RECOMMENDATIONS

of the

GROUND WATER PROTECTION COMMISSION

JANUARY 1981

A Report to the Maine Legislature

STATE OF MAINE
OFFICE OF LEGISLATIVE ASSISTANTS
STATE HOUSE
AUGUSTA, MAINE 04333

February 12, 1981

Honorable Elizabeth H. Mitchell, Chairperson
Legislative Council
110th Maine Legislature
State House
Augusta, Maine 04333

Dear Representative Mitchell:

On behalf of the Ground Water Protection Commission and pursuant to Chapter 43 of the Private and Special Law of 1979, we are pleased to submit our final report and accompanying legislation.

Very truly yours,

Ike Goodwin, Co-chairman
Goodwin Well Drilling Co.

Walter Anderson, Co-chairman
State Geologist
Department of Conservation

ACKNOWLEDGEMENTS

The Ground Water Protection Commission is especially grateful to the Maine Land and Water Resources Council for making available the Council's Executive Secretary, Craig Ten Broeck, to assist the Commission in its study of ground water problems and preparation of this report. The Commission is also grateful for staff assistance for its efforts provided by John Bailey, Legislative Assistant; Haven Whiteside, Legislative Assistant; and Andrews Tolman, Hydrogeologist with the Maine Geological Survey.

SUMMARY OF THE GROUND WATER PROTECTION COMMISSION'S RECOMMENDATIONS

Legislative Recommendations

1. The Commission recommends passage of an appropriation to the Maine Geological Survey consistent with available resources to accomplish the following

   a. Map the sand and gravel deposits in the inhabited areas of the State at 1:50,000 scale by the end of 1981.

   b. Map high yield aquifers and aquifer recharge zones for the same areas, at the same scale, by 1985. This will include reconnaissance bedrock aquifer mapping.

   c. Map moderate yield sand and gravel aquifers and aquifer recharge zones by 1995.

   d. Focus public and private research efforts to obtain flow data on a regional scale for key hydrological parameters for "typical" aquifer systems by 1986.

2. The Commission recommends that the sale and promotion of halogenated hydrocarbons as degreasers for septic tanks be prohibited.

3. The Commission recommends that the Site Location of Development Act be amended to prohibit activities that may discharge hazardous pollutants from being sited on primary sand and gravel recharge areas.

4. The Commission recommends that the Bureau of Health increase supervision and enforcement of the State Plumbing Code. Adequate funds and personnel should be provided to the Bureau for enforcement activities to correct the existing uneven enforcement by local plumbing inspectors.

Administrative Recommendations

5. The Commission recommends that the Department of Environmental Protection initiate a vigorous enforcement program to mitigate existing ground water pollution violations under the present provisions of 38 MRSA, sections 413 and 420.

6. The Commission recommends that:

   a. The Department of Environmental Protection adopt rules for best management practices for all facilities used or capable of being used for storing more than 500 barrels of petroleum products, to reduce the risk of ground water contamination from these facilities. The management practices should emphasize available, economically

feasible methods, and a minimum regulatory process. The Department should form a task force of interested persons to develop these rules.

b. There be a requirement for the installation of a leak detection device on or in the proximity of all new and existing petroleum storage tanks of more than 5,000 gallons capacity.

7. The Commission recommends that research be conducted to:

a. Identify categories and characteristics of ground water pollutants.

b. Establish the dynamics of ground water contamination.

c. Identify the health and economic implications of ground water contamination.

8. The Commission recommends that the Bureau of Health develop a low-cost screening and testing program for chronic pollutants and include it in their basic water test.

9. The Commission recommends that the Department of Environmental Protection adopt rules for best management practices for siting, design, and performance of new holding ponds and lagoons, and performance criteria for existing holding ponds and lagoons. These rules should use available, economically feasible engineering techniques and maximum flexibility to provide for reasonable protection, and a minimum regulatory process. The Department should form a task force of interested persons to develop these rules.

10. The Commission recommends that a revolving fund to clean up and remove hazardous wastes spills be created with the following provisions:

a. The State fund should not duplicate provisions of the recently enacted Federal fund.

b. Revenues for the fund should be collected from those who create the problems. To accomplish this, fees should be assessed from generators on a sliding scale based on:

1) the toxicity of the waste;

2) the degradability of the waste;

3) the historical record of spills for that industry or activity; and

4) the volume of waste handled.

11. The Commission recommends that an environmental health and epidemiology capability be established in the State. This

capability should be used to evaluate the health effects of chronic pollutants in ground water, evaluate the health implications of contamination incidents, and recommend appropriate responses.

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SECTION I

INTRODUCTION

Fifty seven percent of all Maine people obtain their domestic water supply from ground water. Ninety percent of Maine's rural population depends on ground water for their water supply. Municipal water supply systems will probably increase their dependence on ground water because the public health requirements of the Federal Safe Drinking Water Act make ground water a more economical supply source than surface water. This is because ground water generally requires less treatment before use than surface water.

The use of ground water depends on availability of high quality supplies. Contamination of the water supply in East Gray and the wide-spread occurrence of drought-induced dry wells in 1978 are graphic examples which illustrate the disruption caused when either the quality or quantity of ground water drops below usable levels.

Of the 149 municipal water systems in the state, 12 systems have been identified as having insufficient developed supplies of ground water to meet their system demands, and 10 systems have been identified as having ground water quality problems, primarily as a result of high natural levels of iron.

The U.S. Environmental Protection Agency is placing increased emphasis on land application as a means of disposing of residual wastes generated by water and air pollution clean-up programs. These activities greatly increase the potential for polluting ground water supplies. Only recently has test equipment been used by the Maine Department of Human Services that is sufficiently sophisticated to identify toxic substances similar to those involved in the East Gray incident. Many similar substances are still not routinely tested for because of the expense involved. It is likely that as water supplies come under closer scrutiny, additional serious contamination problems will be identified.

Over the past decade we have learned much about how our surface waters can become polluted, how they can be cleaned up, the immense costs associated with maintenance and restoration of water quality, and the complex institutional structure necessary to safeguard the public's interests. We have not made comparable strides with respect to ground water management. Streams flow in defined channels, are open to view, and respond to degredation or improvement on a time scale measured in days and months. Ground water moves in complex pathways at widely varying rates of flow, is hidden from view until withdrawn, and once polluted may require decades to centuries for improvement.

The Legislature, recognizing the threats to Maine's ground water resources, created a Ground Water Protection Commission to review the laws dealing with ground water and report its findings and recommendations to the 110th Legislature.

SECTION II

THE GROUND WATER PROTECTION COMMISSION

The Legislature during its 109th session in 1979 passed An Act to Create a Ground Water Protection Commission to Review the Laws Dealing with Ground Water (see Appendix A for a copy of the Act). The Act charged the Commission with the following duties:

1. Ground water contamination. Identify recent documented cases of significant ground water contamination, and where possible, determine the sources of the contamination;

2. Information gathering and analysis. Review the existing organization for the collection and analysis of ground water information and evaluate its adequacy;

3. Existing regulations. Review the existing federal, state, and local regulations protecting ground water; and

4. Other studies and evaluation. Make any other studies and evaluations necessary to fully assess existing laws and information relating to ground water conservation and protection.

The Act requires that the Commission present its findings with suggested legislation to the 110th Legislature. This report is in fulfillment of this requirement.

The membership of the Commission was appointed according to provisions in the Act. The Commission membership is as follows:

Ike Goodwin, Co-Chairman	Well Driller
Walter Anderson, Co-Chairman	State Geologist
Kenneth Arndt	Regional Planning Representative
John Attig	Public Member
Gerald Bates	Department of Human Services
Daniel Boxer, Esq.	Industry Representative
Peleg Bradford	Water Utility Association
Edward E. Chase	Industry Representative
Thomas R. Downing, Esq.	Public Member
Frederick Greene, Esq.	Public Member
Robert M. Healy	Municipal Representative
Senator James A. McBreairty	Energy and Natural Resources Committee
Alan Prysunka	Department of Environmental Protection
Dr. Roland A. Strucktemeyer	Public Member
Senator Barbara Trafton	Judiciary Committee

The Commission first met in November of 1979 and held its last meeting in January, 1981; meeting twelve times in all. The Commission formed three subcommittees from among its membership to explore ground water quality, quantity, and management related problems. Copies of the Commission minutes of these meetings and the subcommittee reports are available upon request from the Land and Water Resources Council, Maine Department of Conservation.

The Commission's staff also undertook an analysis of 21 activities which affect ground water and made recommendations to the Commission regarding the adequacy for each activity of federal, state, and local controls to protect ground water. The Commission also received testimony from various state and federal agency personnel regarding governmental research and regulation related to ground water.

The final recommendation made in this report to the 110th Legislature are based on consensus of the Commission as to the most important immediate actions that must be taken to protect Maine's ground water resources.

Section III of this report describes Maine's ground water resources, their use, and the activities that can contaminate them. Section IV of this report discusses the current management of ground water, the inadequacies of this management, and the recommendations the Commission has made to better manage and protect Maine's ground water resources.

SECTION III

MAINE'S GROUND WATER RESOURCES

Description of Maine's Ground Water Resources

Ground water is water that is derived from precipitation that infiltrates the soil, percolates downward, and fills the tiny, numerous spaces in the soil and rock below the water table. In Maine, from an average of 42 inches of precipitation each year, only 10 to 20% stays in the ground as ground water; the remainder runs off into streams or is returned to the atmosphere. Ground water moves inches per day through the soil and rock to where it eventually discharges naturally into springs, lakes, rivers, and the ocean. Wells draw water from permeable layers or zones in the saturated soil and rock that are called aquifers.

An aquifer is a geologic deposit that contains sufficient saturated permeable material to conduct ground water and to yield economically significant quantities of ground water to wells and springs. Aquifers differ greatly in regard to their yields, depending on the materials of which they are composed.

Two major types of aquifers occur in Maine: surface sand and gravel aquifers, and fractured bedrock. Sand and gravel aquifers occur in glacial deposits, including most of the ice-contact types (eskers, deltas, kames, and sand and gravel moraines) and some of the outwash and alluvial deposits. Yields of such aquifers range from 10 to more than 1,000 gallons per minute (gpm). Aquifers yielding 500 gpm or more are suitable sources of supply for a municipality of several thousand people. Figure 1 shows the location of the major sand and gravel deposits of Maine. These deposits cover approximately 15% of the state. It is within these sand and gravel deposits that the major ground water aquifers are found. The area of identified aquifers in these sand and gravel deposits has been tabulated for about 42% of the state, and they only comprise 6.3% of that total land area. It is likely that sand and gravel aquifers cover less than 6% of the entire state, since the major systems have already been mapped. Table 1 shows the occurrence of sand and gravel aquifers by county.

Bedrock aquifers occur where crystalline rock is well-fractured, saturated, and has a source of recharge that can sustain the rate of withdrawal. The composition of the bedrock has a relatively small effect on water-bearing capacity. Bedrock that is fractured yields the largest supplies of water, from ten to several hundred gallons per minute. Fracturing is often associated with fault zones. For the most part, bedrock aquifers are of limited area, although some apparently follow the trace of faults and may be several miles long. Significant bedrock aquifers in crystalline rocks are best thought of as high-yield zones, or aquifer zones, within the bedrock as a whole. Low-yield bedrock aquifers supply water from small diameter wells for many rural homes and businesses.

FIGURE 1 - Location of Sand and Gravel Deposits in Maine. (Based on "Glacial Map of the United States East of the Rocky Mountains," published in 1959 by the Geological Society of America.)

Map extracted from -

"Reconnaissance of Ground-Water Conditions in Maine." Geological Survey Water-Supply Paper 1669-T. United States Government Printing Office, Washington: 1963.

DISTRIBUTION OF SAND AND GRAVEL AQUIFERS

AMONG MAINE COUNTIES

COUNTY	AREA INCLUDED IN TABULATION (square miles)	AQUIFER AREA (square miles)	% OF COUNTY UNDERLAIN BY AQUIFERS
Androscoggin	474	39	8.2
Aroostook*	2,570	71	2.8
Cumberland	590	107	18.1
Franklin*	913	37	4.1
Kennebec	872	24	2.8
Knox	362	6	1.7
Lincoln	454	3	0.7
Oxford	1,560	162	10.4
Penobscot*	1,204	41	3.4
Piscataquis*	908	20	2.2
Sagadahoc	245	2	.8
Somerset*	1,195	29	2.4
Waldo	690	20	2.9
York	1,001	256	25.6
Total area tabulated	13,038	817	6.3

*Significant portions of these counties are outside the study area; Washington and Hancock Counties compilation not complete.

Maine Geological Survey January 20, 1980

Contamination of Ground Water

There are many ways by which human activities can affect ground water quality and quantity. Contaminants released to air, water, or land, for example, can find their way into ground water, as suggested by Figure 2. Some rain downwind of industrial areas has a low pH and is referred to as acid rain. This rain may also contain contaminants such as heavy metals and organic chemicals. Chloride-enriched precipitation is common in the coastal areas, where salt water spray is blown aloft.

Water from polluted streams is sometimes drawn into the ground water system by reversed flow gradients caused by pumping a well adjacent to the polluted stream. At other times, flooding streams carry contaminants onto the flood-plains, where they are leached downward into the ground water after the flood has passed.

Leachate from solid and liquid wastes placed on or under the ground surface migrates downward into ground water. Spilled substances such as petroleum products commonly pollute subsurface water.

The opportunity for gound water pollution is present nearly everywhere, not only in the vicinity of populated places. Yet most ground water in Maine remains of good quality because of natural cleansing properties of the unsaturated porous substances that overlie the water table. In the presence of air with oxygen, biologic and organic pollutants are broken down. The ion-exchange capacity of clay soils and sediments is also very important in the removal of such things as metals from recharge water. The most important factor in attenuating pollutants is the thickness of the unsaturated material through which recharge water must pass before becoming part of ground water. Adsorption (adhesion in a thin layer of molecules) of contaminants by soil particles and absorption (physical attraction) to the particles remove many contaminants. Microbes are involved with the breakdown and retention of organic pollutants moving through the soil. Porous materials are superior water-reclamation media, and generally maintain ground water in a potable state. Human activity, however, can overwhelm the natural process available at a given site, and contaminate ground water.

Once in the ground water system, these contaminants travel the various paths followed by ground water, and are sometimes able to migrate considerable distances. Different contaminants travel at different rates and different distances from the source of introduction to the system. Most pathogenic organisms travel with ground water less than 100 feet, but viruses apparently can migrate much farther. Various other chemical compounds such as nitrates, chlorides, and organics will travel varying distances depending on the physical and chemical nature of the permeable materials, and on the total amount of contaminant present. A single large discharge of a particular contaminant may react differently from a small, but continuous discharge of the same waste. There is no general relationship between the nature of the pollutant and the distance it can travel through a

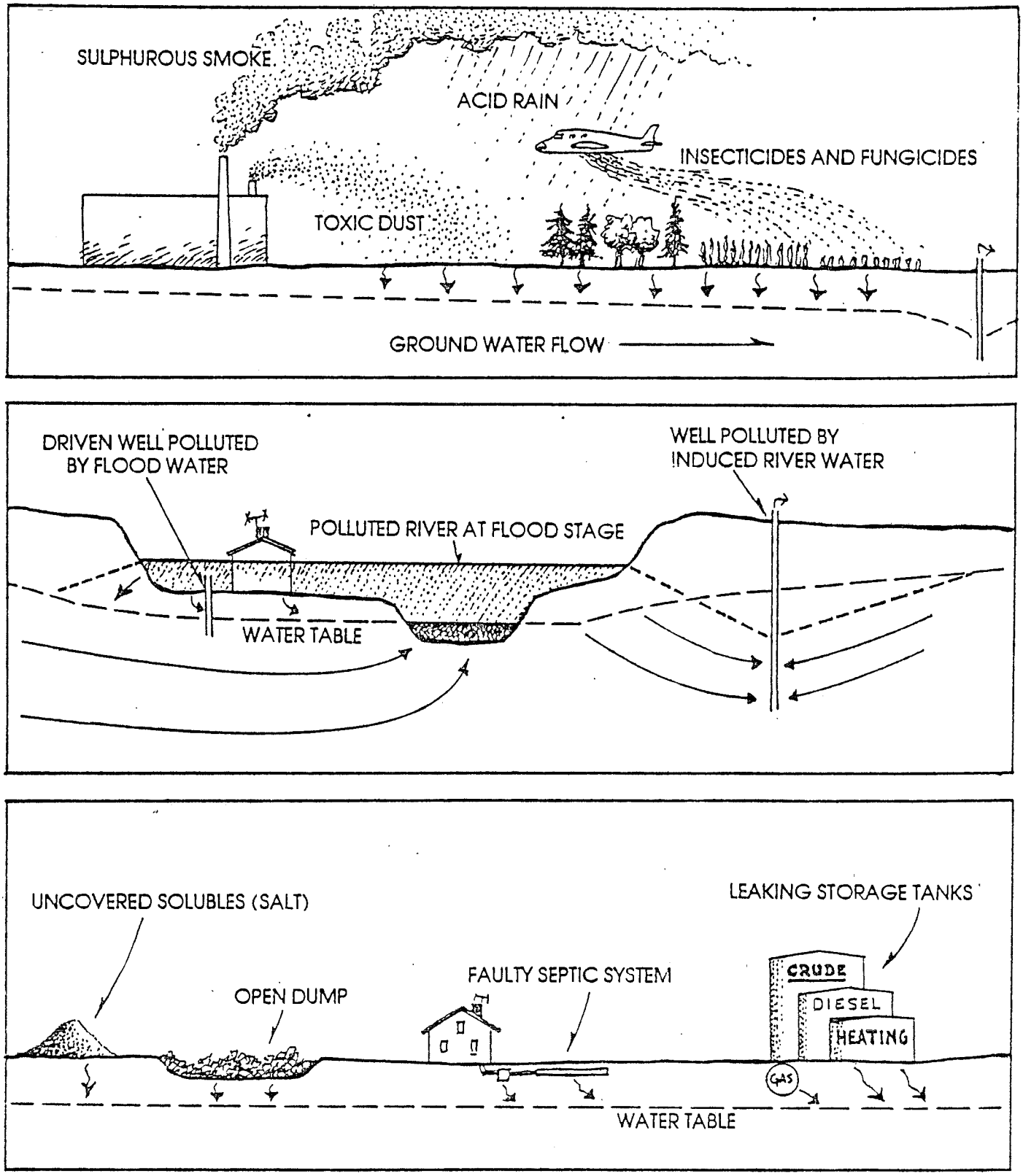

FIG. 2 Mechanisms of ground-water contamination from air, water and land sources.

particular geologic deposit. Much depends on the chemical make-up of both the soil medium and the contaminant. Less permeable substances, especially those containing clays with available ion-exchange sites, are better suited to waste attenuation. Gravel soils are least suitable for this purpose.

Aquifers underlying a thick, unsaturated soil cover are better protected than those with little or no cover. Areas where bedrock fractures have direct openings at the ground surface are especially vulnerable to ground water pollution. Once an aquifer has been polluted, it may take tens to hundreds of years before the contaminant is removed from the flow system. Aquifers, once severely contaminated, can be considered unusable for the foreseeable future.

Natural contamination of ground water also occurs in Maine. Ground water which moves through iron bearing rock or sand and gravel deposits can be very high in iron. When extracted and used this water, due to its iron, may color laundry and have an off-taste. In some coastal areas, excessive pumping of fresh water wells may result in salt water intrusion into the well making the water unfit to drink. Naturally high levels of radon also are found in water extracted from some bedrock wells. When the water is discharged from a faucet radon gas can be released into the air in homes and businesses. This gas may result in increased incidences of cancer.

SECTION IV

MAINE'S GROUND WATER RESOURCES--CURRENT MANAGEMENT, INADEQUACIES OF MANAGEMENT AND RECOMMENDATIONS FOR IMPROVEMENT

The Commission's recommendations for improving the management and protection of Maine's ground water resources are related to four areas of concern:

(1) Aquifer Identification and Research
(2) Protection of Domestic Ground Water Supplies
(3) Aquifer Protection
(4) Protection of Human Health

The following discussion of the recommendations in each of these areas of concern is brief because of the number of recommendations; however, more detailed background information on each recommendation will be available in technical appendices.

Aquifer Identification and Research

A well drilled almost anywhere in Maine will yield some water. However, aquifers which are capable of yielding quantities of water for large-scale municipal and industrial uses are limited in extent. These aquifers are primarily found within the sand and gravel deposits shown in Figure 1; these aquifers cover less than 6% of the state. In some locations, wells drilled into bedrock will yield large quantities of water. The Maine Geological Survey, in conjunction with the U.S. Geological Survey, is identifying and mapping the location of both sand and gravel and bedrock aquifers. All of the major sand and gravel aquifers in the inhabited portion of the state have been identified. Transfer of the field information onto maps has been completed for 30% of the state. The bedrock aquifer mapping program is proceeding more slowly. Bedrock aquifers associated with some major fault zones have been identified.

Major ground water supply sources cannot be protected or used unless they are first identified. Therefore, the Commission recommends passage of an appropriation to the Maine Geological Survey consistent with available resources to accomplish the following objectives:

(1) Map the sand and gravel deposits in the inhabited areas of the State at 1:50,000 scale by the end of 1981.

(2) Map high yield aquifers and aquifer recharge zones (greater than 1 million gallons per day (mgd)) for the same areas, at the same scale, by 1985. This will include reconnaissance bedrock aquifer mapping.

(3) Map moderate yield aquifers (between .3-1 mgd) and aquifer recharge areas by 1995.

(4) Focus public and private research efforts to obtain flow date on a regional scale for key hydrological parameters for "typical" aquifer systems by 1986.

[Legislation to implement this recommendation is contained in Appendix B to this report.]

Once ground water aquifers have been identified there is a need for additional information on their potential safe yield of water and the direction of flow, so that planning for the development and protection of the aquifer can be undertaken. This information is also necessary to better understand how contaminants react in ground water flow systems. Therefore, the Commission recommends that research be conducted to:

a. Identify categories and characteristics of ground water pollutants.

b. Establish the dynamics of ground water contamination.

c. Identify the health and economic implications of ground water contamination.

Protection of Domestic Ground Water Supplies

Currently, the Department of Human Services provides a range of drinking water testing services at cost to the public. Two basic tests are the Safety Test for $9 which examines water supply samples for coliform bacteria, nitrates and nitrites; and the New Water Supply Test for $20 which examines for the above constituents plus chloride, hardness, copper, iron, pH and manganese. However, a test is not currently available to the public to detect the presence of chronic pollutants such as organic compounds. Standard safety test results by the Department of Human Services showed water supplies in East Gray, Maine, to be satisfactory. However, East Gray residents continued to complain of bad odors in their water. A special screening test (not a part of the standard water test) for organic compounds found trichloroethylene and other contaminants in the wells and water supplies. A screening test for chronic pollutants such as organic compounds, heavy metals, and other substances that affect human health would, if any were present in a water sample, alert the water supply owner that further tests should be done to determine the exact pollutants present and the source and mechanism of their entry into the water supply. Therefore, the Commission recommends that:

The Bureau of Health develop a low-cost screening and testing program for chronic pollutants and include it in their basic water test.

One of the most important state programs to protect domestic ground water supplies is the State Plumbing Code. The Code is enforced by local plumbing inspectors in each town.

The problems associated with domestic sewage contamination are far too numerous to cite. Two studies, however, give an indication of the extent of the problem. A 208 study performed by the Androscoggin Valley Regional Planning Commission reported that malfunctioning subsurface disposal systems are a severe problem in the planning area. Approximately 9020 dwellings, and 28,850 inhabitants are served by on-site sewage disposal in this planning area alone. They examined the test results from over 1000 private water supplies. Fully 26% of these supplies were found to contain E. coli bacterial contamination, an indicator of sewage contamination. The York County Individual Water Supply Study performed in 1971-1973 presents strikingly similar data. That study found that 28.7% of the private water supplies tested contained E. coli bacteria at some time during the sampling. Since these water supplies, unlike the Androscoggin Valley data, were selected at random, it must be assumed that they are representative.

Some of these problems may be the result of systems which were installed prior to when the new plumbing code took effect. Other problems are likely due to illegal unlicensed installations and failure to adhere to the code standards. In some situations the code standards may be inadequate. The Code, by requiring adequate septic system design and siting, protects drinking water supplies from bacteria, nitrates, and other potential sources of water supply contamination.

The Commission believes that there is a problem with consistent interpretation and enforcement of the plumbing code across the state. Therefore, the Commission recommends that:

The Bureau of Health increase supervision and enforcement of the State Plumbing Code. Adequate funds and personnel should be provided to the Bureau for enforcement activities to correct the existing uneven enforcement by local plumbing inspectors.

[Legislation to implement this recommendation is contained in Appendix C.]

Two types of septic tank cleaners are currently available. One is an enzyme type and the other is a solvent type. The solvent cleaners contain chemical degreasers such as trichloroethylene (TCE). These cleaners are designed to break up the grease in the septic tank and move it into the leachfield; however, this may result in clogging the leachfield. The solvent type of degreaser is very mobile and may move into the ground water and eventually into nearby wells. TCE is a suspected carcinogen.

Even if TCE-based septic system degreasers are removed from the market, TCE may still enter the ground water because it is used as an industrial solvent and as a degreaser to remove grease from engines and other machines. However, TCE used as a septic tank cleaner poses the most immediate widespread threat to domestic drinking water supplies. Therefore, the Commission recommends that:

> The sale and promotion of halogenated hydrocarbons as degreasers for septic tanks be prohibited.
>
> [Legislation to implement this recommendation is contained in Appendix D.]

Ninety percent of Maine's rural population obtains their domestic water supply from drilled or dug wells; and in some situations from springs or surface water. Improperly constructed wells can result in contamination of the water supply and in some instances the surrounding ground water. The likelihood of water supply contamination is greatest for dug wells because they are usually recharged by surface runoff that may not be adequately filtered by the surrounding soil. There is a substantial record in Maine of improperly constructed wells resulting in contaminated water supplies. There are no laws or regulations regarding well construction in Maine, as there are for the installation of septic systems. The Commission considered recommending that the Bureau of Health with the assistance of the Maine Water Well Drillers Association promulgate mandatory standards for all well construction. However, the Commission felt that this is more of a consumer protection issue. Therefore, the Commission decided not to make a specific recommendation on well construction standards.

Aquifer Protection

To adequately protecting Maine's important ground water aquifers will require both abatement of existing sources of ground water contamination and prevention of new sources.

Although existing sources of ground water contamination may not currently be regulated, or may have been "grandfathered," they can still be controlled or abated under the Protection and Improvement of Waters, Title 38, Chapter 3, Sections 413 and 420. Section 413 states that "no person shall directly or indirectly

discharge or cause to be discharged pollutants without first obtaining a permit from the board (Board of Environmental Protection)." In June of 1979, the Governor signed into law "An Act Relating to the Protection of Ground Water." The Act added a new paragraph to the Protection and Improvement of Waters Act, 38 MRSA §420, which forbids the discharging or spilling, directly or indirectly into ground or surface waters, mercury, toxic or hazardous substances; and radiological, chemical or biological warfare agents. Toxic substances are broadly defined to include any agents that can cause death, disease, abnormalities, cancer, genetic mutations, or physiological malfunctions. Based on this recent amendment, DEP can require complete abatement or stipulate conditions in a license to control any contaminant to ground water which could affect human health. Actions or sources of contamination which can therefore be licensed or abated include: salt piles, solid waste sites, sludge and septage sites, petroleum spills or leaking storage tanks, waste treatment lagoons, pesticide container disposal sites, or any other action which could result in leaching of toxic substances to ground water.

The Department of Environmental Protection generally does not require licensing or abatement of these existing sources of ground water contamination. Therefore, the Commission recommends that:

> The Department of Environmental Protection initiate a vigorous enforcement program to mitigate existing ground water pollution violations under the existing provisions of 38 MRSA Sections 413 and 420.

Sand and gravel aquifers, bedrock aquifers, and the perched ground water table in other areas, can be detrimentally affected by human activities in both the quality and quantity of water obtainable. The major sources of quality degradation result from leaching from surface waste water lagoons, solid waste sites, sludge and septage disposal sites, salt piles, petroleum storage sites where leaks or spills occur, petroleum spills during transfer or transportation, and from other activities that involved the storing, spreading or burying of leachable materials. The major causes of quantity degradation in aquifers result from mining sand and gravel and essentially removing part of the aquifer, reduction in surface water recharge to the aquifer as a result of creating impermeable areas like asphalt parking lots or reducing river flow related recharge, and from excessive water withdrawal from the aquifer.

The Site Location of Development Act (38 MRSA §§48 et seq.) requires a developer to meet 15 standards (where they apply) related to protecting the environment. Two of these standards apply to protecting ground water: (1) no unreasonable adverse effect on ground water quality, and, (2) no unreasonable adverse effect

on ground water quantity. The Site Law generally only requires review for a project which occupies a land or water area in excess of 20 acres, or for structures in excess of 60,000 square feet. Particular types of projects that are smaller than this may still pose a serious contamination threat to ground water. Therefore, the Commission believes that, regardless of size, hazardous activities which consume, generate, or handle hazardous wastes or matter, oil, or quantities of road salt (in excess of one ton per year) should be reviewed under the Site Law when they are proposed to be located over a primary sand and gravel recharge area. This review will assure that the proposed activitity will not pose an unreasonable risk that a discharge to a significant ground water aquifer will occur. Therefore, the Commission recommends that:

> The Site Location of Development Act be amended to prohibit activities that may discharge hazardous pollutants from being sited on primary sand and gravel recharge areas.
>
> [Legislation to implement this recommendation is contained in Appendix E.]

The State's Oil Discharge Prevention and Pollution Control Act, 38 MRSA §§541 et seq., only licenses and regulates oil handling and storage facilities of a capacity greater than 500 barrels and which receive or transfer oil to or from vessels using the waters of the State. The Act requires regulated facilities to have prevention plans in case of oil spills, equipment to clean up spills, and requires that spills be reported to the Department of Environmental Protection when they occur. In 1979, there were 19 oil spill incidents from regulated facilities with a combined volume of 26, 130 gallons. In that same year, there were 174 oil spill incidents with a combined volume of 39,250 gallons not regulated under the Oil Conveyance Act. Most of these spills were at inland locations such as industrial facilities, bulk plants, and service stations. To control the occurrence of oil spills at inland locations the Commission recommends that:

> The Department of Environmental Protection promulgate rules for best management practices for all facilities used or capable of being used for storing more than 500 barrels of petromeum products to reduce the risk of ground water contamination from these facilities. The management practices should emphasize available, economically feasible methods, and a minimum regulatory process. The Department of Environmental Protection should form a task force of interested persons to develop these rules.

There are approximately 200 local fuel storage depots and more than 2,200 retail gasoline facilities in the state. In 1979, there were 53 spills or leaks from these facilities with a combined loss of 18,860 gallons of petroleum product. The loss of petroleum and pollution of ground water, particularly from leaking underground storage tanks, could be avoided or abated if leak detection devices were installed on or near tanks.

Leak detection devices can be installed under or on top of tanks at a cost of around $300. Small diameter PVC plastic pipe wells can be installed under tanks with the pipe exposed at the surface of the ground. Water samples can be drawn up from the bottom of the pipe and analyzed for the presence of petroleum. Leak detection gauges can also be installed on top of tanks. A 5,000 gallon tank costs about $5,000. For $500 a liner can be installed under a tank of this size to contain a leak.

Without a leak detection device, it is not possible to tell if a tank is leaking until a water supply well is found contaminated. There have been several incidents discovered in the last few years where leaking petroleum storage tanks have contaminated water supply wells. More incidents can be expected, because the Department of Environmental Protection estimates that there are 15,000 underground petroleum storage tanks in the state that are reaching the end of their useful life. Once ground water is contaminated by petroleum, it will usually require decades before the petroleum is dissipated. Therefore, the Commission recommends that:

> There be a requirement for the installation of a leak detection device on or in the proximity of all new and existing petroleum storage tanks of more than 5,000 gallons capacity.

The Commission recognizes that some petroleum and other hazardous substances spills will occur, regardless of the best precautions taken. The Commission supports the creation of a revolving fund to finance the cleanup and removal of hazardous wastes. The Commission recommends that:

> A revolving fund to clean up and remove hazardous wastes spills be created with the following provisions:
>
> 1. The fund not duplicate provisions of the recently enacted Federal Fund.
>
> 2. Revenues for the fund be collected from those who create the problems. To accomplish this, fees should be assessed from generators on a sliding scale based on:

a) the toxicity of the waste;

b) the degradability of the waste;

c) the historical record of spills for that industry or activity; and

d) the volume of waste handled.

Holding ponds and lagoons are used for treatment of both domestic sewage and industrial wastes. In Maine, more precipitation than evaporation occurs so that most surface impoundments have either a surface discharge or allow wastes to infiltrate to ground water. Some of the materials placed in lagoons are toxic. The Department of Environmental Protection (DEP) reviews the siting of surface impoundments on a case-by-case basis. DEP does not have standards which specify lagoon bottom permeabilities, wall (dike) strengths, or overflow plans. Such standards would enable DEP to evaluate the merits of specific proposals. DEP does have regulations regarding the closing of lagoons. Because of the potential for contamination of ground water from surface liquid waste treatment systems, the Commission recommends that:

That the Department of Environmental Protection promulgate rules for best management practices for siting, design, and performance of new holding ponds and lagoons, and performance criteria for existing holding ponds and lagoons. These rules should use available, economically feasible engineering techniques and maximum flexibility to provide for reasonable protection and a minimum regulatory process. The Department of Environmental Protection should form a task force of interested persons to develop these rules.

Maine has sufficient supplies of clean ground water to meet its current needs. Because of the water supply treatment requirements of the State and Federal Safe Drinking Water Act, ground water is a more economical supply source than surface water. Therefore, there will be a increasing reliance by Maine communities on ground water as a source for domestic water supply. Areas to the south of Maine, such as southern New Hampshire and eastern Massachusetts, already have water supply shortage problems, and as a result they may seek supplemental sources of supply from Maine. It is most likely that because of the volume of water that will be required to meet the needs of these areas that they will be interested in exporting surface water from Maine. However, proposals for ground water export are also possible. The Commission considered recommending that new legislation be introduced to provide the State the authority to regulate future out-of-state export of water. However, the Commission believes that this is not necessary. Proposals for water export would likely receive review under the Site Law, and the Legislature when it is in session could prohibit such export if it wants to.

The Commission also considered the desirability of statewide legislation that would provide for complete protection of aquifers through land use zoning. However, the Commission decided to leave this approach to the discretion of individual municipalities. The proposed amendments to the Site Law will at least prohibit hazardous activities that may discharge to ground water from locating over aquifers. Other land use activities that have detrimental affects on ground water may still occur. Municipalities may under their municipal police powers enact aquifer protection ordinances. These ordinances can delineate on a map where an aquifer is in the town, and specify prohibited and conditionally permitted activities over the aquifer. A few towns already have enacted such ordinances.

Protection of Human Health

Ground water protection is not undertaken for its own sake--it is for the benefit of people. Therefore, the Commission on several occasions discussed the health consequences of ground water pollution. In fact, much of the public concern about ground water is based on the fact that ground water pollution (both natural and artificial) may contain hazardous chemicals, even including known carcinogens such as halogenated organic compounds and radon.

Of course, protection of the ground water will also protect the health of people who use it. Maine has a relatively high incidence of chronic diseases, but the cause is unknown. In particular, it is not known whether ground water quality is a factor. Unfortunately, it is very difficult to assess the health effects of low level ground water pollution, even in a well known case like that in East Gray.

Some protection is provided by State and Federal drinking water standards, but the standards themselves are subject to revision as new information becomes available. However, revision often lags years behind the introduction of new chemicals into the environment, and EPA gives priority to the ones of greatest national concern. These are not necessarily the ones of greatest concern in the State of Maine. As a result, it would be beneficial to have an independent capability in the State to assess the environmental health consequences of ground water pollution.

An environmental health unit could establish the relationship between chronic disease and drinking water supply contamination through the use of statistical health data, long before the connection could be made using more traditional methods, such as water quality analysis alone. The Commission endorses the establishment of a state environmental health and epidemiology capability. The Commission understands that the Governor will introduce a bill in 1981 to do this. Although the Commission is not prepared to comment on the best institutional arrangement,

it seems clear that an approach that makes use of resources both outside and within State government will have the greatest potential for success. Legislation should be passed to implement an environmental health program, and that program should include ground water problems as one of its primary concerns. Therefore, the Commission recommends that:

> An environmental health and epidemiology capability be established in the State to evaluate the health effects of chronic pollutants in ground water, and to evaluate the health implications of contamination incidents and recommend an appropriate response.

APPENDIX A

AN ACT RELATING TO THE PROTECTION OF GROUND WATER

APPROVED JUN 21 '79 BY GOVERNOR

CHAPTER 43 P & S LAW

STATE OF MAINE

IN THE YEAR OF OUR LORD NINETEEN HUNDRED SEVENTY-NINE

S. P. 397 — L. D. 1215

AN ACT to Create a Ground Water Protection Commission to Review the Laws Dealing with Ground Water.

Be it enacted by the People of the State of Maine, as follows:

Sec. 1. Commission established. There is created a Ground Water Protection Commission, hereinafter known as the "commission."

Sec. 2. Administration. The Land and Water Resource Council shall provide staff support to the commission and administer its functions.

Sec. 3. Membership. The commission shall be composed of 15 members, as follows: One member from the Maine Geological Survey, one member from the Department of Human Services, one member from the Department of Environmental Protection, one member who is a municipal official, one member from a regional planning agency, one member of the Joint Standing Committee on Judiciary, one member of the Joint Standing Committee on Energy and Natural Resources, 4 members representing industry and 4 members from the general public. One member representing industry shall be from a water company and one shall be a well driller. One member from the general public shall be admitted to the Maine Bar Association, and one shall be a member of a statewide environmental organization.

Sec. 4. Appointment. The members shall be appointed as follows: The member from the Maine Geological Survey shall be appointed by the State Geologist. The members from the Departments of Human Services and Environmental Protection shall be appointed by their respective commissioners. A well driller shall be appointed by the Maine Well Drillers Association and a member representing a water company shall be appointed by the Maine Water Utility Association. One municipal official, one member of the Joint Standing Committee on Energy and Natural Resources, one member representing industry and 2 members from the general public, including a member of an environmental organization, shall be appointed by the President of the Senate. One member from a regional planning agency, one member of the Joint Standing Committee on Judiciary, one member representing industry and 2 members from the general public, including a member of the Maine Bar Association, shall be appointed by the Speaker of the House. The members shall be appointed in a timely manner and the commission shall hold an organizational meeting within 30 days after the adjournment of the Legislature at the call of the Chairman of the Legislative Council. At this meeting, the commission shall elect a chairman and a vice-chairman from within the membership.

Sec. 5. Duties. The commission shall:

1. **Ground water contamination.** Identify recent documented cases of significant ground water contamination, and where possible, determine the sources of the contamination;

2. **Information gathering and analysis.** Review the existing organization for the collection and analysis of ground water information and evaluate its adequacy;

3. **Existing regulations.** Review the existing federal, state and local regulations protecting ground water; and

4. **Other studies and evaluation.** Make any other studies and evaluations necessary to fully assess existing laws and information relating to ground water conservation and protection.

Sec. 6. Reports. The commission shall present its findings, together with any suggested legislation, to the First Regular Session of the 110th Legislature.

Sec. 7. Compensation of members. Members, except state employees, shall receive reimbursement for the necessary actual expenses incurred in carrying out their duties.

Sec. 8. Assistance. All executive departments are directed to give prompt assistance to the commission.

Sec. 9. Acceptance of funds. The commission is authorized to accept funds from any agency of the United States, from any private foundation and from any other public or private source for the purposes of carrying out this Act.

Sec. 10. Appropriation. The following funds shall be appropriated from the General Fund to carry out the purposes of the Act.

	1979-80
GROUND WATER PROTECTION COMMISSION	
All Other	$5,000

APPENDIX B

LEGISLATION TO FUND THE MAINE GEOLOGICAL SURVEY FOR GROUND WATER AQUIFER MAPPING

Legislation to Implement Recommendation #1:

AN ACT to Appropriate Funds to the Maine Geological Survey for Ground Water Aquifer Mapping.

Be it enacted by the People of the State of Maine, as follows:

Appropriation. The following funds are appropriated from the General Fund to carry out the purpose of this Act.

	1981-1982	1982-1983
DEPARTMENT OF CONSERVATION		
Geological Survey		
All Other	$25,000	$25,000
Total	$25,000	$25,000

STATEMENT OF FACT

This bill is one of the recommendations of the Ground Water Protection Commission. It establishes an annual appropriation of $25,000 to the Maine Geological Survey for sand and gravel and bedrock aquifer mapping.

APPENDIX C

LEGISLATION TO PROHIBIT THE SALE AND PROMOTION OF HALOGENATED HYDROCARBONS AS SEPTIC TANK CLEANERS

Legislation to Implement Recommendation #2:

AN ACT to Prohibit the Sale and Promotion of Halogenated Hydrocarbons as Septic Tank Cleaners.

Be it enacted by the People of the State of Maine, as follows:

38 MRSA §1602 is enacted as follows:

§1602. Chemical septic tank cleaners

No person may sell, offer to sell or commercially promote the use of any chemical solvent containing halogenated hydrocarbon compounds as septic tank cleaners or degreasers.

STATEMENT OF FACT

This bill is one of the recommendations of the Ground Water Protection Commission. Some chemical solvents containing halogenated hydrocarbons are sold as septic tank cleaners and degreasers. These chemicals leach out of septic systems and enter the ground water. The chemicals are very persistent, and can cause cancer. This bill prohibits the sale or promotion of these chemicals for use in septic systems.

APPENDIX D

LEGISLATION TO AMEND THE SITE LOCATION OF DEVELOPMENT ACT TO PROTECT GROUND WATER

Legislation to Implement Recommendation #3:

AN ACT to Amend the Site Location of Development Law to Protect Ground Water.

Be it enacted by the People of the State of Maine, as follows:

Sec. 1. 38 MRSA §481 is amended by adding the following after the first paragraph:

The Legislature further finds that certain geological formations, particularly sand and gravel deposits, contain large amounts of high quality ground water. The ground water in these formations is an important public and private resource, for drinking water supplies and other industrial, commercial and agricultural uses. The ground water in these formations is particularly susceptible to injury from pollutants, and once polluted, may not recover for hundreds of years. It is the intent of the Legislature, therefore, that activities that discharge or may discharge pollutants to ground water may not be located on these formations.

Sec. 2. 38 MRSA §482, sub-§2, first ¶ is amended to read:

2. Development which may substantially affect the environment. "Development which may substantially affect the environment," in this Article called "development," means any state, municipal, quasi-municipal, educational, charitable, commercial or industrial development, including subdivisions, which occupies a land or water area in excess of 20 acres, or which contemplates drilling for or excavating natural resources, on land or under water where the area affected is in excess of 60,000 square feet, or which is mining activity, or which is a hazardous activity, or which is a structure; but excluding state highways, state aid highways, and borrow pits for sand, fill or gravel, of less than 5 acres, or when regulated by the Department of Transportation.

Sec. 3. 38 MRSA §482, sub-§2-B is enacted to read:

2-B. Hazardous activity. "Hazardous activity" means any activity that consumes, generates or handles any of the following:

A. hazardous wastes, as defined in section 1303;

B. hazardous matter, as defined in section 1317;

C. oil, as defined in section 542; or

D. quantities of road salt in excess of 1 ton per year.

This definition shall not include an expansion of an existing activity unless that expansion by itself would be a hazardous activity.

The board shall identify by regulation activities that are exempt from this definition, including domestic and other uses of substances in quantities too small to present a significant risk of ground water contamination.

Sec. 4. 38 MRSA §482, sub-§4-A-1 is enacted to read:

4-A-1. Primary sand and gravel recharge areas. "Primary sand and gravel recharge area" means the surface area directly overlying sand and gravel formations that provide direct replenishment of ground water in sand and gravel and fractured bedrock aquifers. The term does not include deposits that have been identified as unsaturated and are not contiguous with saturated deposits.

Sec. 5. 38 MRSA §482, sub-§4-C is enacted to read:

4-C. Significant ground water aquifer. "Significant ground water aquifer" means a porous formation of ice-contact and glacial outwash sand and gravel that contains significant recoverable quantities of water, which is likely to provide drinking water supplies.

Sec. 6. 38 MRSA §483 is repealed and the following enacted in its place:

§483. Notification required; commission action; administrative appeals

1. Preliminary notice.

A. Any person intending to construct or operate a hazardous activity shall file a preliminary notice of intent with the department and the municipal officers of any municipality affected. The preliminary notice shall contain a brief description of:

(1) the nature of the proposed development; and

(2) the location of the proposed activity.

Any person intending to construct or operate any other development may file this preliminary notice.

B. The department shall determine whether the proposed development is likely to discharge pollutants to ground water, and whether the proposed location of the development is on a primary sand and gravel recharge area. The department shall make this determination and notify the applicant within 15 days of the receipt of the preliminary notification. If either of these determinations are affirmative, or if requested by the relevant municipal officers, the applicant must then provide, as part of the notice under subsection 2, detailed information on:

(1) the nature and extent of the ground water aquifer, including recharge areas and flow paths;

(2) the quality and quantity of the ground water;

(3) existing and potential uses of the aquifer;

(4) the nature and quantity of potentially hazardous materials to be handled; and

(5) the nature and quantity of pollutants to be discharged.

C. An applicant shall not be required to file the notice under subsection 2 if both determinations in paragraph B are negative, and the applicant is not otherwise required to proceed by this subchapter.

2. Application. Any person intending to construct or operate a development shall, before commencing construction or operation, notify the board in writing of his intent and of the nature and location of the development, together with other information as the board may by regulation require. The board shall within 30 days of receipt of such notification, either approve the proposed development, upon such terms and conditions as are appropriate and reasonable, or disapprove the proposed development setting forth the reasons therefor or schedule a hearing thereon in the manner hereinafter provided.

Any person as to whose development the board has issued an order without a hearing may request, in writing, within 30 days after notice, a hearing before the board. This request shall set forth, in detail, the findings and conclusions of the board to which such person objects, the basis of the objections and the nature of the relief requested. Upon receipt of such request, the board shall schedule and hold a hearing limited to the matters set forth in the request. Hearings shall be scheduled in accordance with section 484.

Sec. 7. 38 MRSA §484, sub-§5 is enacted to read:

5. Ground water. The proposed development will not pose an unreasonable risk that a discharge to a significant ground water aquifer will occur.

STATEMENT OF FACT

This bill is one of the recommendations of the Ground Water Protection Commission. The purpose of the bill is to discourage siting hazardous activities on the direct recharge areas above sand and gravel aquifers. Sand and gravel aquifers yield high quantities of water for municipal drinking water and industrial uses, and cover only about 6.3 percent of the surface of the State. While all ground water supplies should be protected, sand and gravel aquifers are particularly important because of their high potential yield, and because they are very susceptible to contamination.

APPENDIX E

LEGISLATION TO IMPROVE

ENFORCEMENT OF THE PLUMBING CODE

Legislation to Implement Recommendation #4.

AN ACT to Improve Enforcement of the Plumbing Code

Be it enacted by the People of the State of Maine, as follows:

Sec. 1. 22 MRSA §42, sub-§3, 2nd ¶ is amended to read:

Any person who violates the rules and regulations adopted under this subsection, or who violates a municipal ordinance adopted pursuant to Title 30, section 3221 ~~shall be punished by a fine of not less than $100 nor more than $500 for each offense.~~ or uses a subsurface sewage disposal system not in compliance with applicable rules commits a civil violation for which a forfeiture of not less than $100 nor more than $1,000 may be adjudged.

Sec. 2. 30 MRSA §3223, sub-§1-A is enacted to read:

1-A. Penalties. Any person who installs or orders the installation of any subsurface sewage disposal system without the permit required under this section commits a civil violation for which a forfeiture of not less than $100 nor more than $1,000 may be adjudged.

STATEMENT OF FACT

This bill is one of the recommendations of the Ground Water Protection Commission. Plumbing Code violations are a serious threat to ground water supplies and public health.

In some areas of the State, municipalities are not adequately enforcing the plumbing code. In some cases where towns have tried to enforce the code, trivial penalties have been levied, usually against the contractor rather than the owner of the system.

This bill makes it clear that it is illegal to use an improper septic system, or to order the installation of such a system without the required permits. It also increases the maximum fines from $500 to $1,000.