies in bedrock aquifers are typically non-community wells serving small numbers of people.

#### ◀ Magothy and Lloyd Aquifers - Long Island

##### 1. WHPA Definition:

The boundaries of the wellhead protection area for public water supplies using the Magothy and Lloyd aquifers are the boundaries of the Deep Flow Recharge Area as recognized by the Department of Environmental Conservation. Refinements within the overall WHPA may include further definition of Wellfield Management Areas, pending approval by the Department of Environmental Conservation.

##### 2. Rationale:

The Deep Flow Recharge Area was determined to be the most important overall groundwater protection area for wells in the Magothy and Lloyd aquifers in the Long Island Groundwater Management Program already adopted and certified by the Governor of New York as an element of the New York State Water Quality Management Program. The delineations have also been adopted in the Suffolk County Sanitary Code.

##### 3. Mapping and Case Studies:

Mapping of the Deep Flow Recharge Area is already completed. Additional case studies are not considered appropriate.

##### 4. Public Water Supply Significance:

Most public water in Nassau County is withdrawn from the Magothy aquifer. The majority of public water supplies in Suffolk County are also withdrawn from the Magothy aquifer. Of those public water supplies in Suffolk County utilizing the Glacial aquifer, approximately half are located within the Deep Flow Recharge Area. Thus, these wells are included within the overall wellhead protection area for the deeper aquifers.

#### ◀ Glacial Aquifer - Long Island

##### 1. WHPA Definition:

The boundaries of the wellhead protection area for public water supplies using the Glacial aquifer are defined as a fixed variable shape zone with a fixed radius in the upgradient groundwater flow direction of 1,500 feet and a fixed radius in the downgradient direction of 500 feet. Revisions may be made, pending approval by the Department of Environmental Conservation.

## 2. Rationale:

Fixed-shape zones are not based on calculated time-of-travel or drawdown. The proposed definition is consistent with Water Supply Sensitive Areas already delineated by Suffolk County (which contains nearly all of the Glacial wells on Long Island) and for which enhanced protection programs have already been implemented in the Suffolk County Sanitary Code. Approximately half of the Glacial wells are within the Deep Flow Recharge Area and are thus protected within a larger overall WHPA. Significant expansion of the WHPA for all Glacial wells may not provide any reasonable geographic targeting benefits, as most of the WHPA's would intersect or nearly intersect. All fresh groundwaters in the Glacial aquifer are already covered by substantial protection programs which utilize a rigorous set of ambient water quality standards.

## 3. Mapping and Case Studies:

Mapping of the WHPA's for Glacial wells in Suffolk County has been completed through the Water Supply Sensitive Area delineations. For the relatively few Glacial wells in Nassau County, mapping will be completed according to the phasing priorities described in Section 3.3. Case studies of fixed-shape delineations are not considered to be of significant benefit. As proposals for revisions based on alternative approaches are submitted to the Department of Environmental Conservation, they will be evaluated for potential use as models for other Glacial well delineations.

## 4. Public Water Supply Significance:

As stated previously, approximately one-fourth of the public water supplies in Suffolk County are based in Glacial wells that are outside of the Deep Flow Recharge Area. If Nassau County is included, only about one-eighth of the water supply dependency is from Glacial wells outside of the Deep Flow Recharge Area.

## 3.2.5. Remedial Action Areas

For all community public water supply wells, regardless of setting, a remedial action area will be delineated within the WHPA. For those supply wells, the proposed baseline delineation of this area will be a fixed radius zone of 200 feet radius from the well. Revisions may be made after evaluation by the Department of Environmental Conservation. For non-community public water supply wells (e.g., isolated public buildings, etc.), the existing New York State Department of Health standards for well separations (e.g., from waste disposal facilities) are to be followed.

The rationale for this baseline delineation is based upon general observations in the past that such a zone has been adequate for protection against microbiological contamination. An alternative time-of-travel basis for delineating revised remedial action area boundaries would be to use a time-of-travel from a minimum of 60-days up to one year. The 60-day period has been used in New York State and in many European countries (USEPA, EPA 440/6-87-010, Guidelines for Delineation of Wellhead Protection Areas). A one-year period is considered conservative. In certain cases, the site-specific hydrogeology (e.g., confined aquifer conditions or long times-of-travel) and the nature of existing land uses and management options may allow remedial action areas smaller than 200 feet radius.

## 3.2.6. Potential Refinements and Summary

Table 3.1 summarizes the baseline delineations for wellhead protection areas.

Refinements may include:

- Subdivision of the Wellfield Management Area portion of the WHPA, to allow application of different levels of management within the WHPA.
- Revision of the Remedial Action Area portion of the WHPA, according to alternative methods, including time-of-travel or drawdown analysis.

- Revised boundary determinations of the unconsolidated aquifers in Upstate, including primary and principal aquifers, or of the Deep Flow Recharge Area on Long Island.
- Alternative hydrogeologic determinations of appropriate WHPA's in bedrock aquifers or for wells in the Glacial aquifer on Long Island.

## 3.3. Phasing Considerations

The published unconsolidated aquifer maps cited in the previous section complete the baseline WHPA delineations for all public water supply wells within those aquifers. The completed delineation of the Deep Flow Recharge Area on Long Island has been defined according to road boundaries. That delineation defines the WHPA for all public water supply wells in the Magothy and Lloyd aquifers. The baseline WHPA boundaries for public water supply wells using the Glacial aquifer in Suffolk County have been determined by the Suffolk County Department of Health Services through its Water Supply Sensitive Area designations.

The remaining baseline WHPA boundary determinations that are needed consist of a relatively small set of Glacial aquifer wells and public water supply wells in bedrock aquifers. The phasing priorities for these groups are, in order:

1. Municipal community wells
2. Non-municipal community wells
3. Non-community public wells

Within each priority group additional phasing may be generally ordered by population dependency with modifications made if there are significant known or suspected threats to the wells.

It is emphasized that the baseline WHPA delineations for the very large majority of public water supply wells (by population served) are completed. The delineations for the remaining

bedrock wells and Glacial wells will be performed as resources permit.

## 3.4. Summary

The baseline wellhead protection area delineations are considered to be completed through the published aquifer maps cited in this chapter. These cover both confined and unconfined aquifers and low- and high-yielding aquifers. The Deep Flow Recharge Area on Long Island has also been delineated. It is noted that the Deep Flow Recharge Area on Long Island also includes many wells using the shallow Glacial aquifer, and thus provides an added layer of protection.

Refinements (i.e., delineation of additional sub-zones of the overall WHPA) have been completed in many areas. However, such refinements are optional. Their evaluation and delineation will be a goal of future efforts in wellhead protection

## CHAPTER 4

### SOURCE IDENTIFICATION

#### 4.1. Categories of Potential Groundwater Contamination Sources

##### 4.1.1. Introduction

Potential contamination sources as described in the federal Safe Drinking Water Act include those anthropogenic sources, both point and nonpoint, which involve the manufacture, use, storage, handling, transport, or disposal of toxic and hazardous substances which may have any adverse effect on human health. Certain activities (e.g., mining) may also be considered potential sources, because they may increase vulnerability to contamination and may be associated with other activities of concern.

In the broadest sense, potential contamination sources may include nearly all commercial, and many governmental and domestic activities. To be useful in guiding the management of contamination sources to maximize groundwater protection benefits, some differentiation or priority system is needed.

Priorities are based on the significance of the source and the intended management application of the inventory. Source significance is based on the type of contaminant (mobility in groundwater, known impacts on public water supplies, toxicology, pathogenicity), the quantity of the contaminant at that location, and the potential of that source type to release contaminants to groundwater and impact water supplies.

The management applications of the source inventory may include:

- ◀ Developing local awareness and support for groundwater protection program adoption;
- ◀ Emergency response planning;
- ◀ Inspection planning or sequencing;
- ◀ Monitoring design;

- ◀ Enforcement; tracking compliance;
- ◀ Targeting education efforts;
- ◀ Regional and local planning;
- ◀ Local land use regulations development; and
- ◀ Identifying new program or program improvement needs.

##### 4.1.2. Classification of Sources

Potential contamination sources may be classified in many ways. The major need for groundwater protection is to provide a structure for collecting and interpreting data regarding existing contamination sources which is readily useable in a variety of programs.

The United States Office of Technology Assistance developed a comprehensive listing of potential contamination sources, including 33 types within six major groups (Table 4.1). This classification has been included in wellhead protection program guidance manuals prepared by USEPA. All of these source types occur within New York State, although mine tailings, mine waste and mine drainage are less important than in many other states. Mining (e.g., sand and gravel) is still considered to be a potential source in that may be associated with other activities (fuel usage) that can contaminate groundwater.

The OTA classification in Table 4.1 is endorsed by the Department of Environmental Conservation as a useful structure for collecting data related to potential contamination sources.

A long-term goal of contamination source inventory is to utilize computer geographic information systems (GIS) to manage and interpret the data collected. The mapping keys of GIS methods or other maps will not be required to explicitly duplicate the OTA classification, as this would be counterproductive if more efficient

#### Appendix F List of Contaminants of Concern



## List of Contaminants of Concern

### Halogenated solvents

bromochloromethane (3)  
bromomethane (3)  
carbon tetrachloride (1, 3)  
chlorobenzene (1, 3)  
chloroethane (3)  
chloromethane (3)  
2-chlorotoluene (3)  
4-chlorotoluene (3)  
dibromomethane (3)  
1,2-dichlorobenzene (1, 3)  
1,3-dichlorobenzene (3)  
1,4-dichlorobenzene (1, 3)  
dichlorodifluoromethane (3)  
1,1-dichloroethane (3)  
1,2-dichloroethane (1, 3)  
1,1-dichloroethene (1, 3)  
cis-1,2-dichloroethene (1, 3)  
trans-1,2-dichloroethene (1, 3)  
dichloromethane (1,3)  
1,2-dichloropropane (3)  
1,3-dichloropropane (3)  
2,2-dichloropropane (3)  
1,1-dichloropropene (3)  
cis-1,3-dichloropropene(3)  
trans-1,3-dichloropropene (3)  
hexachlorobutadiene (2, 3)  
methylene chloride (1, 3)  
1,1,1,2-tetrachloroethane (3)  
1,1,2,2-tetrachloroethane (3)  
tetrachloroethene (1, 3)  
1,2,3-trichlorobenzene (3)  
1,2,4-trichlorobenzene (3)  
1,1,1-trichloroethane (1, 3)  
1,1,2-trichloroethane (1, 3)  
trichloroethene (1, 3)  
trichlorofluoromethane (3)  
1,2,3-trichloropropane (3)  
vinyl chloride (1,3)

### Petroleum products

benzene (1, 3)  
bromobenzene (3)  
n-butylbenzene (3)  
sec-butylbenzene (3)  
tert-butylbenzene (3)  
cis-1,2-dichlorobenzene (3)  
ethyl-tertiary-butyl-ether (ETBE) (3, 4)  
ethylbenzene (1, 3)  
isopropylbenzene (cumene) (3)  
4-isopropyltoluene (p-cymene) (2, 3)  
methyl-tertiary-butyl-ether (MTBE) (2, 3)  
naphthalene (2, 3)  
n-propylbenzene (3)  
tert-amyl methyl ether (TAME) (3, 4)  
toluene (1, 3)  
1,2,3-trichlorobenzene (3)  
1,2,4-trichlorobenzene (3)  
1,2,4-trimethylbenzene (3)  
1,3,5-trimethylbenzene (3)  
m-xylene (1, 3)  
o-xylene (1, 3)  
p-xylene (1, 3)

### Other Industrial Organics

acrylamide (1,3)  
benzo(a)pyrene (3)  
2,4-dichlorophenol (2)  
2,4-dinitrophenol (2)  
2,4-dinitrotoluene (2)  
2,6-dinitrotoluene (2)  
1,2-diphenylhydrazine (2)  
ethylene glycol (3)  
epichlorhydrin (1, 3)  
hexachlorocyclopentadiene (3)  
p-isopropyltoluene (3)  
4-nitrophenol (3)  
PAHs (benzo(a)pyrene) (1,3)  
PCBs (1, 3)  
propylene glycol (3)  
styrene (1, 3)  
2,3,7,8-TCDD (dioxin) (1, 3)  
2,4,6-trichlorophenol (2)

**List of Contaminants of Concern**

**Pesticides**

acetochlor (2, 3)  
 alachlor ESA (2, 3)  
 alachlor (1, 3)  
 aldicarb (2, 3)  
 aldicarb sulfone (2, 3)  
 aldicarb sulfoxide (2, 3)  
 aldrin (2, 3)  
 atrazine (1, 3)  
 benfluralin (3)  
 bromacil (3)  
 butachlor (3)  
 carbaryl (3)  
 carbofuran (1,3)  
 captan (3)  
 chlordane (1, 3)  
 chlorpyrifos (3)  
 2,4-D (1, 3)  
 dalapon (1, 3)  
 daminozide (3)  
 DCPA mono-acid & di-acid degradates (2,3)  
 DDE (2, 3)  
 diazinon (2, 3)  
 dibromochloropropane (DBCP) (1, 3)  
 dicamba (3)  
 1,2-dichloropropane (3)  
 dieldrin (2, 3)  
 dinoseb (1, 3)  
 di(2-ethylhexyl) adipate (1,3)  
 di(2-ethylhexyl)phthalate (1,3)  
 diquat (1, 3)  
 disulfoton (2, 3)  
 diuron (2, 3)  
 endosulfan sulfate (3)  
 endothall (1,3)  
 endrin (1, 3)  
 EPTC (2, 3)  
 ethofumasate (3)  
 ethylene dibromide (EDB) (1, 3)  
 fonofos (2, 3)  
 glyphosate (1, 3)  
 heptachlor (1, 3)  
 heptachlor epoxide (1, 3)  
 hexachlorobenzene (HCB) (3)  
 3-hydroxycarbofuran (3)  
 imidacloprid (3)  
 isofenphos (3)  
 lindane (1, 3)

**Pesticides (continued)**

linuron (2, 3)  
 mancozeb (3)  
 maneb (3)  
 mecoprop dimethylamine (MCP) (3)  
 metalaxyl (3)  
 methyl bromide (2, 3)  
 methomyl (3)  
 metolachlor (2, 3)  
 methoxychlor (1, 3)  
 metribuzin (2, 3)  
 molinate (2, 3)  
 nitrobenzene (2, 3)  
 organotins (2, 3)  
 oxamyl (Vydate) (1, 3)  
 pendimethalin (3)  
 pentachlorophenol (3)  
 pichloram (1, 3)  
 prometon (2, 3)  
 propachlor (3)  
 propoxur (3)  
 RDX (2, 3)  
 simazine (1, 3)  
 2,4,5-TP (Silvex) (1, 3)  
 tetrachloroterephthalic acid (TPCA) (3)  
 terbacil (2, 3)  
 terbufos (2, 3)  
 toxaphene (1, 3)  
 triazines (& degradation products) (2, 3)  
 trifluralin (3)  
 1,2,3-trichloropropane (3)

**Metals**

antimony (1, 3)  
 arsenic (1, 3)  
 barium (1, 3)  
 beryllium (1, 3)  
 boron (2)  
 cadmium (1, 3)  
 chromium (1, 3)  
 copper (1, 3)  
 iron (3)  
 lead (1, 3)  
 manganese (2, 3)  
 mercury (1, 3)  
 nickel (2, 3)  
 selenium (1, 3)

**List of Contaminants of Concern**

**Metals (continued)**

silver (3)  
 sodium (2, 3)  
 thallium (1, 3)  
 vanadium (2, 3)  
 zinc (3)

**Nitrate**

nitrate (1, 3)  
 nitrite (1, 3)  
 nitrate/nitrite (1, 3)

**Phosphorus**

phosphorus, total (4)  
 orthophosphate (4)

**Cations/Anions**

fluoride (1, 3)  
 chloride (3)  
 cyanide (1, 3)  
 perchlorate (2, 3)  
 sulfate (2, 3)

**Sediments/turbidity**

total suspended solids (3)  
 turbidity (3)

**Industrial Radionuclides**

Ra-226 (1, 3)  
 Ra-228 (1, 3)  
 gross alpha (1, 3)  
 beta particle (1, 3)  
 photon radioactivity (3)  
 Uranium (2)

**Footnotes:**

- (1) Federally regulated
- (2) Contaminant Candidate List (or scheduled for federal regulation)
- (3) NYS regulated
- (4) Not directly regulated

**Enteric viruses**

Caliciviruses (2)  
 Echoviruses (2)  
 Coxsackieviruses (2)  
 Adenoviruses (2)

**Protozoa**

cryptosporidium (1)  
 giardia (1, 3)  
 microsporidia (2)

**Enteric Bacteria**

Aeromonas hydrophila (2)  
 total coliform (1, 3)  
*E. coli.* (1, 3)  
*Helicobacter pylori* (2)  
 Legionella (1)

**Disinfection by-product precursors**

total organic carbon (4)  
 UV254 (4)  
 THMs (1, 3)

**Appendix G**  
**Hypothetical Source Water Assessments**

**SOURCE WATER ASSESSMENT PUBLIC SUMMARY  
CITY OF BIGTOWN - PUBLIC DRINKING WATER SYSTEM  
REVISED JANUARY 1999**

**INTRODUCTION**

The New York State Department of Health (DOH) is completing assessments of the contaminant threats to all public drinking water sources. The New York State and Strong County Health Departments have prepared this *Source Water Assessment Public Summary* to provide information to support local and state efforts to protect the City of Bigtown's public drinking water sources. The information contained in this assessment pertains to the source(s) of water delivered by the City of Bigtown Water System. The emphasis of this assessment is on "source" (river water) water rather than "tap" water. Information on tap water quality is available in the City of Bigtown's *Annual Water Supply Statement* which can be obtained from the Bigtown Water Department by calling (555) 555-1233.

**WHAT IS THE SOURCE OF YOUR DRINKING WATER?**

The source of water for the City of Bigtown is surface water drawn from the Meandering River. An average of 15 million gallons of water is withdrawn from the river per day. The water system serves a population of 100,000 residents. The location of the city's intake on the Meandering River is shown on the attached map. The map also depicts the boundaries of the watershed, which is composed of 2,000 square miles and drains to the Meandering River north of Bigtown. Approximately fifty percent of the watershed area is forested, forty-five percent is used for agriculture (pasture and crops for dairy), and five percent of the area is developed for residential, commercial or industrial uses. There are approximately 1,800 farms raising 120,000 cattle in the watershed area. The estimated population of the Meandering River watershed is 150,000.

**WATER QUALITY AND WATER TREATMENT INFORMATION**

Water withdrawn from the Meandering River is filtered and disinfected with chlorine prior to distribution to consumers. Water quality testing performed by the City of Bigtown indicated that results of tap water sampling done in 1997 were all within the limits set by the DOH. For further information regarding the quality of the system's finished (tap) water, please refer to the *Annual Water Supply Statement*.

**EVALUATION OF SIGNIFICANT POTENTIAL SOURCES OF CONTAMINATION**

This assessment evaluates contaminants that may enter the water drawn directly from the Meandering River before treatment. The contaminants addressed in this assessment include those regulated under the federal Safe Drinking Water Act as well as those which the DOH has determined may present a concern to public health. A description of the **significant potential** sources of contamination associated with the Meandering River watershed are provided below. Each significant potential source of contamination has been analyzed and prioritized (low, medium, and high) according to its potential to impact the water supply. Potential sources of contamination of medium and high priority are summarized below.

Potential Sources of Contamination	Contaminants of Concern	Description	Potential Impact to Source Water Quality
Treated sewage discharges (see map)	Pathogens, including Cryptosporidium.	<ul style="list-style-type: none"> <li>Wastewater generated from most homes and businesses in the watershed is discharged to a municipal sewage collection system.</li> <li>Total permitted discharge represents about 1% of the average flow in the Meandering River; however, during droughts they could contribute up to 20% of river flow.</li> </ul>	Medium to high
Farm animal manure.	Pathogens, including Cryptosporidium.	<ul style="list-style-type: none"> <li>Approximately 1,800 farms raise 120,000 cattle or other large farm animals.</li> </ul>	Medium to high.

As indicated above, treated sewage discharges, farm animal manure, and to a lesser degree, wildlife, are significant sources of pathogens (germs) that can cause waterborne diseases. The combination of filtration and disinfection removes and/or destroys most of these pathogens. A concern remains about *Cryptosporidium* of which about ninety-nine percent can be removed by filtration. Although much is unknown about *Cryptosporidium* it is known to cause an intestinal disease (cryptosporidiosis) which can be very serious for people with weak immune systems due to medical treatments, such as chemotherapy, dialysis or organ transplants, and also for people with Crohn's disease or HIV infection. People with weakened immune systems should discuss with their health care providers the need to take extra precautions to minimize the chance for exposure to *Cryptosporidium*, such as using a certified bottled water or a specially approved home filter, or boiling tap water.

Watersheds like the Meandering River with sewage discharges and farm animals are considered higher risk for containing *Cryptosporidium* than watersheds without these sources. The occurrence is also believed to vary seasonally with weather extremes, such as high precipitation or drought. The method for measuring *Cryptosporidium* contamination in water is not always reliable; and it is difficult to know how much is present at any time.

Other potential sources of contamination (and contaminants of concern) that were evaluated as part of the Source Water Assessment included: agricultural activities (pesticides and nitrates), on-site septic systems (pathogens), waste sites (leaking small amounts of solvents and metals), and commercial/industrial activities (solvents and petroleum). However, based on an evaluation of these potential contaminant sources, as part of this assessment, the DOH concluded that they do not pose a significant threat to the drinking water source for the City of Bigtown.

#### ONGOING WATERSHED PROTECTION ACTIVITIES

Direct discharge of contaminants in this watershed are addressed by state and federal regulations. More diffuse contamination from farms is being addressed by voluntary cooperation among farmers and government agencies. Local groups are also preparing a water management plan to address drinking water and other water quality issues.

#### SOURCE WATER PROTECTION NEEDS

Based on the evaluation that was completed as part of this Source Water Assessment, the DOH has determined that existing state and local programs should provide adequate protection of this drinking water source. Emphasis should be placed on the effectiveness of controls for *Cryptosporidium*. Better understanding of the risks associated with *Cryptosporidium* may result in the need to enhance protection (or treatment).

#### HOW TO OBTAIN ADDITIONAL INFORMATION

This *Source Water Assessment Public Summary* was completed in June 1998. Individuals interested learning more about this water system and watershed can contact the City of Bigtown at (555)555-1234 or the Strong County Health Department at (555)555-3344. Additional information can be obtained from the New York State Department of Health's Source Water Assessment Program at (518) 458-6793. This document is also available on the DOH's "webpage" at WWW.HEALTH.STATE.NY.US (select "Information for Consumers"; "Environmental and Occupational Health"; "Source Water Assessments"). A *Full Length* (more detailed version) of this *Source Water Assessment* is available for review at the Strong County Health Department and the Strong County Library.

## SOURCE WATER ASSESSMENT PUBLIC SUMMARY VILLAGE OF SMALLTOWN - PUBLIC DRINKING WATER SYSTEM REVISED JUNE 1998

#### INTRODUCTION

The New York State Department of Health (DOH) is completing assessments of the contaminant threats to all public drinking water sources. The New York State and Little County Health Departments have prepared this *Source Water Assessment Public Summary* to provide information to support local and state efforts to protect the Village of Smalltown's public drinking water sources. The information contained in this assessment pertains to the sources of water delivered by the Village of Smalltown Water System. The emphasis of this assessment is on "source" (well/spring) water rather than "tap" water. Information on tap water quality is available in the Village of Smalltown's *Annual Water Supply Statement* which can be obtained from the Smalltown Water Department by calling (555) 555-1233.

#### WHAT IS THE SOURCE OF YOUR DRINKING WATER?

The Village of Smalltown water system serves a population of 1,000 residents. The Village of Smalltown has two sources of drinking water as shown on the attached map: a well located within the village limits and a spring located on a hillside approximately two miles west of the well. The spring flows constantly to the water distribution system and provides about 60,000 gallons per day, but somewhat less during droughts. The well is pumped to provide 50,000 gallons per day.

An investigation performed in 1993 revealed that the spring collection pipes were not adequately sealed against penetration from water that had flowed across the surface of the land. The collection pipes were reconstructed to assure that the water entering the pipes had percolated through the ground for some considerable but unknown distance. To be sure to include any possible sources of contamination, it was estimated that the spring draws water from an area extending to the top of the hill, as shown on the attached map. Most of this land is forested and owned by the village. Small sections in private ownership are cleared for pasture. There are no buildings in the area.

The well is 55 feet deep and draws groundwater from a ten-foot deep layer of sand and gravel called an aquifer. The land area (approximately two square miles) that contributes water to the well is depicted on the attached map. This contributory area is composed of land located inside and outside of the village limits. Within the village, this area is used for residential and commercial activities, although the village owns and controls the land immediately surrounding the well (a 200 foot minimum radius). The area outside of the village is composed of mostly agricultural land used to grow corn.

#### WATER QUALITY AND WATER TREATMENT INFORMATION

The water withdrawn from the well and the spring is not disinfected prior to distribution. Water quality testing performed by the village indicated that results of sampling done in 1997 were all within the limits set by the DOH. However, sampling of the well did indicate an increase in the levels of nitrate and the presence of organic solvents. Although detected, both the nitrate and organic solvent levels were within the state drinking water standards. For further information regarding the quality of the system's finished (tap) water, please refer to the *Annual Water Supply Statement*.

**EVALUATION OF SIGNIFICANT POTENTIAL SOURCES OF CONTAMINATION**

This assessment evaluates contaminants that may enter the water drawn directly from the well or spring. The contaminants addressed in this assessment include those regulated under the federal Safe Drinking Water Act as well as those which the DOH has determined may present a concern to public health. A description of the significant potential sources of contamination associated with the watershed is provided below. Each significant potential source of contamination has been analyzed and prioritized (low, medium, and high) in accordance with their potential to impact the water supply. Potential sources of contamination of medium and high priority are summarized below.

Potential Sources of Contamination	Contaminants of Concern	Description	Potential Impact to Water Supply
Gasoline Stations (see map)	Petroleum hydrocarbons and solvents	<ul style="list-style-type: none"> <li>Two gasoline stations (each with 4 underground gasoline storage tanks) are located within 500 feet of the wellhead.</li> <li>A spill at one gasoline station was controlled and a remedial action plan is in place.*</li> </ul>	Medium
On-site septic systems	Pathogens and nitrates	<ul style="list-style-type: none"> <li>Approximately 22 homes and businesses located within the contributory area to the well, use septic systems.</li> <li>Four septic systems are within the two year time of travel to the well. These systems were installed before modern design standards and their integrity is unknown.</li> </ul>	Medium
Sanitary sewers	Pathogens and nitrates	<ul style="list-style-type: none"> <li>All of the buildings within the village are connected to sanitary sewers which discharge to the village's wastewater treatment plant (see map).</li> <li>Sanitary sewers were last tested in 1978 for leaks and found to be marginally acceptable.</li> </ul>	Medium
Industrial waste site (see map)	Solvents	<ul style="list-style-type: none"> <li>An abandoned industrial paint manufacturing facility is located approximately 750 feet from the wellhead.</li> <li>Low levels of solvents have been detected in monitoring wells located at the abandoned facility.*</li> <li>No further environmental remediation is being required at this site.</li> </ul>	Medium
Agricultural Activities	Nitrates and pesticides	<ul style="list-style-type: none"> <li>Fertilizer, a source of nitrate, is used on the cropland within the well's contributory area.*</li> <li>Elevated nitrate levels have been observed in the well.</li> </ul>	Medium-High

\* References are present in the *Full Length Source Water Assessment Report* (see below).

The spring is believed to be adequately protected from pathogen contamination since the entry of nearby surface water has been excluded. Low level concentrations of inorganic chemicals have been detected at the spring; however, these chemicals are probably the result of naturally occurring minerals.

Because the water from the well is not disinfected, the sanitary sewers and septic systems are potential

sources of pathogen contamination which could cause waterborne disease. The presence of nitrates in the well water is suspected to be the result of fertilization of farmland within the assessment area. Septic systems and over fertilization of lawns may also be contributing to the nitrate levels. The low levels of organic chemical solvent in the well originated at the nearby abandoned paint manufacturing facility. No further environmental remediation is being required at the former paint manufacturing site.

Other potential sources of contamination (and contaminants of concern) that were evaluated as part of the Source Water Assessment of the well included: other commercial activities (solvents and petroleum); residential activities (pesticide application); naturally occurring minerals; and radioactivity. However, based on an evaluation of these potential contaminant sources as part of this assessment, the DOH concluded that they do not pose a significant threat to the Village's well. No significant sources of contamination to the spring were identified.

**ONGOING WATERSHED PROTECTION ACTIVITIES**

The Smalltown aquifer has been added to the State Priority Aquifer List, a statewide list of water quality information used to determine the need for additional investigation. The nitrate contamination is being addressed by a voluntary cooperative effort among farmers and government agencies to limit fertilizer application to the amount that could be used by crops. Pesticides and other potential sources of contamination are also being addressed under this voluntary cooperative effort. Elevated nitrate levels also affect private wells located outside of the village. Local groups are in the process of organizing a aquifer/watershed management plan to address drinking water and other water quality issues.

**SOURCE WATER PROTECTION NEEDS**

An aquifer protection program should be developed for the Village of Smalltown well. Preferably, the protection plan should be developed for the entire Smalltown aquifer and the surrounding watershed with the cooperation of neighboring towns, county and state agencies. For example, the protection program may include the distribution of education materials, describing fertilizer application and household chemical storage, use and disposal, to village and town residents. Similar types of materials could also be provided to area businesses. The integrity of the septic systems and sanitary sewers may also need to be evaluated. A future federal rule may require the source water to be disinfected prior to distribution.

**HOW TO OBTAIN ADDITIONAL INFORMATION**

This *Source Water Assessment Public Summary* was completed in June 1998. Individuals interested in learning more about this water system and aquifer/watershed can contact the Village of Smalltown at (555)555-1234 or the Little County Health Department at (555)555-3344. Additional information can be obtained from the New York State Department of Health's Source Water Assessment Program at (518) 458-6743. This document is also available on the DOH's "webpage" at WWW.HEALTH.STATE.NY.US (select "Information for Consumers"; "Environmental and Occupational Health"; "Source Water Assessments"). A *Full Length* (more detailed version) of this *Source Water Assessment* is available for review at the Little County Health Department and the Little County Library.

**SOURCE WATER ASSESSMENT PUBLIC SUMMARY**  
**RUMBLING BROOK MOBILE HOME PARK - PUBLIC DRINKING WATER SYSTEM**  
**JUNE 1998**

**INTRODUCTION**

The New York State Department of Health (DOH) is completing assessments of the contaminant threats to all public drinking water sources. The New York State and Sunny County Health Departments have prepared this *Source Water Assessment Public Summary* to provide information to support local and state efforts to protect the Rumbling Brook Mobile Home Park's public drinking water source. The information contained in this assessment pertains to the source of water delivered by the Rumbling Brook Mobile Home Park water system. The emphasis of this assessment is on "source" (well) water rather than "tap" water. Information on tap water quality is available in the Rumbling Brook Mobile Home Park's *Consumer Confidence Report* on drinking water quality which is prepared annually by the operator of the mobile home park and posted on the bulletin board located in the management office.

**WHAT IS THE SOURCE OF YOUR DRINKING WATER?**

The Rumbling Brook Mobile Home Park water system serves a population of 100 residents. The source of the drinking water is a well located on the northeastern corner of the Property (see attached map). Based on topography, ground water in the assessment area is believed to flow in a southerly direction.

The well is approximately 40 feet deep and is pumped to provide 20,000 gallons per day. Because there is no record of its construction, it is unknown at what depth water is withdrawn from the well. The land area that was assessed as possibly contributing water to the well has been estimated as one mile north, east, and west (uphill) and 700 feet south (downhill). For the purpose of this source water assessment this area has been defined as the assessment area and is depicted on the attached map. The land area uphill of the well is primarily composed of privately owned forested land and a few cleared pasture areas. Rumbling Brook separates the forested area from the pasture land and flows in a southerly direction approximately 300 feet west of the well. The land area downhill of the well is owned by the mobile home park and is occupied by thirty mobile home units, and the park's septic system leach field. Ten mobile home units and the park's septic system leachfield are located within the 700 foot radius downhill of the well.

**WATER QUALITY AND WATER TREATMENT INFORMATION**

The water withdrawn from the well is not disinfected prior to distribution to the homes. Water quality testing performed by the mobile home park and the DOH in 1997 indicated that the water does not need to be treated because no contamination was detected above the limits set by the DOH. For further information regarding the quality of the system's finished (tap) water, please refer to the *Consumer Confidence Report* posted on the bulletin board in the mobile home park management office.

**EVALUATION OF SIGNIFICANT POTENTIAL SOURCES OF CONTAMINATION**

This assessment evaluates contaminants that **may** enter the water that is drawn from the well. The contaminants evaluated in this assessment included those regulated under the federal Safe Drinking Water Act and those the DOH has determined may present a concern to public health. A review of land uses located within the assessment area revealed the following possible contaminant sources: mobile home park septic system leach field, Rumbling Brook, pasture land used for livestock grazing, fuel storage tanks associated with individual mobile home units, and a nearby oil/gas well. A discussion of each of these potential contaminant sources is provided below.

**EXAMPLE**

**MAP NOT INCLUDED**

The mobile home park's septic system leach field, a potential source of pathogens (germs), is located approximately 500 feet south of the well. However, since the septic system is located downgradient (downhill) of the well it is unlikely to cause contamination of the well. Rumbling Brook, another possible source of pathogens, is located approximately 300 feet west of the well. Water from the brook may reach the well because when the well pumps it may draw water from the brook through the ground and into the well. However, Rumbling Brook does not appear to be a significant source of pathogens or other contaminants, because there are no sources of sewage in the area that drains to Rumbling Brook, drainage from pasture lands (including pathogens) within the assessment area are on clay soils and would enter Rumbling Brook downstream of the well, and the potential for contamination from wildlife appears to be negligible.

Approximately one-third of the housing units in the mobile home park are heated with fuel oil. Four aboveground fuel oil tanks (each having a 200-gallon capacity) are located within the source water assessment area. These fuel tanks are a potential source of petroleum contamination. These fuel oil tanks are not considered to be a significant source of contamination since they are in good condition and there was no evidence of leaks or spills observed during the DOH's May 1998 visit to the Rumbling Brook Mobile Home Park. Additionally, the tanks are located downhill of the well and a spill from these tanks would most likely not affect the well.

Another potential source of petroleum contamination is from an oil/gas exploration well approximately one mile east of the drinking water well. However, this oil/gas exploration well is not considered a significant potential source of contamination since a release from the oil/gas well would most likely flow in a direction parallel to the drinking water well.

**SOURCE WATER PROTECTION NEEDS**

A future federal rule may require the source water to be disinfected prior to distribution. This may entail additional monitoring and demonstration that the septic system discharge to ground water could not flow to the drinking water well. To protect the drinking water well, the mobile home park operator and residents should be prudent in handling and storage of hazardous substances at the mobile home park because they could contaminate the water. Hazardous materials should not be stored within a 200 foot radius of the well. Property maintenance staff may wish to perform periodic inspections of on-site fuel oil storage tanks to verify that releases or spills have not occurred.

**HOW TO OBTAIN ADDITIONAL INFORMATION**

This *Source Water Assessment Public Summary* was completed in June 1998. Individuals interested in learning more about this water system and aquifer/watershed can contact the Rumbling Brook Mobile Home Park at (555)555-1234 or the Sunny County Health Department at (555)555-3344. Additional information can be obtained from the DOH's Source Water Assessment Program at (518) 458-6743. This document is also available on the DOH's "webpage" at WWW.HEALTH.STATE.NY.US (select "Information for Consumers"; "Environmental and Occupational Health"; "Source Water Assessments"). A *Full Length* (more detailed version) of this *Source Water Assessment* is available for review at the Sunny County Health Department and the Sunny County Library.

**Appendix H  
Summary of Comments and Responses  
on the Public Comment Draft of the SWAP Plan**



## Summary of Comments and Responses on the Public Comment Draft of the SWAP Plan

On November 10, 1998, the New York State Department of Health (DOH) issued a public notice about the availability of the Draft Source Water Assessment Program Plan for public review and comment. Notice of the public comment period and availability of the Draft Plan was published in the Business and the Environment and the State Register and was also posted on the DOH web page. The Draft Source Water Assessment Program Plan was mailed to approximately 760 people who had previously expressed an interest in the Source Water Assessment Program. An additional 108 copies of the Draft Plan were mailed to owners and operators of small public water systems and other interested parties who attended the New York Rural Water Association Source Water Assessment Seminars in early November. Also, owners/operators of community public water systems serving greater than 5000 people were mailed a copy of the Public Summary of the Draft Plan. The public comment period on the Draft Source Water Assessment Program Plan ran from November 10, 1998 through December 18, 1998. During the public comment period, public hearings were held in Albany, Rochester and Long Island. Two individual hearing sessions were held at each location, one in the afternoon and one in the evening.

This summary of comments and responses was developed from testimonies provided at the public hearings as well as written comments that were submitted to the DOH during the public comment period. For this summary, similar comments were combined and comments associated with common topics were grouped together. All comments refer to the November 10, 1998 version of the Draft Source Water Assessment Program Plan. Revisions to the Plan based on these public comments are reflected in the November 1999 Final Source Water Assessment Program Plan.

### **Data Collection**

#### **Comment 1**

Section 4.1.1. discusses how the DOH will work with local health departments to acquire information about public water systems. The wording concerning sanitary surveys and vulnerability assessments is vague.

#### **Response**

This section has been modified to clarify how these ongoing activities are integrated into the Source Water Assessment Program. As stated in Section 4.1.1, all public water systems undergo periodic sanitary surveys and as stated in Section 4.4.5, sanitary surveys will be updated as part of the effort to field verify information from other sources (e.g., GIS). We plan to include a periodic verification of susceptibility as part of the sanitary survey documentation.

For public water systems that have undergone a source water assessment, the DOH or local health department will be completing vulnerability determinations for certain contaminants as part of alternative monitoring requirements as permitted by the Safe Drinking Water Act . However, the EPA has yet to finalize regulations as to what will be permitted as part of alternative monitoring.

**Comment 2**

Ninety-four percent of water suppliers who attended the New York Rural Water Association Source Water Assessment Seminars in November 1998, indicated that they are willing to assist the DOH by verifying and supplying additional data as well as reviewing draft assessments.

**Response**

The DOH welcomes the opportunity to work with water suppliers on the source water assessments. As indicated in Section 4.2.2, the DOH considers water suppliers as one of the most important sources of information for the assessments. The Source Water Assessment Program Plan has been modified to involve owners/operators of public water systems with data verification and other involved partners.

**Comment 3**

The DOH should send the draft assessments to water suppliers for their review before they are made available to the public.

**Response**

The DOH agrees that involving the water systems and other partners in the review process is a good idea and involved partners will be provided with an opportunity to verify the data used in the assessment, as indicated in Sections 4.1.1 and 4.1.2 of the Source Water Assessment Program Plan.

**Comment 4**

All water suppliers should receive a copy of source water assessments. Assessments for non-community water systems can be "packaged" by town, aquifer or watershed area as long as the water system receives an individual assessment as well.

**Response**

Grouped assessments of non-community water systems will include specific information about each water system's susceptibility to contamination within the defined source water assessment area. As indicated in Section 4.6.2 of the Source Water Assessment Program Plan, all owners/operators of community water systems will receive a summary which is adequate to support the reporting requirements of the Consumer Confidence Reports.

**Comment 5**

The Plan does not have a consistent data collection methodology and use of widely differing data collection methodologies could lead to questions about the scientific integrity of the data.

**Response**

As part of the guidance document that will provide assistance to people conducting assessments, a quality assurance plan will be developed. Also the metadata that will be attached to the GIS information will let the user know the level of confidence associated with that data set.

**Delineation of Assessment Areas**

**Comment 6**

The current Department of Environmental Conservation permitting process for new public water supply wells requires a 200 feet minimum radius protective zone and assessments based on this criteria may be wholly inadequate.

**Response**

As indicated in Section 4.2.2 of the Source Water Assessment Program Plan, a minimum delineation of 500 feet will be used for all public water system supply wells.

**Comment 7**

All source water areas should be modeled.

**Response**

The methodology outlined in the Source Water Assessment Program Plan relies on a simplistic model to evaluate a public water system's susceptibility to significant potential sources of contamination within the defined source water assessment area. The DOH can not undertake groundwater or surface water modeling for each public water system as part of the assessment effort. The information needed for source water modeling is not reasonably available for all systems and initiating such an effort is beyond the scope of the Source Water Assessment Program. However, as noted in Section 4.2.2. of the Source Water Assessment Program Plan, professional judgement will be used in evaluating the hydrogeologically sensitive areas, which may involve the use of analytical models.

**Comment 8**

A disclaimer or other similar statement should be widely used to indicate that the defined assessment area is not appropriate for sophisticated protection programs such as land use regulation, land acquisition, etc.

**Response**

The DOH acknowledges that the proposed methodology for delineating source water assessment areas for public water systems where there is little or no information, may not be a suitable basis for establishing sophisticated protection programs. The text in Section 4.2.1 of the Source Water Assessment Program Plan has been revised to reflect this concern. As indicated in Section 4.6.1. of the Plan, the format of the source water assessment will include "a description of the delineation approach taken, why it was taken, the confidence level associated with how well it represents the contributory area, and an evaluation of the reliability of the contaminant source inventory, based on

field verification". The issue of including qualifiers in the assessments about the delineated source water assessment area will be raised with the Source Water Protection Coordinating Committee's Delineation Issues Working Group during development of the implementation guidance document.

#### **Comment 9**

Funding for an expanded delineation process beyond those delineation efforts proposed as being minimally acceptable in the draft plan should be of immediate public concern, especially in those areas designated as high priorities under the Source Water Assessment Program and the Department of Environmental Conservation Unified Watershed Assessment Report (October 1, 1998).

#### **Response**

For those public water systems where there is no information to support a more detailed delineation, the approach outlined in the Source Water Assessment Program Plan will be the basis for the first iteration of the source water assessment. If, during the assessment process (i.e., contaminant inventory and susceptibility refinement), the available information indicates the need to support completing a more detailed delineation, then additional efforts could be undertaken to do so. Resources, in addition to available Source Water Assessment Program funding, will likely be necessary to enhance delineations of source water assessment areas that are completed for public water systems under the Source Water Assessment Program.

### **Contaminant Inventory**

#### **Comment 10**

The contaminant inventory does not take into account potential sources of contamination arising from accidents associated with railroads, highways and ships.

#### **Response**

The category of "Major Transportation Routes: Roads; Railroads; Water Transport Routes; Pipelines" has been added to Table 2 ("Data Needs to Perform Assessments") under the heading "Contaminant Inventory". The source water assessment will include information about the potential of a source to be affected by a hazardous materials spill, based on available information and professional judgement. Local input and knowledge of this type of information will be extremely valuable in finalizing the assessment. Information on transportation routes can also be supplemented locally or from state GIS coverages. Vulnerability of a specific public water source due to its location near a major transportation route will be evaluated in the susceptibility review and refinement phase of the assessment process. Susceptibility to potential contamination along transportation corridors will be addressed in the guidance document(s) for completing assessments.

#### **Comment 11**

How will the DOH account for sources of contaminants that are not included in the draft Source Water Assessment Program plan? Specifically, how will contaminants associated with fertilizers or from activities such as road spraying and land spreading of septage and sewage treatment plant sludge

be evaluated? How will situations due to poor infrastructure which allow contaminants to enter a system be addressed?

#### **Response**

The potential sources of contaminants identified in the draft plan were compiled from existing databases. Table 2 (Data Needs to Perform Assessments) has been revised to include Biosolid sites under the heading "Contaminant Inventory." Sources of fertilizer contamination will also be evaluated as part of the contaminant inventory (see Table 2). Other sources of contaminants, from activities such as road spraying, or land spreading of septage, may be evaluated in the "Review and Refinement" step in the source water assessment process. Issues related contamination of source water(s) due to infrastructure will be addressed during the initial data gathering effort as part of the information reviewed from sanitary surveys. Local issues and concerns not previously identified can be evaluated and integrated into the final assessment.

#### **Comment 12**

Underground injection wells are not listed in Table 2 (Data Needs to Perform Assessments).

#### **Response**

Underground injection wells have been added to Table 2.

#### **Comment 13**

Section 4.3 does not contain a discussion of how the DOH will identify contaminants of concern. Specifically, how was the list of pesticides in Appendix E chosen? How will agricultural pesticide use be evaluated?

#### **Response**

The pesticides included on the List of Contaminants of Concern in Appendix E (now Appendix F) were compiled primarily from three existing sources: pesticides federally regulated by the EPA as drinking water contaminants; pesticides regulated and monitored for by New York State as drinking water contaminants; and those pesticides that appear on the EPA's Contaminant Candidate List. The pesticides on the Contaminant Candidate List were included because of new concern. The criteria used during the Contaminant Candidate Lists identification process included: chemicals of public concern; chemicals of international interest and global concern; chemicals of known occurrence; chemicals of known toxicity; high release chemicals; high production chemicals; pesticides with high leaching potential/high run-off potential; endocrine disruptors. In addition, the information presented in the Department of Environmental Conservation Annual Pesticide Sales and Use Data Report was reviewed and several additional pesticides with high sales in New York State have been added to the List of Contaminants of Concern.

To evaluate agricultural pesticide use, the DOH will use many databases which contain relevant pesticide data. The U.S. Department of Agriculture is a major source for pesticide use data and has developed databases to provide statistical estimates of fertilizer and pesticide use on crops. The

DOH will also work with the Cornell Cooperative extension, the United States Geological Survey and the New York State Department of Environmental Conservation to determine which pesticides pose threats to ambient water quality. The DOH will be utilizing all readily available databases, including those developed by the U.S. Department of Agriculture, to complete the assessments. As noted in Section 5.1.2 of the Source Water Assessment Program Plan, the DOH is working with the Natural Resource Conservation Service of the U.S. Department of Agriculture on a pilot project to apply the National Agricultural Pesticide Risk Analysis model to two drinking water watersheds in western New York State. This partnership, as well as others, will provide valuable data on pesticide use throughout New York State.

**Comment 14**

MTBE and other additives which may be added to gasoline should also be included on the List of Contaminants of Concern.

**Response**

MTBE is included in the List of Contaminants of Concern (which is now Appendix F in the Plan) under the heading, "Petroleum Products." Two additional gasoline additives, ethyl-tertiary-butyl-ether (ETBE) and tert-amyl-methyl-ether (TAME) have also been added to this listing.

**Comment 15**

Propylene glycol and ethylene glycol should be specifically identified as a "Contaminants of Concern".

**Response**

Propylene glycol and ethylene glycol have been added to the List of Contaminants of Concern under the heading of "Other Industrial Organics" of the Source Water Assessment Plan. The List of Contaminants of concern is now included in Appendix F.

**Comment 16**

Sources of contamination should be geocoded so they can be located on a GIS map.

**Response**

The DOH will be primarily using information from the New York State Department of Environmental Conservation regarding possible contaminant sources. Much of this data already exists in the form of databases that can be accessed using a Geographic Information System (GIS). The DOH and the New York State Department of Environmental Conservation are committed to reviewing the data to assure that it is accurate.

**Comment 17**

When chlorinated water is put on or in the ground, it percolates through the soil and forms trihalomethanes, which then enter the ground water as recharge.

**Response**

The DOH will compare the levels of trihalomethanes in an individual public water supply wells with the levels of trihalomethanes in the finished water that are formed through disinfection. Based on this evaluation, the DOH will review the level of public health concern and determine whether the contribution of trihalomethanes from the ground water source is significant.

**Comment 18**

Hundreds of old, buried residential oil tanks may be rusting and leaking, thereby causing contamination of the groundwater and this threat needs to be addressed.

**Response**

After several decades of monitoring public water system wells for contaminants that are representative of fuel oil, there are very few cases where fuel oil contaminants have been detected in public water supply sources. The majority of these cases are associated with commercial establishments and not homes. However, Table 4 has been revised to reflect an additional rating of "medium" due to the potential for groundwater contamination by petroleum products and halogenated solvents in areas characterized as "high intensity residential".

**Comment 19**

The glossary should be expanded to include the definition of "pesticides" from the Environmental Conservation Law, to clarify the distinction between these chemicals and others on the Contaminant Inventory list.

**Response**

The glossary has been expanded to include a definition of "pesticides" similar to that defined in the Environmental Conservation Law.

**Susceptibility Analysis**

**Comment 20**

Figure 3 in the Source Water Assessment Program Plan needs more detail to be useful. First, only source water contamination above or approaching the maximum contaminant level should immediately trigger high source sensitivity. Second, the DOH needs to outline how it will define a confined aquifer, a lower permeability layer, and an aquifer of high hydraulic conductivity. Sources with unknown sensitivity should be assigned a medium sensitivity priority unless it can be proven that there are extenuating circumstances.

**Response**

Addressing source waters with contamination not above the maximum contaminant level and how to define a confined aquifer, a lower permeability layer, and an aquifer of high hydraulic conductivity will be addressed in the guidance document for implementation of the Source Water Assessment Program. The DOH's approach to characterizing sensitivity considers that the uncertainties associated

with the absence of information (e.g., no well log) is a valid basis for a more protective estimate of sensitivity. Furthermore, such data gaps do not allow confirmation of the natural contaminant protection assumed in the DOH's susceptibility approach for ground waters with a "medium" sensitivity.

### **Public Participation**

#### **Comment 21**

There should be broad public participation in all aspects of the assessment process. In Section 4.5, "public input meetings" should be added to the requirements. These meetings should be held in each watershed to gather comments on the condition of the watershed.

#### **Response**

The DOH will develop a guidance document for individuals conducting the assessments, and the document will include ways to obtain information from people outside of government that are interested in the source. The amount of public participation in conducting assessments will vary from source to source depending on the interest local people have in their source of public drinking water and existing organizational structures for protecting water resources.

#### **Comment 22**

There must be a significant amount of publicity and information on the results of the Source Water Assessment Program once they are available. If the Source Water Assessment Program is to have a meaningful value, it is essential that a major effort must be made to publicize the results of the assessments.

#### **Response**

Information from the source water assessments is required to be included in the Consumer Confidence Reports. These reports will be published annually by all community water systems and will be widely distributed using a variety of methods based on the size of the water system. In addition, the Source Water Assessment Program guidance document will have other suggested methods for local entities to use to provide a broader dissemination of the assessment information. At a minimum, the assessments will be available to the public through the DOH and local Health Departments.

### **General Comments**

#### **Comment 23**

The assessment should provide direction and assistance to a community in carrying out appropriate follow-up actions. Source water protection needs enumerated in the source water assessments should be adequately described so as to give direction to future source water protection efforts, yet not so prescriptive as to be perceived as regulatory requirements.

#### **Response**

The completed source water assessments are designed to guide source water protection planning at the local level. The contaminant inventory that is completed as part of the assessment process will provide specific information about potential contaminant sources of concern and the susceptibility analysis will provide part of the basis for setting priorities for state and local protection. The involvement of local officials with the Source Water Assessment Program will provide a link to future community involvement in watershed and source protection.

#### **Comment 24**

Source Water Assessments should be linked to protection.

#### **Response**

The Source Water Assessment Program is a prelude to protection in that the all available information will be assembled and reviewed to determine where protection of source waters needs to be enhanced. The Source Water Assessment Program will also have relevance to other state and local pollution prevention programs. The Source Water Assessment Program provides another opportunity to look at these issues from a public health aspect and will also provide a mechanism for responding to emerging contaminants of concern, such as MTBE and viruses.

#### **Comment 25**

Smaller systems need to be given a higher priority on the completion of the assessments.

#### **Response**

The Source Water Assessment Program Plan has been revised to delete the reference indicating that higher population water systems will have a higher priority.

#### **Comment 26**

The DOH should note in the objectives of the Plan that the Source Water Assessment Program will benefit systems by providing them with critical information about sources of drinking water.

#### **Response**

This issue has been addressed in Section 1.3 and Section 3.1 of the Plan.

#### **Comment 27**

Long Island has been doing assessment-type work for many years. How will the Source Water Assessment Program help Long Island?

#### **Response**

The Source Water Assessment Program will provide an opportunity to improve the public's understanding of Long Island's unique geologic regime and source water protection needs. The New York State Department of Environmental Conservation and the DOH plan to work with local partners

to update the ground water protection strategy for Long Island as part of the Unified Watershed Assessments.

**Comment 28**

Will the assessments only list items that are resolvable through future funding or will they list all potential contaminant concerns, even if difficult to solve?

**Response**

The Source Water Assessment Program will address all potential contaminants of concern to drinking water sources. In many cases, the issue of resolvability goes beyond basic assessment efforts and requires strategic planning for source protection. For standard assessments, the DOH will discuss issues of resolvability if it is readily apparent that there is ongoing contamination for which there are demonstrated management practices (e.g., nitrate contamination of an aquifer that could be resolved through nutrient management).

**Comment 29**

The DOH should provide more detail on how monitoring flexibility will result from the Source Water Assessment Program.

**Response**

The EPA- approved vulnerability determination protocol (e.g., DOH Technical Reference PWS 72) will be used for granting waivers for systems serving fewer than 10,000 people. Additional monitoring flexibility is allowed in the Safe Drinking Water Act, even though the EPA has not issued the final regulations as required by the 1996 Amendments. When these regulations are available, State procedures, which are based on susceptibility analysis conducted as part of the Source Water Assessment Program, will be submitted to the EPA for approval.

**Comment 30**

The Source Water Assessment Program information is required as part of the Consumer Confidence reports. However source water assessments are a one-time snapshot of the water supply's source. The DOH should ensure that a mechanism exists for updating assessments after their initial completion.

**Response**

The portion of the source water assessment information that will be included in the Consumer Confidence Reports is something that the DOH will update as needed. Section 5.3 of the Source Water Assessment Program Plan also addresses the issue of updating source water assessment information.

**Comment 31**

The DOH has not and should work out the details internally on who will be completing the assessments.

**Response**

Local health departments will be directly involved with the assessment process, and in many cases may be the lead agency for conducting the assessments. The extent of other agency involvement will be determined once the Source Water Assessment Program plan is final. We anticipate that the level of involvement by local partners during the source water assessment process will vary considerably within each county, however, in some cases will be quite extensive.

**Comment 32**

Drought conditions and flooding should not be overlooked when assessing sources of water.

**Response**

Each assessment includes determining the susceptibility of a source of water, and this analysis will evaluate whether drought or flood conditions could adversely affect source water quality.

**Comment 33**

Does the State have sufficient resources to implement the Source Water Assessment Program?

**Response**

The Plan's design is based on the funds budgeted for the program, as outlined in Section 1.4.