MAINE

WELLHEAD PROTECTION

PROGRAM

Maine Department of Human Services

Bureau of Health

Division of Health Engineering

MAINE

WELLHEAD PROTECTION PROGRAM

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GLOSSARY

Analytical Model

A computer program that uses a set of mathematical equations which, subject to certain assumptions, describes physical processes that occur within an aquifer.

Aquifer

A permeable geological formation, either rock or sediment, that when saturated with ground water is capable of transporting water through the formation.

Bedrock Aquifer

An interconnected network of cracks or fractures contained within crystalline bedrock, such as intrusive granites, and which is filled with ground water.

Community Water System

Any public water system that provides water to at least 15 service connections or 25 individuals daily on a year round basis.

Confined Aquifer

An aquifer that is overlain and thus confined by a geologic layer having hydraulic conductivity significantly lower than the aquifer.

Effective Porosity

The amount of interconnected pore space, expressed as a percentage of bulk volume, through which ground water within the aquifer can pass. Because static fluid will be held to the mineral surface by surface tension, the effective porosity will be less than the total porosity.

Ground Water

The water contained within the interconnected pores, cracks or fractures located below the water table of a confined or unconfined aquifer.

Ground Water Divide

A boundary line or ridge along the water table where the ground water flows in opposite directions. Such a divide is conceptually similar to a ridge line along a mountain range.

Hydraulic Conductivity

A numerical value, a coefficient of proportionality, that describes the rate at which ground water can move through a porous material.

Hydraulic Gradient

Relative potential ground water flow associated with changes in ground water slope in a given direction. The steeper the ground water slope, the greater the potential ground water flow.

Major Public Water Systems

Public Water Systems that provide water to 500 or more persons.

Maximum Daily Discharge Rate

The maximum rate at which ground water can be withdrawn from an aquifer at any given time on a day to day basis.

Minor Public Water Systems

Public Water Systems that provide water to less than 500 persons.

Multi-Layered Aquifer

A compound aquifer characterized by a series of water bearing layers separated by layers of less permeable or non-permeable materials.

Non-Conforming Use

Any land use, facility or activity that does not comply with provisions described in the State Wellhead Protection Program.

Non-Conforming Water Source or System

Any water source or system that cannot come into compliance with Wellhead Protection requirements as specified in the Maine State Wellhead Protection Program.

Non-Community Water System

Any public water system that provides water to at least 15 service connections or 25 or more individuals for at least 60 days a year.

Non-Transient, Non-Community Water System

Any public water system that provides water to at least 15 service connections or 25 or more individuals for four hours or more a day, for four or more days a week, for 26 weeks or more a year.

Numerical Model

A computer program that uses a numerical approximation technique to compute values, subject to certain assumptions, for physical processes that occur at a discrete number of nodal (grid) points within the aquifer.

Potential Contamination Source

Any source (land use, facility, area, activity, etc.) of materials, compounds or substances that would result in ground water pollution upon entry of that material into the ground water.

Public Water System

Any water system that provides water to at least 15 service connections or 25 individuals daily for at lest 30 days a year.

Recharge Area

Any porous surface area that allows precipitation to infiltrate into an aquifer.

Reconnaissance Level Inventory

A preliminary inspection, usually conducted via automobile, to identify major or significant sources of pollution (either potential or actual) that would preclude locating a well for a public water system within the same drainage basin.

Safe Yield

The amount of naturally occurring groundwater that can be withdrawn from an aquifer on a sustained basis without impairing native ground water quality, creating undesirable environmental effects or exceeding the capacity of the well to deliver water. The maximum rate at which ground water can be withdrawn without exceeding the rate of recharge thus resulting in ground water depletion or dewatering.

Saturated Thickness

The thickness, within a confined aquifer, of the zone in which the pore space of the aquifer is filled with water at a pressure that is greater than atmospheric pressure. In an unconfined aquifer, the top of the saturated zone will be the water table.

Service Connection

A service connection consists of some type of residential unit, such as a house, a condominium, an apartment or a mobile home. Such residential units are assumed to house at least 3.0 persons per unit and are expected to have water usage rates of up to 100 gallons per person per day.

Specific Yield

The amount of water, expressed in gallons per minute per foot of drawdown, that is pumped from a well.

Time-of-Travel

A measure of the distance that ground water will travel in the saturated zone during a set period of time.

Transient, Non-Community Water System

Any public water system that provides water to at least 15 service connections or 25 or more individuals less frequently than Non-Transient, Non-Community water systems, ie, for less than four hours a day, for less than four days a week and for fewer than 26 weeks a year.

Unconfined Aquifer

An aquifer that is not overlain by a geologic layer having hydraulic conductivity significantly lower than the aquifer.

Unconsolidated Aquifer

Any aquifer within glacially derived surficial deposits such as sands, silts, gravels, tills and lacustrine or marine deposits.

Water Table

The upper level of the ground water surface within the saturated zone of an aquifer.

Wellhead

The specific location of a well (a hole or shaft dug or drilled to obtain water) and/or any structure built over or extending from a well.

MAINE WELLHEAD PROTECTION PLAN

1. Introduction

1.1 Background

The Safe Drinking Water Act of 1974 seeks to protect underground sources of drinking water from contamination and to ensure safe supplies of public drinking water. The U.S. Environmental Protection Agency is responsible for implementing and administering the provisions of the Safe Drinking Water Act.

Amendments to the Safe Drinking Water Act, enacted in 1986, strengthen provisions of the act that concern ground water protection. Section 1428 of the Amendments, specifically, requires each state to develop and submit to the U.S. Environmental Protection Agency a State Wellhead Protection Program that will protect the area surrounding any wellhead that supplies public drinking water. The resulting State Wellhead Protection Program must protect public water systems from any contaminants, or potential contaminants, that may adversely effect human health.

On October 6, 1986, the Governor designated the Ground Water Standing Committee to be the developmental agency for the State Wellhead Protection Program. The Governor also designated the Department of Human Services to be the implementing agency for the Program.

The Ground Water Standing Committee subsequently convened a Work Group to develop the initial program. The Work Group consisted of representatives from the Department of Human Services, the Department of Environmental Protection, the Department of Conservation (Maine Geological Survey), the State Planning Office, the U.S. Geological Survey, the Maine Water Utilities Association, the Maine Rural Water Association, the Maine Municipal Association, and the Maine Association of Regional Councils. The diversity of public interest represented by the Work Group ensured that public concerns for water safety would be adequately addressed. Additional public participation, as described in Section 8, would be provided during succeeding periods of public review and comment.

Under provisions of Maine Law (22 MRSA Chapter 601 subsection 11), the Drinking Water Program is empowered to regulate Public Water Systems in Maine. The Drinking Water Program is a program within the Department of Human Services, Bureau of Health, Division of Health Engineering.

Since 1977, all new sources of public drinking water are required to be reviewed and given approval by the Department of Human Services (10-144A CMR 231.1.c) prior to the delivery of water for human consumption. Following adoption of the State Wellhead Protection Program, all existing and proposed sources of ground water used for public water supplies, will be required to comply with the provisions of the Wellhead Protection Plan.

The Maine Comprehensive Planning and Land Use Regulation Law, passed in 1988, authorized the Department of Economic and Community Development, Office of Comprehensive Planning, through the State Growth Management Program, to require municipalities to develop Comprehensive Management Plans that would address, among other things, the protection of existing and future drinking water resources. Included within the Comprehensive Management Plan of each pertinent community is a section that concerns local Wellhead Protection Plans. Pertinent communities are those that have either public drinking water wells or recharge areas for public drinking water wells within their areas of jurisdiction.

The Department of Economic and Community Development, Office of Comprehensive Planning, is responsible for comprehensive planning and will administer the State Growth Management Program. The Office of Comprehensive Planning will assist individual communities with the development of Comprehensive Management Plans.

The Department of Economic and Community Development and the Department of Human Services will work together to incorporate individual Wellhead Protection Plans into local Growth Management Programs. These departments also will cooperate with other State agencies to support related programs.

1.2 Summary

The State Wellhead Protection Program is a comprehensive program that identifies the requirements, procedures and responsibilities necessary to develop and implement a local Wellhead Protection Plan for public water systems relying on ground water sources.

Each Public Water System and local municipal government having recharge areas within its jurisdiction shall, as equal partners, develop an individual Wellhead Protection Plan in cooperation with the Department of Human Services, and the Department of Economic and Community Development. Any costs associated with the development of an individual Wellhead Protection Plan shall be borne by the public water system.

Individual Wellhead Protection Plans shall contain the following four elements:

1. Delineation of Wellhead Protection Areas:

Wellhead Protection Areas shall be delineated according to one of the methods outlined in Section 3 of this document. The resultant Wellhead Protection Areas shall be transferred to a map of the same type and scale as locally used planning and zoning maps. Wellhead Protection Areas should be transferred to copies of local tax maps to facilitate local cataloging and cross referencing.

2. Inventory of Potential Contamination Sources:

Any land use or activity that may constitute a potential source of contamination to the ground water (see list in Appendix 1 for examples) shall be located, either by point source or by area, whichever is appropriate, and plotted on a map of the same type and scale as that used to delineate Wellhead Protection Areas. These inventories should be transferred to copies of local tax maps to facilitate local cataloging and cross referencing. The inventory also should include areas or sites that historically have a likelihood of having been contaminated by such things as old dump sites or abandoned fuel storage tanks. Areas or sites that are contaminated by naturally occurring agents, such as saltwater intrusion, also should be included in the inventory.

The inventory should consist of a list of threats (land uses or activities) and should include the name, location or address, and description and duration of the activity. Each threat should be cross referenced to the appropriate map. The inventory must be periodically reevaluated and updated. (See Section 4 for inventory procedures and Appendix 3 for sample forms that can be used to develop inventories.)

3. Management Plans for Potential Sources of Contamination:

A management plan shall be developed for each potential contamination source. The plan shall evaluate the risks (See Appendix 1) associated with each potential source of contamination and then establish procedures to eliminate or minimize that risk.

The management plan (see Section 5 for details) shall include:

1) Procedures for public notification of Wellhead Protection Areas,

2) Procedures for managing potential contamination sources,

3) Procedures for evaluating compliance and enforcement of the management plan and

4) Procedures for reviewing, modifying and updating the management plan.

NOTE: Minor systems are exempt from this requirement.

4. Contingency Plan

Each Wellhead Protection Plan shall contain a contingency plan (see Section 6) which details emergency procedures to be followed if water service is interrupted or curtailed due to loss or degradation of water quality or quantity. The plan shall identify alternative water sources to be used during water emergencies. The plan also shall address long term water needs, identify and designate future water resources, develop a schedule for incorporating those water supplies into the water system, and provide specific authority to protect designated water resources. The process for obtaining protection authority shall be described in the management plan.

NOTE: Minor systems are exempt from this requirement.

1.3 Applicability

The State Wellhead Protection Program applies to all existing and all future Public Water Systems that use ground water for their water source. Public Water Systems are systems that provide water to at least 15 service connections* or 25 individuals daily for at least 30 days a year regardless of the number of water sources that are used. If a Water System obtains water from more than one source (for example, multiple wells), but still provides service to at least 15 service connections or 25 individuals daily for at least 30 days a year, that system is still considered to be a Public Water Supply and is thereby subject to regulation.

* A service connection consists of some type of residential unit, such as a house, a condominium, an apartment or a mobile home. Such residential units are assumed to house at least 3.0 persons per unit and are expected to have water usage rates of up to 100 gallons per person per day.

There are three types of Public Water Systems.

They are:

1. Community Water Systems:

These are Public Water Systems that provide water to at least 25 individuals or 15 service connections on a year round basis or regularly serve at least 25 year round residents. Examples of Community Water Systems include Mobile Home Parks, Condominium Complexes, Apartment Buildings, Residential Developments with centralized water systems, Water Districts and Companies.

2. Non-Community Water Systems:

A. Non-Transient, Non-Community Water Systems:

These are Public Water Systems that provide water to 25 or more of the same persons and/or 15 service connections, for four hours or more a day, for four or more days a week, for 26 or more weeks a year. Examples of Non-Transient, Non-Community Water Systems include Schools, Factories, Office Buildings and Businesses that employ 25 or more people.

B. Transient, Non-Community Water Systems:

These are Public Water Systems that provide water to 25 or more persons and/or 15 service connections at a frequency that is less often than that specified above for the Non-Transient, Non-Community Water Systems, i.e., less than four hours a day, less than four days a week and less than 26 weeks a year. Examples of Transient, Non-Community Water Systems include Restaurants, Golf Courses, Campgrounds, Boys and Girls Camps, Hotels and Motels.

NOTE: When referring to public water systems, the terms **major** and **minor** will be used. Major Public Water Systems are those systems that provide water to 500 or more persons while Minor Public Water Systems are those systems that provide water to fewer than 500 persons. The threshold of 500 or more persons is consistent with levels set by the National Primary Drinking Water Regulations for sizes of small community water systems.

The differentiation between major and minor Public Water Systems was made for the following reasons:

1. Administrative Feasibility

Public water systems that serve less than 500 persons are most often privately owned, non-community water systems (motels, restaurants, seasonal camps, etc.) or are small water companies operated by part time and/or volunteer staff. To require these systems to develop an individual Wellhead Protection Plan that is both comprehensive and technically detailed, could present an impossible burden for these systems.

2. Financial Feasibility

An individual Wellhead Protection Plan for most water systems is not expected to exceed $50,000 in total cost. Small utility companies and private businesses (serving less than 500 persons) could be unreasonably burdened by excessive costs or rate increases. Many small companies and businesses could be financially incapable of funding a comprehensive Wellhead Protection Plan or of acquiring control of land use on adjacent properties.

Appendix 4 contains projected rate increases that consumers would be required to pay to finance a local Wellhead Protection Plan. Rates are projected for costs ranging from $20,000 to $100,000 retired over periods of 10, 20 and 30 years, at interest rates of 6%, 8%, and 10% for systems having 50 to 10,000 rate payers.

MAINE PUBLIC WATER SYSTEMS

Type of Public Water System	PWS's Using Groundwater	PWS's Using Surface Water
Major Community Systems (500 or more persons)	51	67
Minor Community Systems (less than 500 persons)	289	8
Non-Transient, Non-Community	639	14
Transient, Non-Community	2147	169
Total	3126	258

1.4 Basic Requirements

Basic requirements for Major and Minor Water Systems are summarized in Tables i, II, AND III.

Major Community Water Systems are required to develop individual Wellhead Protection Plans as outlined above and as detailed further in this plan. Major Community Water Systems are required to complete protection area delineations (See Section 3.3), establish threat inventories (See Sections 4.3.1 and 4.3.2 - Initial and Detailed Inventories) and develop Management Plans (See Section 5) and Contingency Plans (See Section 6).

Minor Public Water Systems are required to complete protection area delineations (See Section 3.3) and to establish threat inventories (See Sections 4.3.1 and 4.3.2 - Initial and Detailed Inventories). Copies of these delineations and inventories will be filed with the appropriate municipality and the Department of Human Services, Drinking Water Program. The Department of Human Services will, in turn, distribute copies of protection area delineations and threat inventories to appropriate state boards and agencies to aid decision making by those agencies. Minor Public Water Systems are not required to develop Management Plans or Contingency Plans.

1.5 Non-Conforming Water Sources or Systems

The Department, under provisions of Title 22, Chapter 601 (Water for Human Consumption) Sub-Chapters I through V is authorized to regulate Public Drinking Water Supplies.

Any water source or system that cannot come into compliance with Wellhead Protection requirements, as specified in the Maine Wellhead Protection Program, shall be declared a non-conforming water source or system. Non-conforming water supplies will be reviewed by the Drinking Water Program with the intent of assessing potential risks associated with those sources, and of initiating actions which will minimize those risks. Such actions will be commensurate with the perceived need to protect public health (also see Section 5.2.2.1, Zone 1 Management, regarding existing non-conforming facilities and activities associated with those facilities).

2. STATE, LOCAL GOVERNMENT, PUBLIC WATER SYSTEM RESPONSIBILITIES

2.1 State Responsibilities

2.1.1 Department of Human Services.

The Department of Human Services shall:

a) Develop rules and guidance for public water systems to identify and direct responsibilities for individual Wellhead Protection Plans (Section 2.3);

b) Assist and cooperate with Federal Agencies and Indian Tribes, as necessary, to facilitate individual Wellhead Protection Plans;

c) Coordinate with the Department of Economic and Community Development, through the Growth Management Program, in implementing the State Wellhead Protection Program;

d) Notify public water systems of the implementation of the State Wellhead Protection Program;

e) Assists public water systems to develop schedules for completing individual Wellhead Protection Plans;

f) Specify minimum acceptable delineation methods in establishing protection zones;

g) Specify minimum acceptable methods in establishing threat inventories;

h) Specify requirements for management plans and contingency plans;

i) Distribute guidelines concerning management techniques for potential ground water contamination sources;

j) Provide technical assistance to public water systems in developing individual Wellhead Protection Plans;

k) Provide an initial review of individual Wellhead Protection Plans;

l) Provide final review and approval of Wellhead Protection Plans;

m) Manage and maintain data generated by individual Wellhead Protection Plans;

n) Disseminate wellhead protection data to appropriate organizations on request;

o) Attempt to resolve conflicts between public water systems and municipalities;

p) Report non-compliance identified through the State Wellhead Protection Program to appropriate agencies, and

q) Monitor the implementation of Management Plans and Contingency Plans to ensure compliance with the State Wellhead Protection Program.

2.1.2 Department of Economic and Community Development

The Department of Economic and Community Development shall:

a) Encourage and promote the incorporation of individual Wellhead Protection Plans into local Growth Management Programs;

b) Coordinate technical assistance and educational programs for individual Wellhead Protection Plans with regional councils, the Department of Human Services and municipalities;

c) Distribute funds for Wellhead Protection Planning if available, and

d) Coordinate the review of individual Wellhead Protection Plans with the review and certification of Municipal Comprehensive Plans and zoning ordinances.

2.1.3 Other State Agencies:

a) The Maine Geological Survey and the Department of Environmental Protection will provide, on request, data concerning water resources and potential contamination sources to:

1) the Department of Economic and Community Development;

2) the Department of Human Services;

3) public water systems, and

4) municipalities.

b) Other State Agencies will provide general technical assistance to the Department of Human Services as requested. In particular:

1) the Maine Geological Survey will provide additional review of Wellhead Protection Area delineations when necessary;

2) the Department of Environmental Protection will provide information concerning pollution sources, and

3) the Department of Environmental Protection will provide guidelines concerning management techniques for potential contamination sources.

c) The Department of Environmental Protection, the Department of

Conservation, the Department of Agriculture Food and Rural Resources, and the Department of Transportation, will be responsible for the transfer of pertinent data generated by individual Wellhead Protection Plans to their individual files.

d) The Land Use Regulation Commission, Department of Conservation, shall provide, within those areas subject to its jurisdiction, those functions otherwise reserved for municipalities.

e) The Department of Environmental Protection, the Land Use Regulation Commission and the Board of Pesticide Control will take appropriate action on reports of noncompliance within their areas of jurisdiction.

2.2 Local Government Responsibilities

a) Cooperate with public water systems, the Department of Economic and Community Development, and the Department of Human Services in development of individual Wellhead Protection Plans;

b) Jointly hold public hearing and comment period with public water system;

c) Implement and enforce portions identified in individual Wellhead Protection Plans that require local government action such as land use and source control provisions, and

d) Notify the public water system, the Department of Human Services, Drinking Water Program, and the Department of Economic and Community Development within thirty (30) days of the implementation of any provision of the State Wellhead Protection Program.

2.3 Public Water System Responsibilities

a) Submit to the Department of Human Services, Drinking Water Program, a schedule for the development of an individual Wellhead Protection Plan within six (6) months of the effective date of the State Wellhead Protection Program. (The effective date shall be six (6) months after Adoption by Rule of the State Wellhead Protection Program);

b) Cooperate with local governments, the Department of Economic and Community Development and the Department of Human Services in the development of individual Wellhead Protection Plans;

c) Delineate or contract delineation of the Wellhead Protection Areas;

d) Inventory potential contamination sources;

e) Develop a Management Plan and Contingency Plan in cooperation with local governments;

f) Jointly hold public hearing and comment period with each local government;

g) Submit the individual Wellhead Protection Plan to the Department of Human Services for initial review;

h) Distribute map of Wellhead Protection Area and potential sources of contamination to the local planning board, zoning board, board of selectmen, health officer, and regional planning commission. Print the map in a local newspaper. Send mailings to customers residents, and affected activities explaining the individual Wellhead Protection Plan;

i) Implement pertinent portions of the State Wellhead Protection Program such as land use acquisition and monitoring programs;

j) Notify the Department of Human Services, Drinking Water Program of the implementation of any provision of individual Wellhead Protection Plans;

k) Comply with the Department of Human Services reporting requirements;

l) Update individual Wellhead Protection Plans as new information becomes available, and

m) Provide current information to the applicable municipal authority to facilitate formal, periodic updates of the Comprehensive Growth Management Plan.

3. DELINEATION OF WELLHEAD PROTECTION AREAS

3.1 Introduction

3.1.1 Development Process

To protect a public ground water supply, the boundaries of the recharge area to the well(s) must be determined. The process for delineation was determined by a Delineation Work Group consisting of technical representatives from the Departments of Human Services and Environmental Protection, the Maine Geological Survey, the Maine Office of the U.S. Geological Survey, and the State Planning Office. A consultant's study was commissioned on feasible delineation methods for use in Maine (Gerber, Robert, 1988, "Evaluation of Wellhead Protection Methods"). A meeting was held with five of the leading delineation consultants in Maine to discuss the study and proposals for Wellhead Protection delineation methodologies, criteria, and thresholds. The Delineation Work Group made the final decisions.

3.1.2 Purpose

This section sets forth technical and administrative guidance for the delineation process for wellhead protection areas. The process shall be conducted by the public water system and its consultants, and submitted for review and approval to the Department of Human Services. Delineation of Wellhead Protection Areas is subject to revision if additional information or more accurate methods become available.

3.2 Delineation for Major Wells in Unconsolidated Aquifers (Unconfined, Confined or Multi-Layered Aquifers)

3.2.1 Criteria for Major Wells in Unconsolidated Aquifers

The primary criterion used to delineate Wellhead Protection Areas for major wells in unconsolidated aquifers (sand and gravel aquifers) is time-of-travel. Time-of-travel is used as a measurement of the distance that ground water will travel in the saturated zone during a set period of time. Time-of-travel shall be used to delineate boundaries for the Wellhead Protection Area zones. A time-of-travel boundary, such as 200 days, would be at a distance away from the wellhead that is equal to the distance traveled by the ground water during 200 days of travel. If the ground water traveled 1,200 feet in 200 days, the boundary limit for the 200 day protection zone would be 1,200 feet from the wellhead.

Ground water time-of-travel incorporates important physical hydrogeologic criteria, including hydraulic gradient, hydraulic conductivity, effective porosity, and resultant ground water flow velocities. The time-of-travel criterion, therefore, provides a comprehensive tool to delineate Wellhead Protection Areas and to develop ground water management strategies.

Time-of-travel calculations should be determined under the following conditions:

a) pumping at the maximum daily discharge rate of the well, that is, the highest rate at which the well can be pumped, using the largest efficient pump, over a 24 hour period based on observed pumping data or the safe yield* of the well, and

b) drought conditions - half the historic average ground water recharge. (Twenty year water demand growth projections required under Contingency Planning Section 6.2.3 should be factored into well design).

* Safe yield is the maximum rate at which ground water can be withdrawn without exceeding the rate of recharge thus resulting in ground water depletion or dewatering.

3.2.2 Thresholds for Major Wells in Unconsolidated Aquifers

Threshold values for the delineation criteria shall be used to delineate zones within a wellhead protection area as follows:

A. Zone 1.

The 200 day time-of-travel boundary to the pumping well shall be determined. The area between the well and the 200 day time-of-travel boundary represents Zone 1 of the Wellhead Protection Area. The Zone 1 threshold primarily protects public water supplies from microbial pathogens. Two hundred days of travel is sufficient for the elimination of most bacteria and viruses. (See Guidelines for Delineation of Wellhead Protection Areas, US Environmental Protection Agency, 1987 for details concerning bacterial and viral survival in soils).

New activities that have the potential to pollute ground water (see Appendix 1) shall be prohibited from this zone. Previously existing activities within Zone 1 that have the potential to pollute ground water shall be individually evaluated and strictly controlled or mitigated as is necessary to protect water quality.

B. Zone 2.

The 2500 day time-of-travel boundary to the pumping well shall be determined. The area between the 200 day and 2500 day time-of-travel boundaries represents Zone 2 of the Wellhead Protection Area. The basis for using 2500 days time-of-travel as the outermost boundary for Zone 2 is that contaminants, in general, will be discovered and remediated before 2500 days have elapsed. Potential sources of pollutants within Zone 2 must be more strictly monitored and controlled because detection and reaction times are decreased.

Activities that have the potential to pollute ground water shall be strictly controlled within this zone. Prohibition of certain new activities in this zone may be warranted, particularly when strict controls are considered to be inadequate.

C. Zone 3.

The area from the 2500 day time-of-travel boundary to the ground water divide* of the watershed shall define Zone 3 of the Wellhead Protection Area. The basis for using ground water divides as the outermost boundary of Zone 3 is that no contaminant from outside these boundaries will affect the well.

* The ground water divide of a watershed is expected to closely approximate the topographic boundaries of the drainage basin of the watershed. Consequently, the terms watershed and drainage basin, as use here, are considered to be interchangeable.

All local and state controls (laws, rules, regulations, etc.) shall apply to activities having the potential to pollute ground water within this zone. Activities within Zone 3 need not be more strictly controlled than is required under current State law. Consideration, however, should be given to siting any new activities, that have the potential to pollute the ground water, to those areas outside of the Wellhead Protection Area.

3.2.3 Hydrogeologic Evaluation for Major Wells in Unconsolidated Aquifers

The following basic steps shall be used to evaluate these major wells.

3.2.3.1 Pre-Pump Test Evaluation for Major Wells in Unconsolidated Aquifers

A. Initial Evaluation

1) Description (with map) of area geology and hydrology.

2) Map of estimated hydrogeologic recharge area boundaries. (Map scale 1:24,000 or larger.)

NOTE: If the Public Water System can assure control of land uses for the entire recharge area, the requirements for pump tests, evaluations and further delineations will be waived.

3) Identification and general map location of potential sources of contamination.

4) Existing water quality analyses.

B. Pump Test Plan

1) Plan elements

a) proposed location of pumping well, observation wells, gaging stations for surface water, and pump test discharge (map scale 1:24,000 or larger),

b) estimated pumping rate,

c) schedule and frequency of drawdown readings and water quality analyses,

d) pre-pumped water table (potentiometric) map for the entire recharge area. The water table map should be based on surface water elevations in ponds, rivers, lakes and streams within the wellhead protection areas and ground water elevations in available wells and new boreholes as specified for stage two submissions (Section 9.2.3.2). In aquifers with shallow water tables (feet of depth) PVC piezometers can be installed at a low cost and with great abundance. Accurate water table altitude measurements are essential and should be determined by a registered land surveyor to at least third order accuracy* of leveling.

* Third order accuracy is defined as C where C equals 0.050 times the square root of M and where C is the allowable closure in feet and M is the distance in miles (For details see Brinker, 1986).

2) Acceptable tolerances of length, volume and time measurements for the aquifer pump test shall be as follows:

a) control of well discharge (±10 percent);

b) depth to water in wells below measuring point (+0.01 ft.);

c) distance from control well to each observation well (±0.5 percent);

d) synchronous time (±1 percent of time since control effected);

e) description of measuring points;

f) elevation of measuring points (±0.01 ft.);

g) vertical distance between measuring points and land surface (±0.1 ft.);

h) total depth of wells (±1 percent);

i) depth and length of screened intervals of all wells (±1 percent);

j) diameter, casing type, screen type, and method of construction of wells (nominal); and

k) location of wells in relation to land-survey net or by latitude and longitude (within one second).

(Stallman/USGS, 1971, "Aquifer Test Design, Observation and Data Analysis")

3.2.3.2 Pump Test/Hydrogeologic Evaluation for Major Wells in Unconsolidated Aquifers

A. Prolonged Pump Test

1) Conduct pump test (minimum 5 days) until stabilization (less than 1/2 inch variation in 24 hour period at the observation well adjacent to the pumping well);

2) Drawdown and recovery readings taken at all observation wells, and adjacent surface water bodies;

3) Precipitation data (to begin seven (7) days before pump test); and

4) Water quality analyses taken at beginning and end of prolonged pump test.

B. Hydrogeologic Evaluation

1) Evaluate aquifer characteristics, including, but not limited to:

a) effective porosity of aquifer,

b) hydraulic conductivity,

c) aquifer saturated thickness,

d) hydraulic gradient, pumping conditions, non-pumping conditions,

e) hydrogeologic boundaries, pumping conditions, non-pumping conditions,

f) surface water impact, (time of travel fromsurface water to well, percentage of surface water contributing to well discharge, and risk assesment),

g) safe yield, and

h) specific yield.

3.2.4 Methodology for Delineation of Wellhead Protection Areas for Major Wells in Unconsolidated Aquifers

NOTE: A single Wellhead Protection Area shall be delineated for wells that are close together, ie, that have intersecting cones of influence. Protection zones will be merged where their boundaries overlap to form a compound protection zone characterized by lobes. For example, imagine a peanut hull or kidney bean shaped zone for two adjacent wells or a clover leaf shape for three or four wells.

3.2.4.1 For major wells in unconsolidated aquifers, the guide illustrated in Figure 1 shall be used to select from the delineation methodologies described below in sections A, B and C. References pertaining to delineation methods are included in the literature citations beginning on page 49.

A. Analytical Methods

Analytical Methods use mathematical equations to define ground water flow conditions based on various hydrogeologic parameters. Analytical techniques generally assume that aquifer properties are homogeneous and isotropic. Therefore, their use is most appropriate in hydrogeologic settings that approximate these conditions.

B. Two-Dimensional Numerical Analysis

Two-Dimensional Numerical Analysis uses computer models that approximate ground water flow equations numerically. The use of two-dimensional finite-difference or finite-element models can simulate horizontal ground water flow in heterogeneous, anisotropic aquifers under both confined and unconfined conditions. Simulation procedures, illustrated in Figure 2, must be conducted to assure model calibration.

C. Three-Dimensional Numerical Analysis

Three-Dimensional Numerical Analysis uses computer models, or combinations of models, that approximate ground water flow conditions numerically in both the horizontal and vertical directions. Three-dimensional models can simulate vertical variations in geometry and hydraulic property while a two-dimensional model can simulate only horizontal variation.

3.2.5 Delineation of Wellhead Protection Areas for Major Wells in Unconsolidated Aquifers

Using the information and methodology above, the following zones shall be delineated within the Wellhead Protection Area. These zones shall be determined on a copy of the town tax map(s). The Wellhead Protection Area boundaries shall be transferred to a map of 1:24,000 scale or larger for presentation purposes. Both the tax map(s) and topographic map shall be submitted to the Department of Human Services for approval. The tax map(s) will be returned to the Public Water System for implementation purposes.

A. Zone 1

Zone 1 is the area from the well to the 200 day time-of-travel boundary.

B. Zone 2

Zone 2 is the area between the 200 day time-of-travel boundary and the 2500 day time-of-travel boundary.

C. Zone 3

Zone 3 is the area between the 2500 day time-of-travel boundary and the ground water divides (the topographic limits of the drainage basin) of the watershed.

3.3 Delineation for Minor Wells in Unconsolidated Aquifers and for Wells in Bedrock Aquifers

3.3.1 Criteria for Minor Wells in Unconsolidated Aquifers and Wells in Bedrock Aquifers

The primary criterion used to delineate Wellhead Protection Areas for minor wells in unconsolidated aquifers and wells in bedrock aquifers is distance from the wellhead. The reasons are as follows:

A. Hydrogeologic

Most bedrock wells derive ground water recharge through fractures. Fracture systems are difficult to identify and map, and are consequently difficult to evaluate.

The US Environmental Protection Agency is currently researching new techniques for delineating bedrock aquifers. When this information becomes available, the criteria presently used to determine protection zone distances and thresholds will be reevaluated.

Until suitable methods are developed for delineating Wellhead Protection Areas around bedrock wells, the Protection Zones for a

bedrock well shall be a circle having a fixed radius of 300 feet for Zone 1 and 1000 feet for Zone 2. Zone 3 is the remainder of the watershed. (See Section 3.3.2 - Thresholds).

B. Economic

The costs of a hydrogeologic evaluation would be difficult for most small Public Water Systems to finance. Most Public Water Systems that use bedrock wells typically serve small populations due to generally lower ground water yields from such wells. As explained in Section 1.3, Applicability, small or minor water systems are defined as those systems that provide water to fewer than 500 persons.

3.3.2 Thresholds for Minor Wells in Unconsolidated Aquifers and Wells in Bedrock Aquifers

Threshold values for the delineation criterion (distance) shall be used to delineate zones within a wellhead protection area as follows:

A. Zone 1.

The contributing area defined by a 300 foot radius circle with the well at the center of the circle shall delineate Zone 1. This arbitrary radius was developed primarily as a setback from septic system leach fields. It has been widely used in Maine and has usually been effective in preventing contamination by pathogens and nitrates.

New activities that have the potential to pollute ground water (see Appendix 1) shall be prohibited from this zone. Previously existing activities in this zone that have the potential to pollute ground water shall be individually evaluated and strictly controlled or mitigated as is necessary to protect water quality.

B. Zone 2.

The outer boundary of Zone 2 shall be delineated by a 1000 foot radius circle with the well at the center of the circle. Zone 2 shall be defined as the contributing area between this boundary and the 300 foot boundary of Zone 1.

The 1000 foot distance is also somewhat arbitrary, selected because of the results of the few intensive bedrock aquifer evaluations in Maine. The thresholds will be reevaluated as more information becomes available on wellhead protection in bedrock settings.

Activities that have the potential to pollute ground water shall be strictly controlled within this zone. Prohibition of certain new activities in this zone may be warranted when strict controls are considered to be inadequate.

C. Zone 3.

The area from the 1000 foot boundary of Zone 2 to the ground water divides* for the watershed shall define Zone 3 of the Wellhead Protection Area. The basis for using ground water divides as the outermost boundary of Zone 3 is that no contaminant from outside these boundaries will affect the well.

* The ground water divides for a watershed are expected to closely approximate the topographic boundaries of the drainage basin of the watershed. Consequently, the terms watershed and drainage basin, as used here, are considered to be interchangeable.

All local and state controls (laws, rules, regulations, etc.) shall apply to activities having the potential to pollute ground water within this zone. Consideration should be given to siting, outside of the Wellhead Protection Area, any new activities that have a potential to pollute the ground water.

3.3.3 Methodology for Delineation of Wellhead Protection Area Boundaries for Minor Wells in Unconsolidated Aquifers and Wells in Bedrock Aquifers

The zone boundaries shall be delineated by creating:

a) a fixed radius circle of 300 foot radius with the well at the center of the circle for the Zone 1 outer boundary;

b) a fixed radius circle of 1000 foot radius with the well at the center of the circle for the Zone 2 outer boundary;

c) a boundary consisting of the ground water divides for the watershed for the Zone 3 outer boundary.

3.3.4 Delineation of Wellhead Protection Areas for Minor Wells in Unconsolidated Aquifers and Wells in Bedrock Aquifers

Using the information and methodology above, the zones listed below shall be delineated. These zones shall be depicted on a copy of the town tax map(s). The tax map(s) shall be submitted to the Department of Human Services for approval. The tax map(s) will be returned to the Public Water System for implementation purposes. Copies shall be distributed by the Department of Human Services to appropriate state agencies and municipal governments.

A. Zone 1:

Zone 1 is the area between the well and the 300 foot radius circle.

B. Zone 2:

Zone 2 is the area between the 300 foot radius circle and the 1000 foot radius circle.

C. Zone 3:

Zone 3 is the area between the 1000 foot radius circle and the ground water divides of the watershed.

4. INVENTORY OF ACTIVITIES AND SOURCES

4.1 Purpose

Many operations and land use activities have the potential to contaminate ground water or affect ground water quantity. Appendix 1 contains a list of activities occurring in Maine that can contaminate ground water. To effectively protect public ground water supplies, these activities must be identified.

4.2 Scope of Inventories

The Wellhead Protection Area inventory should identify, locate, and map, at a minimum, the following:

A. Past, present and proposed operations that represent a potential source of ground water contamination (see Appendix 1).

B. Ground water withdrawals.

C. Local land use zoning designations.

The following two references provide suitable methodologies to inventory potential contamination sources:

1) Ground water Quality: A Handbook for Community Action, Maine Association of Conservation Commissions (1986), and

2) The Planning Process for Local Ground Water Protection, State Planning Office (1988)

Appendix 3 contains sample forms that may be used for the inventory.

A basic threat inventory can be established by reviewing printed materials that indicate the location of current, past and proposed sources of potential contamination (including areas of naturally occurring poor water quality and saltwater intrusion). This material may include telephone directories, yellow pages, business records (such as fuel oil delivery services), state and municipal and county records and permit files, historic records, and news articles. Interviews with long-term residents are often helpful. Finally, field inspections (initial automobile

surveys) should be conducted and a personal canvas of identified potential sources of contamination should be conducted to obtain necessary information. Contact information for state information sources is listed in The Planning Process for Local Ground Water Protection.

4.3 Administrative Procedures

The following inventories shall be conducted to assess potential sources of ground water contamination in Wellhead Protection Areas.

4.3.1 Initial Inventory

After the recharge area for a new ground water source has been identified and mapped, a preliminary (reconnaissance level) inventory should be conducted for the entire area. The primary concern at this point is to locate and identify any significant sources of ground water contamination that may be located in the watershed, especially any contaminant sources, (e.g., old landfills, hazardous waste sites or industrial complexes) that cannot be sufficiently managed to ensure the safety of the water supply. If such threats are present in the watershed, relocation of the proposed well site to an area outside of the original watershed may be warranted.

4.3.2 Detailed Inventory

After the final Wellhead Protection Areas are delineated, a detailed inventory of potential sources of ground water contamination shall be established. This inventory shall be presented on the same maps as those used for the protection zone delineations. Activity code numbers in Appendix 1 are recommended on maps in identifying potential sources of contamination. This code key shall appear on the maps. This information provides a data base for the Management Plan detailed in Section 5.

4.3.3 Revision of Inventory

Whenever new or additional information is available or increased sources of potential contamination suspected, the inventory shall be updated to be as accurate as possible. The inventory also shall be reviewed and formally updated at least every five years, as specified in the Management Plan (Section 5.2.4).

Municipal officials responsible for permitting and compliance evaluation shall notify the public water system of any new or additional information pertinent to the inventory. The public water system is responsible for the continual updating of the inventory based on information received from municipal officials, private citizens or generated by its own personnel. The public water system shall notify the Department of Human Services, Drinking Water Program of any new inventory information.

5. MANAGEMENT PLAN FOR POTENTIAL CONTAMINATION SOURCES

5.1 Purpose

A Management Plan shall be developed by major public water systems, as specified in Section 1.3, and in cooperation with the municipality(ies) in which the Wellhead Protection Area is located. The Management Plan shall detail the risk(s) associated with identified sources of contamination and select from management options a method to eliminate or minimize the risk associated with each potential contaminant source. General categories of risk are listed in Appendix 1 along with specific activities that exhibit those risks. Assistance in developing Management Plans is available through the Regional Planning Commissions or from private consultants.

Municipal governments are authorized to govern surface land uses that overlay ground water aquifers, especially those aquifers that are used as sources of public drinking water (22 MRSA 2642). Municipal governments also are required to enact ordinances to protect and conserve the quality and quantity of ground water (Planning and Land Use Regulation Act, 30-A MRSA 4300 Series).

5.2 Requirements for Management Plan

5.2.1 Wellhead Protection Area Notification Process

The owner/operator of each potential source of contamination in the delineated Wellhead Protection Area shall be officially notified by the public water system in writing following the final Department of Human Services approval of the Wellhead Protection Plan. The notice shall identify the zone in which the activity resides and contain the following basic explanation of minimum goals:

A. Zone 1:

New activities shall be prohibited by the municipal government in this zone. Existing activities shall be strictly controlled.

B. Zone 2:

New and existing activities in this zone may be required by the municipal government to adopt protection requirements more strict than current state laws, rules, and regulations.

C. Zone 3:

New and existing activities in this zone shall comply with all current basic state and local protection requirements. Consideration should be given to siting new activities outside the Wellhead Protection Area, where possible.

The notice should supply a telephone number where further information may be obtained. Risks associated with the activity should be stated. The notice should request notification by the activity to the public water system and the Department of Human Services of any known or suspected discharge. The notice should inform the activity owner/operator of compliance evaluation inspections to be expected (see Section 5.2.3).

5.2.2 Potential Contamination Source Management Programs

A detailed management program for each type of facility shall be described. Potential Contamination Sources are managed according to the zone in which they are located.

5.2.2.1 Zone 1 Management.

Zone 1 is the most critical management zone. Contamination, if it occurs in this zone, will enter the public water system very quickly. Little reaction time exists; little time for remediation is available. The management objective for this zone, therefore, is to exclude potential contamination sources. Due to the limited extent of Zone 1 this is practicable.

Zone 1 may be protected best by public water system or municipality purchase and ownership. An Aquifer Overlay Protection District may be used to protect this, and other, zone(s). Passive uses, such as parks and non-commercial private woodlots, may be permissible. All potential contamination sources, including single family residential units, are incompatible with the protection of Zone 1 areas.

Existing non-conforming facilities (Appendix 1), and activities associated with these facilities, should be individually evaluated and either monitored, mitigated, strictly controlled or prohibited as is necessary to protect ground water quality. Requirements should render the activity as safe as possible to protect the public health

(see Appendix 2). Voluntary deed restrictions and protective covenants may be negotiated for privately owned lands. Tax reductions and other incentives may be useful in attaining the protection objectives of this zone.

5.2.2.2 Zone 2 Management

Zone 2 is an area in which management objectives, due to the proximity to the well, should be as protective as feasible. Because Zone 2 can encompass an extensive area, the comprehensiveness of protection methods should be tempered by the location of Potential Contamination Sources in Zone 2 in relation to the wellhead. In areas close to the Zone 1 border, prohibition of new facilities of certain types of activities should be considered. Toward the outer limits of Zone 2, control measures more applicable in Zone 3 may be satisfactory. Protection methods that are stricter than current state laws, rules and regulations may be necessary to protect the public health. Municipalities have the authority to enact and adopt such protection methods (22 MRSA 2642, 30-A MRSA 4300 Series). Suitable protection methods for Zone 2 are contained in Appendix 2.

5.2.2.3 Zone 3 Management

Zone 3 management objectives are consistent with state programs for the protection of ground water. Municipal officers responsible for compliance evaluation should be thoroughly familiar with state protection programs. Municipal boards are responsible for review and permitting of approximately 80% of new construction and modification occurring in the state. Municipal government is, therefore, the only insurance that these facilities are designed and built properly. New activities with the potential to pollute ground water should be sited outside the Wellhead Protection Area, wherever possible.

5.2.2.4 Management Program Requirements

The Management Program shall describe the following:

a) The activity type, in the order presented (1-57) in Appendix 1.

b) The type of risk(s) (Appendix 1, Risks 1-7) associated with the activity type.

c) By zone, the name and location of each activity. A code (Appendix 1) should be assigned to each activity.

d) By zone, the management method chosen for each associated risk of each activity type. If different management methods are selected for an activity type, the individual code(s) of the affected activity(s) should be included with the different management methods.

e) A compilation of local ordinances, rules, and regulatory programs that provide authority for each management method. If new authority or instruments must be secured or negotiated to attain management objectives, they shall be detailed and an estimate of required time shall be supplied. The responsible board/ person/agency shall be noted. Those responsible shall notify the public water system of any new activities or changes in the Wellhead Protection Area.

5.2.3 Compliance Evaluation and Enforcement Procedures

A program that ensures compliance by activities in the Wellhead Protection Area shall be specified. Usually such a compliance program will require periodic inspections. Inspection periods may be based on the zone in which activities are located (more frequent inspections being required in Zone 1 for example), or the type of activity, or the degree of health threat associated with a type of risk.

The Compliance Evaluation Program should specify the person or position responsible for compliance evaluation and enforcement for each activity type and the inspection/reporting frequency. Those responsible shall notify the public water system of any evaluation and any non-compliance found. The public water system in turn shall notify the Department of Human Services, Drinking Water Program. The Program description should reference the risk(s) associated with each activity type (5.2.2.4b). A detailed inspection procedure and check list for each activity type shall be presented.

The Department of Human Services will evaluate public water system and municipal compliance during triennial sanitary surveys by reviewing municipal files documenting permitting activities, regularly scheduled compliance evaluation inspections, and enforcement actions, and public water system files documenting municipal notification to the water system and water system notification to the Department of Human Services.

5.2.4 Management Plan Review and Modification

The public water system is responsible for continual updating of information received from municipal officials and activities pertinent to the Management Plan. The Management Plan shall specify an interval, five years maximum, for formal review and modification of the Management Plan; the responsible party(s) who will conduct the review; and the requirements for submitting modifications of the Management Plan to the Department of Human Services and the Department of Economic and Community Development for review.

6. CONTINGENCY PLAN

6.1 Purpose

A Contingency Plan shall be developed by major public water systems, as identified in Section 1.3, in cooperation with affected municipalities and the Department of Human Services. The Contingency Plan will be a component of the individual Wellhead Protection Plan. The Contingency Plan will detail emergency procedures and alternative water sources to be used if service is interrupted or curtailed due to water quality or water quantity problems. The Contingency Plan also will address long-range water supply needs by identifying and designating future sources of water supply, developing a schedule for incorporation of those water supplies into the water system, and identifying specific authority to protect designated future water supplies by processes described in the Management Plan. If in identifying long range water supplies it is necessary to conduct a hydrologic study to identify and delineate that supply, the costs of that study shall be borne jointly by the Public Water System and the municipality of concern.

6.2 Requirements for Contingency Plan

6.2.1 Introduction

The introduction will detail:

a) The purpose of the Contingency Plan and its relationship to the individual Wellhead Protection Plan.

b) How and by whom the contingency plan was developed.

c) The relationship of this contingency plan to other federal, state and local plans with special reference to the Safe Drinking Water Act and the Superfund Amendments and Reauthorization Act Title III (see References, page 47, for SARA Title III and related literature citations), Department of Environmental Protection and the Department of Human

Services State Emergency Response Plans, Maine Emergency Management Agency State Disaster Response Plan, municipal Comprehensive Plans, municipal Capital Improvement Plans, and other local plans.

6.2.2 Water Supply Disruption Response Procedures

6.2.2.1 Aquifer Contamination

This section will detail responses that minimize aquifer contamination events. Potential contamination events should include those possibly due to the potential contamination sources described in Section 4.

This section will detail:

a) State, local government, and public water system responsibilities for evaluation of monitoring, testing, and inspections carried out as part of the Management Plan for Potential Contamination Sources described in Section 5.2.3 of the State Wellhead Protection Program.

b) A description of State and local action levels (degree of contamination or quantity of contaminant that will initiate some specific action) for use in classifying incidents.

c) A chart or matrix showing State and local responsibilities (Who's in charge?) during various types and phases of contamination events.

Phases should include:

1) additional monitoring and testing,

2) contamination event verification,

3) assessment of potential health threat,

4) notification, public communication, community relations,

5) public water system emergency/short term containment and cleanup,

6) local government emergency/short term containment and cleanup,

7) State emergency/short term containment and cleanup,

8) provisions for emergency water supplies,

9) long term monitoring and testing,

10) long term containment, remediation, and cleanup.

d) A chart or matrix showing public water system, local government, and state equipment and capabilities available during a contamination event.

This should include:

1) monitoring and testing equipment,

2) laboratory analysis,

3) technical assistance,

4) communication equipment,

5) containment equipment,

6) cleanup equipment,

7) emergency water supply equipment.

e) A public water system chain-of-command.

f) A notification roster of contact names and telephone numbers.

g) A sample media notification release.

h) A sample boil order.

i) A sample stop use order.

6.2.2.2 Non-contamination Interruption of Service

This section will detail responses to water shortage events that minimize the duration of interruption. Water shortage events may be caused by drought, seasonal overuse, equipment failure, power outages, and other accidents.

This section will detail:

a) A definition of water shortage including action levels that will initiate conservation and/or restoration.

b) State, local government, and public water system responsibilities for declaring a water shortage or interruption of service.

c) A chart or matrix showing State and local responsibilities (who's in charge?) during various types and phases of water shortage events.

Phases should include:

1) notification, public communication, community relations,

2) public water system emergency/short term restoration action,

3) local government emergency/short term restoration action,

4) State emergency/short term restoration action,

5) provision of emergency water supplies,

6) long term restoration action.

d) A chart or matrix showing public water system, local government, and state equipment and capabilities available during a water shortage event.

This should include:

1) designated alternative water supplies,

2) emergency water supply equipment,

3) replacement equipment,

4) technical assistance,

5) communication equipment.

e) A schedule of conservation measures to be taken.

f) A public water system chain-of-command (repeat or reference section 6.2.2.1).

g) A notification roster of contact names and telephone numbers.

h) A sample media notification release.

6.2.3 Long-Range Water Supply Expansion

This section will address long-range water supply needs by identifying and designating future sources of water supply, developing a schedule for incorporation of those water supplies into the water system, and identifying specific authority to protect designated future water supplies by processes described in the Management Plan.

This section will detail:

a) A summary description of watershed usage.

b) A schematic or map of the public water system boundaries and the water supply system including wellheads, wellhead protection areas, water lines, pumps, valves, hydrants, storage facilities, treatment facilities, and interconnections with other systems.

c) An estimate of the quantity of water available from currently connected sources.

d) A description of consumption showing seasonal variations, distribution among specific uses, community priorities of uses, and projected future demand for the next 5, 10, 15, and 20 years.

e) Identification of the amounts of water supply shortage to be expected over the next 20 years.

f) Identification of additional water supplies that will meet future needs. Conservation measures and development of regional water supplies should be considered.

g) Identification of the specific municipal action and authority taken to protect designated future water supplies.

h) Reference to sections of the Management Plan (5.2.2, 5.2.3) that detail a protection program for designated future water supplies.

i) A schedule for incorporation of designated future water supplies into the water system.

j) An estimation of the resources (authority, consulting expenses, capi-

tal expenses) necessary to incorporate designated future water supplies into the water system by the schedule detailed in (i) above.

k) Identification of financial resources available to incorporate designated future water supplies into the water system.

7. NEW WELLS

New well approval is conditioned on the public water system complying with all sections of the State Wellhead Protection Program. Specifically, the appropriate requirements in the following sections shall be followed in the review and approval process for new ground water sources for Public Water Supply systems:

A) Section 3:

Delineation of Wellhead Protection Areas

B) Section 4:

Inventory of Potential Contamination Sources

C) Section 5:

Management Plan for Potential Contamination Sources

Note: Minor systems are exempt from this requirement.

D) Section 6:

Contingency Plan

Note: Minor systems are exempt from this requirement.

The location of well sites for new public water supply wells must be reviewed and given initial approval by the Division of Health Engineering prior to installation of the well. In addition to well site approval, water quality must meet State and the U.S. Environmental Protection Agency Drinking Water Standards prior to the delivery of water to consumers. Treatment, such as filtration or iron removal, may be necessary to meet Drinking Water Standards. Department of Human Services approval of new wells will depend on the ability of those responsible (municipalities, public water suppliers, state agencies) to provide the highest degree of reliable control possible. The Department of Human Services policy is to deny permission for new wells to be put into service if this cannot be accomplished.

8. PUBLIC PARTICIPATION

8.1 State Wellhead Protection Program Development

8.1.1 State Wellhead Protection Program - Development Work Group

On October 6, 1986, the Governor designated the Ground Water Standing Committee as the development agent for the State Wellhead Protection Plan and the Department of Human Services as the implementing agency for the Plan. The Ground Water Standing Committee convened a Work Group, chaired by representatives of both designees, to develop the Plan. The Work Group consisted of representatives of the Departments of Human Services, Environmental Protection, and Conservation (Maine Geological Survey), the State Planning Office, the U.S. Geological Survey, the Maine Water Utilities Association, The Maine Rural Water Association, the Maine Municipal Association, and the Maine Association of Regional Councils. The diverse public interests represented in this work group ensured a significant public interest input.

8.1.2 State Wellhead Protection Program - Public and Legislative Review and Involvement

The following steps comprise the public participation process for the State Wellhead Protection Program:

a) Thirty-day public comment period:

1) State wide newspaper announcements;

b) State Ground Water Standing Committee review and comment;

c) State Land and Water Resources Council review and comment;

d) Governor's review and comment;

e) Modification of pertinent statutes (including the Comprehensive Planning and Land Use Regulation Law, the Site Review of Development Law, and others) to implement the Wellhead Protection Plan;

f) Legislative committee public hearing.

At each step listed above, review and comment by the public as well as suggestions from specific groups, are requested and encouraged. These have been and will be incorporated into the plan wherever possible. This active and open public participation will enhance acceptance and success of the plan.

8.1.3 State Wellhead Protection Program - Department of Human Services Implementation by Rule

After the above developmental and review procedures, the Department of Human Services will implement the State Wellhead Protection Program through the Adoption by Rule process according to the State of Maine Administrative Procedures Act. This process will involve legal review, public notice, public hearing, public comment period and state response.

8.1.4 State Wellhead Protection Program - Cooperation with Canada and New Hampshire

Adjacent Canadian provinces (Quebec and New Brunswick) and other New England states will be sent copies of the State Wellhead Protection Program for review and comment.

Once Wellhead Protection Areas are delineated and Wellhead Protection Plans drafted in border areas, the Department of Human Services will consult with appropriate provincial, state and municipal officials in Canada and New Hampshire where appropriate to secure cooperation and coordination with individual Wellhead Protection Plans for these governments.

8.2 Individual or Local Wellhead Protection Plans

8.2.1 Individual Wellhead Protection Plans - Development

Individual Wellhead Protection Plans are developed by each public water system in cooperation with the pertinent municipality(s). The Wellhead Protection Plan encourages participation of local interest groups such as commercial and industrial interests and environmental groups. The individual Wellhead Protection Plan encourages public information through newspaper articles, town meetings, and presentations to interest groups. Owners of potential sources of contamination will be interviewed in the inventory process and notified of their inclusion in the Management Plan.

The individual Wellhead Protection Plan must be submitted by public water system and municipal officers jointly to a public hearing and comment process upon its completion in each municipality mentioned in the Wellhead Protection Plan. These officers shall provide a written record of responses that address comments

received. The Wellhead Protection Plan is subsequently submitted, with public comments, to the Department of Human Services for initial review. The Department of Human Services shall attempt to address or have the above noted officers address public comment it determines has not been satisfactorily addressed.

8.2.2 Individual Wellhead Protection Plans - Review and Approval

Individual Wellhead Protection Plans will receive initial review by the Department of Human Services, final review as part of the community's Comprehensive Plan by the Department of Economic and Community Development, and final approval by the Department of Human Services as detailed in Section 9.2.4. Any plan alteration of a significant nature will require another public hearing and comment period by the public water system and municipal officers jointly in each municipality mentioned in the individual Wellhead Protection Plan.

Upon final approval, the public water system is required to distribute a map of the Wellhead Protection Area, that identifies protection zones and potential sources of contamination, to public representatives such as the planning board, zoning board, board of selectmen, health officer, and regional planning commission. The map is to be printed in a local newspaper for public information and a flier explaining the individual Wellhead Protection Plan is to be inserted in water bills.

8.2.3 Individual Wellhead Protection Plans - Implementation

Municipal governments and the public water system shall implement those parts of the individual Wellhead Protection Plan designated by the municipalities and approved by the Department of Human Services within twelve (12) months of final approval by the Department of Human Services. This process generally requires submission to the voting public at town meeting or town council, where all views have an opportunity to be heard. The public, then, implements the individual Wellhead Protection Plan.

8.2.4 Individual Wellhead Protection Plans - Periodic Review and Modification;

Each individual Wellhead Protection Plan will be reviewed at least every five years and modified as necessary. The modification of a Wellhead Protection Plan will follow the public processes outlined in sections 8.2.1, 8.2.2, and 8.2.3.

9. STATE WELLHEAD PROTECTION PROGRAM - ADMINISTRATION AND SCHEDULE

9.1 Coordination with the Comprehensive Planning and Land Use Regulation Act

The Growth Management Program, established by the Comprehensive Planning and Land Use Regulation Act, Title 30A, Section 4301, provides a vehicle for incorporating individual or local Wellhead Protection Plans into municipal strategies for managing growth. The State Wellhead Protection Program will be coordinated with the Growth Management Program in three areas:

1) technical assistance;

2) schedules for the development and submission of local wellhead protection plans and,

3) review of individual Wellhead Protection Plans.

9.1.1 Technical Assistance

The success of the State Wellhead Protection Program will depend on technical assistance provided to municipal governments on understanding the need for individual Wellhead Protection Plans and how these plans can be integrated into their comprehensive plans and zoning ordinances. The Office of Comprehensive Planning provides funds to Maine's 11 regional councils to provide technical assistance on planning and land use issues. A similar program should be established for the State Wellhead Protection Program. The Office of Comprehensive Planning will work with the Department of Human Services to develop and administer a technical assistance program with the regional councils.

9.1.2 Coordination of Local Planning Efforts

The development and submission of Wellhead Protection Plans will be done to coincide with the schedule for submission of comprehensive plans and zoning ordinances for the Growth Management Program. Because the communities in the First and Second Tier have already begun their planning process, this coordination will start with the Third Tier towns. The Department of Human Services and the Office of Comprehensive Planning will assist any First and Second Tier Community interested in developing a Wellhead Protection Plan. The schedule for submission of comprehensive municipal plans and zoning ordinances is as follows:

Submission of Comprehensive Plans to the Office of Comprehensive Planning:

a) First Tier Communities July 1996

b) Second Tier Communities July 1998

c) Third Tier Communities July 1994

Submission of Zoning Ordinances to the Office of

Comprehensive Planning:

a) Zoning ordinances that implement comprehensive plans will be submitted for review 12 months following submittal of the comprehensive plan.

9.2 Individual Wellhead Protection Plan Submissions

9.2.1 Individual Wellhead Protection Plans - Development Schedule

Within six (6) months of the effective date of the State Wellhead Protection Program, each public water system will submit to the Department of Human Services, Drinking Water Program an individual Wellhead Protection Plan Development Schedule. The Department of Human Services will evaluate the Development Schedule, in cooperation with the Department of Economic and Community Development and approve or require changes, based on:

a) the technical and financial capabilities of the public water system,

b) an evaluation of the extent of the potential and existing threats to the water supply, and

c) the status and schedule of comprehensive planning in the affected municipalities (See Section 9.1.2)

Each Development Schedule will specify the date for public water system submission of the local Wellhead Protection Plan to the Department of Human Services and the Department of Economic and Community Development and will project milestone dates in the development of the individual Wellhead Protection Plan.

Milestones should include:

a) Formation of a local Wellhead Protection Plan development committee or work group,

b) Completion of the Initial Evaluation and Initial Inventory of Potential Contaminant Sources,

c) Completion of the Pump Test (for major and new wells),

d) Completion of the Wellhead Protection Area delineation (Sec. 3),

e) Completion of the Detailed Inventory (Sec. 4),

f) Completion of the Management Plan (Sec. 5),

g) Completion of the Contingency Plan (Sec. 6), and

h) Completion of the Public Hearing (Sec. 8.2.1).

9.2.2 Individual Wellhead Protection Plans - Development Stages

Development stages for individual Wellhead Protection Plans are described in the following sections of this document:

a) Section 3:

Delineation of Wellhead Protection Areas

b) Section 4:

Inventory of Potential Contamination Sources

c) Section 5:

Management Plan for Potential Contamination Sources

d) Section 6:

Contingency Plan

Public water systems and municipal officers are encouraged to engage the public and local interest groups in this process to the maximum extent possible. Significant input is likely from municipal officers and board members, commercial and industrial interests, code enforcement and safety officers, and environmental groups. The public should be informed of progress throughout the process through newspaper articles, town meetings, and group presentations. In this way support for the program is built.

Upon its completion, and prior to submittal for review to the Department of Economic and Community Development as part of a Comprehensive Plan, each local Wellhead Protection Plan will be submitted by public water system and municipal officers jointly to a public hearing and comment process in each community listed in the State Wellhead Protection Program.

9.2.3 Individual Wellhead Protection Plans - Submission Process to the Department of Human Services

Submissions to the Department of Human Services will occur in four stages.

9.2.3.1 Stage One

An individual Wellhead Protection Plan Development Schedule will be submitted to the Department of Human Services for approval within six (6) months of the effective date of the State Wellhead Protection Program. Submission requirements are detailed in Section 9.2.1.

9.2.3.2 Stage Two

Preliminary delineations, site information and initial inventories of potential contaminant sources will be completed and submitted to the Department of Human Services for approval. For minor public water systems, approved delineations and detailed inventories of potential contaminant sources for Protection Zones 1 and 2 will be submitted to the appropriate municipality(ies) for inclusion and implementation in the local Comprehensive Plan. For major systems and new wells, Stages Three and Four also are required.

9.2.3.3 Stage Three

Pump Tests, Hydrogeologic Evaluations and Wellhead Protection Area Delineations will be required for all major public water systems and all new well proposals. These will be submitted to the Department of Human Services for approval prior to further work on the local Wellhead Protection Plan. Submission requirements are detailed in Section 3.

9.2.3.4 Stage Four

Individual Wellhead Protection Plans will be submitted to the Department of Human Services for initial review. Submission requirements include delineation, inventory, management plan, contingency plan and results of public hearing.

Reports for each submittal shall address all items specified in the appropriate section(s) of the local Wellhead Protection Plan. The Department of Human Services approval will be based on the hydrogeologic and engineering accuracy of the work performed and the validity of any assumptions used in aquifer evaluation. Each public water system shall submit the local Wellhead Protection Plan, with public comments, to the Maine Department of Human Services, Bureau of Health, Drinking Water Program. Department of Human Services personnel will provide initial review of the local Wellhead Protection Plan for completeness and fulfillment of program objectives. The Department of Human Services, within sixty (60) days of submission, will either:

1) authorize the submission of the individual Wellhead Protection Plan to the Department of Economic and Community Development, as a part of the Comprehensive Municipal Plan, or

2) state additional requirements in writing to public water system and municipal officers.

Department of Human Services personnel will make themselves available for direct consultation with public water system and municipal officers concerning additional requirements. The public water system will respond to additional requirements within 120 days. If, in the estimation of the Department of Human Service, significant changes have been made by additional requirements, a new public hearing and comment process will be completed by public water system and municipal officers jointly. The revised local Wellhead Protection Plan with public comment will be resubmitted to the Department of Human Services for review.

9.2.4 Individual Wellhead Protection Plans - Submission Process to the Department of Economic and Community Development

Following initial review by the Department of Human Services, the completed Wellhead Protection Plan will be forwarded as part of the municipal Comprehensive Plan to the Department of Economic and Community Development.

During the review of comprehensive plans by the Department of Economic and Community Development, as required by law, that agency will determine if the completed Wellhead Protection Plan has been integrated into the municipal strategy for managing growth. The Department of Economic and Community Development will ensure that the Wellhead Protection Plan is consistent with the designation of growth and rural areas. Upon final review by the Department of Economic and Community Development, the Department of Human Services will be notified of the compatibility of the completed Wellhead Protection Plan with the Comprehensive Municipal Plan. The Department of Human Services will then notify the individual Public Water System of concern.

NOTE: If the water utility has not developed a protection plan, then the town is not responsible for doing so.

Upon final approval, the major public water systems shall distribute to

the local planning board, zoning board, board of selectmen, health officer, and regional planning commission a Wellhead Protection map that identifies protection zones and potential sources of contamination. This map shall be printed in a local newspaper. A mailing shall be sent to all customers, residents, and affected activities to explain the Wellhead Protection Plan.

Eighteen months after the submission of a comprehensive plan, each municipality must submit their zoning ordinance to the Department of Economic and Community Development for review. The zoning ordinance will be reviewed to determine if provisions implementing the local Wellhead Protection Plan are included.

9.2.5 Individual Wellhead Protection Plans - Implementation

Municipal governments and public water systems listed in the State Wellhead Protection Program shall insure implementation of the local Wellhead Protection Plan within twelve (12) months of final approval. This schedule should allow sufficient time for developing or revising ordinances and adoption by the town.

Municipal governments shall notify the public water system, the Department of Human Services, Drinking Water Program, and the Department of Economic and Community Development within thirty (30) days of the implementation of any provisions of the local Wellhead Protection Plan.

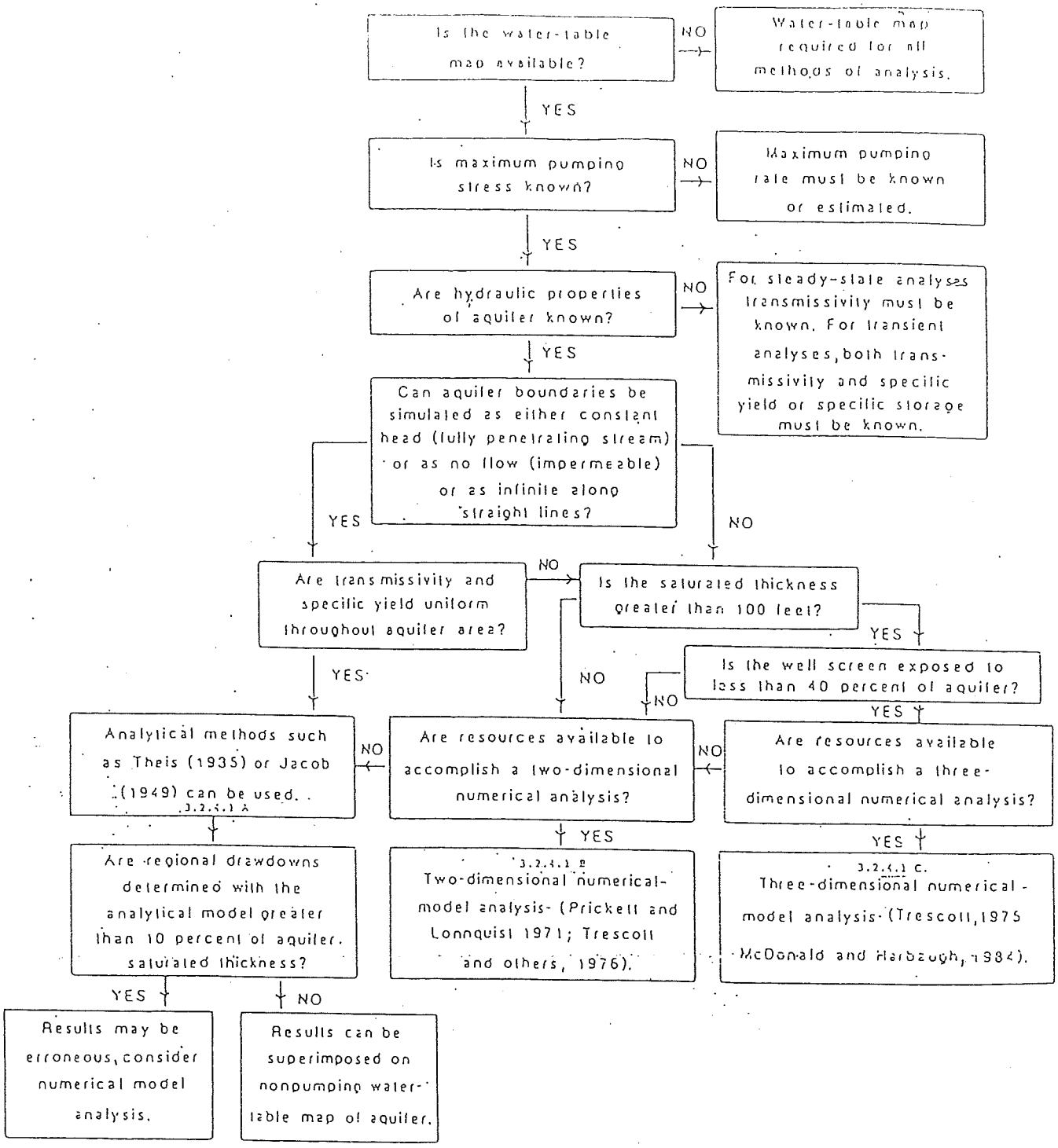
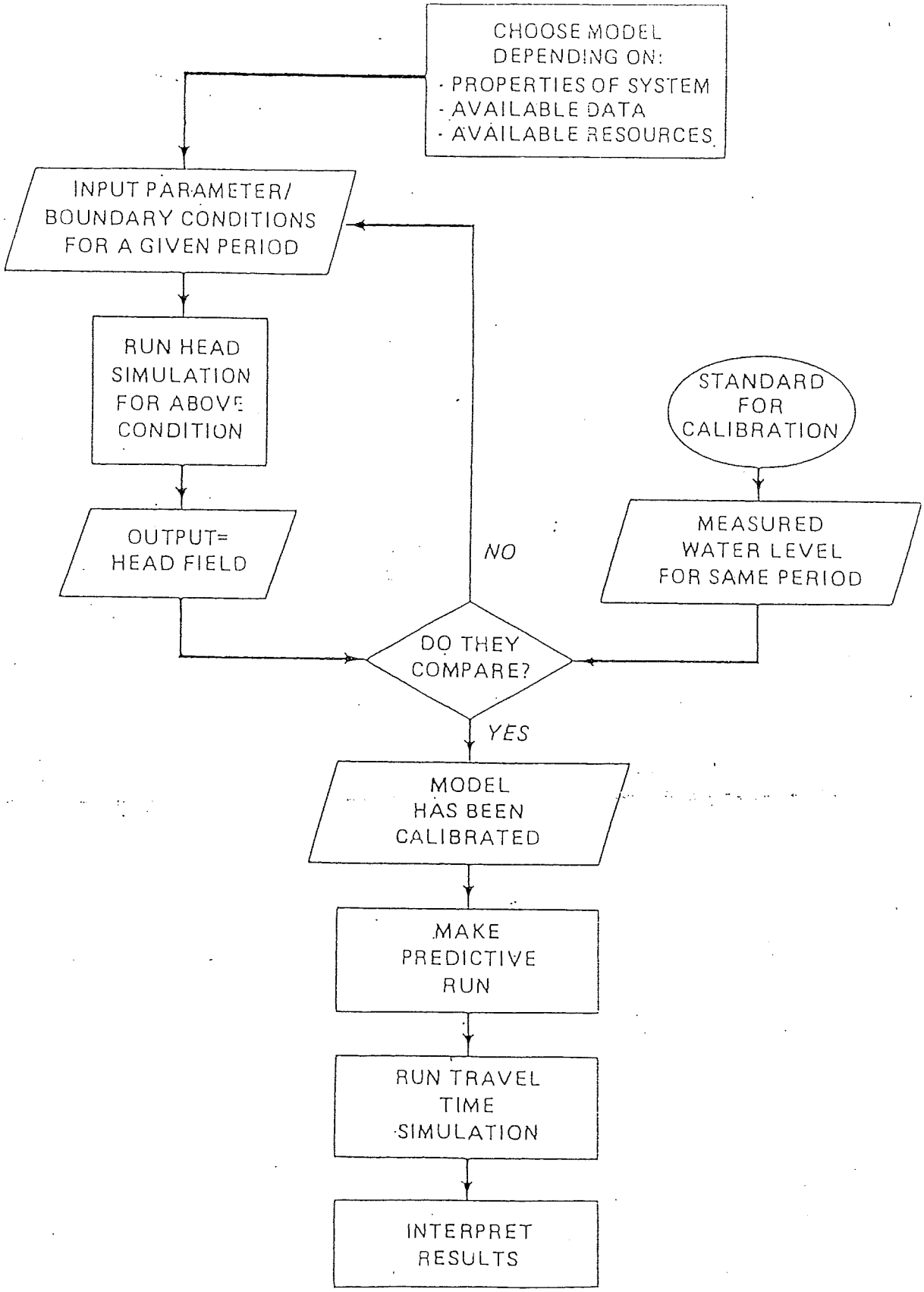


Figure 1: Guide for selecting a hydraulic method of analysis to estimate the contributing area of a well in an unconfined stratified-drift, river-valley aquifer.

(Morrissey, USGS, 'Estimation of the Recharge Area Contributing Water to a Pumped Well in a Glacial-Drift, River - Valley Aquifer', 1987)

Figure 2

Simulation Procedure Used in WHPA Delineation with Numerical Modeling



(EPA, "Guidelines for Delineation of Wellhead Protection Areas, 1987)

Table I - Basic Requirements for Community Water Systems

Unconsolidated Aquifers - Gravel Packed Wells		
Requirements	Major Systems	Minor Systems
Boundary Delineation		
Zone 1	200 Days Time of Travel	300 foot Radial Circle
Zone 2	2500 Days Time of Travel	1,000 foot Radial Circle
Zone 3	Watershed	Watershed
Contaminant Sources Inventory and Map	Zones 1, 2, and 3#	Zones 1 and 2
ManagementPlan	Required	Exempt
Contingency Plan	Required	Exempt

Consolidated Aquifers - Bedrock Wells, All Others		
Requirements	Major Systems	Minor Systems
Boundary Delineation		
Zone 1	300 foot Radial Circle	300 foot Radial Circle
Zone 2	1,000 foot Radial Circle	1,000 foot Radial Circle
Zone 3	Watershed	Watershed
Contaminant Sources Inventory and Map	Zones 1, 2,#	Zones 1 and 2
ManagementPlan	Required	Exempt
Contingency Plan	Required	Exempt

See Sections 4.3.1 and 4.3.2 - Initial & Detailed Inventories

Table II - Basic Requirements for Non-Transient, Non-Community Water Systems

Unconsolidated Aquifers - Gravel Packed Wells		
Requirements	Major Systems	Minor Systems
Boundary Delineation		
Zone 1	200 Days Time of Travel	300 foot Radial Circle
Zone 2	2500 Days Time of Travel	1,000 foot Radial Circle
Zone 3	Watershed	Watershed
Contaminant Source Inventory and Map	Zones 1, 2, and 3#	Zones 1 and 2
ManagementPlan	Required	Exempt
Contingency Plan	Required	Exempt

Consolidated Aquifers-Bedrock Wells, All Others		
Requirements	Major Systems	Minor Systems
Boundary Delineation		
Zone 1	300 foot Radial Circle	300 foot Radial Circle
Zone 2	1,000 foot Radial Circle	1,000 foot Radial Circle
Zone 3	Watershed	Watershed
Contaminant Sources Inventory and Map	Zones 1, 2,#	Zones 1 and 2
ManagementPlan	Required	Exempt
Contingency Plan	Required	Exempt

See Sections 4.3.1 and 4.3.2 - Initial & Detailed Inventories

Table III - Basic Requirements for Transient, Non-Community Water Sytems

Unconsolidated Aquifers - Gravel Packed Wells		
Requirements	Major Systems	Minor Systems
Boundary Delineation		
Zone 1	200 Days Time of Travel	300 foot Radial Circle
Zone 2	2500 Days Time of Travel	1,000 foot Radial Circle
Zone 3	Watershed	Watershed
Contaminant Sources Inventory and Map	Zones 1, 2, and 3#	Zones 1 and 2
ManagementPlan	Required	Exempt
Contingency Plan	Required	Exempt

Consolidated Aquifers - Bedrock Wells, All Others		
Requirements	Major Systems	Minor Systems
Boundary Delineation		
Zone 1	300 foot Radial Circle	300 foot Radial Circle
Zone 2	1,000 foot Radial Circle	1,000 foot Radial Circle
Zone 3	Watershed	Watershed
Contaminant Sources Inventory and Map	Zones 1, 2,#	Zones 1 and 2
ManagementPlan	Required	Exempt
Contingency Plan	Required	Exempt

See Sections 4.3.1 and 4.3.2 - Initial & Detailed Inventories

Table IV - State Information Sources.

Sources of Ground Water Related Information

Agency and Address	Available Services
Maine Geological Survey State House Station 22 Augusta, Me. 04333 (Hydrogeologist) (207-289-2801)	Sand & Gravel Aquifer Maps Significant Sand & Gravel Aquifer Maps Surficial & Bedrock Geology Maps Geological & Hydrological Studies Topographic Maps, Interpretive Services Contamination Information
Department of Environmental Protection (207-289-7688) State House Station 17 Augusta, Me. 04333	
Bureau of Water Quality Control (Hydrogeologist) (207-289-3901)	Protection Planning Assistance Known Contamination Information
Bureau of Oil & Hazardous Materials Control (Hydrogeologist) (207-289-2651)	Known Contamination Information
Bureau of Solid Waste Management Technical Services Division (Hydrogeologist) (207-582-8740)	Known Contamination Information (Landfills, Sewage Disposal Sites)
Department of Human Services Division of Health Engineering State House Station 10 Augusta, Me. 04333 (207-289-3826)	Wellhead Protection Planning Assistance Public Water Supply Information Known Contamination Information
U.S. Geological Survey 26 Ganneston Drive Augusta, Me. 04333 (207-622-8201)	Hydrological Data Topographic Maps Interpretive Services
U.S. Soil Conservation Service USDA Office Building University of Maine Orono, Me. 04469 (207-581-3446)	Soils Maps

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APPENDIX 1

POTENTIAL SOURCES OF CONTAMINATION

Code # Contaminant Source

1. abandoned wells
2. agricultural chemical spreading, spraying
3. agricultural chemical storage
4. airport fire fighter training areas
5. airport fueling areas
6. airport maintenance
7. animal populations, grazing
8. auto chemical supplies wholesalers,
9. auto repair
10. auto washes
11. barnyards
12. beauty salons
13. boat builders, refinishers
14. body shops
15. chemical reclamation
16. concrete, asphalt, tar, coal companies
17. construction sites
18. dry cleaners
19. feed lots
20. fertilized fields, agricultural
21. food processors
22. fuel oil distributors, fuel oil storage
23. furniture strippers
24. gas stations, service stations
25. golf courses, parks
26. graveyards
27. heat treaters, smelters, annealers, descalers
28. heating oil storage (consumptive use)
29. industrial discharges
30. industrial manufacturers
31. industrial waste disposal
32. junk, salvage yards
33. landfills, dumps, transfer stations
34. laundromats
35. machine shops
36. manure piles
37. meat packers, slaughter houses
38. medical, dental, vet offices
39. metal platting retailers
40. municipal wastewater treatment plants
41. nurseries (horticultural activities)
42. oil pipelines
43. painters, finishers
44. pesticide, herbicide, wholesalers, retailers, applicators
45. photo processors
46. printers
47. railroad yards
48. research laboratories
49. residential homes
50. rust proofers areas
51. salt, sand-salt, piles
52. sand and gravel, mining, other mining
53. septic systems, septic waste disposal
54. small engine repair shops
55. snow dumps
56. stormwater run-off/impoundment
57. subdivisions
58. transportation corridors
59. truck terminals
60. wastewater impoundment areas
61. wastewater treatment plants, discharges
62. wood preservers
63. other

Activities and Associated Risk Categories

(Code Numbers from Pages 53 & 54)

1. Septic Systems

8, 10, 12, 16, 19, 21, 22, 25, 27, 31, 32, 34, 35, 36, 40, 42, 43, 45, 46, 47, 50, 53, 55, 57

2. Unsewered Drains/Dry Wells

6, 8, 9, 10, 12, 13, 16, 19, 21, 22, 25, 27, 31, 32, 34, 35, 36, 42, 43, 45, 46, 47, 50, 53, 55, 57

3. Underground Tanks/Piping

5, 13, 20, 22, 26, 27, 39, 44, 46, 53, 55

4. Hazardous Materials Storage

3, 6, 7, 8, 11, 12, 13, 16, 20, 21, 22, 27, 32, 36, 40, 41, 42, 43, 45, 47, 50, 55, 57

5. Hazardous Materials Spills

5, 13, 20, 22, 27, 39, 44, 49, 54, 55, 57

6. Leaching Chemicals

1, 2, 4, 11, 14, 17, 18, 23, 24, 28, 29, 30, 33, 37, 38, 48, 51, 52, 56

7. Urban Runoff/Reduced Recharge

15, 27, 53, 54

APPENDIX 2

ACTIVITY CONCERNS AND MANAGEMENT METHODS

Descriptions in this appendix are intended to familiarize the reader with concerns regarding specific activities that are potential sources of contamination. Appropriate management methods are noted. These management methods are explained in greater detail in the Best Management Practices Manual under development by the Non-Point Source Pollution Control Program (Department of Environmental Protection). Management methods, noted here, are listed in order of increasing protection. Basic management methods are indicated by (B) and typically constitute state requirements that are appropriate for Zone 3. Additional management methods are intended for Zone 2 and non-conforming uses within Zone 1.

General assistance for creating Management Plans, if needed, is available from your local Regional Planning Agency, from the State Office of Community Development, or from private consulting firms.

General risk categories (septic systems, unsewered drains/dry wells, underground tanks/piping, hazardous materials storage, hazardous materials spills, urban runoff/reduced recharge) are discussed first. Specific activities are discussed under the general category leaching due to their diverse nature. The reader is directed to Appendix 1 for activity types falling within each general risk category.

A2.1 Septic Systems

Septic systems are intended to treat typical wastewaters from bathrooms, kitchens, and laundries. Septic systems are not intended to treat chemicals. Septic systems depend on the natural filtering capacity of soils and on beneficial bacteria for treatment. Most chemicals have a negative effect on beneficial bacteria. If bacteria are inhibited, or soil conditions are not suitable, ground water pollution may result.

Septic systems are generally licensed locally by municipal plumbing inspectors under the authority of the Department of Human Services. Larger systems are licensed directly by the Department of Human Services, often in cooperation with the Department of Environmental Protection's site review program. Two comprehensive handbooks on septic systems are available: Site Evaluation for Subsurface Wastewater Disposal Design in Maine (the Department of Human Services, 1987) and Cleaning Up the Water: Private Sewage Disposal in Maine (DEP, 1974).

A2.1.1 -- Residential septic systems

a. Concern: site suitability

Management: site evaluation as specified by State Plumbing Code as performed by licensed evaluator and approved by local plumbing inspector. (B)

b. Concern: density of development

Management: minimum lot sizes determined by mathematical equation and depending on soil types;

OR construct public sewer service.

c. Concern: continued viability of septic systems

Management: municipal septic system management program;

OR construct public sewer service.

A2.1.2 -- Commercial and industrial septic systems (in addition to A2.1.1)

a. Concern: disposal of large volumes of chemicals through septic system

Management: separation of chemical wastes by separators or waste stream segregation and holding tanks pumped on a regular basis by licensed haulers.

A2.2 Unsewered Drains and Dry Wells

a. Concern: disposal of large volumes of chemicals as point discharges

Management: if not sewerable, chemical wastes should be separated from wastewater or segregated and held in holding tanks pumped on a regular basis by licensed haulers. (Extreme caution should be used in allowing chemical waste streams into municipal sewer systems as incompatibility could exist.)

A2.3 Underground Tanks and Piping (all types of chemicals)

a. Concern: corrosion

Management: use of tank and piping types as approved by the state for petroleum products. (B)

b. Concern: leaks

Management: installation of monitoring wells as approved by the state for petroleum tanks in sensitive areas (B)

OR installation of containment liner;

OR use of double walled tanks;

OR use of double walled tanks with interstitial monitoring;

OR installation of tanks in inspectible underground vaults;

OR use of above ground tanks where permitted.

A2.4 Hazardous Materials Storage

a. Concern: leaks within the storage site

Management: storage of hazardous materials in well-labeled, leak-proof containers with fixed covers, in storage areas protected from the elements with impermeable floors and bermed perimeters.

A2.5 Hazardous Materials Use

a. Concern: spills - indoors

Management: use of drip pans;

OR use of subfloor containment liner;

OR use of impermeable floor with bermed perimeter and drain trap collection system;

AND guards on exposed pipelines.

b. Concern: spills - out of doors

Management: impermeable chemical transfer areas with bermed perimeter.

A2.6 Urban Runoff/Reduced Recharge

a. Concern: concentration of urban runoff especially in areas of highly permeable soils

Management: proposal review that considers and avoids concentration of urban runoff.

b. Concern: spills

Management: avoid facilities of this type in areas providing significant drinking water supplies (for transportation routes, seek alternate routes for hazardous chemical transport).

c. Concern: reduced recharge to ground water supplies

Management: avoid facilities of this type in areas providing recharge to significant drinking water supplies.

A2.7 Leaching

A2.7.1 -- Out-of-doors chemical storage

a. Concern: leaching

Management: storage on impermeable, bermed base with cover;

OR location in areas not supplying or recharging drinking water supplies.

A2.7.2 -- Out-of-doors chemical use

a. Concern: leaching

Management: subsurface liner;

OR location in areas not supplying or recharging drinking water supplies.

A2.7.3 -- Impoundments (pits, ponds, lagoons, dumps, landfills, junk and salvage yards)

a. Concern: leaching

Management: subsurface liner;

OR double subsurface liner with interstitial monitoring;

OR double subsurface liner with interstitial monitoring and leachate collection system;

OR location in areas not supplying or recharging drinking water supplies;

OR (for existing impoundments) installation of monitoring wells and periodic sampling.

A2.7.4 -- Agricultural chemical and waste use

a. Concern: leaching

Management: State agricultural best management practices;

OR State developed pesticide management plan through the Critical Area Program of the Board of Pesticide Control (22 MRSA 1471);

OR location in areas not supplying or recharging drinking water supplies.

A2.7.5 -- Abandoned wells

a. Concern: leaching through point discharge

Management: abandoned wells should be properly sealed.

A2.7.6 -- Graveyards

a. Concern: leaching

Management: (for existing sites) concrete containment and minimal fertilizer and pesticide use;

OR location of new facilities in areas not supplying or recharging drinking water supplies.

APPENDIX 3

POTENTIAL CONTAMINANT INVENTORY FORMS

ACTIVITY SURVEY

TOWN	TAX/LOT IDENTIFICATION#

Type of land use		In which Zone is activity located?	
___residential	___commercial	Longitude_____	
___industrial	___agricultural	Latitude:	
___other(specify)			
Activity type:		Date:	
		Person conducting survey:	
Address:		Telephone number:	
		Firm (name and address):	
Specific descriptive location:			
Active? currnet property owner:		Inactive? current property owner:	
		Dates active:_____	Dates inactive:_____

Description of threat(s):

Any documented contamination:

Source of information:

Reliability of information:

BUSINESS QUESTIONNAIRE ON TOXIC AND HAZARDOUS MATERIALS

TOWN: _____ **TAX LOT/IDENTIFICATION#** _____

1. Business Name:

   Location:

2. Toxic and hazardous materials used or generated:

The intent of this question is to identify commercial and industrial establishments that use toxic and hazardous materials in their operations. Please put a check beside each product that you use or generate at your operation.

____Antifreeze
(for gasoline or coolant system)
____Automatic transmission fluid
____Engine and radiator flushes
____Hydraulic fluid (including brake
____Motor oils/waste oils
____Photochemicals
____Diesel fuel, Kerosene, #2 heating oil
____Wood preservative (creosote)
____Other petroleum products (grease, lubricants)
____Lye or caustic soda
____Degreasers for driveways and garages
____Battery acid (electrolyte)
____Rustproofers
____Other chlorinated hydrocarbons including carbon tetrachloride
____Car waxes and polishes
____Paints, varnishes, stains, dyes
____Any other product with Poison labels
(including chloroform, formaldehyde, hydrochloric acid, other acids)
____Floor and furniture strippers
____Laundry soil and stain removers (including bleach)
____Spot removers and cleaning fluids
(dry cleaners)
____Other cleaning solvents you feel may be toxic or hazzardous
____Bug and tar removers
____Drain cleaners
____Toilet cleaners

____Cesspool cleaners
____Disinfectants
____Road Salt (Halite)
____Refrigerants
____Pesticides, (insecticides, herbicides, rodenticides)
____Gasoline, jet fuel ,
____PCB's
____Printing ink

____Swimming pool chlorine
____Jewelry cleaners
____Leather dyes
____Fertilizers.(if stored outdoors)
____Car wash detergents

____Asphalt and roofing air
____Paint and lacquer thinners
____Paint brush cleaners

____Metal polishes

____Other products not listed
____Degreasers for engines and metal

____Household cleaners, oven cleaners (please list):
_____
_____

Business Questionnaire on Toxic and Hazardous Materials -- page 2

3. Which toxic and hazardous materials are used or generated in the largest quantities by your firm?

	Material	Quantity Generally On-hand
A.		
B.		
C.		

Questions 4-6 refer only to the toxic and hazardous materials listed above (Question 3).

4. What types of containers are used to store the toxic and hazardous materials listed in Question 3 above? Please list type of material in the boxes below.

____cans	____bottles	____jars	____drums
____barrels	____bags	____boxes	____open, loose, uncovered?
____above ground storage tanks (see below)		____underground tanks (see next page)	

Are all toxic and hazardous materials containers labeled to alert persons to possible health dangers?

____Yes ____No

For Aboveground Tank Storage --

Type of Hazardous Materials Storage Tank and Date of Installation (DOI):

Tank 1: Type_____ DOI_____ Capacity_____ Age_____
Tank 2: Type_____ DOI_____ Capacity_____ Age_____
Tank 3: Type_____ DOI_____ Capacity_____ Age_____
Tank 4: Type_____ DOI_____ Capacity_____ Age_____

Type of Hazardous Material in Storage by Tank:

Tank 1: _____ Tank 3: _____
Tank 2: _____ Tank 4: _____

Previous Leaks?_____
Date(s)_____
_____
_____

Leak Detection Devices, (if any):

Business Questionnaire on Toxic and Hazardous Materials -- page 3

For Subsurface Tank Storage --

Type of Hazardous Material Storage Tank and Date of Installation (DOI):

Tank 1: Type_____ DOI_____ Capacity_____ Age_____

Tank 2: Type_____ DOI_____ Capacity_____ Age_____
Tank 3: Type_____ DOI_____ Capacity_____ Age_____
Tank 4: Type_____ DOI_____ Capacity_____ Age_____

Type of Hazardous Material in Storage by Tank:

Tank 1: _____ Tank 3: _____
Tank 2: _____ Tank 4: _____

Previous Leaks:_____

Date(s):_____
_____
_____

Leak Detection Devices,
(if any):

Business Questionnaire on Toxic and Hazardous Materials -- page 4

5. What types of storage facilities are used? Please list the type of materials in the space provided.

Type of Storage	Types of Materials
Indoor	
A. Seperate, contained room	
B. Stored in general work area	
Outdoor	
A. Uncovered, exposed to weather	
B. Placed on impervious surface	
C. Shed or special storage building	

Are storage areas for hazardous materials diked or curbed to capture spills and stormwater runoff?

____Yes ____No

Business Questionnaire on Toxic and Hazardous Materials -- page 5

6. What methods are used for disposal of toxic and hazardous materials?

Type of Disposal	Yes	No	Types of Materials
A. Reclamation/recycling			
B. On-site disposal			
1. Community sewer			
2. Private septic system			
3. Seperate holding tank			
4. Disposal on the ground			
5. Other			
C. Off-site disposal			
1. Haulded by own firm			
2. Hired hauler			
a. Name of firm			
b. Address of disposal site			

Would you like further information on ground water protection or storage, handling, and disposal methods for toxic and hazardous materials?

____Yes ____No

Name of person completing questionnaire: _____

Date: _____

APPENDIX 4

ESTIMATED COST OF WELLHEAD PROTECTION PLANS

Estimated Cost of Wellhead Protection Plans

MONTHLY PAYMENTS AT 6% FOR 10 YRS.

	COST			
RATEPAYERS	$20,000	$50,000	$75,000	$100,000
50	$4.44	$11.10	$16.65	$22.20
100	$2.22	$5.55	$8.33	$11.10
250	$0.89	$2.22	$3.33	$4.44
500	$0.44	$1.11	$1.67	$2.22
1,000	$0.22	$0.56	$0.83	$1.11
5,000	$0.04	$0.11	$0.17	$0.22
10,000	$0.02	$0.06	$0.08	$0.11

MONTHLY PAYMENTS AT 6% FOR 20 YRS.

	COST			
RATEPAYERS	$20,000	$50,000	$75,000	$100,000
50	$2.87	$7.16	$10.75	$14.33
100	$1.43	$3.58	$5.37	$7.16
250	$0.57	$1.43	$2.15	$2.87
500	$0.29	$0.72	$1.07	$1.43
1,000	$0.14	$0.36	$0.54	$0.72
5,000	$0.03	$0.07	$0.11	$0.14
10,000	$0.01	$0.04	$0.05	$0.07

MONTHLY PAYMENTS AT 6% FOR 30 YRS.

	COST			
RATEPAYERS	$20,000	$50,000	$75,000	$100,000
50	$2.40	$6.00	$8.99	$11.99
100	$1.20	$3.00	$4.50	$6.00
250	$0.48	$1.20	$1.80	$2.40
500	$0.24	$0.60	$0.90	$1.20
1,000	$0.12	$0.30	$0.45	$0.60
5,000	$0.02	$0.06	$0.09	$0.12
10,000	$0.01	$0.03	$0.04	$0.06

MONTHLY PAYMENTS AT 8% FOR 10 YRS.

	COST			
RATEPAYERS	$20,000	$50,000	$75,000	$100,000
50	$4.85	$12.13	$18.20	$24.27
100	$2.43	$6.07	$9.10	$12.13
250	$0.97	$2.43	$3.64	$4.85
500	$0.49	$1.21	$1.82	$2.43
1,000	$0.24	$0.61	$0.91	$1.21
5,000	$0.05	$0.12	$0.18	$0.24
10,000	$0.02	$0.06	$0.09	$0.12

MONTHLY PAYMENTS AT 8% FOR 20 YRS.

	COST			
RATEPAYERS	$20,000	$50,000	$75,000	$100,000
50	$3.35	$8.36	$12.55	$16.73
100	$1.67	$4.18	$6.27	$8.36
250	$0.67	$1.67	$2.51	$3.35
500	$0.33	$0.84	$1.25	$1.67
1,000	$0.17	$0.42	$0.63	$0.84
5,000	$0.03	$0.08	$0.13	$0.17
10,000	$0.02	$0.04	$0.06	$0.08

MONTHLY PAYMENTS AT 8% FOR 30 YRS.

	COST			
RATEPAYERS	$20,000	$50,000	$75,000	$100,000
50	$2.94	$7.34	$11.01	$14.68
100	$1.47	$3.67	$5.50	$7.34
250	$0.59	$1.47	$2.20	$2.94
500	$0.29	$0.73	$1.10	$1.47
1,000	$0.15	$0.37	$0.55	$0.73
5,000	$0.03	$0.07	$0.11	$0.15
10,000	$0.01	$0.04	$0.06	$0.07

MONTHLY PAYMENTS AT 10% FOR 10 YRS.

	COST			
RATEPAYERS	$20,000	$50,000	$75,000	$100,000
50	$5.29	$13.22	$19.82	$26.43
100	$2.64	$6.61	$9.91	$13.22
250	$1.06	$2.64	$3.96	$5.29
500	$0.53	$1.32	$1.98	$2.64
1,000	$0.26	$0.66	$0.99	$1.32
5,000	$0.05	$0.13	$0.20	$0.26
10,000	$0.03	$0.07	$0.10	$0.13

MONTHLY PAYMENTS AT 10% FOR 20 YRS.

	COST			
RATEPAYERS	$20,000	$50,000	$75,000	$100,000
50	$3.51	$8.78	$13.16	$17.55
100	$1.76	$4.39	$6.58	$8.78
250	$0.70	$1.76	$2.63	$3.51
500	$0.35	$0.88	$1.32	$1.76
1,000	$0.18	$0.44	$0.66	$0.88
5,000	$0.04	$0.09	$0.13	$0.18
10,000	$0.02	$0.04	$0.07	$0.09

MONTHLY PAYMENTS AT 10% FOR 30 YRS.

	COST			
RATEPAYERS	$20,000	$50,000	$75,000	$100,000
50	$3.51	$8.78	$13.16	$17.55
100	$1.76	$4.39	$6.58	$8.78
250	$0.70	$1.76	$2.63	$3.51
500	$0.35	$0.88	$1.32	$1.76
1,000	$0.18	$0.44	$0.66	$0.88
5,000	$0.04	$0.09	$0.13	$0.18
10,000	$0.02	$0.04	$0.07	$0.09

APPENDIX 5

RESOURCE DIRECTORY

Regional Planning Agencies

Androscoggin Valley Council of Governments
70 Court Street
Auburn, ME. 04210(207) 783-9186

Capital Coastal Coincil of Governments
89 Western Avenue
Augusta, ME. 04333(207) 622-7146

Hancock County Planning Commission
RFD 4, Box 22
Ellsworth, ME. 04605(207) 667-3151

Land Use Regulation Commission
State House Station 22
Augusta, Me. 04333(207) 289-2631

Northern Maine Regional Planning Commission
P.O. Box 779
Caribou, ME. 04736(207) 498-8736

Southern Mid-Coast Council of Governments
Contact: Capital Coastal Council of Governments

Southern Maine Regional Planning Commission
P.O. Box Q
255 Maine Street
Sanford, ME. 04073(207) 324-2952

Eastern Mid-Coast Planning Commission
9 Water Street
Rockland, ME. 04841(207) 594-2299

Greater Portland Council of Governments
233 Oxford Street
Portland, ME. 04102(207) 774-9891

Lincoln County Municipal Resource and Planning Office
Lincoln County Court House
Wiscasset, ME. 04578(207) 882-6358

North Kennebec Regional Planning Commission
7 Benton Avenue
Winslow, ME. 04902(207) 873-0711

Penobscot Valley Council of Governments
P.O. Box 2579
Bangor, ME. 04401(207) 942-6389

Southern Kennebec Planning and Development Council
Contact: Capital Coastal Council of Governments

Washington County Regional Planning Commission
63 Main Street
Machias, ME. 04654(207) 255-8686

NON-DISCRIMINATION NOTICE

In accordance with Title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000d et seq.), Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), the Age Discrimination Act of 1975, as amended (42 U.S.C. 6101 et seq.), and Title IX of the Education Amendments of 1972, the Maine Department of Human Services does not discriminate on the basis of sex, race, color, national origin, handicap or age in admission or access to or treatment or employment in its program or activities. Ann Twombley, Affirmative Action Officer, has been designated to coordinate our efforts to comply with the U.S. Department of Health and Human Services regulations (45 C.F.R. Parts 80, 84 and 91) and the U.S. Department of Education (34 C.F.R. Part 106) implementing these Federal laws. Inquiries concerning the application of these regulations and our grievance procedures for resolution of complaints alleging discrimination may be referred to Ann Twombly at 221 State Street, Augusta, Maine 04333, Telephone Number: (207)289-3488 (Voice) or 1-800-332-1003 (TTY), or to the Assistant Secretary of the Office of Civil Rights, Washington, D.C.

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