MAINE PUBLIC DRINKING WATER

SOURCE WATER ASSESSMENT PROGRAM

"Providing Maine people with information about their drinking water supplies"

Developed by:

MAINE DEPARTMENT OF HUMAN SERVICES

DRINKING WATER PROGRAM

under the guidance of the:

SOURCE WATER ASSESSMENT PROGRAM

CITIZENS AND TECHNICAL ADVISORY COMMITTEE

January, 2000

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1.0 Introduction

Maine has 2200 public water systems which serve drinking water to half a million people by drawing water from more than 2600 individual water sources (wells and surface water intakes). These sources include:

- A seasonal boys and girls camp in the western Maine mountains withdrawing water from a great pond to supply the cabins, lodge, and shower houses.
- A mid-coast village comprised of 120 homes, a church, a fire station and a general store, all supplied by a single bedrock well.
- A southern Maine municipality of more than 10,000 residents supplied by three high-yield gravel packed wells.
- An elementary school of 125 students and staff in northeastern Maine supplied by a dug well.
- A bowling alley in central Maine supplied by a single, 6"-diameter bedrock well.

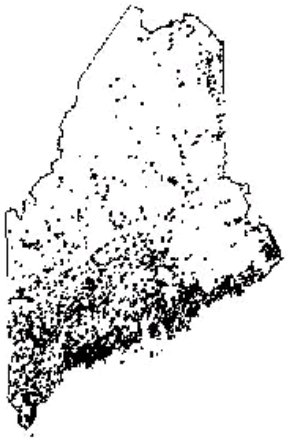
Public water suppliers are required to periodically test the water they serve and, if necessary, to treat it. For this reason, you can be reasonably sure that the water you pour into your glass today is safe to drink. But sometimes Maine public water supply wells do get contaminated by human and animal waste, gasoline and other volatile organic compounds, nitrate from fertilizers, and landfill leachate, among other pollutants. Diminished water quality in some lakes has led some public water suppliers to build facilities to filter and disinfect the water or to abandon the surface water source in favor of wells. Developing a new ground water supply can cost a town more than half a million dollars. How can water supply contamination and such costly remedies be prevented?

The responsibility for protecting public water supply sources from contamination falls largely to public water suppliers. However, land use decisions are made by municipal officials, not water suppliers. This means that protection of public water supplies requires a partnership between water suppliers, regulators, local land owners, and municipalities. The lengths to which Maine communities have gone to protect the public water sources in their towns vary greatly from place to place - from land purchases at one extreme to no action at the other. In some cases no action may be necessary, as when the source is surrounded by protected land such as a state park. In others, however, ensuring that existing sources of drinking water are available for our children will require action. The type and selected course of action taken should be proportional to the level of risk.

The Maine Drinking Water Program wants to ensure that when a water supply is at risk of contamination, the citizens of Maine are made aware so that appropriate steps can be taken at the local level to minimize or eliminate the risk. That is the purpose of the **Source Water Assessment Program or SWAP**. By implementing SWAP over the next 3 years, the Drinking Water Program will *evaluate* each of the 2600 public water supply sources, assess for each the likelihood of contamination by existing or future activities, and *make the results of these studies widely available* to the public. At that point the assessment process ends and the time for protection action begins.

And that is up to you. The DWP will be available to provide technical and in some cases financial assistance to protection efforts, but these efforts will have to be initiated locally. It is you who live in the town who work the land; benefit from the revenues generated by the restaurants, camps, and businesses; drink water supplied by the utility; and send your children to the school. To ensure that that water is always safe to drink, you must also become involved in overseeing the activities that could contaminate it.

2.0 An Overview of Maine Public Water Supplies



Maine has more than 2200 public drinking water systems, ranging in size and function from large community systems serving entire cities or towns to seasonal restaurants and camping facilities which serve only a few hundred people for the summer. The vast majority of these water systems utilize one or more wells drilled in fractured bedrock. However, most large community water systems are supplied by a well or wells installed into loose, unconsolidated materials such as sand and gravel or by water drawn through an intake in a lake or pond. Protecting these resources, therefore, requires that a plan be based on a system-specific evaluation which identifies the nature of the water source, the number of customers served, and the land use activities around the well.

Based on federal and state regulations, a public water system is one which serves 25 or more people for 60 or more days per year. There are three types of public water systems and for each there is a different set of requirements. These system types are:

- **Community Water Systems** which serve people in their place of residence;
- **Non-Transient, Non-Community Water Systems** such as schools or office buildings; and
- **Transient Water Systems** which serve a constantly changing, transient population.

A brief discussion and statistics for each type of water system are given below.

2.1 Community Water Systems

A Community Water System (CWS) is defined as a public water system which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year round residents (10-144E CMR 231). Examples include water districts and departments, privately owned water companies, mobile home parks, and apartment buildings. Table 2.1 summarizes important statistics about the numbers and types of CWSs in Maine.

Table 2.1: Statistics on Maine Community Water Systems (CWSs):
Number of CWSs in Maine.....417
Number of Surface Water Intakes supplying CWSs.....71
Number of Wells supplying CWSs:
Surficial (sand and gravel) Wells.....167
Fractured Bedrock Wells.....368
Dug Wells and Springs.....24

2.2 Non-transient, Non-community Water Systems

Non-transient, Non-community public water systems (NTNCs) are defined as non-community water systems which serve at least 25 *of the same persons* for six months or more per year (10-144E CMR 231). Examples of NTNCs include schools, factories, industrial parks, and office buildings. Table 2.2 summarizes important statistics about the numbers and types of NTNCs in Maine.

Table 2.2: Statistics on Maine Non-transient, Non-community Water Systems (NTNCs):
Number of NTNCs in Maine.....374
Number of Surface Water Intakes supplying NTNCs.....1
Number of Wells supplying NTNCs:
Surficial (sand and gravel) Wells.....129
Fractured Bedrock Wells.....811
Dug Wells and Springs.....9

2.3 Transient Water Systems

Transient public water systems (Transients) are defined as non-community water systems which serve at least 25 persons, *but not necessarily the same persons* for at least 60 days per year (10-144E CMR 231). Examples include highway rest stops, restaurants, motels, campgrounds, golf courses, and boys and girls camps. Table 2.3 summarizes important statistics about the numbers and types of Transients in Maine.

Table 2.3: Statistics on Maine Transient Water Systems (Transients):
Number of Transients in Maine - 1366 Number of Surface Water Intakes supplying Transients - 31

Number of Wells supplying Transients: Surficial (sand and gravel) Wells - 184 Fractured Bedrock Wells - 1489 Dug Wells and Springs - 156

2.4 Regulation of Maine Public Water Systems

The operation of a public water system is governed by the federal Safe Drinking Water Act (SDWA). As with 48 other states, the federal government has delegated authority for enforcing the SDWA in Maine to a state agency - the Maine Drinking Water Program (DWP). The DWP is part of the Bureau of Health in the Department of Human Services. At present there are approximately 30 full time professional and support staff in the DWP.

The DWP is further subdivided into five sections serving distinct functions:

- The Compliance Section makes sure systems take the required water tests.
- The Enforcement Section is responsible for taking legal action for non-compliance.
- The Field Services Section inspects water systems and responds to emergencies.
- The State Revolving Fund Section administers loans to water systems.
- The Source Water Protection Section coordinates initiatives to prevent contamination.

The SDWA was first passed in the 1970s and amended in 1986 and 1996. As initially written, the focus of the SDWA was on determining safe levels for drinking water contaminants (Maximum Contaminant Levels or MCLs), outlining schedules and methods for testing, and requiring treatment for MCL violations. With each reauthorization, the focus of the SDWA has expanded to emphasize proactive measures to prevent contamination of public water supplies. This led to the establishment of the Source Water Protection Section in 1998. The Source Water Assessment Program is the first major initiative of the newly established section.

3.0 From Statute to Program: The Development of SWAP

The Maine Source Water Assessment Program represents the end product of a year-long public process involving the deliberations of a Citizens and Technical Advisory Committee (SWAP Advisory Committee) and associated work groups; public meetings held throughout the state attended by water systems, municipal officials and citizens; and presentations at numerous conferences and conventions. Such public involvement is both required by law and vital to the development of a program which will meet its obligation to be "for the protection and benefit of public water systems." The process began when the federal Safe Drinking Water Act (SDWA) was reauthorized in 1996.

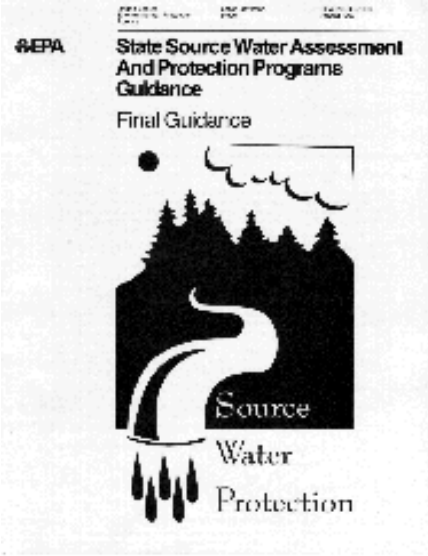
3.1 The Statute

The Source Water Assessment Program has its origin in the latest Amendments to the SDWA, passed by the U.S. Congress in August, 1996. Based on the belief that consumers have a right to know about the water they drink, the Amendments require each state to develop a program for assessing the susceptibility to contamination of each public drinking water source in the state. The SWAP is to be "for the protection and benefit of public water systems" and the results of the

assessments are required by the law to be made "available to the public." To aid states in meeting this obligation, Congress appropriated more than one billion dollars in fiscal year 1997 and authorized appropriation of more than 500 million in succeeding years, portions of which are available to states to set aside for the support of assessment projects.

3.2 The Guidance from EPA

In guidance materials provided by the federal Environmental Protection Agency to aid states in developing and implementing a SWAP, several required elements of an acceptable state program were outlined. These include:



- A **delineation** of the recharge area of a well or watershed of a surface water body;
- An **inventory** of land uses and potential contamination sources which exist, or could occur, within the delineated source water protection area;
- An **evaluation** of the susceptibility to contamination of the water source to the potential hazards that are identified in the inventory; and
- a process for **communicating** the assessment results to the public.

In addition to these program elements, EPA guidance also lists several process requirements for states to meet when designing the SWAP. Most significantly, the guidance requires each state to involve the public in a comprehensive and meaningful way in the design and implementation of the SWAP. The DWP has accomplished this in several ways including convening a Citizens and Technical Advisory Committee and holding public meetings throughout the state. Implementation of the SWAP will be done over a period of several years and the program is designed to engage citizens and officials at the local level throughout that implementation period. Rather than an end in itself, the SWAP is expected by EPA to be a catalyst for protection action initiated locally.

3.3 The SWAP Advisory Committee

The goal of SWAP is to produce assessments which are both meaningful and understandable so that citizens can use the results to make informed decisions about protecting the public water supplies in their town. To ensure that this is so, the DWP convened a SWAP Advisory Committee, with technical and citizen representatives, which met five times beginning in May 1998. In addition, the SWAP Advisory Committee meetings were managed by a professional process facilitator. The involvement of a professional facilitator was deemed crucial to ensuring that advisory committee meetings would be conducted fairly and even-handedly and that all viewpoints would be considered and incorporated into the process.

To form the committee, the DWP first created a list of potential participants by researching Maine's environmental, public health, political, and economic professionals and organizations through such available resources as Internet postings and web sites; regional newsletters, newspapers, and trade publications; statewide yellow pages; and the institutional knowledge of DWP staff. Following the compilation of names and organizations resulting from the review process described above, invitations to join the SWAP Advisory Committee were issued to

approximately forty parties in early April 1998. Invitees were given the option of declining the invitation, recommending an alternate organization, attending themselves, or designating another individual to participate in their place.

At the first SWAP Advisory Committee meeting, participants were asked to identify individuals, interests, or organizations which should be added to the committee. Also, interested parties not initially invited who later learned of SWAP and sought to become involved were encouraged to join the process. Three additional members were added to the committee in this way: a consultant, a private citizen, and a community regional water resources representative. The table on the following page identifies organizations which sent a representative to at least one of the Advisory Committee meetings.

The work of the advisory committee was supported and enhanced through the formation, convening, and meeting of three subcommittees which considered and made recommendations on specific SWAP subtopics.

Table 3.1 Affiliations of The Maine SWAP Advisory Committee Members

Public and Conservation Interests

1. Saco River Corridor Commission
2. China Region Lakes Alliance
3. Maine Association of Conservation Commissions
4. Northeast Rural Community Assistance Program
5. Private Citizens

Public Health and Vulnerable Population Interests

1. Maine Bureau of Health / Infectious Epidemiology Program
2. The AIDS Project
3. Maine Association of Retirees

Business, Industry, and Commerce

1. Maine Chamber and Business Alliance
2. Maine Pulp and Paper Association
3. Maine Real Estate and Economic Development Association

Local Government

1. Maine Municipal Association
2. Androscoggin Valley Council of Governments

Public Drinking Water Suppliers

1. Maine Rural Water Association
2. Maine Water Utilities Association
3. Newport Water District
4. Norway Water District
5. Lincoln Water District
6. Portland Water District

7. Great Salt Bay Utility District
8. Maine Youth Camping Association
9. Maine Campground Owners Association

Wastewater Treatment Plant Operators

1. Maine Wastewater Control Association

Agricultural Interests

1. Maine Farm Bureau Association
2. Maine Potato Board

Other State and Federal Agencies

1. Maine Department of Environmental Protection
2. Maine State Planning Office
3. Maine Department of Inland Fisheries and Wildlife
4. Maine Department of Economic and Community Development
5. Maine Department of Transportation
6. University of Maine Cooperative Extension Service
7. United States Geological Survey

These work groups were:

- The Surface Water Workgroup
- The Public Involvement and Education Workgroup
- The Public Meeting Planning Workgroup

3.4 Program Philosophy and Definition of Susceptibility

The Safe Drinking Water Act requires public water systems to periodically test the water for a variety of contaminants and to respond immediately if contaminant limits are exceeded. This "test and treat" approach is the fundamental means of ensuring customers of the safety of their drinking water. The Source Water Assessment Program is designed to be predictive rather than diagnostic. It seeks to evaluate the likelihood that a public water supply, safe to drink now, will continue to be so into the future.

Predicting whether or not an aquifer or surface water body will become contaminated is imprecise at best. Basing the likelihood of contamination on the number of potential sources of contamination near a well, for example, ignores the fact that one unlined landfill could contaminate several wells in one town while ten underground storage tanks in another may never contaminate a single well. Predicting the likelihood of future contamination reliably is made difficult by many factors, some of which are not known: hydrogeology, facility management practices, future development and growth, human error, rainfall, etc.

Because of this imprecision, Maine's Source Water Assessment Program is based on the philosophy that a source will be considered highly susceptible to contamination (at high risk) only if there are potential sources of contamination near the source AND water quality data from the well or surface water body or other observations which indicate that some contaminants have

been introduced. If evidence for only one of these factors is documented, the risk of contamination will be considered moderate. If the data indicate that neither is true, the risk of contamination will be labeled low.

4.0 Assessment Methodology for Groundwater Sources

4.1 Required SWAP Elements

The Amendments permit each state to develop an assessment methodology which is tailored to its unique geological and hydrologic characteristics and land use activities. However, there are certain required elements as described in the August, 1997, final guidance from EPA to states. These include a **delineation** of the source water protection area, an **inventory** of potential sources of contamination within the source water protection area, and an **assessment** of the susceptibility of the drinking water source to contamination. States are directed to utilize existing sources of information wherever practical. For ground water sources, the first two required elements, delineation and inventory, are already a part of Maine's approved Wellhead Protection Program and most community and NTNC water systems have already submitted this information to the Drinking Water Program. Therefore, the work of the SWAP Advisory Committee was focused on methods to assess this information.

4.2 Ground Water Systems in Maine

4.2.1 Transient Ground Water Systems

A public water system is defined as any publicly or privately owned system of pipes and facilities through which water is served to 15 or more service connections or to 25 or more persons per day for at least 60 days per year. A transient public water system is one that serves a constantly changing population of customers. Examples included restaurants, camps and campgrounds, and motels. As would be expected in a largely rural state, most Maine public water systems are transients. Because in theory no individual is exposed to water from a transient water system for an extended period of time, transients are regulated only for acute contaminants (pathogens and nitrate/nitrite). The vast majority of the transient systems in Maine are supplied by a single, 6"-diameter bedrock well and most test the well once per year for coliform bacteria and nitrate/nitrite. The numbers of systems and sources change constantly as businesses open and close and new wells are drilled. As of May, 1998, there were 1366 transient public water systems in Maine and all but 31 of these utilize ground water. Taken as a group, transient water systems utilize 1320 bedrock and surficial wells and 156 dug wells and springs.

4.2.2 Non-Transient, Non-community Ground Water Systems

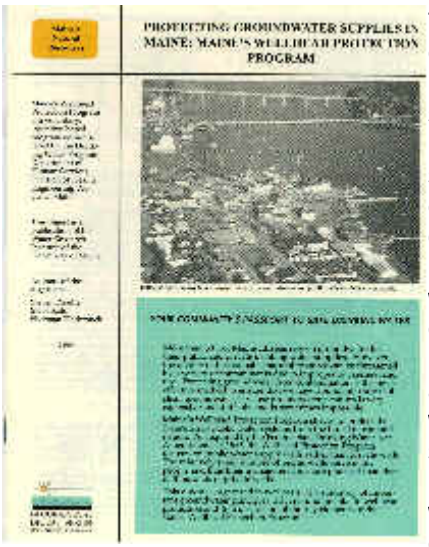
A non-transient, non-community (NTNC) public water system is a non-community system that serves at least 25 of the same persons for at least six months per year. As of May, 1998, there were 374 NTNC systems in Maine, mostly schools, and all but one has a ground water source or sources. These water systems utilize a total of 413 bedrock and surficial wells and 9 dug wells and springs. NTNC systems are regulated for both acute and chronic (i.e. chemical) drinking water contaminants.

4.2.3 Community Ground Water Systems

A community public water system serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents. Examples include water districts and departments, mobile home parks, and nursing homes. As of May, 1998, there were 417 community public water systems in Maine. Of these, approximately 350 utilize primarily a ground water source or sources. Together, community systems utilize 167 surficial wells (gravel packed, gravel developed or well points); 368 bedrock wells; and 24 dug wells or springs. Community systems are regulated for both acute and chronic drinking water contaminants.

4.3 Data to be Compiled and Considered

4.3.1 The Maine Wellhead Protection Program



The Maine Wellhead Protection Program (WHPP) was established to comply with the 1986 Amendments to the Safe Drinking Water Act. As with SWAP, the statute required states to establish a program with certain required elements but gave states the flexibility to craft a program tailored to the state's needs. The DWP hired a planning consultant who convened a series of technical advisory committee meetings during 1992, 1993, and 1994. These advisory committees included representatives of large and small water utilities, well drillers, mobile home parks, campground owners, youth camp owners, business and agricultural interests, municipalities, and state regulatory and natural resource agencies. What emerged from these committee meetings was a voluntary program with required components for water systems choosing to participate. Because participation in the program made a water system eligible for waivers to some water tests, most community and non-transient, non-community water systems chose to participate. To date, transient public water systems have not been sent application materials. Among other things, participating systems submitted the following information:

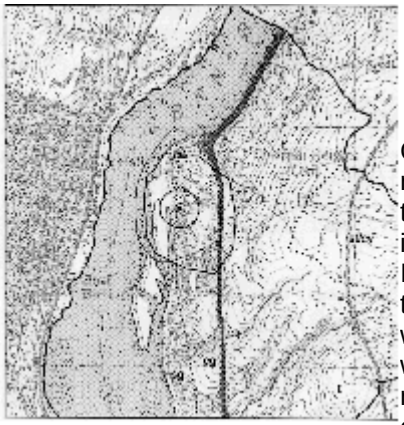
- *Delineation*

Systems were required to delineate a protection area around each well or group of wells. For transient systems, an arbitrary fixed radius of 300 feet was used. For all other systems, a calculated fixed radius method was used. The circular protection areas range from a minimum radius of 300 feet to a maximum of 2500 feet, based on population served or pumping rate. Some large utilities chose to contract for a rigorous hydrogeologic delineation resulting in irregularly shaped protection areas based on ground water flow and response of the aquifer to pumping.

- *Inventory*

The WHPP advisory committees agreed on a list of 76 potential contamination sources which should be identified on a map if they are identified within the delineated wellhead protection area. To facilitate identifying them on the map, each was assigned a number and water systems were instructed to simply put the number in the appropriate location on the map. The list of potential contamination sources is reproduced in Appendix G.

4.3.2 Phase II/V Waiver Program



Community and NTNC water systems are required to monitor their water for 89 regulated contaminants. Contaminants have been added to the list in phases over the past 10 years and a group of them, mostly synthetic organic compounds including many herbicides and pesticides, are referred to collectively as the 'Phase II/V Parameters.' Maine has a Phase II/V Waiver Program which permits systems to test their water once, and then apply for a waiver from further testing. To receive a waiver, systems must provide documentation about the following land use activities within a 2500 foot radius of their well: A system which completes one satisfactory round of testing and documents that none of these activities occur within 2500 feet of the well (Phase II/V Waiver Radius) is granted a waiver from additional testing for these compounds. Partial waivers (waivers for some but not all tests) are granted to systems which document that some of these activities occur within 2500 feet of the well but others do not.

Table 4.1: Land Use Activities Inventoried as part of Phase II/V Waiver	Asphalt, Tar, Coal companies. Fertilized Fields, Agricultural areas Forestry areas Golf Courses Grain (Bulk) Storage Site Commercial Municipal Incinerator Landfill or Dump Military Base or Depot Paper Mill Discharge Pesticide Sales Pesticide Storage Pesticide Spill Sludge Spreading Superfund Site Wastewater Treatment Plant Wood Preserving Facility

4.3.3 The SWAP Gravel Well Delineation Project

The Wellhead Protection Program permits systems to utilize a circular wellhead protection area. For low-yielding bedrock wells, this is probably the only feasible approach given the cost of determining a more geologically reasonable protection area. However, methods for delineating gravel wells through hydrogeological modeling of pump test drawdown data are well established and relatively inexpensive, particularly if monitoring wells are already installed. In addition, many high-yielding gravel wells in Maine are located in esker deposits and many have wellhead protection areas which depart dramatically from a circle.

The Drinking Water Program retained the services of a consulting hydrogeologist and entered into a Memorandum of Understanding with the Maine Geological Survey to delineate the 200-day and 2500-day time-of-travel zones for gravel wells serving community water systems serving 250 or more customers. There are approximately 150 gravel wells of this type and approximately half have already been delineated. At the conclusion of the 18-month project all will have a hydrogeologic delineation to be used for conducting assessments.

The delineation approach uses the results of a prolonged pump test to construct a MODFLOW (a finite-difference model developed by the US Geological Survey) model using GMS (Groundwater Modeling System) software.This model simulates ground water flow through the geological materials around the well, and provides a flow field. MODPATH, a particle tracking computer

program used with MODFLOW, calculates contributing (recharge) areas and estimates time of travel to the well.

4.3.4 The Maine Drinking Water Program GIS

Over the past 5 years the DWP has developed a desktop geographic information system (GIS). The GIS incorporates basemap data from the Maine Office of GIS (OGIS); coverages of potential threats to water quality, primarily developed by the Maine Department of Environmental Protection (DEP); and a coverage of all public water supply wells and intakes created by the DWP. A wellhead protection area coverage has also recently been created. Table 4.2 lists data types in the Drinking Water Program GIS.

One of the required elements of a SWAP assessment is a map of source protection areas and potential contamination sources. The Drinking Water Program GIS is an ideal means to accomplish this objective since much of the data have already been collected. The GIS is equipped to produce both paper maps for distribution and to organize geographic data for distribution by electronic means, including the Internet.

Table 4.2: Drinking Water Program GIS data coverages

BASEMAP DATA (MAINE OGIS)
Hydrology
Roads
Utility Rights-of-way
Wetlands
Sand and Gravel Aquifers
Topography
Watershed Boundaries

POTENTIAL CONTAMINATION SOURCES (MAINE DEP)	
Underground fuel storage tank leak	
Aboveground fuel storage tank leak	
Municipal landfill	
Commercial landfill	
Special waste landfill	Compost site
Demolition debris	Ash utilization site
Septage storage or disposal hazardous waste site	Superfund
Sand/salt storage	Surface petroleum spill
Hazardous waste site	Wastewater treatment facility
Residuals (food) utilization site hazardous waste site	Uncontrolled
Tank farm	Industrial complex
Non-point pollution source (golf course)	Transfer station
Sludge utilization site	Automobile graveyard
Engineered subsurface wastewater dispose	Woodyard (wood chips, etc.)
Underground injection	Surface impoundment
Mining or mineral processing site	

DRINKING WATER DATABASES (DWP)
Well and Intake Locations and Descriptions
Wellhead Protection Areas

4.4 The Ground Water Assessment Methodology

The Amendments require that SWAP assessments be "for the protection and benefit of public water systems." EPA SWAP guidance states that assessments are "a tool for further efforts" which are envisioned to be locally driven. To be useful to citizens or municipalities, assessments must be detailed and at the same time easy to understand. For example, a determination that a well is "high risk" will not be an effective tool for local protection action unless the nature of the risk is clear and recommendations for action are provided.

To meet these dual goals, Maine's ground water assessment methodology will produce risk rankings for each public water supply well in the state in several categories. Risks to wells for transient water systems will be ranked (high, moderate, or low) in three categories:

- **Risk based on well type and site geology**
- **Existing risk of acute contamination**
- **Future risk of acute contamination**

Table 4.3: Assessment Methodology for Transient Ground Water Sources

RISK BASED ON WELL TYPE AND SITE GEOLOGY		RISK FACTORS FOR ACUTE CONTAMINANTS		
			Existing	Future
HIGH RISK	(1) dug well (1) spring	HIGH RISK	(2) coliform bacteria positive within previous 3 years OR (2) nitrate >5 ppm within previous 3 years	(1) Do not own or have legal control of all land within 150 feet of well
MODERATE RISK	(1) well points (1) gravel well (1) bedrock well, <20' overburden (1) bedrock well, overburden unknown	MODERATE RISK	(1) nearest acute PCS <300 feet from well OR	(1) Do not own or have legal control all land within 300 feet of well
LOW RISK	(1) bedrock well, >20' overburden	LOW RISK	(1) Nearest acute PCS >300 feet from well AND (2) NO coliform bacteria positive within previous 3 years AND (2) NO nitrate >5 ppm within previous 3 years	(1) Own or have legal control all land within 300 feet of well

NOTES

Sources of Information:

(1) Wellhead Self Evaluation Forms, Sanitary Surveys, OR DWP Source database

(2) DWP Sample Master database

PCS = Potential source of pathogens, including:

septic system leach fields
manure pile or manure spreading
barnyard
animal grazing

Table 4.4: Assessment methodology for Community and NTNC Ground Water Sources

RISK BASED ON WELL TYPE AND SITE GEOLOGY		RISK FACTORS FOR ACUTE CONTAMINANTS		
			Existing	Future
HIGH RISK	(1) dug well (1) spring	HIGH RISK	(2) coliform bacteria positive within previous 3 years OR (2) nitrate >5 ppm within previous 3 years	(1) Do not own or have legal control of all land within 150 feet of well
MODERATE RISK	(1) well points (1) gravel well (1) bedrock well, <20' overburden (1) bedrock well, overburden unknown	MODERATE RISK	(1) nearest acute PCS <300 feet from well OR	(1) Do not own or have legal control all land within 300 feet of well OR 200-day time-of-travel zone
LOW RISK	(1) bedrock well, >20' overburden	LOW RISK	(1) nearest acute PCS >300 feet from well AND (2) NO coliform bacteria positive within previous 3 years AND (2) NO nitrate >5 ppm within previous 3 years	(1) Own or have legal control all land within 300 feet of well OR 200-day time-of-travel zone

NOTES

Sources of information:

(1) Wellhead Self Evaluation Forms, Sanitary Surveys, OR DWP Source database

(2) DWP Sample Master database

(3) DEP Water Resources database

acute PCS = Potential source of pathogens, including:
- septic system leach fields
- manure pile or manure spreading
- barnyard
- animal grazing

chronic PCS = potential source of chemical contaminants.

	RISK FACTORS FOR CHRONIC CONTAMINANTS	
	Existing	Future
HIGH RISK	(1), (3) 4 or more "significant" chronic PCS's within WHPA AND (2) detection of regulated/unregulated chronic contaminants	(1) Do not own or have legal control of entire WHPA
MODERATE RISK	(1), (3) 4 or more "significant" chronic PCS's within WHPA OR (2) detection of regulated/unregulated chronic contaminants	(1) Own or have legal control of entire WHPA but NOT 2500-foot Phase IIV waiver radius
LOW RISK	(1), (3) 3 or fewer "significant" chronic PCS's within WHPA AND (2) NO detection of regulated/unregulated chronic contaminants	(1) Own or have legal control of WHPA AND 2500-foot Phase IIV waiver radius

The assessment method for transient ground water systems is illustrated in Table 4.3 and described beginning in Section 4.4.1 below.

In addition to acute contaminants, NTNC and community water systems are also regulated for chronic (mostly chemical) contaminants since water from these systems can be consumed by individuals for many years. Therefore NTNC and community wells will be ranked in two additional risk categories:

- **Existing risk of chronic contamination**
- **Future risk of chronic contamination**

The assessment method for NTNC and community ground water systems is illustrated in Table 4.4 and described beginning in Section 4.4.1 below.

In addition to risk rankings, recommendations will be provided for action to be taken at the local level to protect each well from contamination.

4.4.1 Risk Based on Well Type and Site Geology

No drinking water source is completely free from threats to water quality. However, some are more likely to become contaminated than others just by the nature of their construction and the geology of the site. For example, dug wells and springs more frequently test positive for the presence of coliform bacteria than do wells drilled into fractured bedrock covered by a thick layer of low permeability silty clay.

Low Risk: Bedrock wells in areas overlain by more than 20 feet of overburden will be deemed low risk in this category.

Moderate Risk: Well points, gravel wells, and bedrock wells with less than 20 feet of overburden will be deemed moderate risk in this category.

High Risk: Dug wells and springs will be deemed high risk in this category.

4.4.2 Existing Risk of Acute Contamination

Acute contaminants (such as pathogens and nitrate/nitrite) are those which can make consumers sick immediately after being consumed. Many acute contaminants originate in human or animal wastes. Possible sources include septic system leach fields, animal feed lots, manure piles, etc. The risk ranking in this category is based on the results of water tests of the well for the previous two years and the presence or absence of potential sources of acute contamination in the Wellhead Protection Area.

Low Risk: A well for which the nearest potential source of acute contaminants is more than 300 feet from the well AND all nitrate tests in the previous 2 years are below 5 parts per million (one-half the maximum contaminant level of 10 ppm) AND all coliform bacteria tests are negative for the same period will be deemed low risk in this category.

Moderate Risk: A well which has one or more potential sources of acute contamination within 300 feet.

High Risk: A well which has revealed nitrate at a concentration greater than 5 ppm OR which has tested positive for coliform bacteria will be deemed high risk in this category.

4.4.3 Existing Risk of Chronic Contamination

Chronic contaminants are those which pose a health risk if consumed (even sometimes at very low doses) over many years. There are 89 contaminants which by law must not be present in public drinking water or which can only be present below some specified level (the Maximum Contaminant Level). Examples of chronic contaminants include MTBE and other gasoline additives, chlorinated solvents, many herbicides and pesticides, gross alpha radiation, lead, arsenic, and many others. The risk ranking in this category is based on the water testing history of the

well and on the presence or absence of at least 4 significant potential sources of chronic contamination (as indicated on a Wellhead Protection Program Self Evaluation Form) in the Wellhead Protection Area.

Low Risk: A well which does not have four or more significant potential sources of chronic contaminants in the Wellhead Protection Area AND which has had no detections of regulated or unregulated chronic contaminants (herbicides, pesticides, volatile and semi-volatile organics, and certain inorganic parameters) during Phase II/V compliance testing will be deemed low risk in this category.

Moderate Risk: A well which has at least four significant potential sources of chronic contaminants in the Wellhead Protection Area .

High Risk: A well which has had significant detections of regulated or unregulated chronic contaminants during Phase II/V compliance testing will be deemed high risk in this category, unless the Department determines that the contaminant(s) detected are likely to have been naturally occurring (i.e. Arsenic).

4.4.4 Future Risk of Acute Contamination

Risk rankings in this category are meant to evaluate the likelihood that potential sources of acute contaminants could be introduced near the well in the future. As such the ranking is based on the ownership or legal control by zoning of land within 300 feet of the well (or the 200-day time-of-travel zone for gravel wells).

Low Risk: A well for which the public water system owns or the municipality legally controls (through zoning, for example) all land within 300 feet of the well (or 200 day time-of-travel zone) will be deemed low risk in this category.

Moderate Risk: A well for which the public water system owns or the municipality legally controls all land within 150 feet of the well BUT NOT all land within 300 feet of the well will be deemed moderate risk in this category.

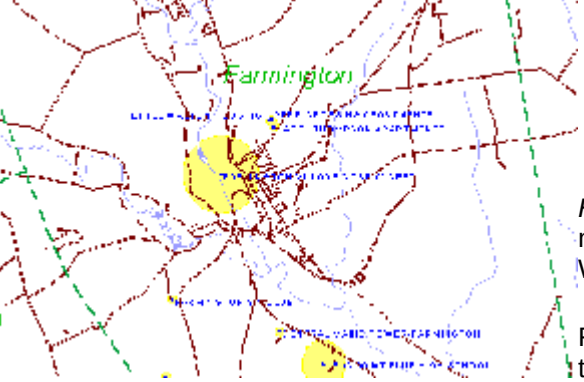
High Risk: A well for which the public water system DOES NOT own nor does the municipality control through appropriate zoning all land within 150 feet of the well will be deemed high risk in this category.

4.4.5 Future Risk of Chronic Contamination

Risk rankings in this category are meant to evaluate the likelihood that potential sources of chronic contaminants could be introduced near the well in the future. As such the ranking is based on the ownership or control by zoning of land within the Wellhead Protection Area and within the Phase II/V Waiver Radius (2500 feet).

Low Risk: A well for which the public water system owns or the municipality legally controls virtually all land within the Wellhead Protection Area AND a 2500'-radius circle around the well (the Phase II/V Waiver Radius) will be deemed low risk in this category.

Moderate Risk: A well for which the public water system owns or the municipality legally controls virtually all land within Wellhead Protection Area BUT NOT the Phase II/V Waiver Radius will be deemed moderate risk in this category.



High Risk: A well for which the public water system DOES NOT own nor does the municipality legally control virtually all land within the Wellhead Protection Area will be deemed high risk in this category.

For gravel wells which have had a time-of-travel based delineation, the 2500-day time-of-travel zone will be used in place of the Phase II/V Waiver Radius to evaluate the future risk of chronic contamination.

4.4.6 Recommendations

Each assessment report will include suggested recommendations for local action to address potential risks. Appendix A includes an example of an assessment report and includes recommendations for protection actions.

4.5 The Assessment Process

4.5.1 Compile Necessary Information

Some of the information required to complete the assessments described in the previous section has been collected through the Wellhead Protection Program, the Phase II/V Waiver Program, or in developing the Drinking Water Program GIS. Other information (for example, an inventory of potential sources of acute contaminants near transient water supply wells) will be collected through mass mailings to water systems. Community water systems will be given an opportunity to identify local agencies or individuals who may be useful partners in any protection planning or action which could result from distribution of the assessment report (e.g. planning board, school board, code enforcement officer, regional planning commission).

4.5.2 Provide Opportunity for Review

Once the necessary information has been compiled, a draft assessment will be completed. Attached as Appendix E is a sample assessment report for a NTNC public water system (a school). It lists **data about the water system and the well, a map** of the Wellhead Protection Area, **risk rankings** in each of the five categories described in the previous section, and **recommendations for protection** actions which could be undertaken at the local level. When completed, a report such as this will be provided for comment and review to the public water supplier and other identified local interests to ensure that the information in it is accurate.

4.5.3 Release Final Assessment Report

After a review period, the assessment report will be finalized and the results made available to the general public. Chapter 6.0 describes how the results will be distributed.

5.0 Assessment Methodology for Surface Water Sources

5.1 Required SWAP Elements

EPA guidance identifies the three required elements of a SWAP assessment: a delineation of the source water protection area; an inventory of potential contamination sources; and a determination of the susceptibility of the public water supply to the potential contamination sources which were inventoried. States were directed to develop a state-specific methodology which includes at least these required elements.

5.2 The SWAP Surface Water Work Group

For ground water supplies, Maine's approved Wellhead Protection Program established delineation and inventory methods. These methods were developed by advisory committees which met during 1993 and 1994. No analogous surface water protection program exists in Maine. Therefore, the DWP convened a Surface Water Work Group (SWWG) to consider delineation, inventory and assessment approaches for surface water supplies and to recommend a SWAP methodology to the SWAP Advisory Committee. In addition to representatives of the Maine Department of Environmental Protection and the DWP, the SWWG included representatives of large community water systems (CWS). The participants in the SWWG are listed in Table 5.1. This SWWG met twice in June, 1998, and made recommendations which were later presented to the SWAP Advisory Committee.

Table 5.1 : Representatives on the SWAP Surface Water Work Group

Auburn Water District	Bangor Water District
Bath Water District	Biddeford and Saco Water Co.
Dept. of Environmental Protection	Maine Water Utilities Assoc.
Milo Water District	Portland Water District
York Water District	

5.3 Surface Water Systems in Maine

5.3.1 Community Surface Water Systems

Many of Maine's largest community public water systems are supplied by surface water bodies, including the Portland Water District's Greater Portland System. The five largest community surface water suppliers serve a total of more than 200,000 people, one-sixth of the state's population. Several systems have intakes on more than one surface water body (e.g. Augusta Water District, Limestone Water & Sewer District) and some share the same surface water source (e.g. Anson Water District and Madison Water District). In all there are 58 different community water systems utilizing surface water sources. Four of these systems are planning to or have begun the process of drilling a well to replace the surface supply (Andover Water District, Limestone Water & Sewer District, Waldoboro Water Company, and Winter Harbor Water District). A fifth (Damariscotta Mills Water System) may interconnect with Great Salt Bay Water District. A total of 64 different water bodies are used as sources. If the changes described above are all realized, this number will be reduced to 59 water bodies. It is likely that over the next several years, as SWAP is implemented, these numbers will continue to change.

5.3.2 Non-transient, Non-community Surface Water Systems

There is only one non-transient, non-community public water system in Maine which is supplied by surface water - the S.D. Warren mill in Hinckley Township. The mill is supplied by water from the Kennebec River. Non-transient, non-community water systems are regulated for both acute and chronic contaminants.

5.3.3 Transient Surface Water Systems

There are 22 transient public water systems with a surface water supply. Most of these are boys and girls camps or camping lodges. As a group transient surface supplies utilize 16 different surface water bodies; Sebago Lake is a source for five of them and Cobbosseecontee Lake for three. All transient surface water supplies are required to filter and disinfect the water before delivering it to consumers. Transient public water systems are regulated for acute contaminants (pathogens and nitrate/nitrite) only.

5.4 Data to be Compiled and Considered

The Surface Water Work Group identified five categories of information which, **if available**, should be considered during an assessment. Each of the categories is listed and discussed beginning in text section 5.3.1 below. It is expected that no public water system will have all of this information available, particularly the water quality information. It is hoped that systems will attempt to gather as much information as is feasible. The assessment will be based on the best available information.

5.4.1 Data Element 1 » Physical Characteristics of Watershed

The purpose of compiling information about the physical characteristics of the watershed is to describe the water body in sufficient detail so that the water quality, potential contamination source, land use and assessment information provided later can be put into an appropriate context for the person reviewing or evaluating it.

Table 5.2 : Watershed Physical Characteristics to be Considered in Assessment

Data Element	Comment
Watershed Boundaries, Area	both direct and indirect watershed
Area of Water Body	in acres
Tributaries	will be located on map
Watershed topography	20’ contours, if available
Wetlands	National Wetlands Inventory data are digitized
Water body depth	maximum and/or average depth

Sand and Gravel Aquifers.....Boundaries defined by >10 GPM potential yield
Location and depth of intake
Length of Shoreline
Soil Types.....consider erodibility and slope

5.4.2 Data Element 2 » Raw Water Quality

When available, raw water quality data measured at the intake is preferred. In some cases, systems have no water quality information except the samples required under the Safe Drinking Water Act. **No additional monitoring by public water systems of raw water quality will be required by the DWP as part of the SWAP.** However, it is hoped that systems will attempt to collect samples and test for some of the parameters listed below in anticipation of an assessment and, after the assessment, into the future to guide protection decisions. These data, if available, will be used to evaluate the existing condition of the water body and, if historical data are available, to establish improving or worsening trends in water quality. Such evidence can help establish the urgency with which individuals and municipalities should act to protect the source.

Table 5.3 : Raw Water Monitoring Parameters Recommended by the Surface Water Work Group

- Transparency (Secchi)
- Turbidity
- pH
- Phosphorous
- Pesticides & herbicides
- Color
- Total coliform and E-coli
- Dissolved Oxygen
- Temperature
- VOC's
- Chlorophyll-a
- Total Organic Carbon

5.4.3 Data Element 3 » Potential Contaminant Source Inventory

DEP has a developed Ground Water Resources database - a GIS coverage of sites which have the potential for impacting water quality. DEP also maintains a database of NPDES discharges in Maine. This database will be utilized for assessments, including compliance data for each permit holder. Maps produced to accompany assessments will include data from these coverages. However, most of the sites identified in these coverages are DEP-licensed sites and there are other activities, not regulated by DEP, which have the potential to impact water quality (such as agricultural sites, boat launches, etc.). Water systems and municipalities may be the best source of information about these other PCS sites. Table 5.4 identifies the potential contamination source types to be considered in surface water assessments.

Table 5.4 : Potential Contamination Sources to be Considered in Surface Water Assessments

From DEP Databases:	
Underground fuel storage tank leak site	Tank farm
Aboveground fuel storage tank leak site	Industrial complex
Municipal landfill	Non-point pollution source
Commercial landfill	Transfer station
Special waste landfill	Sludge utilization site
Compost site	Automobile graveyard
Demolition debris	Engineered subsurface wastewater disposal system
Ash utilization site	Woodyard (e.g. wood chips, etc.)
Septage storage or disposal	Underground injection well
Superfund hazardous waste site	Surface impoundment
Sand/salt storage	Mining or mineral processing site
Surface petroleum spill site	Overboard discharges (rivers)
Hazardous waste site	Active Underground Fuel Storage Tanks
Wastewater treatment facility	
Residuals (food) utilization site	
Uncontrolled hazardous waste site	
From OGIS Database:	
Roadways	Utility rights-of-way
Railroads	Boat Launches
Other Data not Presently in Statewide Databases:	
Commercial Farms	Airports
Concentrated Animal Feeding Operations	Bathing Beaches
Commercial Forest Operations	Combined Sewage Overflows
Private Septic systems	
Home heating oil tanks	

Table 5.5 : Land Uses and Zoning to be considered in a SWAP Assessment	
Restricted Areas (e.g. no-contact zone) Residential Density Percent Ownership by PWS Compatible Uses (e.g. public lands) Percent Forested Percent Impervious Surface Percent Agricultural Land	Percent with Protective Zoning Recreational Uses (heavy-moderate-light): Ice Fishing Boating Swimming Recreational Vehicles

5.4.4 Data Element 4 » Land Uses and Zoning

Information about land uses and zoning is not available in any statewide database. It will be difficult to obtain in a digital form for incorporation into a GIS map. It may only be possible for the DWP to obtain estimates of watershed percentages for each category and to use those percentages to make judgments about potential for future water quality impacts. Table 5.5 lists the activities and zoning types identified by the SWWG.

Table 5.6 : Zones to be Assessed for Each Surface Water Source		
ZONE	**ASSESSMENT ITEMS**	**COMMENTS**
WATERSHED: (direct watershed)	Identify activities of highest risk Recommendations for action Identify potential for future risk Recommendations for action	Focus on chemical contaminants and non-point sources Based on ownership/control For PWS; municipalities
SHORELAND ZONE: (250’ from high water)	Identify Activities of highest risk Recommendations for Action Identify potential for future risk Recommendations for action	Focus on non-point sources Based on ownership/control For PWS; municipalities
INTAKE ZONE: (1000’-radius circle)	Identification activities of highest risk	Focus on pathogens, human activities

	Recommendations for Action Identify potential for future risk Recommendations for action	 Based on ownership/control For PWS; municipalities

5.4.5 Data Element 5 » Other Analyses

Vulnerability has been evaluated in other ways for other reasons for some of Maine's larger water bodies. The results of these analyses can be included in the SWAP assessments and can help form the basis of susceptibility determinations. Examples include Trophic State Index, Vulnerability Index, and Build-out Analysis.

5.5 The Surface Water Assessment Methodology

It was the consensus of the SWWG and agreed to by the Advisory Committee that an assessment for a surface water supply should include more than one evaluation in more than one category since no single score or ranking could take into account the many factors which must be considered when evaluating susceptibility. As with ground water sources, surface water sources will be evaluated in discrete zones and for both existing and future risk. The following approach will be followed:

5.5.1 Community and Non-transient, Non-community Water Suppliers

A zoned assessment format is proposed for community and non-transient, non-community surface water suppliers as follows:

5.5.2 Transient Surface Water Suppliers

Transient water systems are regulated only for acute contaminants (pathogens and nitrate/nitrite) since the individuals consuming the water are not the same ones from one day to the next. In general, no individual consumes the water for an extended period of time and therefore contaminants which pose a long-term health risk are not significant. For this reason, evaluations only of the intake zone will be completed. A map of the whole watershed, however, will be created and made available.

5.5.3 Segmentation of River and Stream Watersheds

There are 18 public water suppliers in Maine which utilize a river, stream or brook source. In some cases, the upstream watershed extends more than 50 miles from the intake. For these sources, the entire watershed will be delineated and a map produced from statewide GIS data illustrating potential contamination sources in the watershed. For the purposes of assessment, however, the watershed and shoreland zone will be evaluated for a minimum of one mile upstream. In addition, each source will be evaluated on a case-by-case basis to determine if the assessment area should be extended further upstream.

5.5.4 Conjunctive Delineation

In 1995, Maine completed evaluation of all community ground water sources and identified those which are under the direct influence of surface water. Through testing it was determined that these wells draw in surface water which does not receive adequate natural filtration. Evaluation

of non-community ground water sources is underway. For those wells which are determined to be under the direct influence of surface water, both the wellhead protection area and the watershed of the adjacent surface water body will be delineated and assessed.

5.5.5 Interstate and International Source Protection Areas

At least three of Maine's community surface water suppliers draw water from sources with watersheds which cross state or country borders. These include the Berwick Water Department (Salmon Falls River), Biddeford-Saco Water Company (Saco River), and Madawaska Water District (St. John River). Others may be identified as the drinking Water Program completes a GIS coverage of public water supply watersheds. The State of New Hampshire is developing GIS databases for SWAP Assessments similar to that being compiled in Maine. This information will be shared and the data from New Hampshire used to complete the Berwick and Biddeford-Saco assessments. Both states are working with the New England Interstate Water Pollution Control Commission (NEIWPCC) to facilitate the sharing of this information. NEIWPCC has begun the process of identifying a contact or contacts in New Brunswick, Canada, for a similar cooperative effort.

5.6 The Assessment Process

Maine’s surface water supplies are a diverse group, ranging from a former bedrock quarry to the Saco River. For this reason, a program for assessing their susceptibility needs to be flexible enough to be applied to each source and significant site-specific data collection and stakeholder contact is required. The DWP will seek to enter into a contract with a qualified individual or agent with experience evaluating surface water bodies (Contractor) to conduct the assessments and produce a written report for each. Conducting an assessment will be accomplished via the following steps:

5.6.1 Contact Letter

The DWP or Contractor will send a letter to each surface supplier describing the assessment process and listing required or desirable information. A letter will also be sent to the chief elected official of each municipality in the watershed. That individual will be encouraged to identify other local stakeholders (code enforcement officer, conservation commission, planning board, lake association, etc.). The letter will recommend (though not require) initiation of raw water quality data collection if little or none exists.

5.6.2 Site Visit

The DWP or Contractor will schedule a site visit. The visit will include a meeting with the PWS and municipal designees, a windshield survey of the watershed, and gathering of any available information.

5.6.3 DWP Evaluate Each Zone

The DWP or Contractor will complete an evaluation of each assessment zone (watershed, shoreland zone, and intake zone) by reviewing available data. For each zone, significant existing threats will be identified and the potential for future threats will be evaluated. Unlike Maine’s groundwater assessments, surface water assessments will not include rankings of "high, medium or low". Instead, each *significant* potential or existing source of contamination, water quality monitoring result(s), or water qualty parameter identified will be prioritized, using the guidlines outlined in Tables 5.6, 5.7, 5.8 and 5.9, and will include recommendations for actions by the system operator, municipal officials or other involved parties to remove or mitigate for the identified threat.

For example: *in the intake zone, those activities which may introduce pathogens to a source water would be a higher priority than non-point sources, while non-point sources in the watershed zone would be a higher priority than a new, properly constructed and maintained underground storage tank located on the edge of the watershed. The recommendations for each identified threat will reflect the seriousness of that threat.*

Table 5.7: Guidelines Prioritizing Risks to Surface Supplies

Priority Higher  Priority Lower	Known water quality impacts Proximity to intake and shoreline Nature of contaminant [pathogen>>turbidity>>chemical] Nature and extent of control of PCS site [abandoned >>managed] Slope of land at PCS site Other factors

5.6.4 Potential Threats To Surface Water Sources

Table 5.4 lists the potential contamination sources which will be considered within each assessment zone. All of these potential sources will be identified in each zone. Those posing the greatest risk within each zone will be prioritized based on the contaminant type, the zone it's located in, and its proximity to the surface intake as follows:

Intake Zone (1,000 foot radius around intake): Acute contaminants, i.e. sources of viral, bacteriological or Nitrate/Nitrite contamination, represent the most significant threats in the intake zone.

Shoreland Zone (250 feet from high water): Acute contaminants, i.e. sources of viral, bacteriological or Nitrate/Nitrite contamination, represent the most significant threats in the intake zone.

Watershed Zone (the direct watershed, including the intake and shoreland zones): Sources of chemical contaminants are the most significant sources to be considered in the remainder of the watershed.

Table 5.8 lists the potential sources of contamination that will be considered during the evaluations. *Please note: the Department reserves the right to amend this list as needed should new, previously unidentified sources of contamination are identified.*

5.6.5 Indicators of Ambient Risks To Surface Water Sources

Ambient water quality will be assessed for each surface water source for the Intake, Shoreland, and Watershed zones. Existing water quality problems will be used to assess the current state of the source, and its likelihood of continued water quality degradation. The detection of chemical contaminants, the erodibility of soils near the water body, and the ability of the water body to meet

State and federal water quality classifications will be used to make these determinations of susceptibility.

Table 5.8: Significant Potential Sources of Contamination for Surface Water Sources

	Sources of Contamination to be Identified in all Zones		
Contaminants With Significant Susceptibility for the Watershed Zone	HERBICIDE/PESTICIDE USE Agricultural chemical spreading or spraying Agricultural chemical storage Bulk grain storage Chemically fertilized agricultural field Golf course Herbicide sales or applicator Nursery or garden shop Pesticide sales or applicator High voltage transmission lines	PETROLEUM/HYDROCARBON USE (VOCS OR SEMI-VOCS) Aboveground oil storage tank (including home heating oil tanks) Underground oil storage tank Airport fueling area Airport maintenance Auto chemical supply wholesaler Auto repair Body shop Concrete, asphalt, tar, coal company Dry cleaner Furniture stripper Gas station, service station Junk or salvage yard Machine shop Oil pipeline Painters, finisher Parking lot Photo processor Printer Sand and gravel mining, other mining	OTHER Abandoned well Boat builder, refinishe maintenance Chemical reclamation Food processor Graveyard and ceme Heat treater, smelter, annealer, descaler Incinerator Industrial discharge Industrial manufactur Industrial waste dispo Landfill, dump, transf station Metal plating Military facility Monitoring well Railroad yard or line Recycling or processi center (other than beverages) Research laboratory

		Small engine repair shop Snow dump (large commercial or municipal) Stormwater impoundments or run-off area Truck terminal	Residential home Rust proofer Salt pile or sand and pile Wood preserver
Contaminants With Significant Susceptibility for the Shoreland Intake Zones	BACTERIA AND INORGANICS SUCH AS NITRATES/NITRITES Animal burial (large scale site) Animal grazing Barnyard Manure pile Manure spreading Meat packer, slaughter house Municipal wastewater treatment plant Septic system Sewer line		

	Sludge disposal or spreading Wastewater impoundment Wastewater treatment plants, discharge	

The above contaminants shall, at a minimum, include those regulated under Section 1412 of the Safe Drinking Water Act.

Intake Zone: The presence, or lack of detections for chemical contaminants will be used to evaluate whether a surface source has a low, moderate, or significant level of susceptibility to water quality problems with no detections in the previous three years being low, and MCL exceedences being significant.

Shoreland Zone: SCS soil survey and classification information will be used to assess the potential for soils and nutrients to wash into the surface source. Soils unlikely to erode will result in a low susceptibility, while highly erodible soil will be considered significantly susceptible. Soil surveys and classifications include this information. For example, the Scio series is described in the Kennebec County Soil Survey as follows:

"The Scio series consists of deep, moderately well drained, gently sloping to sloping soils that formed in lacustrine or marine sediments. Low to medium permeability; poor to good stability and compaction characteristics; susceptible to piping; erodible."

Watershed Zone: Failing to meet a CWA water quality standard or having a state water quality classification of B or having a trophic class of eutrophic will yield a significant susceptibility determination. Having a state water quality classification of A or having a trophic class of mesotrophic will be considered a moderate level susceptibility. While a state water quality classification of AA and having a trophic class of oligotrophic will be considered a low level of susceptibility.

Table 5.9 summarizes the criteria to be used to assess the susceptibility of surface water sources using existing water quality, soil, and water quality classification information.

Table 5.9: Ambient Water Quality Assessment Criteria

	Significant Susceptibility	Moderate Susceptibility	Low Susceptibility

Intake Zone	MCL Exceedence for One or More Chemical Contaminants in the Previous Three Years	Chemical Contaminant Detections in the Previous Three Years with no Exceedences	No Chemical Detections in the Previous Three Years
Shoreland Zone	Highly Erodible Soil Type	Moderately Erodible Soil Type	Soil Erodibility not Probable
Watershed Zone	Failing to Meet a CWA Water Quality Standard or Having a State Water Quality Classification of B or Having a Trophic Class of Eutrophic Or Greater than 30% of the land area has been developed for any combination of urban or agricultural land use	Having a State Water Quality Classification of A or Having a Trophic Class of Mesotrophic Or Between 20% and 30% of the land area has been developed for any combination of urban or agricultural land use	Having a State Water Quality Classification of AA and Having a Trophic Class of Oligotrophic Or Less than 20% of the land area has been developed for any combination of urban or agricultural land use
	Particular attention shall be given to Clean Water Act (CWA) water quality parameters that are also regulated under the Safe Drinking Water Act		

5.6.6 Overall Susceptibility Evaluation

Significant Overall Susceptibility: Any surface water source zone, which receives both significant ambient and potential contaminant susceptibility ratings, will be determined to be significantly susceptible to water quality problems.

Low Overall Susceptibility: Any surface water source zone, which receives both low ambient and not significant potential contaminant susceptibility ratings, will be determined to have a low overall susceptibility to water quality problems.

Moderate Overall Susceptibility: Any surface water source zone, which receives either a moderate ambient or significant potential contaminant susceptibility rating will be determined to have a moderate overall susceptibility to water quality problems.

5.6.7 DWP and PWS Review Evaluation and Develop Recommendations

A second meeting will be scheduled to allow the PWS and municipal representatives to review and comment on the evaluation and to request revisions if necessary. Recommendations for action will be developed for inclusion in the final report.

5.6.8 Release Final Report

The DWP or Contractor will compile the information, evaluation, and recommendations in a bound report. The report will be reviewed by PWS and municipal representatives prior to being finalized and made available to the public.

5.6.9 Contractor Progress

The DWP will monitor the progress of contractors using existing State regulations and policies for insuring contractor performance.

6.0 Moving from Assessment to Protection: Making the SWAP Results Available to the Public

According to the enabling federal legislation, SWAP is to be implemented "for the protection of benefit of public water systems." In Maine, protecting public water sources is largely the responsibility of water systems and municipalities. Awareness is the first step in developing a local protection plan. Therefore, for SWAP to be effective, the results must be made known to water systems and their customers as well as municipalities and their citizens. In addition, there are state agencies (such as the Department of Environmental Protection) and quasi-municipal organizations (such as the Maine Water Utilities and Maine Rural Water Associations) which include as part of their mission the protection of public water supplies. No single method of publicizing the SWAP results is going to be effective at communicating to all of these audiences. For this reason, the DWP will utilize several diverse means to communicate the results.

6.1 Report to Public Water System and Customers

A summary report, including a map, a description of the system, the assessment results, and recommendations for action, will be provided to each water system. Community water systems are required to make known the existence of the assessment in their annual consumer confidence report (CCR). The customers will be given a brief summary of the assessment in the CCR and also given instructions on how to get a copy of the complete report on their water system.

6.2 Report to Selected Municipalities

There is at least one public water source in 462 of Maine’s municipalities. The total number of public water sources in any single town ranges from one to 47 (Naples). In an effort to facilitate local planning to protect these resources, the DWP will provide a map and summary assessment report on all public water sources in their town to the chief elected official in each of the 156 towns with 5 or more public water sources. Summary reports to other municipalities will be provided on request.

6.3 Executive Summary Report

When all SWAP assessments have been completed, the DWP will produce a bound Executive Summary report describing and analyzing the results. In contrast to the system-specific reports to be provided to water systems and towns, the summary report will evaluate the information state-wide and describe trends and important patterns. The purpose of this summary report will be to assist interested agencies and parties to prioritize their protection activities in areas where such activities will be most effective. For example, grant funding for non-point source projects could be directed toward watersheds with sites which have been identified as presenting a significant risk to water quality. Or inspections for floor drains could be prioritized in wellhead protection areas of wells identified as at high existing risk for chronic contamination.

Copies of the Executive Summary report will be distributed to the Governor, the Maine Legislature, the SWAP Advisory Committee members, the Department of Environmental Protection, regional planning commissions, and other state resource and planning agencies.

6.4 Press Releases and Regional Meetings

When the Executive Summary report is distributed it will be accompanied by a press release and copies will be made available to Maine's largest newspapers. In addition, the DWP will schedule regional meetings at selected sites throughout Maine to describe the methodology, the results, and to explain the accompanying recommendations.

6.5 The Internet

Progress has already been made in making public water supply source information available over the Internet. The Maine Office of GIS has created an Internet mapping site using the wells and intakes coverage created by the DWP. Using this site, anyone with an Internet browser can produce a map of any location in Maine showing wells and intakes, roads, town boundaries, and water bodies. More recently, the DWP has created a web site which allows the user to click on any Maine county and view a list, organized by town, of all public water supply sources. Both of these projects are designed to give interested individuals and organizations information they can use to protect public water sources. Both of these sites can be accessed through links on the DWP homepage (www.state.me.us/dhs/eng/water). As assessments are completed, the DWP will continue to work to make available over the Internet the assessment results and the information used to make susceptibility determinations.

6.6 DWP Role After SWAP

For the next several years, assessing and reporting on Maine's public water sources will be a primary task of the Drinking Water Program. Once the results are made available, the responsibility for responding to the assessments with protection efforts is a local one. The DWP role will then be that of facilitator - linking interested local parties with state and federal resources (including technical and financial assistance). To help make this happen, the DWP will produce a guidebook for distribution to Maine municipalities and water suppliers. The purpose of the guidebook will be to bring together under one cover the names and responsibilities of the various resources available to assist in local protection efforts.

7.0 SWAP Implementation Schedule

The Maine Drinking Water Program will evaluate the susceptibility to contamination of each public water source by accurately locating it; delineating the contributing area; completing an inventory of potential contamination sources; reviewing water quality data and other information; and, finally, evaluating all of this information. As much as possible, this information will be drawn from existing databases collected through existing programs. For this reason, implementation is already underway. Completion of this document initiates a 3+ year process of evaluating the completeness and accuracy of existing information, communicating with water systems and municipalities, filling data gaps, compiling data into appropriate databases, conducting assessments, and then reporting the results in a variety of formats.

As described in previous sections, all 2600 public water sources in Maine will be evaluated. The type of information collected, level of detail, extent of contact with the water system, and method of assessment will vary depending on the type of system, type of water source, and population served. Based on these factors, the water systems can be grouped in six categories. The process of conducting these six groups of assessments will be concurrent. As assessments are completed, the results will be made available as soon as feasible, initially to the water systems.

Ultimately, all assessment results will be compiled in an executive summary report in the winter of 2002-3.

Table 7.1 is a generalized chart identifying process goals for each group of systems for each of the 3+ years of implementation.

Table 7.1: SWAP Implementation Schedule

	CWS Surface Water	Large CWS Ground Water	Transients Surface Water	Transients Ground Water	Non-Transient Ground Water	Small CWS Ground Water
Jan - Jun 1999	Negotiate Contract	Complete Delineations	Site Visits	Mass Mailing	Inventory	Inventory
Jul - Dec 1999	Data Collection	Complete Delineations	Data Compilation	Data Compilation	Inventory	Inventory
Jan - Jun 2000	Site Visits	Site Visits/Inventory	Site Visits	Mass Mailing #2	Data Compilation	Data Compilation
Jul - Dec 2000	Data Analysis	Site Visits/Inventory	Data Analysis	Data Compilation	Data Compilation	Data Compilation
Jan - Jun 2001	Data Analysis	Data Analysis	Data Analysis	Data Compilation	Data Analysis	Data Analysis
Jul - Dec 2001	Reports Completed	Data Analysis	Reports Completed	Data Analysis	Data Analysis	Data Analysis
Jan - Jun 2002		Reports Completed		Reports Completed	Reports Completed	Reports Completed
Jul - Dec 2002						
Jan - Jul 2003	REGIONAL PUBLIC MEETINGS	INTERNET SITE COMPLETED	EXECUTIVE SUMMARY REPORT ISSUED			

APPENDICES

APPENDIX A: ACRONYMS AND DEFINITIONS

CCR - Consumer Confidence Report

CWS - Community Water System

DEP - Maine Department of Environmental Protection

DHS - State of Maine Department of Human Services

DWP - State of Maine Drinking Water Program, within DHS

EPA - U.S. Environmental Protection Agency

GIS - Geographic Information System

GPM - gallons per minute

MCL - Maximum Contaminant Level

MTBE - methyl-tertiary-butyl-ether

NPS - Nonpoint Source

NTNC - Non-transient, Non-Community Public Water System

OGIS - Maine Office of Geographic Information Systems

PCS - Potential Contamination Source

PWS - Public Water System

SDWA - Safe Drinking Water Act

SWAP - Source Water Assessment Program

SWWG - Maine Surface Water Workgroup

TOT - Time-of-Travel

USGS - U.S. Geological Survey

UST - Underground Storage Tank

VOC - Volatile Organic Compounds

WHPP - Wellhead Protection Program

WHPA - Wellhead Protection Area

Acute Contaminants Compounds which, if in water which is consumed, can immediately make an individual sick. These include nitrate/nitrite and bacteria/pathogens.

Chronic Contaminants Compounds, which, if in water which is consumed over a long duration (years to decades), may eventually make an individual sick. These include chemical contaminants such as metals, gasoline and other volatile organic compounds, pesticides/herbicides, and so forth

Community Water System (CWS). A public water system that serves at least 15 service connections used by year-round residents of the area served by the system or regularly serves at least 25 year-round residents.

Conservation Easements. Easements are an interest in land that entitles a person to use the land possessed by another (affirmative easement), or to restrict uses of the land subject to the easement (negative easement). A conservation easement restricts the owner to uses that are compatible with conservation environmental values. Easements are one technique for exercising Legal Control over land.

Contamination Source Inventory. The process of identifying, locating, and verifying contaminant sources within delineated source water protection areas

Drinking Water State Revolving Fund (DWSRF). Under section 1452 of the SDWA, EPA awards capitalization grants to states to develop drinking water revolving loan funds to help finance drinking water system infrastructure improvements, SWP, to enhance operations and management of drinking water systems, and other activities to encourage PWS compliance and protection of public health.

Dug Wells and Springs These are sources which both involve drawing from a source at or near where the water table is expressed into the open atmosphere. Because both draw water from locations at or near the ground surface, both are categorically at high relative risk to contamination as compared to gravel and bedrock wells.

Fractured Bedrock Well A well which is drilled into, and draws from, groundwater found in networks of fractures in bedrock. Bedrock wells are commonly drilled to depths of several hundred feet below the ground surface, and typically yield less water than a gravel well.

Geographic Information System (GIS) A GIs is a collection of computer hardware, software, and geo-referenced data which permits storage, retrieval, and analysis of spatial information.

Legal Control A mitigating factor to minimize a source's future risk for contamination; typically an option available only to municipalities, legal control strategies (here, to limit certain land use practices or activities within a source water protection area) include, but may not be limited to zoning, comprehensive planning, resource protection district establishment, and conservation easements.

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

Non-Transient, Non-Community Water Systems (NTNC) Public water systems which regularly serve at least 25 of the same non-resident persons per day for more than 6 months per year. Non-transient non-community systems typically include schools, offices, churches, factories, etc.

Primacy State. State that has the responsibility for ensuring a law is implemented, and has the authority to enforce the law and related regulations. State has adopted rules at least as stringent

as federal regulations and has been granted primary enforcement responsibility. Maine is a primacy state for the federal Safe Drinking Water Act (SDWA).

Source Water Protection Area (SWPA). The area delineated by the state for a PWS or including numerous PWSS, whether the source is ground water or surface water or both, as part of the state SWAP approved by EPA under section 1453 of the SDWA.

Surface Water Treatment Rule (SWTR). A section of the SDWA. The rule specified maximum contaminant level goals for Giardia lamblia, viruses and Legionella, and promulgated filtration and disinfection requirements for PWSs using surface water sources or by 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.

Surficial Well A well drilled typically in sand and gravel deposits, a surficial well is one which draws water from unconsolidated (non-bedrock) geologic materials at or near the ground surface.

Susceptibility Analysis. A required element of SWAP; an analysis of the likelihood of contamination of a PWS.

Transient Water Systems Transient Water Systems (Transients) are non-community water systems which serve at least 25 persons, but not necessarily the same persons, for at least 60 days per year. They serve a constantly changing population of individuals whose exposure to the water is of short duration. Examples include highway rest stops, restaurants, motels, campgrounds, among others.

Watershed. A topographic boundary area that is the perimeter of the catchment (drainage) area of a stream, river, lake or pond.

Watershed Area. A topographic area that is within a line drawn connecting the highest points uphill of a drinking water intake, from which overland flow drains to the intake.

Wellhead Protection Area (WHPA). The surface and subsurface area surrounding a well or well field, supplying a PWS, through which contaminants are reasonably likely to move toward and reach such water well or well field.

APPENDIX B: ADVISORY COMMITTEE DOCUMENTS

APPENDIX C: PUBLIC OUTREACH INITIATIVES

APPENDIX D: PRESS CLIPPINGS

APPENDIX E: SAMPLE ASSESSMENTS

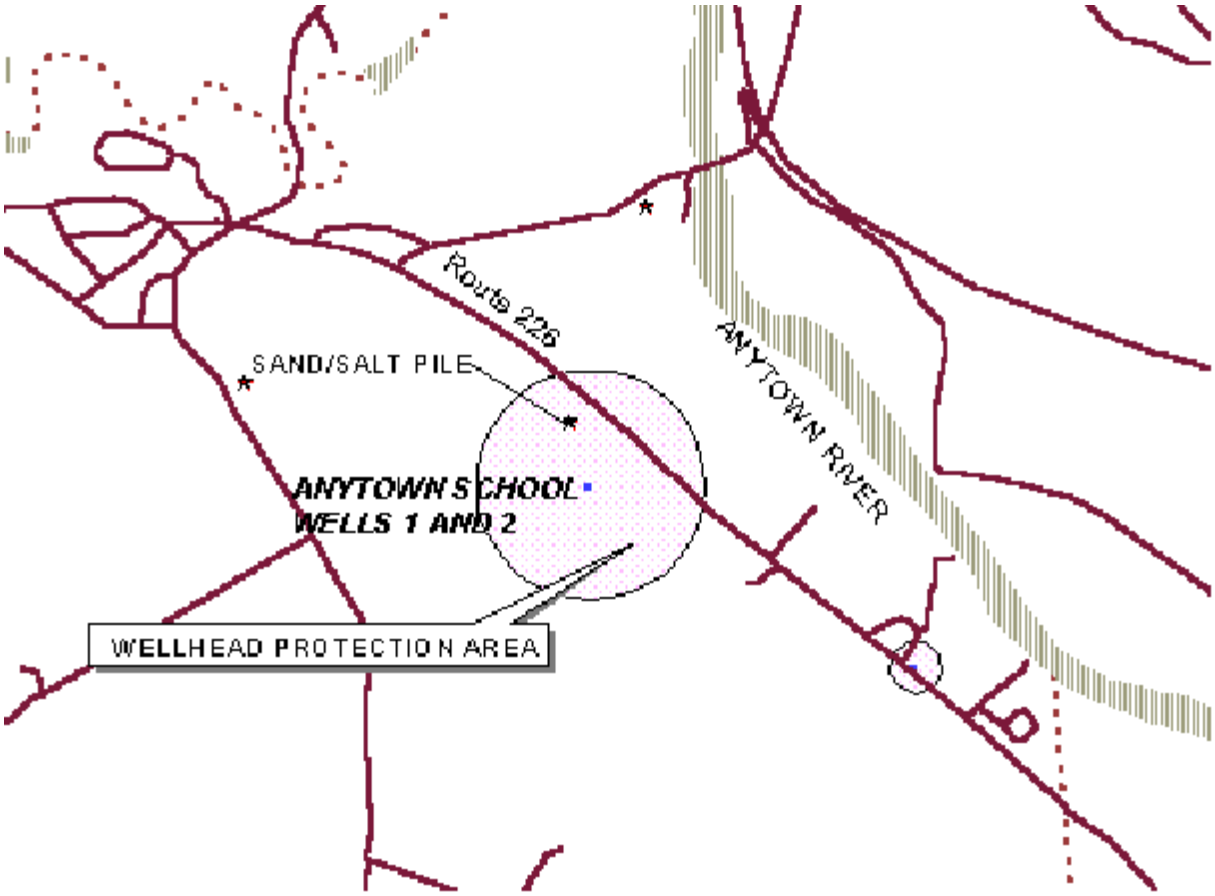
ANYTOWN SCHOOL: DRINKING WATER SOURCE ASSESSMENT

INTRODUCTION:

The Maine Drinking Water Program, a state agency within the Department of Human Services-Bureau of Health, has completed an assessment of the susceptibility to contamination of the drinking water source serving ANYTOWN SCHOOL, a public water system located in Anytown, Maine. The assessment is a requirement of the Federal Safe Drinking Water Act, a law originally passed in 1974 in an effort to ensure the safety of public water supplies. The water system has voluntary cooperated with the Drinking Water Program in completing this assessment. In the

following sections the water system and sources are described, a map of the source locations is provided, the risk of contamination of the source(s) is evaluated, and recommendations for action on the part of the water supplier, citizens, and municipal officials are provided.

MAP OF THE SOURCE:



WATER SYSTEM DESCRIPTION:

Water System Name: Anytown School

Water System Type: Non-transient, Non-community system

Location: Anytown, Maine

Number of Individuals served daily: 282

Number of Ground Water Sources: 2

Number of Surface Water Sources: 0

Type of Treatment: chlorination

Estimated Daily Water Use 7050 Gallons per day

Source 1 of 2

Description: Drilled Well 485’

Location: on right side of school

Well Type: bedrock

Well Depth: 485 feet

Estimated Thickness of Overburden: 60 feet

Estimated Yield: Unknown

Type of Wellhead Protection Area: Circle

If circle, what diameter: 300 feet

Source 2 of 2

Description: Drilled Well 231’

Location: near flagpole

Well Type: bedrock

Well Depth: Unknown

Estimated Thickness of Overburden: 42 feet

Estimated Yield: Unknown

Type of Wellhead Protection Area: Circle

If circle, what diameter: 300 feet

SUSCEPTIBILITY TO CONTAMINATION:

In completing this assessment, the Drinking Water Program has considered the following types of information from the following sources:

Information Type	**Information Source**
well type and site geology	DWP databases, public water supplier
potential sources of contamination	DEP databases, public water supplier
water quality data	public water supplier
ownership and zoning	public water supplier

In general, potential risk of contamination is evaluated (high, moderate, or low risk) in five categories. These are:

Risk Based on Well Type and Site Geology

No drinking water source is completely free of any and all threats to water quality, however some are more likely to become contaminated than others just by the nature of their construction and the geology of the site. For example, dug wells and springs more frequently test positive for the presence of coliform bacteria than do wells drilled into fractured bedrock covered by a thick layer of low permeability silty clay. Therefore, dug wells and springs are considered high risk, bedrock wells with more than 20 feet of overburden are considered low risk, and all others (well points, gravel wells, and bedrock wells with less than 20 feet of overburden) are considered to be at moderate risk of being contaminated.

Anytown School Ranking:

Existing Risk of contamination

based on Well Type & Site Geology LOW RISK

Existing Risk of Acute Contamination

Acute contaminants (such as pathogens and nitrate/nitrite) are those which can make consumers sick immediately after being consumed. Many acute contaminants originate in human or animal feces. Possible sources include septic system leach fields, animal feed lots, manure piles, etc. The risk ranking in this category is based on the system's water testing history and the presence or absence of potential sources of acute contamination in the Wellhead Protection Area.

Anytown School Ranking:

Existing Risk of Acute Contamination: MODERATE RISK

Existing Risk of Chronic Contamination

Chronic contaminants are those which pose a health risk if consumed (even sometimes at very low doses) over many, many years. There are 89 contaminants which by law must not be present in public drinking water or which can only be present below some specified level (the Maximum Contaminant Level). Examples of chronic contaminants include MTBE and other gasoline additives, chlorinated solvents, many herbicides and pesticides, gross alpha radiation, lead, arsenic, and many others. The risk ranking in this category is based on the system's water testing history and the presence or absence of at least 4 potential sources of chronic contamination in the Wellhead Protection Area.

Anytown School

Existing Risk of Chronic Contamination: MODERATE RISK

Future Risk of Acute Contamination

Acute contaminants (such as pathogens and nitrate/nitrite) are those which can make consumers sick immediately after being consumed. Many acute contaminants originate in human or animal feces. Possible sources include septic system leach fields, animal feed lots, manure piles, etc. Risk rankings in this category are based on the ownership or control by zoning of land within the 300 feet of the well (or the 200-day time-of-travel zone for gravel wells).

Anytown School

Future Risk of Acute Contamination: HIGH RISK

Future Risk of Chronic Contamination

Chronic contaminants are those which pose a health risk if consumed (even sometimes at very low doses) over many, many years. There are 89 contaminants which by law must not be present in public drinking water or which can only be present below some specified level (the Maximum Contaminant Level). Examples of chronic contaminants include MTBE and other gasoline additives, chlorinated solvents, many herbicides and pesticides, gross alpha radiation, lead, arsenic, and many others. Risk rankings in this category are based on the ownership or control by zoning of land within the defined Wellhead Protection Area and out to a circular zone with a radius of 2500' around the well.

Anytown School

Future Risk of Chronic Contamination: HIGH RISK

DISCUSSION AND RECOMMENDATIONS

No water system in the United States can legally serve water to the public which does not meet drinking water standards. Therefore, almost invariably, water from a public drinking water system is safe to drink. However, conditions can change over time and that is why systems test their water daily, monthly, annually, etc., as appropriate. This assessment is an evaluation of how likely the system is to become contaminated now and into the future. It is based on available information at the date listed in the title. It is subject to change if conditions changes, for example if new development is initiated near the well or an existing potential source of contamination is removed. The most favorable outcome is five LOW RISK rankings. This means that it is unlikely that the drinking water source will become contaminated. The least favorable outcome is five HIGH RISK rankings. This means that there have already been unfavorable water quality results from the system, there are existing potential sources of contamination too near the well, and that the system does not own or control the land around the well considered necessary to protect the source.

The purpose of this assessment is to provide the water system, the individuals drinking the water, land owners near the well, and municipal officials from the town or towns encompassing the source protection area, with basic information to make decisions about activities existing or proposed near the well. A cooperative relationship among these individuals is the important first step toward a plan for protecting the well and therefore for protecting the health of the people who drink the water. Based on the results of the assessment, the following general recommendations should be considered:

High or Moderate Risk Based on Well Type and Site Geology

Often a system has no choice about the type of well it uses as a source and certainly site geology is a given. However, in some cases a dug well or spring could be replaced with a bedrock well. In general, if your drinking water source is determined to have high or moderate risk based on well type and site geology, you should prepare a CONTINGENCY PLAN. This is a plan for quickly switching to another source of drinking water if the existing one becomes contaminated. Examples include a second well or wells, an agreement with another water supplier, or arrangements for temporarily supplying bottled water.

High or Moderate Exiting Risk of Acute Contamination

A high or moderate ranking in this category means that there are existing sources of acute contaminants near the well, that the water has tested unfavorably for acute contaminants in the recent past, or both. If there are existing potential sources of pathogens near the well, it would be wise to plan how to prevent contaminants from reaching the well. This could include purchasing land and removing septic system leach fields; connecting to public sewer (if possible); having the septic tank pumped at least annually; etc. If the presence of acute contaminants has already been detected in the water, the water is probably already being tested more frequently to be sure future contamination will be detected early. An investigation should be undertaken to determine the source of the contamination and reduce or eliminate the risk (as described above).

If the water supplier does not own or control through all of the "sanitary zone" around the well (usually within 300 feet) then there is some risk that a future potential source of contamination will be installed there (such as a new leach field on your neighbor's property). The sure way to ensure that this doesn't happen is to buy the property. Short of that, purchasing an easement or at least communicating with your neighbor about the proximity of your well to his property can help mitigate the risk.

High or Moderate Existing Risk of Chronic Contamination

A high or moderate ranking in this category means that there are more than 4 existing sources of chronic contaminants near the well, that the water has tested unfavorably for chronic contaminants in the recent past, or both. If your water supply source is determined to have existing risk of chronic (chemical) contamination, you should evaluate each potential source individually and determine the level of risk posed by each. The level of risk will differ for different activities and based on many factors including the distance from the well; geology and hydrogeology; level of care with which the activity is managed (as with the storage or use of lubricating chemicals, for example); the water system or town's authority to control the activity (as with the storage or use of lubricating chemicals, for example); and other factors. The risk can only be truly eliminated through purchasing land and ceasing the activity. Less drastic (and expensive) measures include communicating with your neighbors to make them aware of the risk their activity poses. A water supplier or town may want to inspect facilities periodically to ensure that on-site practices will not impact ground water and, ultimately, reach the well.

High or Moderate Future Risk of Chronic Contamination

A high or moderate ranking in this category indicates that the water suppliers does not own or control all the land encompassed by the Wellhead Protection Area and/or the land encompassed by a 2500'-radius circle around the well. If part of the Wellhead

Protection Area is not owned or controlled by the water supplier, future activities could occur in these areas and impact the well. Short of purchasing all land which contributes to the well, a water supplier in conjunction with the municipality could purchase easements from abutters, could pass protective ordinances to limit the types of activities which could occur there, could be granted authority by a planning board or other local entity to review and comment on projects proposed in this protection area, could work with proposed developers to help them design projects so that they pose lesser risk to ground water, etc.

If you have questions about the information in this assessment, please contact:

Maine Drinking Water Program

10 State House Station

Augusta, Maine 04333-0010

Anytown School

PO Box 55

Anytown, Maine

(207) 287-2070 (207) 555-6144

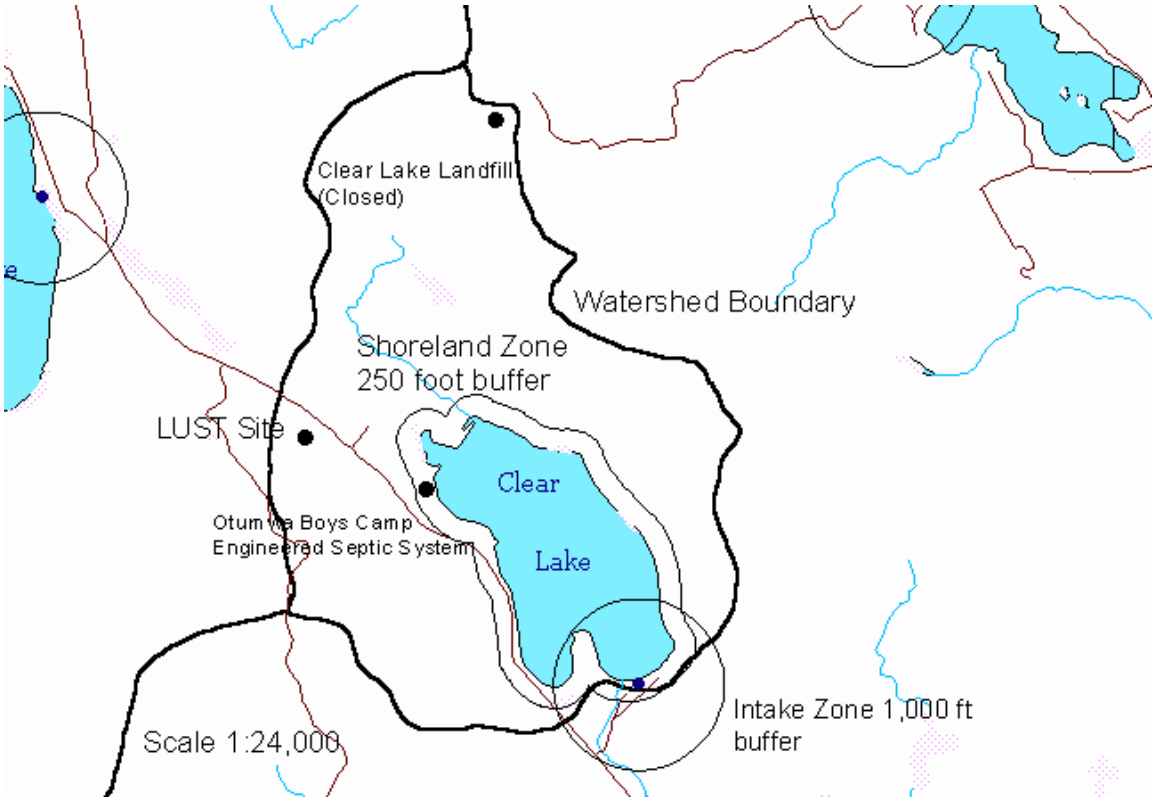
DRAFT SURFACE WATER ASSESSMENT

Clear Lake Village Water Company: Drinking Water Source Assessment

Introduction

The Maine Drinking Water Program, a state agency within the Department of Human Services, Bureau of Health, in cooperation with Watershed Consulting Services and the Clear Lake Village Water Company, has completed an assessment of the susceptibility to contamination of the drinking water source serving Clear Lake Village, a public water system located in Clear Lake, Maine. The assessment is a requirement of the Federal Safe Drinking Water Act, a law originally passed in 1974 in an effort to ensure the safety of public water supplies. The Public Water Supplier (PWS) has voluntarily cooperated with the Drinking Water Program in completing this assessment. In the following sections, the water system and sources are described, a map of the source locations is provided, the risk of contamination of the source(s) is evaluated, and recommendations for action on the part of the water supplier, citizens, and municipal officials are provided.

Map of the Source



Water System Description

Water System Name: Clear Lake Village Water Company

Water System Type: Non-transient, Community system

Location: Clear Lake, Maine

Number of individuals served daily: 2,500

Number of Ground Water Sources: 0

Number of Surface Water Sources: 1

Type of Treatment: ozonation

Filtration: Filtration avoidance through waiver

Estimated Daily Water Use: 275,000 Gallons per day

Source 1

Description: Clear Lake

Location: Clear Lake outlet.

Susceptibility to Contamination

In completing this assessment, the following types of information from the following sources were considered.

Information Type	Information Source
Watershed Characteristics	DWP GIS, USGS 24K coverage
Raw Water Quality	PWS monitoring, DEP databases
Potential Contamination Sources	DEP, OGIS, Windshield survey
Land Use and Zoning	PWS data, USGS 24K coverage, Windshield survey
Other Analyses	DEP/U. Maine Databases

More detail about these data sources is available in Appendix A and the Methodology section.

Assessment Zones

The assessment was performed for three zones, listed below. The potential contamination sources considered vary among the zones.

Zone	Measure	Findings	Risk level
Watershed	Ambient water	Classified as AA, in compliance	Low

	quality Potential threats Future Threats Overall	LUST site, closed landfill Roadway zoned for development	Significant Moderate Moderate
Shoreland	Lake classification Soils Potential Threats Future Threats Overall	Mesotropic Buxton Boys camp engineered septic system Undeveloped lots west of lake	Moderate Moderate Significant Moderate Moderate
Intake	Raw water quality Ownership/control Potential Threats Future Threats Overall	meets MCL's PWS owns 100% of shorefront None Increased recreational pressure	Low Low Low Low Low
Overall			Moderate

Discussion and Recommendations

Clear Lake Water Company has taken some important steps to conserve its supply. The PWS owns the intake shoreland area, and raw water quality is good. The PWS should consider purchasing any parcels, which may become available in the shoreland zone. There are areas in the shoreland and watershed zones that require ongoing management and vigilance. Much of the shoreland zone is underlain by moderately erodible soils. Both current and future shorefront developments require careful erosion and sedimentation control to minimize the risk to water quality. The PWS should work with Clear Lake to assure enforcement of shoreland zoning and NRPA regulations. The seasonal boy's camp, with its large engineered septic system also presents a potential for bacterial and nutrient contamination of the lake. The system should be inspected for proper function on a regular schedule, and be pumped out at least biannually.

Although the watershed is not highly developed, the closed landfill for the Town of Clear Lake and an identified leaking underground storage tank site are present in the watershed. The LUST site has had tank and soil removal performed, but it is likely that low-level hydrocarbons are present in the area. The landfill has a monitoring well network. The PWS should ensure that monitoring requirements at these sites are fulfilled, and review the data for possible adverse changes in water quality. Any future development within the watershed should prefer uses that are compatible with water quality conservation.

The road along the west side of Clear Lake is zoned for development. There are undeveloped lots within the shoreland zone, as well as in the watershed zone. The Town and the PWS should work together to reduce development pressures in this area, either through purchase, easement, or re-zoning.

Methodology

The Drinking Water Program, in cooperation with Maine DEP, Water Districts, and Watershed Associates, has evaluated existing information and collected new information about three zones around each surface water source. The data, assembled in a GIS, was used to perform an assessment of threats to the source based on the guidelines listed in the table below. Many of the data types are continuous, like drainage basin size. For these items, a comparative range was used. For items with discrete standards, like MCL's, the standard was used as a yardstick to judge potential risks. Further detail concerning the methodology for the assessment is included in the SWAP document, chapter 5.

Table of Assessment Guidelines

Risk to the source

Assessment Item/threat	**low**	**moderate**	**significant**
Physical Characteristics of the Watershed.			
Watershed boundary, area	Smaller	>>	Larger
Area of water body	"	>>	"
Tributaries	few	>>	many
Watershed Topography	low	moderate	steep, rugged
Wetlands	many	>>	few
Water body depth	deep	>>	shallow
Sand and Gravel Aquifers	few	some	many
Soil types (erodibility and slope)	low	moderate	high
Raw Water Quality			
Secci Disk Transparency	<8 M	4-8 M	> 4 M
Turbidity pH	<1 NTU	<5 NTU	>5 NTU
Phosphorus	6.5-8.5	N/A	<6.5 or >8.5
Pesticides and Herbicides	<10 ppb	<20 ppb	>30 ppb

Color Total Coliform and E Coli Dissolved Oxygen Temperature VOC's Chlorophyll-a Total Organic Carbon	ND < 5 > 29/ 100 ml >7 mg/l ambient absent <2 ppb < 4 mg/l	N/A 5-15 occasional 5-7 mg/l - N/A 2-6 ppb 4-8 mg/l	detected >15 >142/100 ml <5 mg/l >10o C ambient Detected >6 ppb >8 mg/l
Potential Contamination Source Inventory UST/AST leak sites Municipal/Comm/Special Landfill Compost sites Demolition Debris sites Ash/ Septage storage/utilization Superfund site Sand/Salt storage sites Petroleum Spill sites Hazardous Waste sites Wastewater Treatment facilities Food residuals utilization sites Uncontrolled Hazardous sites Tank farms Industrial complexes Non-point pollution sources Transfer stations	Absent from watershed or actively monitored and controlled or fully remediated	Present in watershed, some operational deficiencies and/or remediation is underway.	Present and unmonitored and/or unremediated.

Sludge utilization sites Automobile graveyards Engineered subsurface systems Woodyards Underground injection wells Surface impoundments Mining/mineral processing sites Overboard discharges to rivers Active UST sites Roadways Railroads Utility Rights-of-way Boat Launches Commercial farms CAFO's Commercial Forest Operations Private Septic Systems Home heating oil tanks Airports Bathing Beaches Combined Sewage overflows	If present, at low density, properly installed and operated. In compliance with applicable local, state, and federal regulations.	>>>>	High density, little evidence of active management, documented incidence of problems and failures
Land Uses and Zoning Residential Density Percent of watershed	>2 A/lot	1-2 A/lot intake and	<1A/lot critical areas

Owned by PWS Public Lands or conservation Forested With Protective zoning	total >80% for all protected uses	shoreland protected, others developed	(intake, shoreland) unprotected or developed
Agricultural Impervious cover Industrial/commercial	<20% total <20% " <20% "	20-30% total 20-30% " 20-30% "	>30% total of three >30% " >30% "
Waterbody uses: Restricted areas Ice Fishing Boating Swimming Recreational vehicles	large, posted limited to absent	intake zone moderate, well-managed	Small to none Prevalent, uncontrolled
Other Analyses Trophic State Index Vulnerability Index Build-out analysis	<25 Low Fully developed	25-60 Moderate >>>	>60 High High potential for development

If you have questions about the information in this assessment, please contact

Maine Drinking Water Program Clear Lake Village Water Company

10 State House Station P.O. Box 100

Augusta, Maine 04333-0010 Clear Lake, Maine

(207) 287-2070 (207) 555-1212

Appendix A: Detailed list of information sources considered

Information Type	Information Source
Physical Characteristics of the Watershed.	DWP GIS, USGS 24K coverages
Watershed boundary, area	"
Area of water body	"
Tributaries	"
Watershed Topography	"
Wetlands	Digitized NWI maps
Water body depth	DWP GIS from DEP database
Sand and Gravel Aquifers	DWP GIS from MGS maps
Soil types (erodibility and slope)	DWP GIS - NRCS Maps
Raw Water Quality	Water District, Existing DEP monitoring
Secci Disk Transparency	"
Turbidity	"
pH	"
Phosphorus	"
Pesticides and Herbicides	"
Color	"
Total Coliform and E Coli	"
Dissolved Oxygen	"
Temperature	"
VOC’s	"
Chlorophyll-a	"
Total Organic Carbon	"
Potential Contamination Source Inventory	
UST/AST leak sites	DEP Database, District Data where available
Muni/Comm/Special Landfill	"
Compost sites	"
Demolition Debris sites	"
Ash/Septage storage/utilization	"
Superfund sites	"

Sand/Salt storage sites	"
Petroleum Spill sites	"
Hazardous Waste sites	"
Wastewater Treatment facilities	"
Food residuals utilization sites	"
Uncontrolled Hazardous sites	"
Tank farms	"
Industrial complexes	"
Non-point pollution sources	"
Transfer stations	"
Sludge utilization sites	"
Automobile graveyards	"
Engineered subsurface systems	"
Woodyards	"
Underground injection wells	"
Surface impoundments	"
Mining/mineral processing sites	"
Overboard discharges to rivers	"
Active UST sites	"
Roadways	DWP/OGIS Database
Railroads	"
Utility Rights-of-way	"
Boat Launches	"
Commercial farms	Windshield Survey, Dept. of Agriculture data.
CAFO's	"
Commercial Forest Operations	"
Private Septic Systems	"
Home heating oil tanks	"
Airports	"
Bathing Beaches	"
Combined Sewage	"

overflows	
Land Uses and Zoning	
Residential Density	Topographic maps, Windshield survey
Percent of watershed:	Inventory, PWS interview
Owned by PWS	
Public Lands or conservation	
Forested	
Agricultural	
Impervious cover	
With Protective zoning	
Waterbody uses:	Inventory, PWS interview
Restricted areas	
Ice Fishing	
Boating	
Swimming	
Recreational vehicles	
Other Analyses	
Trophic State Index	DEP files, PEARL
Vulnerability Index	DEP files, PEARL
Build-out analysis	DEP files

APPENDIX F: SIGNIFICANT COMMENTS AND RESPONSES

APPENDIX G: MAINE WELLHEAD PROTECTION PROGRAM SELF-EVALUATION FORM

APPENDIX H: POTENTIAL SOURCES OF CONTAMINATION

HERBICIDE/PESTICIDE USE

1._____ Agricultural chemical spreading or spraying
2._____ Agricultural chemical storage
3._____ Bulk grain storage
4._____ Chemically fertilized agricultural field
5._____ Golf course
6._____ Herbicide sales or applicator
7._____ Nursery or garden shop
8._____ Pesticide sales or applicator
9._____ High voltage transmission lines

PETROLEUM/HYDROCARBON USE (VOCS OR SEMI-VOCS)

10._____ Aboveground oil storage tank (including home heating oil tanks)

41._____ Animal grazing
42._____ Barnyard
43._____ Manure pile
44._____ Manure spreading
45._____ Meat packer, slaughter house
46._____ Municipal wastewater treatment plant

OTHER

50._____ Abandoned well
51._____ Boat builder, refinisher, maintenance
52._____ Chemical reclamation
53._____ Food processor
54._____ Graveyard and cemetary
55._____ Heat treater, smelter, annealer, descaler

11._____ Underground oil storage tank
12._____ Airport fueling area
13._____ Airport maintenance
14._____ Auto chemical supply wholesaler
15._____ Auto repair
16._____ Body shop
17._____ Concrete, asphalt, tar, coal company
18._____ Dry cleaner
19._____ Furniture stripper
20._____ Gas station, service station
21._____ Junk or salvage yard
22._____ Machine shop
23._____ Oil pipeline
24._____ Painters, finisher
25._____ Parking lot
26._____ Photo processor
27._____ Printer
28._____ Sand and gravel mining, other mining
29._____ Small engine repair shop
30._____Snow dump (large commercial or municipal)
31._____Stormwater impoundments or run-off area
32._____ Truck terminal

BACTERIA AND INORGANICS SUCH AS NITRATES/NITRITES

40._____ Animal burial (large scale site)

56._____ Incinerator
57._____ Industrial discharge
58._____ Industrial manufacturer
59._____ Industrial waste disposal
60._____ Landfill, dump, transfer station
61._____ Metal plating
62._____ Military facility
63._____ Monitoring well
64._____ Railroad yard or line
65._____ Recycling or processing center *(other than beverages)*
66._____ Research laboratory
67._____ Residential home
68._____ Rust proofer
69._____ Salt pile or sand and salt pile
70._____ Septic system, septic waste disposal
a._____ Beauty parlor
b._____ Car wash
c._____ Laundromat
d._____ Medical, dental, veterinarian office
e._____ Mortuary/funeral parlor
f._____ Multi-unit housing
g._____ Single-family housing
h._____ Other _____
71._____ Sewer line
72._____ Sludge disposal or spreading
73._____ Wastewater impoundment area
74._____ Wastewater treatment plants, discharge
75._____ Wood preserver

APPENDIX I: EPA APPROVAL LETTER