THE PLANNING PROCESS FOR LOCAL GROUNDWATER PROTECTION

STATE OF MAINE
EXECUTIVE DEPARTMENT
Ground Water Standing Committee
Land and Water Resources Council

January 1, 1988

Prepared by Paul W. Dutram
Revised September 1, 1989

THE PLANNING PROCESS FOR LOCAL GROUNDWATER PROTECTION

State of Maine
Executive Department

Ground Water Standing Committee
Land and Water Resources Council

January 1, 1988

Prepared by Paul W. Dutram
Revised September 1, 1989

The Planning Process for Local Groundwater Protection

Introduction

Drinking water, whether supplied from public or private sources, is one of the most important municipal resources. Property values and municipal growth depend on the quantity and quality of water available for drinking and for commercial and industrial processes. Many communities share these uses with important recreational uses. Approximately sixty percent of Maine's population draws its drinking water from groundwater supplies. This number includes nearly ninety-eight percent of the State's rural population.

The potential threats to this resource are many. Several large and pervasive threats, such as underground petroleum tanks, sand-salt piles, and dumps, have recently begun to be addressed at the State level. Many other potential threats are of a more insidious nature. They occur as routine processes taken for granted or as unplanned for spills and discharges. Table 1 lists operations having a potential threat to groundwater.

Despite the State's best efforts, these potential threats are best addressed and controlled at the local level. The State
does not possess the resources to be aware of the multitude of activities -- planned, current, and discontinued -- that exist in each municipality. Municipalities are much more fully aware of daily operations occuring within their boundaries. Furthermore, most potential threats are or may be required to receive local building or operation permits. The local permitting process, together with local code enforcement efforts, are two of the best available protection mechanisms. Finally, the decisions necessary to permitting these operations are properly dependent on local hydrogeological, environmental, economic and sociopolitical considerations.

This Planning Process is a common-sense municipal self-help approach to groundwater protection planning. It provides a mechanism for organization, data gathering and evaluation, community education and support building, selection of protection mechanisms, integration with existing comprehensive municipal plans, and program implementation. Extreme caution should be exercised in considering removal of any element(s) of the process, especially in an effort to save time or accelerate the process. Each element is important to implementing an adequate groundwater protection plan. This process is easily adaptable to community capabilities. At several points professional assistance is required, however, every effort has been made to keep the need for this assistance to a minimum.

The length of the process depends on the size of the community, the amount and quality of the data available, the time necessary to build support, and other parameters. Most communities will require twelve to eighteen months of preparation and effort.

TABLE 1
Operations with Potential Threat to Groundwater

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

The Planning Process consists of ten steps or elements:

1. Organize a Groundwater Committee
2. Inform the Public of your Intent
3. Gather Existing Data
4. Conduct an Inventory of Well Locations and Potential Contamination Sources
5. Evaluate the Data
6. Educate the Public on Your Findings
7. Develop a Groundwater Protection Plan
8. Identify and Address Land-Use Conflicts
9. Identify and Address Conflicts with other Regulatory Programs and Community Priorities
10. Implement the Groundwater Protection Plan

Step 1: Organize a Groundwater Committee

The Planning Process begins with the formation of an ad hoc Groundwater Committee. This may be the most important step, as the dedication of these people will decide whether the planning process succeeds or fails. The varied interests in your community should be represented on this Committee. All interests in your town should feel that they have been fairly listened to and that they have played an active part in the creation of your Groundwater Protection Plan. More importantly, the support of these interests is generally necessary in passing any Groundwater Protection Plan at town meeting. The people on this Committee will give their time to this planning process, therefore, it is important to involve persons with time to give, especially as leaders for the tasks that must be performed.

It is recommended that the Groundwater Committee include representatives of the town manager/mayor, selectmen/city council, town planner/planning commission, zoning commission, board of health, water utility, conservation commission, chamber of commerce, major industry, town engineer, code enforcement officers, fire chief, and other interested town boards and citizen's groups.

While the Groundwater Committee will normally consist of six to twelve individuals, more volunteers may be available and necessary to complete some of the tasks outlined in subsequent steps. It is not necessary to expand the size of the Groundwater Committee to utilize these volunteers. Any assistance, properly instructed, may be effectively utilized by the Groundwater Committee.

Step 2: Inform the Public of your Intent

The public's support is most important to implement a Groundwater Protection Plan. It is very important, therefore, to keep the public informed throughout the planning process and, thereby, build the necessary support for groundwater protection as you go along. The first task is to inform citizens and officials about the Groundwater Committee's purpose. The reasons for conducting a groundwater study and the benefits to be gained from it should be fully explained. The public should be told what you are going to do (especially details of the inventories you will conduct in Step 4), how you are going to do it, and why it is a good idea. Current or potential future groundwater problems should be detailed.

This is best done by asking your local newspaper to do an article on your proposed project and to follow your progress throughout the project. Public notices at the town office, library, clubs and churches, and presentations at board and organization meetings are also effective. The Committee should never proceed without the understanding and tacit approval of the public.

Step 3: Gather Existing Data

The Committee should now gather the data necessary to make sense of the groundwater situation in your town. This includes demographic data bases such as the location of water wells and potential threats, the extent of public water supply and sewer systems, known contamination sources, growth projections, and current local regulations that pertain to your water resources; and technical data bases such as geology, topography, soils, and aquifer locations.

It is extremely important that data be collected and displayed in a manner useful to the town. Experience has shown that mapped data at a scale of 1"=1000' (1:12,000) enables towns to present data at a visual level that allows correlation with local landmarks, such as identifiable roads and property boundaries. A base map should be constructed, at this scale, that includes property boundaries, roads, and other important features such as surface water bodies. A competent cartographer should be employed to create this base map. Some communities may find a cartographer who is a citizen of the town, your local Regional Planning Agency may have cartographic services, or professional cartographic firms may be hired.

Copies of the base map should be used to present each individual data base. These can be paper copies or, more useful, copies on clear plastic. Information on clear plastic copies can be overlaid, one over another, and allows comparisons to be easily made. It is easiest to create the data bases on paper copies and then "xerox" them onto plastic.

Alternatively, the availability and use of digital data in geographic information systems (GIS) should also be checked. Data in a digital format offers significant advantages over hard copy paper maps. Towns may want to insist that maps be generated in this fashion. **A word of caution though in the use of GIS. Digital data must be stored in the computer from a controlled base map. Towns should also request not only maps as a final product, but a copy of the digital data on computer tape or disk.** Once maps are stored in a computer they can be overlayed, combined and manipulated to generate new maps.

To begin data collection, the extent of public water supply and sewer systems should be indicated on a copy of the base map. The area not served by public water supplies should be targeted for the private well inventory explained in Step 4. Areas not serviced by public sewer systems will make use of private septic systems and are more often a concern to groundwater quality.

The yellow pages of your local telephone directory and Committee members' knowledge should be used to locate potential threats listed in Table 1; these should be coded and located on a copy of the base map. The numbers associated with potential threats in Table 1 may be used as codes. The code list should be printed on the map showing potential threats. They will be surveyed in the potential contamination threat inventory explained in Step 4. Some potential threats may occur as activities which have been discontinued, some so long ago that little if any visual indication of their location now exists. The search for these activities is much like detective work. Long established service companies in your region, such as fuel delivery companies, may have records on activities no longer in operation. Similarly, old tax records or other business records may be useful. The recollections of senior citizens are often helpful, as are town histories or the knowledge of town historians. Information on known contamination sites is compiled by the Department of Environmental Protection.

If your community or water district has completed a future growth study, areas of expected growth should be indicated on the map. Current zoning areas -- residential, commercial, agricultural, etc., even a simple designated industrial park -- if any, should be delineated on the map. If areas are not zoned in your community, general boundaries of generally recognized residential, commercial, and agricultural areas may prove useful. The Committee should also compile any town regulations or ordinances that in any way pertain to water resources.

An Important Caution About Utilizing State Mapped Data

Before describing State-mapped data bases and your use of them, a strong word of caution is necessary. The degree of accuracy necessary to create maps legally useful at the individually-owned lot level would require detailed and expensive site examinations. Such examinations are, therefore, usually left until the need arises and the burden of the examination is generally on the developers. Virtually all State mapped data, whether mapped by State or federal organizations is inexact to a degree that may render it unfit for use as a basis for legal mechanisms such as ordinances. This is true because most mapped data is at a scale of 1:15,840 or larger. The minimum size delineations that can be cartographically drawn on maps are:

Map Scale	Inches per mile	Minimum Size delineation (acres)
1: 5,000	12.7	0.25
1:12,000	5.28	1.4
1:15,840	4.0	2.5
1:20,000	3.17	4.0
1:24,000	2.64	5.7
1:50,000	1.26	25.0
1:62,500	1.0	39.0

This is especially true of subsurface data such as groundwater because these are unseeable resources. These data have been generated by performing widely dispersed point examinations and making simple assumptions as to what exists in between. The boundary lines on 1:62,500 surficial geology maps and 1:50,000 Significant Sand and Gravel Aquifer maps are accurate to approximately plus or minus 250 feet. The minimum size delineation on 1:62,500 maps is about 39 acres and 25 acres on 1:50,000 scale maps. Soil maps are generally mapped at scales of 1:15,840, 1:20,000 or 1:24,000. These maps are also generated by making point examinations, but examinations are made in much greater detail in order to generate a map at a larger scale. Soil maps do not show areas of soils smaller than 2.5, 4 or 6 acres (depending on scale), however smaller areas (inclusions) are described within the soil survey report or are indicated by spot symbols (such as wet spot) on the soil map.

These data bases do, however, provide useful information that can be utilized in several important ways. The data can be used to justify site examinations in greater detail than normal. For instance, where these maps indicate poor soils or shallow water tables the developer may be required to perform very detailed examinations to substantiate the actual conditions. The maps may also be used by a town as a rough check on assessments initially provided by developers. Developers themselves can scan the town's maps to obtain a general idea of the complexity likely in receiving a permit for any particular property. Therefore, although accurately transferring these data bases to town base map scale will require professional assistance, towns are encouraged to do so. The original mapped scale of all data bases should be indicated on maps you create.

* * * * * * * * * * * * * * * * *

Note: Addresses for the resource organizations mentioned below are listed in Table 2.

TABLE 2

Public Agencies Available for Groundwater Related Information

Agency	Address	Service
Maine Geological Survey, Hydrogeologist	State House Station 22 Augusta, Maine 04333 289-2801	Sand and Gravel Aquifer Maps Significant Sand and Gravel Aquifer Maps Surficial/Bedrock Geology Maps Geological Hydrological Studies Topographic Maps Known Contamination Information Interpretive Services
Department of Environmental Protection	State House Station 17 Augusta, Maine 04333	
Bureau of Water Quality Control, Hydrogeologist	289-3901	Protection Planning Assistance Known Contamination Information
Bureau of Oil and Hazardous Materials Control, Hydrogeologist	289-2651	Known Contamination Information
Bureau of Solid Waste Management, Technical Services Division, Hydrogeologist	582-8740	Known Contamination Information (Landfills, Septage Disposal Sites)
Department of Human Services, Division of Health Engineering, Hydrologist	State House Station 10 Augusta, Maine 04333 289-5681	Protection Planning Assistance Public Water Supply Information Known Contamination Information
State Planning Office, State Groundwater Coordinator	State House Station 38 Augusta, Maine 04333 289-3261	Protection Planning Assistance Maine Coastal Zone Water Supply and Demand Maps
U.S. Geological Survey	26 Ganneston Drive Augusta, Maine 04330 622-8208	Hydrological Data Interpretive Services Topographic Maps
U.S. Soil Conservation Service	USDA Office Building University of Maine Orono, Maine 04469 581-3454	Soils Maps

The first useful map is a U.S. Geological Survey Topographic Map showing land elevations. Topographic maps at scales of 1:24,000 or 1:62,500 are available from the U.S. Geological Survey or the Maine Geological Survey. A professional can easily link high elevations to create water basin boundary lines. Your town may, thereby, be separated into several major water basins. This knowledge is important because groundwater is generally self-contained within each of these basins. This information will be useful in assessing the likely impacts of any potential pollution source. A pollution source in one basin does not generally contaminate another basin. If the assumption is made that groundwater generally flows in the same manner as surface water, i.e., from high elevations towards lower elevations, then the general flow directions of groundwater in each basin may be indicated. The exception to this assumption usually occurs in areas of "bedrock" geology as bedrock is fractured and folded and groundwater flow is difficult to ascertain. The more complex the geology, the more likely professional assistance will be required to determine groundwater flow.

Surficial Geology Maps are available from the Maine Geological Survey. These maps, together with Soil Survey Maps available from the U.S. Soil Conservation Service, indicate the type of "loose" materials between the surface and the solid bedrock (ledge). The water table will lie somewhere within this layer or down in the bedrock itself. The distance between the surface and the water table can be viewed as a protective zone as it indicates the relative time necessary for a surface or near-surface contaminant to reach the water table. For identical contaminants in identical materials, the thicker this zone the more reaction time available to take action on the contamination. Highly permeable soils and surficial materials are of greater concern in protecting groundwater than more impermeable soils and surficial materials. Shallow or outcropping (exposed) bedrock is also of great concern.

General Sand and Gravel Aquifer Maps and more detailed Significant Sand and Gravel Aquifer Maps are available from the Maine Geological Survey. These maps indicate areas of high yield groundwater resources, generally sources of large volumes of water. These maps do not indicate all the aquifer material or the recharge areas of these aquifers. It should also be remembered that virtually all other areas are also sources of groundwater that require protection. Although wells in these other areas are drilled into bedrock or dug into relatively shallow surficial materials and generally yield less water than sand and gravel aquifers, they are important resources and may be contaminated as easily as sand and gravel aquifers.

Maine Coastal Zone Water Supply and Demand maps are available to coastal communities. These maps detail the water supply sources, delivery systems, a few known contamination sites, and some projected future water supply sources and likely areas of community expansion as of 1977. Your local town office or water utility may have a copy of your community's map or copies may be obtained by contacting the State Groundwater Coordinator at the State Planning Office. Further information on your community's public water system may be obtained from water utility officials or from the hydrologist in the Department of Human Services' Division of Health Engineering.

Several other data maps should be generated by the Groundwater Committee. Specifically, Depth to Water Table and Depth to Bedrock maps and a map of Potential Contamination Sources. The data necessary to generate these maps is collected as detailed in Step 4.

Step 4: Conduct an Inventory of Well Locations and Potential Contamination Sources

The purpose of the inventories is to locate public and private wells and gather important data about them that will be used to generate maps, and to identify former and current activities and land uses that may threaten your community's water supply quality. Not all of the threats identified will necessarily be contaminating your water resources today, but it is important to identify potential threats. The procedure for conducting the potential contamination source inventory is detailed in "Groundwater Quality... A Handbook for Community Action", available from the Maine Association of Conservation Commissions (P.O. Box 831, Yarmouth, Maine 04096, telephone: 846-3329). MACC's publication lists printed materials which should be researched and individuals who should be interviewed, details the most productive methods for conducting the inventory, and provides valuable bibliographies. A synopsis of MACC's method is provided in Appendix 1.

In Step 3 the Groundwater Committee delineated the areas of the community not on public water supplies. All lots that may contain private wells in these areas should now be surveyed by a personal canvas. A copy of a useful form for this canvas is contained at the back of this publication. Entitled "Well Survey" it may be modified and reproduced as needed.

It may prove useful to first contact area well drillers and ask to review their well logs of wells in your community. Some information, such as depths to water producing veins in bedrock, and yields, may only be identified from these well logs. The Maine Geological Survey has compiled well data in many areas through its Well Inventory Program and may be another important resource to contact. The most important information to be gathered in this effort is well location, depth to water table, and casing length (or depth to bedrock). The location of each well on each lot should be indicated on a copy of the base map as accurately as possible. Some identification code, such as the tax lot number, should be entered on the Well Survey form. The location of any public water supply well and the known extent of its recharge zone should also be placed on this map.

The depth to the water table may be obtained on-site by Committee members or their assistants with the permission of the well owners. The depth to the water table from the ground surface should be measured with a clean tape measure. Preferably, this should be done in the month of May when groundwater levels are generally closest to the surface and contaminants. This measurement can only be made accurately in dug wells and well points. The type of well should be noted on the survey form. The measurement should be made early in the morning before water is used that day so that the water level in the well has had an opportunity to recover to its normal level during the night. Water in drilled wells is under pressure and does not truly represent the depth to the water table. Some well drillers may indicate on the well log the depth at which they struck water in a drilled well. This information, if available, may also be used. The depth to bedrock may be indicated on well drillers' well logs or may be estimated by subtracting five feet from the length of the well casing installed.

Water table depth information should be used by a professional to develop a contour map similar to a topographic map showing depths to water table. Shallow depths to water table are particular cause for concern. Similarly, depth to bedrock information should be used by a professional to develop a contour map showing depths to bedrock. Shallow depths to bedrock and bedrock outcrops at the surface are particular cause for concern.

The professional you hire to create these contour maps should take care not to contour in areas where data points are not sufficient to accurately indicate the situation. These areas should be delineated as "unknown" or areas of insufficient data.

In Step 3 the Groundwater Committee identified the locations of past and current potential contamination sources. These locations should now be verified, accurately located on a copy of the base map, and detailed information should be gathered on each by conducting a personal canvas. A copy of a useful form for this canvas is contained at the back of this publication. Entitled "Activity Survey", it may be modified and reproduced as needed. Some identification code, such as the tax lot number, should be entered on the Activity Survey form. The Activity Type may be indicated using the designations in Table 1. The particular potential contaminants may be indicated under Description of Threats on this form.

In addition to the basic Activity Survey form, you may wish to have more detailed information for those activities that store, use, or generate toxic and hazardous materials. This information may be particularly useful to emergency services such as firefighters in the event of an emergency. A five-page "Business Questionnaire" is provided at the back of this publication for that purpose. It may be modified and reproduced as needed. It should be appended to the activity's basic Activity Survey. Professional assistance to help you evaluate the seriousness of the potential threat from each activity in relation to your town's groundwater situation may be obtained from the Department of Environmental Protection, Bureau of Water Quality Control hydrogeologist or from private consulting firms.

Step 5: Evaluate the Data

The data gathered should be organized and summarized in report form. The review should consider the adequacy of the data base, the adequacy of existing supplies, the projected future demand for water supplies, and the potential for contamination of water supplies.

Most often, the data that may be inadequate is that relating to groundwater resources, such as depth to water table (especially in areas where sand and gravel aquifers are scarce), and local geology, such as depth to bedrock. Expert investigations are required to provide this additional data. Aquifer boundaries, recharge areas, flow directions, groundwater elevations, potential well sites, yields, and cones of influence, and contaminant travel times should be determined by competent professional investigators. They should be based on well-documented hydrogeologic data and be defensible in a court of law. When hiring a consultant, the community should be very careful to specify the type of information that is needed. Appendix 2: Selecting a Consultant for a Hydrogeological Investigation offers important guidelines for this process.

State agencies have no capability to conduct these additional investigations. Water utilities may increase their water rates (concurrently encouraging conservation) or funds from town revenues may be made available for hydrogeological investigations.

Step 6: Educate the Public on Your Findings

A public education program should be conducted to inform citizens and officials about the results of the groundwater study. Again, newspaper articles, public displays at

the town office, library, clubs and churches, and presentations at board and organization meetings are effective.

This effort should culminate at a town meeting, where the data gathered is displayed and the Committee's report is delivered. The Committee should be prepared to answer questions including a justification for any expenditures requested for further actions. Justification should be in terms of economic, environmental, and public health reasons. Several workshops may be held prior to the town meeting and announced as give-and-take sessions. The workshops will allow the Committee an opportunity to satisfy the questions of those most vocal about the study, prior to the town meeting. Further steps to be taken by the Committee should be thoroughly explained with a commitment to another town meeting to present options for solutions.

Step 7: Develop a Groundwater Protection Plan

The Groundwater Committee should now know the location of the community's water supplies and the wells utilizing them, the general direction of groundwater flow, and the location of potential threats to groundwater.

The Groundwater Committee must now use this information to formulate appropriate groundwater protection measures. State regulations offer some basic protection for groundwater. By using a combination of the protection methods listed in Table 3, communities will have the capability to manage and protect their own groundwater.

Protection methods consist of Protection Mechanisms (PM) and Performance Standards (PS). Several methods may be available to address each potential threat to groundwater that exists. For instance, gas stations may be addressed in a Building Ordinance (PM-4d), in a Health Regulation (PM-4f), or in a Hazardous Materials Storage Regulation (PM-4g). It is recommended that most of these potential threats come under local Site Plan Review (PM-4a). In an indoor situation where hazardous materials are used or stored, either centrally located Drain Traps (PS-2b) or Grated Perimeter Drain Traps (PS-2d) may be required as appropriate for each facility. Similarly, different methods are included for different locations. For instance, Drain Traps (PS-2b) and Grated Perimeter Drain Traps (PS-2d) are appropriate for indoor facilities, while Berms (PS-2f) with Gravity Traps (PS-2i) are appropriate for outdoor facilities. Several alternatives exist within each Performance Standard. Both Double Walled Tanks (PS-1b) or Secondary Containment by Subsurface Vault (PS-1d) are appropriate protection methods for underground storage tanks. Appropriate Monitoring/Warning Devices (PS-1f) should always be required. Similarly, for outdoor areas where hazardous materials are used or stored, Berms (PS-2f) with either Imbiber Bead Valves (PS-2g) or Manually Operated Sump Valves (PS-2h) are appropriate. Subfloor Containment Liners (PS-2a) are designed for indoor facilities while Subsurface Containment Liners (PS-2e) are designed for outdoor facilities.

The Groundwater Committee must select from these options and recommend a protection measure for each threat that meets the community's specific environmental, sociopolitical and economic needs. The protection measures selected must not arbitrarily discriminate against growth and development. The protection measures your community selects should be drawn up in a Groundwater Protection Plan which must be addressed by your town's Comprehensive Plan to be legal.

TABLE 3

Protection Methods

Protection methods consist of Protection Mechanisms (PM) and Performance Standards (PS).

Protection Mechanisms

PM-1 Deeds

a. Land Acquisition
b. Purchase of Development Rights
c. Easements
d. Protective Covenants

PM-2 Incentives

a. Tax Abatement
b. Transfer of Development Rights

PM-3 Zoning

a. Aquifer Overlay Zone
b. Watershed Protection Zone
c. Open Space/Green Area Zones
d. Agricultural Preservation Zones
e. Coastal Protection Zone
f. Wetlands Protection Zone
g. Floodplain Protection Zone

PM-4 Regulations

a. Site Plan Review
b. Minimum Lot Size
c. Subdivision Regulations
d. Building Ordinance
e. Seasonal Home Conversion Ordinance
f. Board of Health Regulations (septic system, septage disposal, solid waste disposal)
g. Hazardous Materials Storage Regulation
h. Business Safety Inspections
i. Underground Storage Tank Regulations
j. Landfill Operation Regulations
k. Road Sand-Salt Application and Storage Regulations
l. Pesticide Use/Application Regulations (application rates/ timing, filling, spreading, cleaning, crop dusting)
m. Sand and Gravel Mining Regulations

Performance Standards

PS-1 Underground Storage Tanks/Pipelines

a. Corrosion Resistent Tanks/Pipes
b. Double Walled Tanks
c. Synthetic Containment Liner
d. Secondary Containment by Subsurface Vault
e. Underground Pipeline Vaults
f. Monitoring/Warning Devices

PS-2 Hazardous Materials

a. Subfloor Containment Liner
b. Drain Trap
c. Drain Collection System
d. Grated Perimeter Drain Trap
e. Subsurface Containment Liner
f. Berms
g. Imbiber Bead Valves
h. Manually Operated Sump Valves
i. Gravity Traps
j. Covered Loading Docks
k. Drip Pans
l. Exposed Pipeline Guards
m. Container/Pipeline/Valve Labeling
n. Operation/Caution Signs
o. Emergency Diking and Cleanup Materials

PS-3 Sand-Salt Storage

a. Covered Sand-Salt Storage Area

PS-4 Agriculture

a. Manure Storage Platform
b. Pesticide/Herbicide Storage Area
c. Feed Lot Standards

Assistance in identifying appropriate protection measures for specific threats is available from the State's Groundwater Protection Planning Program personnel, from your local Regional Planning Agency, from the Department of Economic and Community Development, or from private consulting firms.

Step 8: Identify and Address Land-Use Conflicts

Current sources of pollution should be identified. The municipality should track and assist State and federal efforts to address these sites. Current land uses which conflict with proposed groundwater protection measures should also be identified. Non-conforming land uses may be addressed in several ways. They may be purchased by the municipality or a buyer who would discontinue the non-conforming use or replace non-conforming equipment immediately or at the end of its normal life cycle with conforming equipment. Performance standards or mitigating safety measures (such as hazardous materials storage regulations and safety inspections) or equipment may be required. Or the non-conforming use may be allowed to continue to operate as it currently exists.

A variance procedure provides the mechanism to allow a non-conforming use to continue or to require specific actions of it. The Committee should recommend the form this variance procedure should take and how it is to be administered. Decisions in the variance process should be based on the seriousness of the threat to the population or to surrounding groundwater resources, the need to return a polluted area to drinking water quality, and the benefits of continuing the current operation in its present location.

Step 9: Identify and Address Conflicts with Other Regulatory Programs and Community Priorities

Implementing the selected groundwater protection measures may cause conflicts with existing zoning or other regulatory schemes. The community's regulations, bylaws and ordinances should be reviewed to identify any conflicts. Accommodation must be reached between all such programs.

In a larger sense, the community's efforts to protect groundwater may conflict with community efforts in other priority areas. You can't protect groundwater in a vacuum. Consideration should be given to the effects which each groundwater protection method will have on other resources, such as surface waters, marine resources, residential and commercial growth, etc. For example, it may be a goal to prevent groundwater pollution by preventing urban or agricultural runoff from ponding and infiltrating in highly permeable areas. The result of this effort will be to ultimately direct this runoff to surface water bodies which may be adversely impacted. Similarly, the groundwater situation in your community may indicate that the safest area to develop if protecting groundwater would be coastal sites. This may prove extremely difficult given shoreland zoning regulations or marine resource considerations such as clam flat locations.

Groundwater protection points to the inescapable conclusion that comprehensive planning is required to wisely protect any set of community resources. Your Groundwater Protection Plan should be part of your overall Comprehensive Plan. Interactions among resources and management programs must be addressed.

Step 10: Implement the Groundwater Protection Plan

Implementation consists of presenting the Groundwater Protection Plan to the public and building support for it, winning approval for the plan, working out an implementation plan and schedule, and operational review of the Protection Plan's programs after they have operated for a time.

As essential as public support is to the development of a groundwater protection plan, public support is many times more important to implementation of the protection plan. Public education through newspaper articles, public displays, presentations, and workshops is vital. The objectives, benefits, and costs associated with the protection plan should be fully explained. The Committee should make a presentation to all community boards at their regular meetings to discuss the program and foster understanding of it. It is particularly important to schedule meetings with the planning board, finance committee, board of selectmen, board of health, public-works commission, and water and conservation commissions. Special attention should be given to those boards that are expected to sponsor, administer, or enforce the protection measures; they should be given ample opportunity to review and amend the proposals as necessary.

Once public support is secured for the protection plan, or for as much of the plan as possible at one time, the specific warrant articles should be developed. Information handouts should be sent to all voters restating the objectives, benefits, and costs of the proposals. The handout should present a convincing argument for approval of the proposals. Answers to anticipated or obvious questions may be included.

The handouts should also be available at the town meetings. The Committee should select a spokesperson who is respected, articulate, and informed. The Committee should have supporting speakers lined up. Again, be prepared to answer all questions concerning objectives, benefits and costs, and to justify the protection plan in respect to these factors.

Once approved, in whole or in part, the Committee should work with its town's administration to develop an implementation plan. This plan should describe tasks, duties, responsibilities and guidelines for those who will implement, administer, and oversee the programs and regulations that your Protection Plan calls for. A schedule for program and regulation activation should be developed. Without active implementation the Plan is useless.

The Groundwater Committee should give the Protection Program an adequate amount of time to become effective. After a reasonable amount of time (one to two years) the Committee should evaluate the effectiveness of the Plans programs and regulations. The Committee should make recommendations for modifications, additions, and deletions necessary to improve the Protection Plan. Periodic review of the Plan thereafter will insure that it remains an active, up-to-date mechanism for addressing groundwater protection.

Appendix 1

INVENTORYING CONTAMINATION SOURCES

Gwen Hilton and Rich Rothe, Maine Association of Conservation Commissions

The purpose of an Inventory is to identify former activities and land uses within the community that may threaten the quality of water supplies. It is important to recognize that this is an inventory of potential threats, and that not all land uses identified are necessarily contaminating groundwater resources today. Professional evaluation of the inventory results will be necessary to determine such threats.

Types of Threats:

1) Situations where toxic materials were used or generated as wastes (e.g. industries using such materials or bulk petroleum storage sites).
2) Situations where dumping may have occurred and contaminants had ready access to groundwater (e.g. dumps in old sand and gravel pits).

Inventory Methods: Historic land uses can be identified from:

a) printed materials:
   -- local histories
   -- comprehensive plans
   -- historic society records
   -- municipal and county records (eg. tax records)
   -- local and regional maps
   -- U.S. Census reports (every 10 years since 1970)
   -- newspapers
   -- business records
b) interviews with local people:
   -- long time residents
   -- fuel delivery people
   -- business people
   -- civic leaders
   -- history teachers and the local historical society
   -- newspaper people
c) field inspections

Using the Inventory Results: The information gathered:

-- will need to be evaluated by a professional person
-- should be shared with water companies/districts and town officials
-- can be used in a public education program, and
-- should be kept for long-term reference and use

Tips on Inventorying:

-- For suggestions on organizing an inventory, see MACC's Groundwater Handbook.
-- Be sure to get the support of municipal officials.
-- Be cautious about trespassing.
-- Keep in mind that this is not a police effort; you are only inventorying, and old sites may not be contaminating groundwater at the present time.
-- You may want to start with only part of the community (e.g. areas where people are living, where there are significant aquifers, where there are water supply sources, or areas near a railroad line).

Appendix 2

Communities must often employ consultants to conduct hydrogeological investigations. There are many consulting firms that offer this service. Many firms offer a variety of consulting services related to groundwater. It is important to remember the following rule: **THE PURPOSE AND PRODUCTS OF THE STUDY SHOULD BE DICTATED TO THE FIRM SELECTED, NOT VICE VERSA.**

The best method of dictating your requirements is by being very specific and complete in your invitation to bid or request for proposal (RFP). At a minimum, the RFP should include:

- o project title
- o major goal
- o background of project and other related efforts
- o scope of work (detailed enough to outline work required, general enough to require bidder to show understanding of project)
- o general level of effort and qualifications required
- o request for qualifications and experience
- o reports and other products required
- o request for work plan (methodology, types of analyses, necessary data)
- o deadline and procedures for submission
- o role of local governments and the Groundwater Committee
- o criteria for proposal selection
- o local contact person.

The RFP can be disseminated through:

- o public announcement in local and statewide newspapers
- o request to firms believed to be qualified based on the local governments' experiences and
- o other forms of media and word of mouth.

The products required of a hydrogeological study may include the following:

- o Groundwater Resource map - map showing the locations of all usable groundwater resources and recharge areas with emphasis on those supplies of adequate yield for community (public well) development.

- Surficial Geology Map - map showing distribution of major types of deposits occurring at the land surface. Surficial deposits of low permeability, greater than five feet thick, should be indicated as such.

- Bedrock Geology Map - map showing topographic configuration of bedrock geology, compiled from well logs, bedrock exposures, and subsurface testing.

- Water Table Map - map showing elevations of the water table and general groundwater flow directions, compiled from water table elevations in wells, borings, ponds, streams and wetlands.

- Drainage Basin Map - map showing the drainage basin boundaries for all drainage basins located fully or partially in the community. Drainage basin boundaries that extend into adjacent communities should be delineated.

- Cone of Depression and Contaminant Travel Zones - the cone of depression is the area around a well where the water table is depressed by a change in the hydraulic gradient caused by the withdrawal of water by a well. It is the area of an aquifer where groundwater is drawn directly into a well. The shape of the cone will vary, depending on rate of pumping, soil permeability, and other factors. The radius of the cone of depression for all public or community water supply wells should be delineated. Contaminant Travel Zones, based on contaminant travel times, should be indicated for all public or community water supply wells.

The following studies may also be needed:

- Water Budget Analysis - a quantitative study of the water that is available. This information, together with town growth projections, will indicate the need to locate, designate and protect water supply sources that will be required to meet future needs.

- Water Quality Analysis - existing and potential sources of supply may be tested for suspected pollutants including organic compounds.

Interested firms will respond to an RFP with a proposal that should contain the following major categories of information:

- a letter of interest

- demonstration of understanding of the project

- work plan (methodology, anticipated problems/solutions, data to be collected, analyses to be performed, or models to be used)

- list and description of tasks and deliverables

- completion schedule for tasks and deliverables

- evidence of ability to perform work (professional qualifications of the firm)

- indication of staff and project director to be assigned

- resumes and work experience of those who will actually do the work, and description of facilities

- o references, including clients with similar projects, and
- o cost by task.

Occasionally it may be necessary to schedule a pre-proposal conference to allow interested firms an opportunity to ask questions and gain a better understanding of the project and of community expectations. During the conference and during all contacts, it is important that the same information be given to all respondents. If revisions to the scope of work do become necessary, then a revised RFP should be sent to the list of firms receiving the first invitation. Some communities make attendance at pre-proposal conferences a condition for submitting a proposal.

After all proposals have been received, it is necessary to evaluate each according to the criteria included in the original request. Typical criteria would include the following:

- o overall firm experience
- o specific experience in projects similar to the proposal
- o professional qualifications, including education, State certifications, and other particular expertise of the firm's professional staff
- o indication of personnel to be assigned to the project, accompanied by a description of general responsibilities, and an estimate of time to be spent (expressed as a fraction or percentage)
- o availability of the personnel to be assigned to the project, including concurrent commitments
- o firm's policy regarding replacement of assigned personnel should they leave the firm during the project
- o firm's policy regarding project management, including planning, organizing, and communicating
- o firm's approach to the proposed project, including data-gathering methods, evaluation techniques, mathematical modeling, and other relevant factors
- o firm's understanding of scope and quality of work expected, or recommended approach
- o facilities and equipment of the firm, including computer capabilities, laboratory and testing equipment, and any other equipment necessary to completion of the project
- o firm policy on billing, travel time, and costs
- o professional reputation of the firm, including any special awards or recognition received by the firm or any of its staff, and
- o calls to past clients.

It is helpful to list these criteria on a form to facilitate ranking of prospective consultants during the evaluation. The evaluation can be performed by the Groundwater Committee or by representatives from town boards, such as the board of selectmen, conservation commission, town engineer, planning board, water commission, and board of

health. Even though funds for the groundwater study may be appropriated under one department's budget, selection of the consultant should involve other boards. This fosters a spirit of cooperation and participation early on, critical to facilitate implementation of the recommendations.

The evaluation group should meet as often as necessary to complete the consultant selection in a timely manner. Generally, the top three firms are selected for further consideration, at which point all information concerning the firms as well as the evaluators' comments are reviewed and discussed. The Committee then should schedule interviews with firm representatives.

The interviews should be structured so that each firm is given a fair chance to display its capabilities. If necessary, specific questions about the firm's proposal or experience may be sent in writing to the firms in advance and then discussed during the interview. Communities have the right, and the consulting firms may expect, to negotiate the proposed costs down. It may also be necessary to clarify the technical aspects of the proposal.

A contract should be prepared by town council, reviewed by the key staff members and the evaluation team, and forwarded to the local policymakers for approval. Some consulting firms offer a standard agreement for adoption after local review. The submitted proposal should be incorporated into the contract directly or by reference so there is a link to the primary document by which the firm was selected.

The Groundwater Committee should schedule periodic meetings with the consultant for presentation of findings at appropriate stages of the study. The Committee should use these meetings to monitor progress, review the work performed to date, and make any necessary changes in the scope of work. It is also important to report the progress of the study to local newspapers to increase awareness of and gain public support for the groundwater protection effort.

The final study presentation should be widely publicized. Notices should be sent to all town departments, and a notice explaining the study in detail should be sent to local newspapers.

Town: Tax Lot/Identification #____

WELL SURVEY

Owner:

Location of well on property:

Type of well:
____ bedrock
____ sand and gravel
____ dug
____ other (spring, etc.)

Is well cap ____ exposed OR ____ buried? If buried, is location ____ known OR ____ unknown?

Depth from ground surface to water table: ____ ft.
This depth was measured in what month?

Depths to water producing veins (from well log):

Depth from ground surface to bedrock: ____ ft. OR
Well casing length: ____ ft.

Material overlying bedrock: ____ clay ____ till ____ sand
____ gravel ____ other

Well yield: ___ gallons per minute, according to well driller

___ sewer OR ___ septic system
Distance from edge of septic system leach field to well: ___ ft.

Additional material from well log if available:

Town: Tax Lot/Identification #____

ACTIVITY SURVEY

Type of land use: ____ residential ____ commercial
____ industrial ____ agricultural
____ other (specify)

Activity type:

Address:

Specific descriptive location:

Active? -- current property owner:

Inactive? -- current property owner:
-- dates active:
-- property owner(s) when active:

Description of threat(s):

Is activity within 1000' of a public water supply well? ____
Name:

Is activity within 300' of a private water supply well? ____
Name(s) of well owner(s)?

Any documented contamination:

Source of information:

Reliability of information:

Date:
Person conducting survey:
Telephone number:

BUSINESS QUESTIONNAIRE ON TOXIC AND HAZARDOUS MATERIALS

1. Town: Tax Lot/Identification #____

Business Name:

Location:

2. Toxic and hazardous materials used or generated:

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

____ Antifreeze (for gasoline or coolant system)
____ Automatic transmission fluid
____ Engine and radiator flushes
____ Hydraulic fluid (including brake fluid
____ Motor oils/waste oils
____ Gasoline, jet fuel
____ Diesel fuel, Kerosene, #2 heating oil
____ Other petroleum products: grease, lubricants
____ Degreasers for engines and metal
____ Degreasers for driveways and garages
____ Battery acid (electrolyte)
____ Rustproofers
____ Car wash detergents
____ Car waxes and polishes
____ Asphalt and roofing air
____ Paints, varnishes, stains, dyes
____ Paint and lacquer thinners
____ Paint brush cleaners
____ Floor and furniture strippers
____ Metal polishes
____ Laundry soil and stain removers (including bleach)
____ Spot removers and cleaning fluids (dry cleaners)
____ Other cleaning solvents
____ Bug and tar removers
____ Household cleaners, oven cleaners
____ Drain cleaners
____ Toilet cleaners
____ Cesspool cleaners
____ Disinfectants
____ Road Salt (Halite)
____ Refrigerants
____ Pesticides (insecticides, herbicides, rodenticides)
____ Photochemicals
____ Printing ink
____ Wood preservative (creosote)
____ Swimming pool chlorine
____ Lye or caustic soda
____ Jewelry cleaners
____ Leather dyes
____ Fertilizers (if stored outdoors)
____ PCB's
____ Other chlorinated hydrocarbons (including carbon tetrachloride)
____ Any other products with "Poison" labels (including chloroform, formaldehyde, hydrochloric acid, other acids)
____ Other products not listed which you feel may be toxic or hazardous (please list):

_____

_____

_____

_____

_____

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

aboveground tanks (use next page)

underground tanks (use next page)

bags, boxes

open, loose, uncovered

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

____ Yes ____ No

Business Questionnaire on Toxic and Hazardous Materials -- page 3

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 2: _____
Tank 2: _____ Tank 4: _____

Previous Leaks:

Leak Detection Devices, if any:

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 2: _____
Tank 2: _____ Tank 4: _____

Previous Leaks:

Leak Detection Devices, if any:

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. Separate, 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 on the site	

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

____ Yes ____ No

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

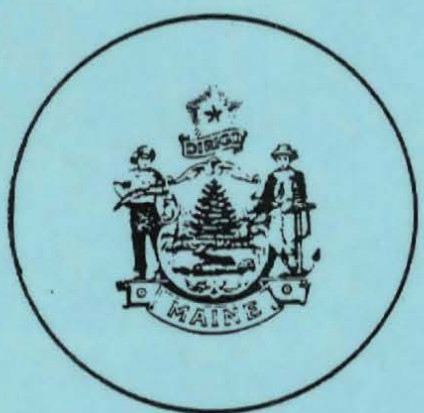
Type of Disposal	Types of Materials
A. Reclamation/recycling	
B. On-site disposal	
1. Community sewer	
2. Private septic system	
3. Separate holding tank	
4. Disposal on the ground	
5. Other	
C. Off-site disposal	
1. Hauled by own firm	
2. Hired hauler	
a. Name of hauler	
b. Address of disposal site	

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

____ Yes ____ No

Name of person completing questionnaire:

Date:


DIRIGO
MAINE