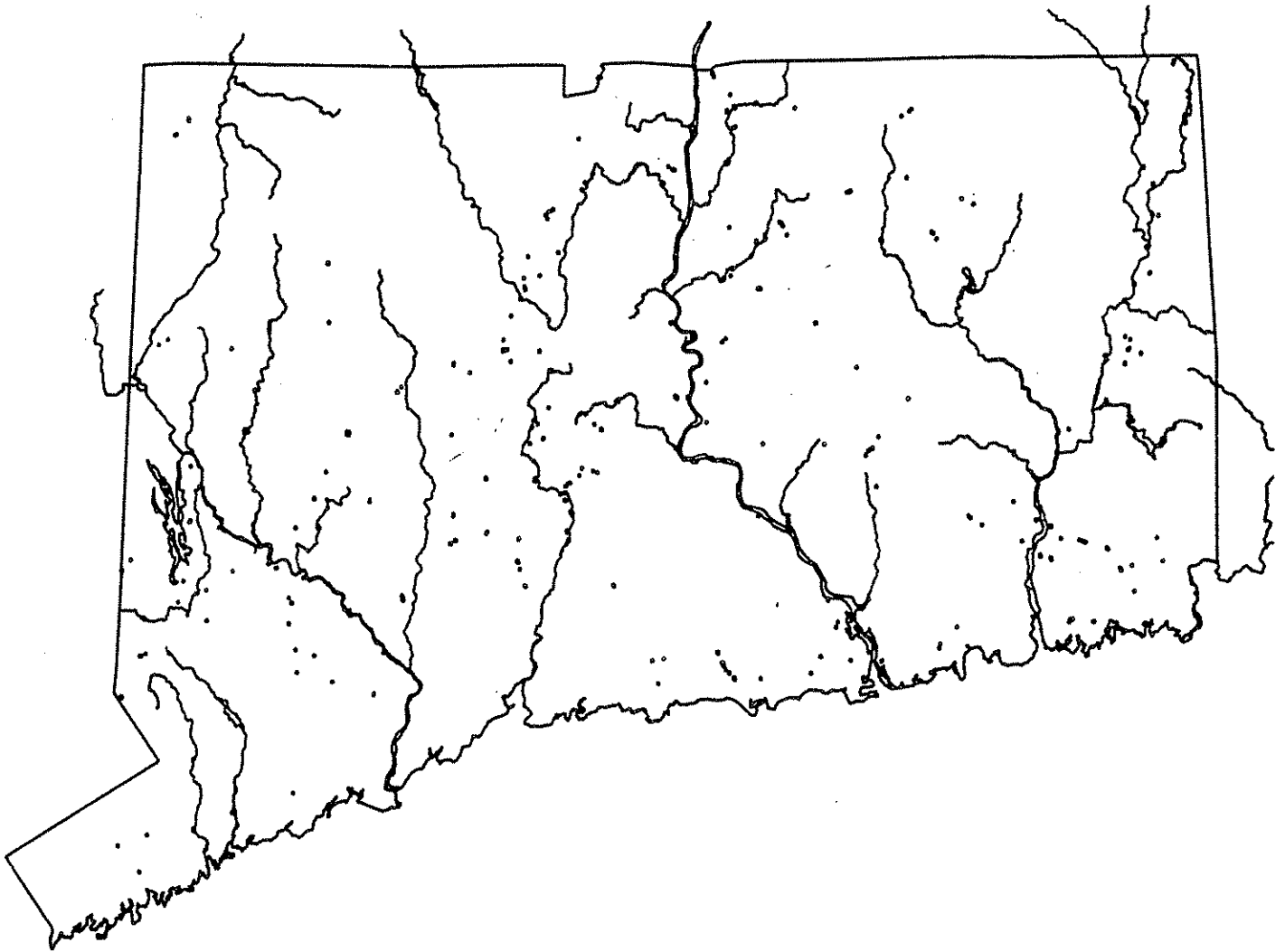


REPORT OF THE
**AQUIFER PROTECTION
TASK FORCE**



FEBRUARY 15, 1989

1988-89 AQUIFER PROTECTION TASK FORCE

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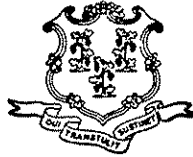
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February 15, 1989

TO: Governor William A. O'Neill
Connecticut General Assembly

FROM: Senator Michael P. Meotti
Representative Thomas P. Luby

Pursuant to P.A. 88-324 we, hereby, transmit to the Governor and
the Connecticut General Assembly, the 1989 Report of the Aquifer
Protection Task Force.

ACKNOWLEDGEMENTS

The Task Force would like to thank all those individuals and organizations who expressed their interest, related their concern, and imparted their knowledge to the Task Force.

Our appreciation also extends to Armando Carbonell, Executive Director of the Cape Cod Planning and Economic Development Commission for his expertise and informative presentation; to Ron Gehl and his associates at TRC Environmental Consultants for their participation and availability for technical information; and to the Towns of Manchester and Glastonbury for hosting the Task Force and providing valuable perspective to our work.

To Fred Banach and Diane Mayerfeld of the State Natural Resource Center go unbounded thanks for their professional expertise and consistent hard work on behalf of the Task Force.

PRELUDE

This report represents an exhaustive consideration of the complex and often technical issues related to protecting Connecticut's present and future drinking water supplies. The intention of the Task Force is to direct this report to the broadest possible audience, as protection of present and future drinking water supplies involves the participation of every Connecticut citizen.

Connecticut citizens have enjoyed a long history of readily available and good quality drinking water. A decade ago, state planners had many potential reservoir sites identified for development as public water supplies. With the tremendous growth Connecticut has experienced during successive years, many of these sites are no longer available. The high costs of reservoirs, as well as user conflicts over the few suitable river sources, is making groundwater the primary choice for future drinking water supplies. Unfortunately, developmental pressures and incidents of contamination are rapidly encroaching on these potential drinking water sources as they have on once promising reservoir sites.

We are fortunate that Connecticut has a plentiful supply of groundwater in many areas of the state. The increasing importance of groundwater as a present and future supply of drinking water makes it one of our state's most valuable natural resources. Unfortunately, such an abundance of a natural resource often leads to complacency among those of us who utilize and depend on it. It is easy to forget that as present citizens of Connecticut, we are charged with using its natural resources wisely and with preserving them for use by future generations.

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EXECUTIVE SUMMARY

State government has a fundamental responsibility to protect public drinking water supplies. Over one million Connecticut residents rely on groundwater as their source of drinking water. This groundwater is extracted through wells from underground water supplies known as aquifers. Unfortunately, over 1300 incidents of public or private water supply well contamination have been documented during the past ten years, occurring in nearly two-thirds of the State's municipalities.

With Connecticut experiencing continued growth in its economy and mounting pressures for further development of open space, incidents of drinking water contamination are likely to occur with increasing frequency. Additionally, new areas are being developed without regard to their potential as a future supply of drinking water. Though numerous communities have made efforts to protect their groundwater supplies, consistent and effective protection of groundwater drinking water supplies will require state action.

In the last decade, Connecticut's state government has begun to address the problem of groundwater protection. The 1987 DEP report, "Protection of High and Moderate Yield Stratified Drift Aquifers", made available the first inventory of Connecticut's largest aquifers, identified known and potential contamination threats, and set forth numerous policy issues to be confronted in an effort to protect groundwater supplies. That report triggered the formation of this Task Force by the Legislature in the Spring of 1987.

In its first year, the Task Force concluded that Connecticut must develop a comprehensive regulatory framework to protect public drinking water supplies and determined that a prerequisite for implementing such a protection program was a statewide mapping effort of stratified drift aquifers. In 1988, the Legislature passed an act requiring medium and large utilities to map stratified drift aquifers used for public water supply and authorized the Task Force to develop further recommendations for protecting these resources.

This year, the Task Force focused on constructing the regulatory framework which should include minimum state protection standards for the most sensitive aquifer areas as they are identified through the mapping process.

This report presents the findings of the Task Force and includes the following major recommendations:

FIRST PHASE RECOMMENDATIONS REQUIRING FUNDING

1. Authorize and require the Department of Environmental Protection to:

- o Develop regulations and performance standards for existing land uses to be implemented by municipalities in Aquifer Protection Areas;
- o Develop a schedule of compliance for existing non-conforming uses in Aquifer Protection Areas;
- o Develop regulations and performance standards for future land uses to be implemented by municipalities in Aquifer Protection Areas;
- o Develop an administrative exemption procedure for prohibited uses which, for special reasons, do not pose contamination risks to existing or future water supplies;
- o Develop, in conjunction with DOHS, a statewide education program on groundwater protection which should involve utilities, public service organizations, state education institutions, environmental and other non-profit organizations, regional planning agencies, municipal groups, corporate leaders and the regulated community;
- o Develop a program in conjunction with DOHS and the water utilities to provide technical assistance to regional health districts, municipalities, and the regulated community for implementing all aspects of the program;
- o. Develop in conjunction with DOHS, water utilities, and the regulated community, a strategic groundwater monitoring plan to be implemented within one year of completion of level A mapping;
- o Develop a model aquifer protection ordinance and a procedure for approving local ordinances to ensure consistency and compliance with minimum state standards;
- o Direct farms located within Aquifer Protection Areas to develop and implement Farm Resource Management Plans;
- o Enforce state minimum standards in municipalities which do not institute acceptable protection ordinances for Aquifer Protection Areas;
- o Work with the Department of Transportation to develop protection programs for public wells near interstate highways and state roads
- o Develop a positive incentive program to provide recognition for successful efforts within the regulated community to promote protection of public drinking water resources;

- o Develop in conjunction with DOHS and DPUC land acquisition guidelines for lands surrounding existing or proposed public water supply wells and to encourage acquisition of title and development easements;
 - o Develop amendments to the water diversion policy act to permit the reservation of diversion rights by utilities engaged in the mapping and water supply planning process;
2. Adequately fund the use of DEP's Geographic Information System (GIS) to support the Aquifer Protection Program.
 3. Authorize funding of research into bedrock aquifers.

FIRST PHASE RECOMMENDATIONS NOT REQUIRING FUNDING

1. Require municipalities to designate Aquifer Protection Areas and to adopt regulations in accordance with minimum state guidelines;
2. Require municipalities to notify the appropriate utility of any pending land use applications within Aquifer Protection Areas;
3. Require utility mapping of future stratified drift public water supplies upon approval of individual water supply plans but before completion of regional plans if no jurisdictional issue exists;
4. Require DEP and other government agencies to provide high priority to aquifer protection in their ongoing programs for land acquisition, land management, water quality classification, and environmental enforcement;
5. Require water utilities to prepare municipal technical assistance programs;
6. Require municipalities to complete land use inventories within one year of receipt of approved level B maps;
7. Require DEP to work with federal agencies to prioritize federal resource related protection efforts in Connecticut;
8. Require one municipal designee from each municipality containing a present or proposed public water supply well in stratified drift aquifer to receive technical training on aquifer protection through DEP or other DEP approved training programs prior to municipal adoption of aquifer protection ordinances;

9. Require existing agricultural cost-sharing programs to include development of individual resource management plans;
10. Require inspection and enforcement coordination among DEP, DOHS, municipalities, utilities, and regional health districts utilizing DEP's delegation statute where appropriate;
11. Authorization for water utilities to explore state owned lands for the purpose of determining their potential as future public drinking water supplies;
12. Require DOHS to review the resources currently committed to the water planning process and to redirect current resources to this program where feasible; and
13. Authorize DOHS to take measures to expedite the approval procedure for the individual water supply plans.

RECOMMENDATIONS FOR FUTURE LEGISLATION

1. Supplemental Funding of existing agricultural cost-sharing plans commensurate with estimated agricultural lands located within Aquifer Protection Areas;
2. Funding for expansion of the Geographic Information System's role in mapping delineated aquifers as well as analyzing aquifer and other land use information;
3. Funding to DEP for conducting research in developing better modeling techniques for Aquifer Protection Areas in fractured bedrock conditions; and
4. Implement acquisition recommendations developed by DEP and DOHS including funding if required.

RECOMMENDED AMENDMENTS TO PUBLIC ACT 88-324

Require public or private water supply companies serving between one thousand and ten thousand persons to complete level A mapping of existing stratified drift wells by July 1, 1994;

Require public and private water supply companies serving between one thousand and ten thousand persons with potential wellfields identified and approved as a future water supply source, complete level B mapping two years and level A mapping five years subsequent to approval of the plan;

Authorize the Commissioner of Environmental Protection to map at level B, all potential wellfields located in stratified drift aquifers;

Authorize mapping of public and private water supply wells to commence subsequent to approval of individual water supply plans where no jurisdictional conflicts exist.

RECOMMENDED AMENDMENT TO DOHS WATER SUPPLY LEGISLATION

1. Require the reports of the Water Utility Coordinating Committees to specify recommendations for land acquisition for lands surrounding proposed stratified drift wells.

THE AQUIFERS

An aquifer is any set of geologic conditions which allows for the withdrawal of water from the ground in useable quantities. Connecticut is blessed with such geologic conditions in many areas of the state. In specific areas, such reserves are sufficient to supply thousands of Connecticut citizens with their daily water needs.

There are two principle types of aquifers in Connecticut. Bedrock aquifers are composed of hard rock which has been fractured and faulted over millions of years. These fractures and faults provide "channels" through which groundwater flows. Bedrock underlies the entire state of Connecticut. While they are geographically wide spread, bedrock aquifers generally have a low yield. They represent the principal water source for most private wells in rural and suburban areas.

Stratified drift aquifers are the highest yielding groundwater sources in Connecticut. They are composed of unconsolidated sands and gravels of glacial origin transported and deposited by streams and rivers. Most stratified drift deposits in the state's uplands appear as long thin bands, while in the lower lying and broad river valleys, they may be quite extensive and deep. The water drawn from these stratified drift aquifers is generally of excellent quality.

Figure 2 illustrates in cross-section, a typical stratified drift aquifer. The aquifer, having been developed as a drinking water supply, is delineated into four regions:

Wellfield: The area immediately surrounding the well and the region where the water supply is most vulnerable to contamination.

Area of Contribution: The region where the water table is lowered due to the pumpage of the well. Water in the Area of Contribution flows directly to the well, making the well highly susceptible to any contamination occurring in the area. Typically 20 - 100 acres.

Recharge Area: The area from which groundwater flows directly to the Area of Contribution.

Indirect Recharge Area: The area which contributes surface water to the Area of Contribution.

Three of these regions - the wellfield, the area of contribution and the recharge area comprise the sectors in which a chemical spill presents the most direct threat to a well. Thus, these regions comprise the area to be designated an "Aquifer Protection Area".

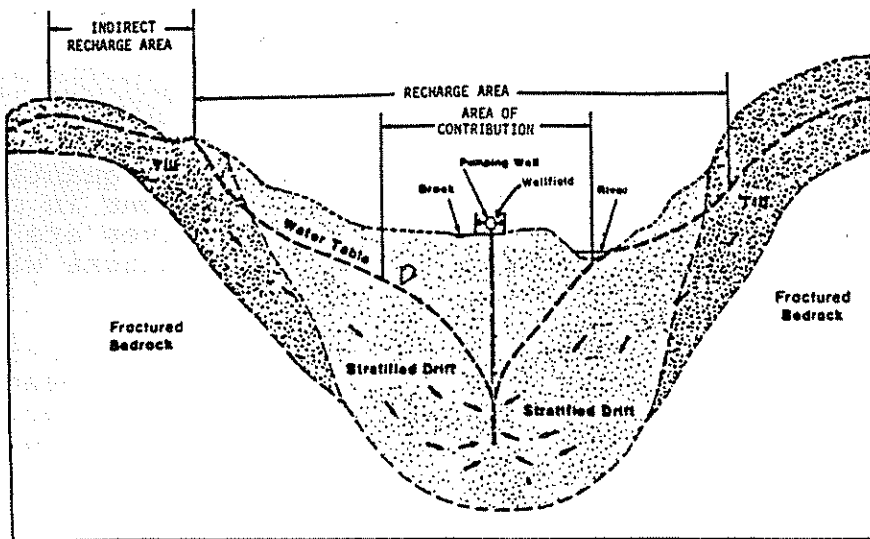


FIGURE 2: CROSS-SECTION, STRATIFIED DRIFT AQUIFER

Table 2 sets forth the number of public water supply wells in Connecticut which extract water from stratified drift aquifers.

TABLE 2

STATE OF CONNECTICUT
PUBLIC WATER SUPPLY WELLS IN STRATIFIED DRIFT AQUIFERS

| Number of Community Water Systems Served | Total Withdrawal (MGD) | Number of Stratified Drift Wells | Approximate Number of Wellfields |
|------------------------------------------------|------------------------------|----------------------------------------|----------------------------------------|
| 157 | 55.0 | 480 | 240 |

Figure 3 illustrates locations of public water supply wells in stratified drift aquifers.

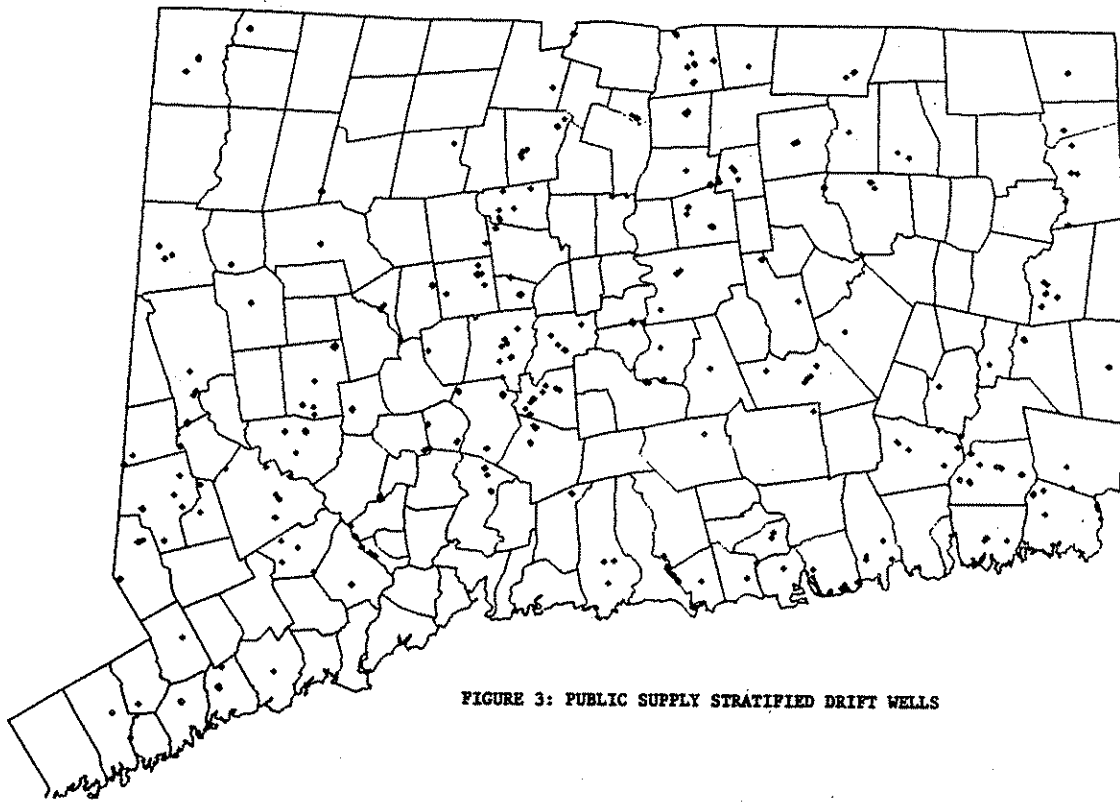


FIGURE 3: PUBLIC SUPPLY STRATIFIED DRIFT WELLS

GROUNDWATER CONTAMINATION - A STATEWIDE PROBLEM

Connecticut's highly urbanized and industrialized nature has resulted in numerous instances of well water contamination including many public water supply wells. Since 1980, the groundwater supplies of more than 150,000 people have been contaminated. There have been 1,332 documented incidents of well pollution in the last decade. Groundwater contamination has been found in every town, and 116 of the State's 169 towns have experienced public or private well contamination (Figure 4).

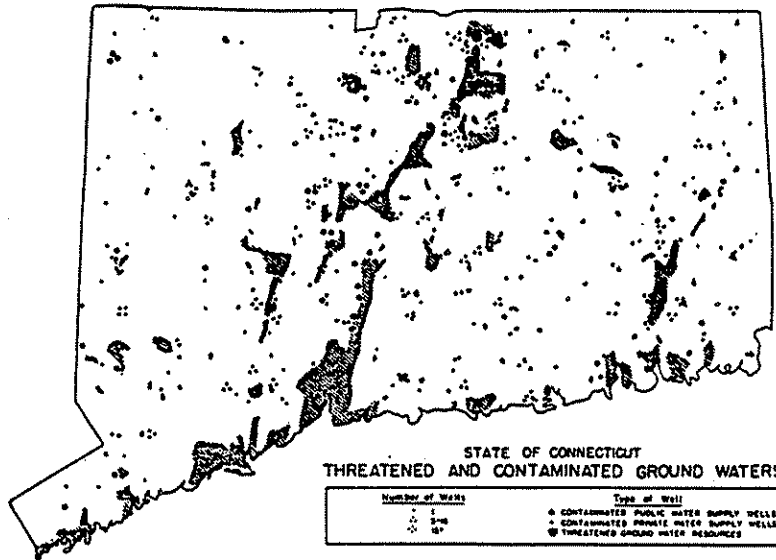


FIGURE 4

Table 3 identifies the various types of materials responsible for well pollution. Pesticides and nitrates are agriculture related. Solvents are the result of industrial and commercial land uses and activities.

TABLE 3

Occurences of Known Groundwater Contamination By Type 1979 - 1988

| <u>Type</u> | <u>Number of Occurences</u> |
|---------------------------------------|-----------------------------|
| Pesticides | 387 * |
| Nitrates | 95 |
| Solvents | 292 |
| Landfill Leachate | 176 |
| Gas and Oil | 245 |
| Road Salt (sodium) | 111 |
| Other | 26 |
| TOTAL KNOWN WELLS CONTAMINATED | 1,332 |

*(Note: 339 wells are contaminated by the pesticide EDB)

REMEDATION

In recent years, many chemical spills posing a threat to groundwater have been addressed through remediation efforts. The effectiveness of these clean-up efforts principally depends on the chemical involved, the time gap between spill and detection, and the subsurface material involved. The Task Force investigated the costs and technology associated with remediation in order to evaluate its viability as a vehicle for protection. As part of this investigation, the Task Force was given numerous case studies, a portion of which is listed in table 4.

TABLE 4: AQUIFER REMEDIATION CASE STUDIES

- o PROBLEM: EDB/EDC contamination of 25 domestic wells.
SOLUTION: Abandon wells, connect 25 homes to public water supply.
COST: \$30,000 investigation, \$420,000 for connection
- o PROBLEM: Leaking underground gasoline storage tanks (volatile organic compounds)
SOLUTION: Soil vapor extraction, groundwater recovery with air stripping
COST: \$70,000 investigation, \$175,000 remediation, \$40,000/yr operation and maintenance
- o PROBLEM: Leaking underground storage tanks and salt contamination (volatile organic compounds, chloride)
SOLUTION: Groundwater recovery with air stripping and carbon adsorption
COST: \$280,000 investigation, \$500,000 remediation; \$590,000/yr operation, maintenance and monitoring
- o PROBLEM: Chlorinated volatile organic compounds in fractured bedrock aquifer
SOLUTION: Groundwater recovery with air stripping and vapor phase carbon adsorption
COST: \$130,000 investigation; \$195,000 remediation; \$55,000/yr operation, maintenance and monitoring
- o PROBLEM: Industrial and municipal waste landfill (Many contaminants in leachate, bedrock aquifer)
SOLUTION: Landfill cap, leachate collection and treatment, abandon 50 domestic wells, connect to public water supply
COST: \$20,000,000 for landfill(cap, collection, treatment), \$1,500,000 for water supply hookup and well abandonment

Although remediation techniques and costs vary greatly with individual cases, the Task Force concluded that remediation should not be considered a substitute for other protection efforts. Rather, the difficulty and cost of clean-up highlights the need for prevention policies as a cost effective means of safeguarding our drinking water supplies.

THE EFFORT TO PROTECT

State And Federal Efforts

Connecticut has been in the forefront of a national effort to preserve good quality drinking water. Connecticut's landmark environment report, Environment/2000: Connecticut's Environmental Plan, defines the State's position on protection of water resources. The Report explains:

Since the enactment of Connecticut's 1967 Clean Water Act, significant improvements have been made in the State's surface water quality, although some surface waters have not yet attained designated goals. In 1980, the program was expanded and Connecticut was the first state to adopt a comprehensive groundwater quality program. In spite of these efforts, existing high quality waters are in jeopardy and may become permanently contaminated and unfit for use. Among the major problems left to be dealt with are inadvertent or accidental discharges and land use development impacts. As more incidents of contamination are identified, there will be increased difficulty in risk assessment, establishment of health effects, and designation of tolerance limits.

Historically, surface waters have received the principal attention of federal and State water quality improvement programs as they were the most used and known abused sources of waters. Groundwater, on the other hand, has more recently become the subject of serious concern. With passage of Connecticut's 1967 Clean Water Act, and subsequent Federal legislation (RCRA, CWA, CERCLA), groundwater has been protected from the most obvious sources of pollution. The State's policy of prohibiting virtually all non-domestic wastewater discharges to its groundwaters is, perhaps, the single most important mechanism in place for preventing contamination of drinking water supplies.

Most activities on land impact groundwater quality and quantity. The impact may be slight or not immediately noticeable, but it will occur. In recognition of this, the Departments of Health Services and Environmental Protection have, developed a large number of diverse measures to protect and manage groundwater resources and to ameliorate the impacts of groundwater contamination. These management programs apply statewide and fall into the following categories:

1. Drinking Water Standards
2. Water Quality Standards and Classifications
3. Source Controls
4. Enforcement
5. Education
6. Statewide Prohibitions
7. Best Management Practices
8. Victim Compensation
9. Planning

10. Water Use and Allocation
11. Monitoring
12. Research
13. Data Management
14. Local Assistance

Connecticut's groundwater management program represent a comprehensive approach that is considered a national model. The State's requirements for wastewater and leachate discharges, hazardous wastes, prohibitions on certain hazardous substances, and other groundwater protection mechanisms are more comprehensive than ever.

Despite these achievements, increasing population and urbanization suggest Connecticut will continue to experience groundwater contamination from accidental spills and non-point source pollution. Stratified drift aquifers are very susceptible to contamination. Public water supply wells tapping these resources may be adversely affected in the future unless the State's water pollution control program provides strong protection for these especially vulnerable areas.

In order to further the goal of groundwater protection, the DEP produced a 1987 report, "Protection of High and Moderate Yield Stratified Drift Aquifers." This report inventoried Connecticut's major aquifers; identified known and potential contamination threats; and set forth numerous policy issues to be confronted. To investigate these complex issues, the report recommended that a task force be created. Acting on this recommendation, the 1987 General Assembly established the Aquifer Protection Task Force.

Municipal Aquifer Protection Initiatives

Section 8-2 of the Connecticut General Statutes provides that "zoning regulations shall be made with reasonable consideration for the protection of . . . existing and potential public surface and groundwater drinking water supplies." Forty-eight Connecticut towns have adopted some form of groundwater protection legislation as listed in Table 5.

TABLE 5

Towns With Local Groundwater/Aquifer Protection Regulations

| | | | |
|--------------|--------------|------------------|-------------|
| Bozrah | Essex | Newtown | Stonington |
| Canterbury | Farmington | North Haven | Thomaston |
| Cheshire | Groton | North Stonington | Thompson |
| Columbia | Guilford | Old Lyme | Tolland |
| Cornwall | Haddam | Old Saybrook | Wallingford |
| Coventry | Hamden | Plainfield | Waterford |
| Cromwell | Hebron | Redding | Westbrook |
| Danbury | Kent | Salisbury | Westport |
| Durham | Killingly | Scotland | Willington |
| East Hampton | Killingworth | Sharon | Wilton |
| East Lyme | Mansfield | Southington | Windham |
| Enfield | Middletown | Stafford | Woodbury |

The ordinances vary widely with regard to rigor, comprehensiveness, relationship to drinking water supply needs, and in the scientific basis for protection area boundaries. There is also a significant demand at the local level for increased technical assistance. Although local efforts thus far have been important, much more needs to be done.

1988 TASK FORCE REPORT AND LEGISLATION

The 1988 Report of the Aquifer Protection Task Force included recommendations to the General Assembly. The report concluded that a rigorous aquifer protection program requires a sound scientific foundation and therefore that the stratified drift aquifers containing current or future public water supply wellfields should be mapped. The Task Force recommendations were adopted in Public Act 88-324 (Appendix 5), and include:

DEP must establish two standards for aquifer mapping. The more detailed mapping is described as Level A, and the less costly mapping as Level B.

All public or private water companies serving more than 1000 persons shall complete level B mapping of their existing well fields by July 1, 1990. Those water companies serving more than 10,000 customers shall complete level A mapping of their existing well fields by July 1, 1992.

Public and private water companies serving more than 10,000 persons shall map all potential well fields that are located within stratified drift aquifers as identified by Water Utility Coordinating Committee Plans. Level B mapping is to be completed within 2 years and level A within 4 years of the completion of the applicable plan.

Within three months of receiving approval from the Commissioner of Environmental Protection of level B mapping, each municipality is responsible for designating a body which will inventory land uses located within well fields, areas of contribution and recharge areas of such aquifers mapped within their municipal boundaries.

Level A studies in stratified drift, requiring the most sophisticated data collection and interpretation program, are designed to minimize the number and magnitude of assumptions, and utilize the most sophisticated multi-dimensional models. These studies are designed to be highly accurate in their representations of the physical systems and are to be calibrated and verified.

Level B studies for stratified drift aquifers are designed to be conducted in a relatively short period of time at a low cost. These studies are based for the most part on existing mapping and data and the methodology is based on gross assumptions concerning the flow of groundwater under pumping conditions. The equations used to determine the initial setback distances have been used to predict well drawdowns for decades. Because of the gross assumptions that must be made concerning the physical characteristics of the system and the behavior of groundwater flow, protection boundaries based on level B mapping may designate substantial areas for both under and over protection.

In addition, the act called for the continuation of the Task Force for the purpose of considering minimum protection standards for existing and future activities occurring in wellfield areas, areas of contribution and recharge areas. Additionally, the legislation called for the Task Force to study the use of water softeners on water quality and to recommend programs for the education and training of utility personnel as well as local agencies and officials. The Task Force was also charged with proposing appropriate legislation related to the protection of aquifers.

1988-89 AQUIFER PROTECTION TASK FORCE PROCESS

With the fundamental requirement of accurate mapping having been addressed in the 1988 legislation, the next goal of the Task Force was to develop a comprehensive, fair and effective program to protect Connecticut's aquifers, once delineation of their boundaries is completed.

In September 1988, the Task Force visited two communities in the Hartford area which typify the spectrum of issues which an aquifer protection program must be prepared to address. In Manchester, the Task Force met with town officials who are in the process of formulating regulations to protect their groundwater, which supplies approximately 50% of the town's drinking water. Much of Manchester is already developed with many "high risk" existing land uses located over sensitive areas of the aquifers.

In Glastonbury, the Task Force observed a largely undeveloped area which overlies a major stratified drift aquifer. The area has outstanding potential as a major future supply of drinking water. However, this area is facing tremendous and immediate developmental pressures. Protecting this vital future resource for the community and the region poses an enormous challenge to local officials.

Over the next several months, the Task Force held many public meetings. Subcommittees were formed to consider different elements of the issue. The subcommittees included Task Force members along with representatives from interested public and private organizations. These subcommittees submitted reports to the Task Force which were reviewed, revised, and incorporated into this report. In addition, the Task Force heard testimony from federal, State and local officials from Connecticut and New England.

The remainder of this report describes the elements, participants, framework and specific recommendations of the Task Force for the protection of groundwater public drinking water supplies.

PART II: THE STATE AQUIFER PROTECTION PROGRAM: A PROPOSAL

A successful aquifer protection program will require the participation of many different levels of government, private organizations, and individuals. The program should make use of diverse management approaches such as water supply planning, land acquisition, facility regulation, zoning and education. This discussion provides an overview of the many participants and elements recommended for inclusion in a new program to protect Connecticut's groundwater drinking supplies.

THE PARTICIPANTS

The Federal Government - administers many laws and programs which affect groundwater, conducts basic research on groundwater hydrology (USGS, EPA), and provides technical assistance to the states. The Federal "Wellhead Protection Program" (authorized by the Federal Safe Drinking Water Act) requires states to develop special resource protection programs for public water supply wells and their associated groundwater resources.

The State of Connecticut - leadership must be exerted at this level for comprehensive aquifer protection. This begins with the State legislature where program authorization is needed, and then must be carried out by State agencies. The Department of Environmental Protection should have primary responsibility for implementing and coordinating the aquifer protection program.

Municipalities - have the major responsibilities for zoning and subsequent authority to assure continued compliance with zoning requirements. They can also accept delegated authority for certain programs, such as inspection authority from DEP. Regional Health Districts, as agents for municipal government, should be encouraged to assist municipalities and DEP in meeting their obligations under this recommended program. Municipalities are the level of government in most direct contact with the users of the land. Thus, the municipal level of government, particularly with respect to future land use, will carry aquifer protection to the people.

The Water Utilities - whether private, quasi-public, or municipal, water supply utilities clearly have a great interest and role to play in aquifer protection. Utilities are already required to conduct the technical groundwater modeling and mapping needed to identify critical areas of protection. Water Utility Coordinating Committees prepare area wide water supply plans and identify aquifers not currently tapped but which may be needed for drinking water in the future.

The Regulated Community - industries along with commercial and institutional entities must work with State and municipal government to ensure implementing regulations are both technically sound and affordable. The regulated community should

be encouraged to participate in education and technical assistance opportunities for the purpose of preventing future groundwater contamination.

The Public - represents the ultimate beneficiary of the aquifer protection program, and therefore must also be the ultimate watchdog. The general public can be instrumental in encouraging the use of private monies for land acquisition. In addition, groundwater contamination can arise from a variety of residential activities, so it is vital that the public be well-informed about threats to groundwater and that they actively participate in the process to protect it.

Non-Profit Organizations - play a vital role in the process. Many environmental organizations have significant experience in dealing with drinking water issues. In addition, civic groups, scouting and other youth groups along with a multitude of community organizations have a tremendous potential to contribute both in raising public awareness and in educating their communities with regard to the risks of taking drinking water for granted.

PROGRAM ELEMENTS

Mapping

The entire aquifer protection program is predicated on knowing where the aquifer lies and the specific regions within the aquifer where certain land uses are likely to affect the quality of drinking water. Mapping of aquifers used for drinking water will take place over the next four years, as required by PA 88-324. Recommendations for amendments to this public act are contained in this report.

Land Use Regulation

The principal tool for regulating future land use is zoning, which will therefore be a centerpiece of the aquifer protection program. Rather than using traditional zoning categories which either allow or prohibit commercial and industrial uses altogether, the program will rely on an aquifer delineation overlay to identify protection areas where specially designed land use regulations would be applied. Within these Aquifer Protection Areas, certain high risk activities should be prohibited outright. The judgement to prohibit an activity should be based on the relative drinking water threat, the quantity of the chemicals involved, the probability of successfully regulating working practices to control discharges, and the feasibility of quickly detecting any discharge. Also, regulations can be used to reduce risks from pre-existing uses. A preliminary list of activities which might be prohibited or regulated is included in appendix 2.

Education

Education at all levels, from officials implementing regulations to the individual citizen living or working over an aquifer, is crucial to the success of groundwater protection.

Acquisition

Land acquisition offers the most complete protection for groundwater. However, this protection method is too expensive to apply over entire Aquifer Protection Areas. For lands immediately surrounding present and future wellfields, acquisition should be considered a necessary component of aquifer protection.

Technical Assistance

With the vital roles played by municipalities and the general public, along with the need and desire of the regulated community to be aware of best management practices, the availability of technical assistance to these participants is an essential element of the protection program.

Enforcement

Enforcement is clearly a necessary element of implementing the aquifer protection program. Responsibility for enforcement, including facility inspection, should be shared among DEP, the municipalities, and water utilities. DEP should have lead responsibility and must provide for overall coordination to minimize or prevent redundant or inconsistent enforcement efforts.

Monitoring

Monitoring by DEP, DOHS and the water utilities is an essential program element. It provides a necessary tool for enforcement purposes, and serves the critical role of detecting contaminants before they impact the well field. Monitoring further provides check to ensure that groundwater quality is up to drinking water standards.

Agriculture

Given the State's interest in agricultural preservation and the unique way agriculture is both assisted and regulated by state and federal governments, special considerations have been developed for agriculture. Preventing contamination from improper or excessive application of pesticides or fertilizers, correcting leaking fuel storage tanks and improving agricultural waste management are agricultural objectives.

Figure 5 is a summary matrix which illustrates the role of each participant with respect to the various elements of the program.

| Program Elements | Federal | State | SW Con.D. | Municipal | Wtr. Util. | Industry | Public | Non Profits |
|------------------|---------|-------|-----------|-----------|------------|----------|--------|-------------|
| Mapping | | M | | M | M | | | |
| Land Use Regs | S | M/S | | M | S | M | S | |
| Education | S | M | S | S | S | S | S | S |
| Acquisition | | M/S | | M/S | M | | S | S |
| Tech. Assistance | S | M | S | S | S | S | S | S |
| Enforcement | S | M | | M | S | S | S | |
| Monitoring | S | S/M | | S | M | M | S | |
| Agriculture | M | M | S | S | S | | S | |

FIGURE 5: SUMMARY MATRIX

ELEMENTS IN MORE DETAIL

1. MAPPING OF PUBLIC WATER SUPPLIES

To protect our groundwater resources, aquifer locations and potential yields need to be determined. In 1988, the legislature took a major step by establishing a timetable for the completion of level A and level B mapping for existing and proposed stratified drift public water supply wells operated by utilities serving more than 10,000 persons. Level B mapping of existing wells operated by utilities serving fewer than 10,000 persons was required. The Task Force recommends that this legislation be amended to include mapping completion guidelines for proposed wells serving 1,000 - 10,000 persons, and level A mapping for existing wells which presently serve 1,000 - 10,000 persons. In addition, the commissioner of DEP should be authorized to conduct level B mapping in all potential wellfields in stratified drift aquifers. Table 6 summarizes existing and recommended mapping guidelines.

TABLE 6

| | SERVICE AREA > 10,000 | | SERVICE AREA 1,000-10,000 | | SERVICE AREA < 1,000 | | UNSERVICED |
|------------|--------------------------|-------|------------------------------|-------|-------------------------|--------|------------|
| | Prop | Exist | Prop | Exist | Exist | Prop | |
| LEVEL B | 7/1/90 | 2yrs | 7/1/90 | 2yrs | Commis | Commis | Commis |
| LEVEL A | 7/1/92 | 4yrs | 7/1/94 | 5yrs | | | |

Existing Requirements: regular print
Proposed Amendments: bold print

As a result of the 1988 legislation, identification of proposed wells is being done through a coordinated water system planning process. This process includes two main components: the preparation of water supply plans by the individual water utilities, and the preparation of areawide supplements by the Water Utility Coordinating Committees (WUCCs) within seven designated water supply management areas. The areawide components are being sequentially prepared for each of these areas.

The mapping of aquifers targetted for future wells is tied to completion of the particular WUCC report responsible for that aquifer. In the report, the WUCC must assign to utilities jurisdictional boundaries. In essence, each potential well field must be assigned to a utility.

The ability of the WUCCs to complete their work according to the original timetable is in doubt. Contractors involved in formulating these plans have indicated that the present funding level is inadequate. The Task Force is concerned with delays in these projects as protection of future water supply sources presently hinges on the completion of the reports. However, it may not be necessary to wait for the completion of the WUCC reports before clarifying the water utility areas of responsibility. Allocation of aquifer mapping responsibilities in the WUCC reports will be based primarily on approved individual water supply plans of the water utilities. These plans have already been drafted for most of Connecticut, although the approval process for most of these reports has yet to be completed. Accordingly, the Task Force recommends that future wellfields with clear jurisdiction should be mapped by the appropriate utility with a timetable of two years for level B mapping and four years for level A mapping subsequent to approval of individual water supply plans. The mapping of future water supplies for which utility jurisdiction is still undecided or disputed would await the conclusion of the WUCC process.

Additionally, the Task Force recommends that the staff resources committed to the water planning process, and the approval process for the water supply plans be reviewed. Expediting the process for mapping potential future water supplies ranks at the highest priority level of the Task Force.

The Task Force is also concerned that some municipalities may not have adequate input to the WUCC planning process which may result in municipalities acquiring significant responsibilities under the 1988 legislation and the recommendations of this report. Although they presently have the opportunity to testify before their WUCC on a voluntary basis, some municipalities may not yet realize the important long term consequences of WUCC recommendations. Municipalities should be encouraged to maximize their involvement in the WUCC water planning process.

Finally, the most effectively protected land areas are those which are owned by the State. These lands are presently not open to exploration of water resources. The Task Force recommends that water utilities be given permission to explore state owned lands for the purpose of determining their potential as future water supply sources.

2. LAND USE REGULATION

During the late 1970's and throughout the 1980's, numerous laws and regulations, necessary for Statewide groundwater protection, have been enacted. However, these same laws do not

provide the special protection measures needed to protect the highly vulnerable and important aquifers areas useful for public water supply. Many different land uses and activities in Connecticut pose unacceptable risks to wells. It is therefore essential that land use regulations be included in this resource protection program.

This section of the report identifies the major types of activities and chemicals which pose a threat to groundwater supplies (refer to Appendices 1 and 2); recommends various land use controls, regulations, and management techniques to minimize the risk of groundwater pollution from those activities (Appendices 2 and 3); and assigns responsibility for minimizing the risks of groundwater contamination.

Where These Protection Mechanisms Should Apply

Protection Measures pertaining to land uses should be applied in "Aquifer Protection Areas". Aquifer Protection Areas should be designated by municipalities based on detailed mapping of stratified drift aquifers supplying public water supply wells. This mapping is required of all major water utilities and, as discussed previously, must be approved by DEP per the requirements of Public Act 88-324. These protection measures do not apply outside Aquifer Protection Areas, where any uses are allowed as long as they meet all other federal, state, and local land use and other environmental requirements.

As stated earlier, the Aquifer Protection Areas will normally consist of the Area of Contribution (which includes the wellfield), and the Recharge Area. Most prohibitions of new land uses would only apply to the Area of Contribution. However, the Commissioner of DEP should identify those land uses or activities, such as most solid waste disposal activities, hazardous waste disposal sites, major fuel storage and chemical manufacturing facilities, that should be prohibited throughout the entire Aquifer Protection Area. Additional regulations for existing and future activities should, in most cases, also apply throughout the Aquifer Protection Area.

Relationship Between Regulation and Prohibition of Land Uses

Regulation and prohibition of new land uses are discussed together in this report as they represent complementary protection approaches. Some land uses pose such high risks of groundwater contamination that they should be prohibited from moving into Areas of Contribution. For other activities, certain design measures can sufficiently reduce the risks of groundwater contamination, and these activities could be allowed in Aquifer Protection Areas, subject to certain regulations. Also, as discussed below, uses already located in Aquifer Protection Areas cannot be forced to relocate, but they can be subjected to greater regulation in order to minimize the chance of groundwater pollution from their activities.

Need for Cooperation

A cooperative effort among State and local government, water utilities, the regulated community and the public will be needed to protect public drinking water aquifers without imposing an undue burden on any one participant. The State should take the lead in setting standards and controls on high risk land uses to assure a consistent level of State-wide protection. Municipal government will be largely responsible for implementing such controls on new or expanded land uses. It is also important that municipalities inform utilities of any land use applications involving Aquifer Protection Areas. Similar to the Inland Wetlands Act, DEP should be provided the authority to intervene or revoke municipal authorities, as developed by this program, if a municipality fails to take actions required to protect groundwater in Aquifer Protection Areas.

Municipalities will also conduct site plan reviews. These plans contain detailed site information on areas of parking, unloading facilities, storm water runoff, and storage of chemicals associated with the activity.

Materials management plans are presently required for certain land users which handle hazardous materials. These plans should be required for all land uses within Aquifer Protection Areas which involve the use of potential groundwater contaminants and should include details on the use, storage and handling of hazardous substances as well as the disposal of byproducts. The plans should also include measures to prevent groundwater contamination including education of employees. DEP would have primary responsibility for reviewing these materials management plans. However, arrangements may be made for municipal or regional bodies to have responsibility for reviewing some of these plans under DEP's deligation program.

Should Protection Measures be Based on Chemical Use or Activities?

Ultimately, the purpose of the aquifer protection program is to prevent contamination of drinking water supplies by harmful chemicals. However, as new chemicals are constantly being introduced, and as one chemical may be known by different trade names, the Task Force feels that it would be more helpful to both the regulators, and the regulated community to list the land uses and activities commonly associated with these substances rather than to simply provide a list of chemicals of concern. Although both regulators and the regulated community will probably rely heavily on the list of land uses and activities, the ultimate decision to regulate or prohibit should depend on the use, handling, storage, and disposal of potential contaminants.

Appendix 1 includes a summary list of chemical groups of concern. Land uses and activities which involve storage, use, handling, or disposal of significant quantities of such substances pose the greatest risks to underlying groundwater supplies.

Appendix 2 presents a detailed list of activities, industries, and commercial/institutional uses which are recommended for prohibition or regulation in Aquifer Protection Areas. The list was derived largely from DEP's experience with groundwater contamination in the State. The most common groundwater contaminants between 1979 and 1988 in Connecticut were pesticides, nitrates, solvents, landfill leachate, gas and oil, and road salt. In addition, DEP provided the Task Force members with information developed in other States. As stated previously, the prohibitions would not apply to existing high risk uses. Existing uses would, however, be subject to new Aquifer Protection regulation (see also "non-conforming use" discussion).

Statutes authorizing DEP to develop minimum State regulations associated with these restrictions are necessary. The actual approach for the development of such regulations would likely focus on certain high risk uses, such as new dry cleaners or gas stations, but also should have a high risk chemical association (use of chlorinated solvents) as a primary or major activity of a manufacturing or commercial process. See also the discussion of "Administrative Exemptions".

Designing the State Standards

The minimum state standards should consist of the following four major elements:

1. Prohibition of certain types of proposed development in the Area of Contribution and of a few particularly high risk activities throughout the Aquifer Protection Area. The list of uses to be prohibited should be developed by DEP and based generally on types and quantities of chemicals used, and activities associated with their use. See Appendices 1 and 2.
2. Regulation of proposed development in the Aquifer Protection Area. These regulations should be implemented by towns under the local review process and should be consistent with state regulations.
3. Regulation of existing non-conforming uses would be subject to regulatory requirements. DEP should establish a schedule for compliance with State statute and implementing State regulations.
4. Administrative Exemption. The list of land uses and activities in Appendix 2 is not exhaustive. There may well be processes and activities not included in the list which nevertheless pose a risk to groundwater and should therefore be regulated or even prohibited from moving into Areas of Contribution. Conversely, it is possible that a land use or activity listed in Appendix 2 may be safe enough to allow in an Aquifer Protection Area, either because of new technology or use of safer materials, or because the business, despite its general classification, does not involve hazardous substances which may contaminate groundwater. An "Administrative Exemption" should be

set up to allow DEP to review these different cases. However, the applicant should have to bear the burden of proof and offer convincing guarantees that the use will, in fact, not threaten groundwater supplies.

Both the exemption and appeals processes should follow the Uniform Administrative Procedures Act (UAPA). However, DEP should only be required to hold a public hearing on an exemption decision if: 1) the Department decides the decision will be of broad public interest, 2) a municipality requests a hearing, 3) the public requests a hearing (by a letter or petition with at least 25 signatures) or 4) the applicant requests a hearing. With this exemption procedure, the process for prohibiting or regulating uses would have some flexibility and not be an absolute system.

Aquifer Protection Area Non-Conforming Uses

Although the prohibitions on land uses would principally apply to new development in the Area of Contribution, the regulations should also apply to existing uses in the Aquifer Protection Area. Thus, existing uses in categories to be prohibited or regulated should be required to come into compliance with regulations designed to minimize the risk of groundwater contamination. Such regulations could address the storage, use handling and disposal of hazardous materials and other hazardous substances, including spill prevention and response planning, and additional monitoring requirements.

Certain existing uses would continue in the Aquifer Protection Area as non-conforming uses. Non-conforming uses are a well established device under zoning law and, in most cases, a non-conforming use is not allowed to expand or intensify. However, the Aquifer Protection Program should deal with "non-conforming uses" differently through new legislation. The following is a list of possible methods to deal with Aquifer Protection Area non-conforming uses:

- o require by statute or ordinance that non-conforming uses meet more stringent regulations within a certain time period established by regulation;
- o increase inspection programs for land uses, giving priority to the non-conforming uses;
- o develop an educational program intended for non-conforming and regulated activities in Aquifer Protection Areas;
- o allow a certain expansion or use intensification if compliance with regulations is achieved and use of hazardous materials does not increase;
- o develop financial incentives to assist business, industry and municipalities to implement Aquifer Protection Area regulations;

- o require additional groundwater monitoring of non-conforming sites;
- o establish a State program, or encourage municipalities or water utilities to develop their own program, to relocate or buy out non-conforming uses (transfer or purchase of development rights or relocation incentive program). This program would not be needed for several years, until the level A mapping is complete and the highest risk non-conforming uses have been identified, and therefore is of lower priority than the other methods.

Coordination to Assure Regulatory Compliance

It is vital that the participants be coordinated, so as to avoid duplication of effort or inconsistency. Where a single aquifer underlies more than one town, it is also important that all the towns over the aquifer work together. One technique might be to form a multi-town coordinating committee for each aquifer. Other means of directing the coordination could be through Delegation Agreements (regional health districts/ municipalities/ utilities/regional planning organizations) or through direct assignment of inspections by DEP.

Time-table For Land Use Element

Development and implementation of the land use element of the protection program will involve several stages occurring over a period of several years. The Task Force therefore recommends that the initial phase of the land use element include:

- o completion of mapping effort;
- o development of State regulations *;
- o adoption of local ordinances; and
- o educational and technical assistance programs.

Later phases of the program should include:

- o requiring additional inspections;
- o coordination of inspections with federal, State and local programs;
- o review of materials management plans;
- o support for municipal implementation of aquifer protection programs;
- o relocation program for non-conforming uses; and

- o financial incentives for non-conforming businesses and industry to comply with stricter regulation.

* It is not recommended that legislation include a specific list of uses and activities to be prohibited or regulated. Appendix 3 is intended as an indication of what State aquifer protection regulations should include.

3. EDUCATION

The Task Force feels the role of education in protecting groundwater cannot be overstated. As with many environmental issues, a successful program for protecting Connecticut's drinking water requires a change in the attitudes of society based on enlightened sensitivities to the finite resources upon which it depends.

Water utilities, public service organizations, state education institutions, environmental and other non-profit organizations, municipal groups, corporate leaders and the regulated community should all be involved in the process of education. However, the Task Force believes that the State should provide guidance and play a leadership role in facilitating the education process. Accordingly, the Task Force recommends that the Department of Environmental Protection be directed to develop a specific strategy for education, working in conjunction with representatives of the various organizations mentioned above.

4. ACQUISITION

The most effective method for protecting groundwater resources is for utilities, municipalities and the state to own and strictly control the land which lies above it. Presently, utilities are required to purchase or obtain controlling interest in the land within a 200 foot minimum radius of public water supply wells which have a pumping rate of 50 or more gal/min. With typical areas of contribution ranging from 20 to 100 acres, the 200 foot radius represents a minimal level of protection. The Task Force feels that this issue, which has been often discussed in recent years, should be more substantively addressed. Accordingly, the Task Force recommends that the Department of Health Services working in conjunction with DEP and the Department of Public Utilities Control should develop recommendations for a land acquisition/wellfield protection program.

The Task Force further recommends that the Water Utility Coordinating Committees be directed to include specific site recommendations for land acquisition as part of their reports.

Further, in an effort to incorporate aquifer protection into existing state programs, the Task Force recommends that the

Commissioner of DEP establish aquifer protection as high priority in the evaluation process for the purchase of open space under the Connecticut Grant-In-Aid and the Recreational and Natural Heritage Trust Programs.

5. ENFORCEMENT

The enforcement of this program is a shared responsibility and should occur through a program of positive and negative incentives. There is no protection strategy more effective than the conscientious efforts of the land user. The Task Force therefore recommends that the Department of Environmental Protection prepare a method for public recognition of land users located within Aquifer Protection Areas which demonstrate a successful record of concern for protecting the aquifer.

Responsibility for inspection of regulated facilities will be shared primarily by State, municipal, and water utility officials. The Department of Environmental Protection shall have lead responsibility for inspecting commercial and industrial land uses within Aquifer Protection Areas unless individual delegation agreements with municipalities are arranged. For example, through DEP's existing delegation authority, municipal officials could be charged with inspection of all non-commercial/non-industrial land uses and activities. The Task Force recommends that one municipal designee from towns containing existing or proposed stratified drift, public water supply wells receive DEP approved training.

Presently, federal and state inspection programs are conducted for handlers and generators of hazardous waste materials. Because of limited resources, the frequency of these inspections is often based on the size of the operation and the amount of material involved. It is the recommendation of the Task Force that, with identification of Aquifer Protection Areas, DEP work with the federal Environmental Protection Agency in coordinating and prioritizing their inspection efforts so as to both target inspections where they are most needed, and also to maximize the efficiency of the inspection process by avoiding overlaps in responsibilities.

The Task Force recommends that water utility companies provide technical assistance and advice to municipalities as required. They should also participate in a visual inspection process and advise the proper inspection officials of any concerns. The Task Force further recommends that municipalities and DEP have the option to arrange agreements with the appropriate utility to assume their portion of the inspection responsibilities.

6. MONITORING

With the serious health risks and the enormous cleanup costs associated with groundwater contamination that is not immediately detected, the Task Force feels that implementing a

strategic monitoring program is essential. These "Early Warning Monitoring Systems" would consist of a series of monitoring wells strategically located in Aquifer Protection Areas. The initial installation of such wells would be conducted by the appropriate utility. Additional monitoring wells may be installed when allowing new uses to locate in an Aquifer Protection Area or when bringing existing uses into compliance with protection ordinances.

Determining the necessary location of these monitoring wells should be a cooperative effort between DEP, the water utility and the regulated community involved. The final decisions on location of these strategic monitoring wells should rest with DEP. The Task Force recommends that the cost of implementing these early warning systems should be a shared responsibility between the utilities and the regulated community.

The State's role in the monitoring program would also include identifying priorities for monitoring under the Clean Water and Safe Drinking Water Acts, along with the state RCRA and Superfund programs. Additionally, ongoing research related to groundwater contaminants and movement should continue.

7. AGRICULTURE

Connecticut's farms are a proud part of its heritage. The number of Connecticut farms continues to decline at an alarming rate. Efforts are ongoing to preserve this important element of Connecticut's character.

The Agricultural community has long enjoyed a governmental network for disseminating technological advances in soil and water matters. In addition, few local land use officials are well versed on these technologies and methods, and the small number of farms within each municipality makes development of such technical expertise by each town inefficient. For these reasons, the Task Force has addressed agriculture as a separate element in the protection program, and is recommending that agriculture be assisted in this aquifer protection plan by those same State and federal governmental agencies which are already dealing with agricultural matters.

At the center of the Agricultural element of the program is the proposed State mandate that all farms which overlay an Aquifer Protection Area operate under a state approved resource management plan. Guidelines for these plans will be developed by DEP with the assistance of Soil and Conservation Service and the Connecticut Council for Soil and Water Conservation. Technical assistance is also available through federal USDA agencies. Each farm located within an Aquifer Protection Area will have a resource management plan specific to the needs of that particular farm. The plans themselves will cover traditional soil and water conservation measures, and assess animal waste storage needs. In addition, practices will be recommended for integrated pest management, proper storage, use and disposal of pesticides, proper use of fertilizers and underground gasoline storage tanks.

In developing the individual farm resource management plans, technical teams drawn from existing agricultural agencies will work with each farm in the Aquifer Protection Area to write an effective resource management plan. The county Soil and Water Conservation Districts should coordinate the technical team, which will cooperatively write the resource management plans.

The Department of Agriculture will receive requests from the technical teams for cost-sharing on best management practices as necessary. Presently, the UCONN Cooperative Extension Service and the USDA Soil Conservation Service cooperate to assist farmers in developing and implementing resource management plans. The Task Force recommends that the cost-sharing program presently available to the agricultural community through the Department of Agriculture, be expanded to include developing groundwater protection plans. Upon completion of the aquifer mapping process, the Task Force recommends that state funds directed at the cost-sharing program be supplemented to insure completion of groundwater protection plans for every farm located within an Aquifer Protection Area.

PROPOSED OUTLINE OF ROLES

Federal Role

- o test and set drinking water standards, action levels, and issue health advisories for contaminants; and
- o give Aquifer Protection Areas priority for funding and inspection in CERCLA and RCRA programs

State Role

The Department of Environmental Protection should be given authority to develop regulations including:

- o a list of new land uses to be prohibited in Areas of Contribution;
- o a list of particularly high risk, new activities to be prohibited throughout the Aquifer Protection Area;
- o a list of uses or activities to be specially regulated in the Aquifer Protection Areas, with implementing regulations;
- o regulations to be imposed on "non-conforming uses" in the Aquifer Protection Areas;
- o an administrative exemption procedure for seeking exemptions for uses listed as prohibited but for special reasons, do not pose significant risks of groundwater contamination;
- o identification of threshold quantities of hazardous substances, including petroleum products, for regulation or prohibition;
- o a schedule for municipalities to implement these provisions in their Aquifer Protection Areas; and
- o authority for the Commissioner of DEP to intervene or revoke municipal program responsibilities in the event required actions to protect the Aquifer Protection Area are not taken.

Additional DEP roles:

- o provide technical assistance to municipalities, including directions and checklists for conducting site plan reviews on regulated activities in the Aquifer Protection Area;

- o assist in training and certification of local inspectors and water utility inspectors;
- o coordinate DEP regulatory and inspection programs and other related State, local, and federal programs, with priority given to the aquifer protection effort;
- o review materials management plans for land uses not reviewed at the municipal or regional level;
- o develop an aquifer protection land use control education program for local officials, the regulated community, the utilities, and the public;
- o enforce, or require the enforcement of, the aquifer protection regulations developed for this program; and
- o coordinate data management related to aquifer protection including expanding capabilities of the Geographic Information Service (see Appendix 4).

The Department of Health Services should:

- o advise DEP on contaminants of concern to drinking water supplies;
- o intervene where necessary in municipal land use decisions that may have an adverse impact on groundwater supplies; and
- o increase the efficiency of the water planning process.

Municipal Role

- o designate Aquifer Protection Areas on zoning maps;
- o Complete inventory of land uses within recharge and contribution areas within one year of receiving approved level B mapping;
- o Adopt the prohibitions and regulations conforming to by DEP regulatory standards;
- o require new land users to notify the town of plans to move into the Aquifer Protection Area, and require existing land users in Aquifer Protection Areas to notify the town of planned changes;
- o Ensure enforcement of the Aquifer Protection Area provisions where so arranged through DEP's delegation program;
- o coordinate with existing programs, requirements for site inspections, permitting, and regulation;

- o review materials management plans for certain land uses arranged under DEP's delegation program;
- o notify utilities of land use applications within Aquifer Protection Areas; and
- o take advantage of education and training provided by DEP, other State organizations, water utilities, and non-profit environmental organizations.

Regulated Community's Role

- o comply with Aquifer Protection Area regulations;
- o notify towns of changes in use in Aquifer Protection Areas;
- o prepare site plans and materials management plans; and
- o take advantage of education and training provided by the State, water utilities, and non-profit environmental organizations.

Utility Role

- o provide technical assistance to municipalities including the process of developing Site Plan Reviews;
- o conduct visual inspections of Aquifer Protection Areas notifying the appropriate agency of any concerns and , where so deligated, perform facility inspections, similar to the Connecticut Public Health Code required program for public reservoir watersheds;
- o conduct strategic groundwater monitoring programs;
- o educate local officials and public about groundwater protection;
- o provide training and certification for local inspectors; and
- o Review applications for development in Aquifer Protection Areas.

ECONOMIC IMPACT

Implementation of the Task Force recommendations will have an impact on the communities and the regulated uses located within Aquifer Protection Areas. One of the challenges of the Task Force has been to develop a program which will maximize the positive impact of protecting public drinking water supplies while minimizing the negative impact on the participants involved. Since all aspects of Connecticut's society benefit from having a plentiful supply of drinking water, it is only fair that the burden for its protection be shared as equitably as possible.

Unfortunately, some land uses and activities which presently are occurring in areas which would eventually be designated as Aquifer Protection Areas are facing significant adjustments in their modes of operations and in their future land use capabilities. However, the Task Force is resolved in its intention that this plan, and any regulations developed in association with it, reflect a flexible and reasonable approach, particularly with regard to the rights and obligations of existing land users. In developing its own regulations, as well as in reviewing the acceptability of any local protection programs, the DEP should scrutinize not only the adequacy of the protection measures, but also insure that any local programs reflect the Task Force's intentions that such programs be designed with the specific goal of protecting public drinking water supplies.

The Task Force also received many comments related to the impact of Aquifer Protection Areas on land values. Utility companies expressed concern that the APA designation would significantly raise the property values such that acquiring future well sites would be extremely costly. Land users within APAs were concerned that possible restrictions and regulations might have a negative impact on their property value. The Task Force is aware of only one effort to study the impact of aquifer protection measures on land values. This study, sponsored by the South-Central Regional Water Authority concluded that identifying specific areas for aquifer protection regulation had no significant impact on property values.

Water utilities presently face significant costs under the mapping recommendations of this report as well as last years legislation. The potential inspection responsibilities proposed within the recommendations along with their charge of providing technical and educational support may also impact utility costs.

Finally, by establishing uniform minimum standards, and by subjecting local ordinances to DEP review, the business community will be benefitted by greater consistency of controls, greater technical merit to the limitations, more assistance in conforming to the rules, and reduced likelihood of overly exclusionary local controls.

PART III: OTHER AREAS

WATER SOFTENERS

The 1988 legislation specifically requested the Task Force to review the issues surrounding water softeners and sodium contamination. Contamination of private wells with sodium from the disposal of water softener wastewater into home septic systems has occurred in several areas of the state. Such disposal is a violation of State law. Yet, the use of sodium water softeners continues because of a real or perceived need for home water treatment. It is evident that current regulations are not working and that new measures are required.

The State Department of Health Services Regulations for On-Site Sewage Disposal Systems, Item X Other Wastewaters, includes the statement "No. . . waste from water treatment. . . which may pollute wells shall discharge to any subsurface sewage disposal." Additionally, section 22a-430 of the Connecticut General Statutes requires a permit from DEP for any discharge other than domestic sewage. The 1982 DEP Delegation Agreement which authorizes DOHS to regulate discharges of 5,000 GPD or less specifically prohibits DOHS from approving "wastes from water treatment" units. Thus State regulations prohibit the use of water softeners in homes with private septic systems.

The only type of home water softening system currently permitted under the law uses replacement cartridges, which are regenerated at a central location where the wastewater can be properly discharged. Currently only two companies offer this type of service in the state.

The homeowner with a water quality problem knows little about water treatment or its legality. They know that something has to be done to correct a color, odor or hardness problem, and finds someone who will sell them the water treatment equipment. In most cases, this equipment will include a sodium cycle water softener. If the homeowner happens to have sewers, then the wastewater will not pose a threat to nearby wells. However, if their home has a septic system, then the wastewater cannot be legally disposed of into this system. Home water softeners are generally available to homeowners, through major stores and mail order houses. If the need exists, and the equipment cannot be installed "legally", then the homeowner will find other means to obtain and install it.

The law prohibiting water softener discharge to septic systems is not being uniformly enforced at the municipal level. Some towns actively prohibit installation of water softeners in homes with septic systems, while others either do nothing or permit the use of potassium cycle water softeners. The environmental impacts and health effects of potassium chloride, which has been used as a substitute for sodium chloride as a water softener regenerant, have not been fully evaluated. Reputable dealers will not sell or install water softeners in homes with septic systems, but others will do so.

The problem is intensified by the type of unit installed and the design of the installation. Most home water softeners are designed to regenerate on time, rather than after treating a certain quantity of water. The length of the regeneration cycle is usually set by the dealer to err on the side of a shorter regeneration cycle. Units required solely to address a hardness problem, are usually installed on the whole house water inlet line, rather than just on the hot water system. All of these factors contribute to higher than required amounts of regeneration and therefore higher quantities of sodium being discharged in the wastewater. Additionally, problems with false and misleading advertising practices in the home water treatment industry is a growing problem in Connecticut.

Further concern has been raised regarding possible negative effects of water softener discharge on the efficiency of septic systems. Two studies have been conducted which investigated the impact of water softeners on septic tanks: "Potential Effects of Water Softener Use on Septic Tank Soil Absorption On-Site Waste Water Systems" by the University of Wisconsin-Madison; and "The Effect of Home Water Softener Waste Regeneration Brines on Individual Aerobic Wastewater Treatment Plants" by The National Sanitation Foundation. Both of these studies concluded that:

1. Water softener waste effluents caused no operation problems in home wastewater treatment systems.
2. The volume of wastes from properly installed and maintained water softeners are added to the septic tank slowly and do not cause any deleterious hydraulic loading problems.
3. Water softener regeneration wastes did not interfere with septic tank drain field soil percolation, and actually improved soil percolation in fine-textured soils.

It should be noted that brine discharges can adversely affect concrete tanks, baffles and distribution boxes of septic systems above the water line. Also, even moderate increases in flows of 50-100 GPD could cause hydraulic failure of septic system which are on marginally suited lots. Most importantly, these studies do not look directly at groundwater contamination. Even when not impaired, septic systems do not remove sodium from water softener brine wastewater.

The Connecticut Water Quality Association (CT WQA), representing the Connecticut home water treatment industry, has recognized that water softener problems in the state are adversely impacting their business and reputations. They have been meeting with representatives of DOHS, Department of Consumer Protection, UCONN, and health districts to discuss means to address and resolve these problems. The CT WQA is also developing proposed voluntary guidelines for members to reduce water softener produced sodium chloride discharge into septic systems.

The National Sanitation Foundation and the Water Quality Association have both developed standards for water softeners. Units which meet these standards will perform, with proper operation and maintenance, in accordance with the claims made under the standard. The WQA Voluntary Industry Standard S-100-85 for Household, Commercial and Portable Exchange Water Softeners provides a standard of hardness removal, capacity, performance, construction, sanitation and service for devices which conform to this standard. It is estimated that newer systems may reduce the amount of salt used by 80 percent.

The unregulated sale and use of water softeners and other water treatment equipment throughout the state is increasing at an alarming rate. Since the current regulations are not working, any new regulations should apply to the whole non-public water treatment equipment industry. This will provide protection to the environment, the consumer, and the reputable businesses throughout the state.

The State of California recently enacted legislation which permits discharge of the regeneration waste to home waste disposal systems if certain conditions are satisfied:

1. The appliance is certified to control the quantity of salt used per regeneration cycle.
2. Water conservation devices are on all fixtures using softened or conditioned water.
3. Piping system modified to only deliver untreated water to fixtures outside the house.

This law also requires installation and certification by a Contractor having a valid water conditioning contractor's license or plumbing contractor's license. The State of California is also considering legislation to require certification of all water treatment devices sold in the state, and make it a misdemeanor to make false or misleading statements about water treatment devices or contamination problems in tap water.

Many homes with private wells require water treatment to remove iron, manganese and hardness. Water softeners are designed to correct hardness problems. Other technologies which do not involve sodium discharge are available for adjusting iron and manganese. It is recommended that a water hardness standard be developed through a State/industry cooperative effort in order to reduce the number of sodium based water softeners being used for purposes other than correcting a significant hardness problem.

Certain changes are required to properly control this currently unregulated industry. The Task Force recommended program to regulate the sale and installation of water treatment equipment includes the following:

1. Modify existing State Regulations to permit discharges from properly designed and operated water treatment

systems to on-site disposal systems. DEP should delegate the authority to the State Department of Health Services, who in turn could delegate the authority to local health departments to approve home water treatment systems which meet certain design standards.

2. DEP and DOHS should develop technical standards for water softener equipment. These standards should minimize quantities of wastewater produced and adverse impacts on the aquifer. This could include adopting standards developed by other organizations such as the National Sanitation Foundation or the Water Quality Association.
3. Require DEP and DOHS, working with industry representatives, to develop minimum hardness requirements for the use of home water softeners.

More stringent measures were recommended by the Task Force Subcommittee assigned to investigate the water softener issue.

1. License the designers/installers of potable water treatment systems. This licensing should include passing a written examination covering equipment design and operation and principles of water treatment. No grandfathering should be permitted. The State could consider accepting the Water Quality Association Certified Water Specialist examination in lieu of requiring a separate test. There will be a need for continuing education courses to train town sanitarians and those needing to prepare for the licensing examination.
2. System design and installation must be based on water tests performed by a DOHS certified testing laboratory. While an uncertified laboratory or field test kit may be used for preliminary evaluation of water quality, the final system design should be based on testing performed by a certified laboratory.
3. All installations should require a permit from the local health department. Applications should include all pertinent information regarding the problem, water tests, system design, acceptable discharge point (if applicable), name of system designer and license number, name of installer and license number. This would be similar to the well permits and septic permits which they currently issue.
4. Notification of health risks associated with the use of sodium cycle water softeners should be provided to consumers through use of a label on the equipment.
5. Use of sodium cycle water softeners should be limited to hot water systems rather than the whole house water inlet.

RESEARCH

The Task Force recognizes the need to support ongoing research into groundwater. Both the scientific understanding of groundwater processes, and the socio-economic impact of protection strategies need further investigation. Specific areas requiring investigation include bedrock aquifers (discussed below), dispersion and transport of various pollutants, development of new monitoring techniques, aquifer rehabilitation, as well as health and economic effects. The University of Connecticut Institute of Water Resources has conducted research into several of these and other groundwater issues. The Task Force recommends that such research be continued and that the Institute serve as the coordinating body for this research.

TRANSPORTATION

One activity posing a threat to drinking water supplies which is not directly addressed under the recommendations of this report is spills of contaminants during transportation. Figure 6 illustrates the major transportation routes in Connecticut relative to stratified drift wells. There is a correlation in the locations of these wells due to the practice of constructing major roadways in river valleys. Presently, roadway spills of hazardous materials are addressed by DEP through the use of the Emergency Spill Response Fund. Established by the legislature in 1979 as a means for addressing emergency hazardous waste spills, the function of the fund has expanded to include waste site cleanup, provision of potable water to those with contaminated wells, support for the hazardous waste management service, completion of waste site inventory, and studies and public education on pesticide groundwater pollution.

The Task Force feels that a need exists to address this issue beyond the level of clean-up and remediation. DOT presently considers the location of aquifers in its design and construction of new roadways. However, this generally involves consideration of the entire, undelineated aquifer. The Task Force recommends that upon completion of level A mapping, the DEP in conjunction with DOT, develop regulations pertaining to location, use, maintenance and construction of new and existing roadways located in Aquifer Protection Areas. These regulations would take effect upon completion of level A mapping.

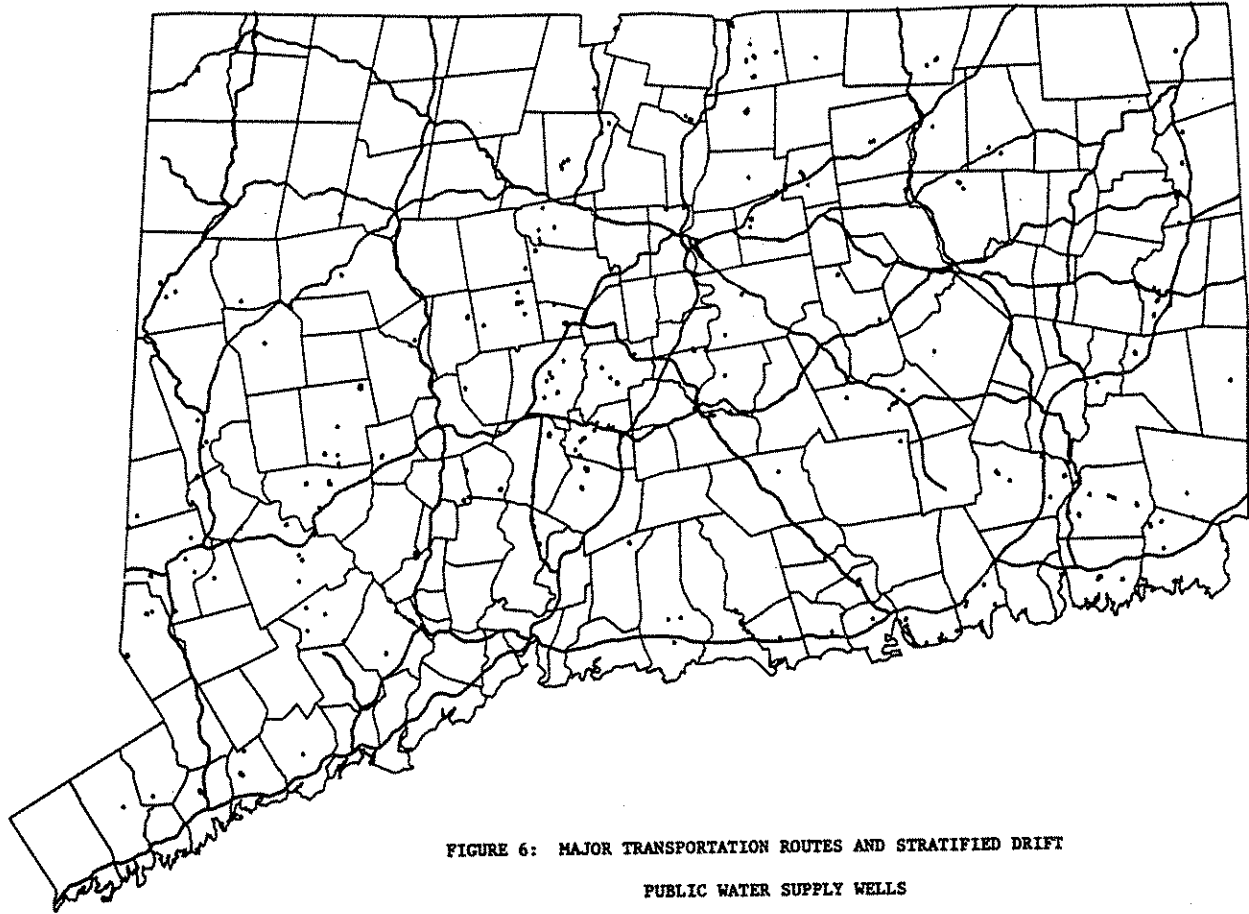


FIGURE 6: MAJOR TRANSPORTATION ROUTES AND STRATIFIED DRIFT
PUBLIC WATER SUPPLY WELLS

PROTECTING CONNECTICUT'S BEDROCK AQUIFERS

Bedrock Fracture Aquifer Conditions in Connecticut

Connecticut is underlain by consolidated bedrock. Bedrock is the most commonly utilized aquifer, supplying virtually all single family domestic residences that are self-supplied, as well as a large number of small public water supply systems.

There are two predominant types of bedrock in Connecticut, sedimentary and metamorphic. Each of type of bedrock exhibits different structural characteristics which significantly influences the behavior of water flowing through them.

Sedimentary rocks in Connecticut are found primarily in the central valley area running from the Massachusetts line to Long Island Sound. The rocks include conglomerates, sandstones, siltstones and shales; all having primary porosity (intergranular void spaces). These rocks are layered in distinct units with undefined layering and slightly trending to the east. Fracturing in sedimentary rocks generally occurs parallel to layering with secondary fractures developing at right angles. Flow of water through this rock is predominantly through the fracture systems but may occur to some degree through the primary pore spaces.

The metamorphic rock aquifers are located in both eastern and western Connecticut. These rocks are crystalline and composed of interlocking grains. Fracture systems are extremely complex with orientations and intensities changing radically over very short distances. Flow of groundwater occurs only through these fracture systems and is highly variable in velocities and volumes of flow, depending on the intensity and continuity of fracturing and the amount of interconnection to the unconsolidated aquifer.

Use of Bedrock Wells For Public Water Supply

Bedrock is the most commonly used source of groundwater in the State (Figure 7). Most community water systems and homes that require small to moderate amounts of water are supplied by wells that tap bedrock. Approximately 500 community water systems in Connecticut rely upon water withdrawn from bedrock wells (Table 7).

Approximately 1,000 of the 1,500 public supply wells in Connecticut tap bedrock aquifers. The 1,000 bedrock wells produce 20 percent of the public drinking water supply from groundwater; the remaining 500 stratified drift wells produce 80 percent of the groundwater used for public supply in Connecticut. Although more numerous than stratified drift wells, bedrock wells used for public supply only serve 140,000 people or 5 percent of the State.

PUBLIC SUPPLY BEDROCK WELLS

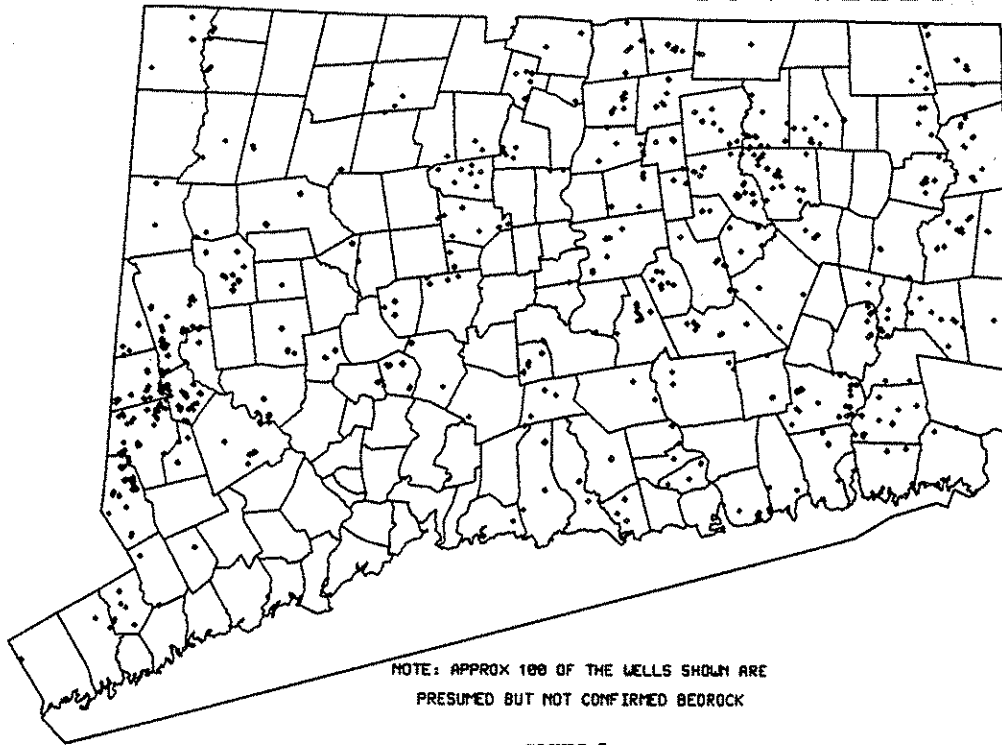


FIGURE 7

TABLE 7

Public Supply Wells

| | No. Wells | No. Well Fields | No. Com. Water Systems | Avg. Pop. Served Per Syst. | Residential Population Served | % State Served |
|----------------|--------------|-----------------------|------------------------------|----------------------------------|-------------------------------------|----------------------|
| Bedrk | 1,000 | 525 | 500 | 300 | 140,000 | 5 |
| Strat Drift | 480 | 240 | 157 | | 380,000 | 11 |

A bedrock well taps water that is transmitted through open fractures, pore spaces, and bedding planes within the rock. The vast majority of the bedrock wells used for public supply, tap crystalline bedrock in western and eastern Connecticut. In Central Connecticut, public supply bedrock wells generally tap sedimentary bedrock which tends to yield more than the average well set in crystalline bedrock. Fractured bedrock wells generally have relatively little storage capacity compared to that of wells set in porous, granular stratified drift.

Additionally, bedrock wells are generally deeper than wells set in stratified drift. Bedrock wells range from 50 to 900 feet deep. The average bedrock well is 300 feet deep compared to an average of 65 feet for stratified drift wells. Moreover, the typical public water system on bedrock wells serves 300 people from water withdrawn from two wells drilled next to each other. These small systems serve residential developments, trailer parks, apartments, and condominiums in outlying areas where large public water systems are nonexistent and stratified drift deposits are limited. Depending upon the nature of the bedrock, public supply wells generally yield from .5 to 50 gallons per minute.

In certain instances, some relatively large community water systems augment their supply with higher than average yielding bedrock wells. Fifteen of the community water systems serving from 1,000 to 10,000 have bedrock wells for this purpose. Two of the most notable bedrock well fields in Connecticut tap fractured cacarlate bedrock overlaid by stratified drift in Ridgefield, yielding .5 million gallons of water per day.

Delineation of Aquifer Protection Areas For Bedrock Wells.

Presently, there are a very limited number of models available to simulate the flow of groundwater in fractured bedrock aquifers. These models have been applied in a very limited number of attempts to simulate real flow systems. Those applications have dealt with only the simplest of actual fracture patterns. Additionally, calibration and verification have been, for the most part, incomplete or non-existent.

In Connecticut, there have been no attempts to model groundwater flow in fractured bedrock. Data requirements for modelling flow in fractured rock are highly variable depending upon the geology and in most instances are much more costly than requirements for modelling in the unconsolidated aquifer.

The accuracy of delineation of the Area of Contribution is a function of a number of different factors including: the complexity of the actual physical system, the amount and quality of data describing the system, the amount and quality of data describing the system, the validity of the assumptions used in the description of the physical attributes and processes that operate within the system and the appropriateness of the

methodology used for simulation.

At this time, delineation of Areas of Contribution for fractured bedrock aquifers based on the available technology for data collection, interpretation and modeling flow would result in low confidence levels at high cost. Conceptually, the behavior of flow in fractured rock is understood, but the application to a real system is complicated by the lack of real data on the system.

Recommendations For Delineation Of Aquifer Protection Areas For Bedrock Wells

1. Institute mechanism to develop a methodology for analysis of contributing areas to fractured rock wells. This would involve research into the following areas:
 - a. Physical properties of fractured rock
 - b. Modelling techniques to simulate flow in fractured rock.
2. Interim delineation methodology to be adopted
 - a. Method 1 - treat fractured rock conditions similar to stratified drift (gross assumption). Use level B setback methodology.
 - b. Method 2 - setback area based on recharge calculations. Using catalog values of recharge to groundwater in upland (till-rock) areas between zero and six inches per year and 24 to 30 inches per year in sand and gravel areas; calculate land area needed to supply well discharge.
3. Utilize appropriate management strategies based on one of the above methods.

PART IV: RECOMMENDATIONS AND FUNDING

Implementing an effective program for protecting Connecticut's present and future drinking water supplies will require a substantial commitment at all levels of government along with the firm and active support of the public. The program outlined in this report, building on the foundational elements of the 1988 report, charts a course which would put Connecticut in the forefront of groundwater protection. Although the eventual implementation of the entire program will be expensive, the cost of doing nothing could be catastrophic. Additionally, all program elements need not be enacted during the 1989 legislative session. Many of the costs associated with this program will not be incurred until the protective regulatory measures are instituted upon completion of the aquifer delineation process. The Task Force feels a strong responsibility to prioritize its proposals in terms of a timetable for enactment and to be conscientious with regard to maximizing the utilization of present state resources.

Similar to the philosophy of the 1988 Task Force recommendations, this year's Task Force feels it is vitally important that certain elements of the program be adopted during the immediate legislative session in order to allow the local protection programs to begin upon completion of the mapping mandated in last years legislation. Chief among these primary recommendations are the development of minimum state protection standards as well as educational and technical assistance programs. The following section outlines the major recommendations of the Task Force.

FIRST PHASE RECOMMENDATIONS REQUIRING FUNDING

1. Authorize and require the Department of Environmental Protection to:
 - o Develop regulations and performance standards for existing and future land uses to be implemented by municipalities in Aquifer Protection Areas;
 - o Develop regulations and performance standards for future land uses to be implemented by municipalities in Aquifer Protection Areas;
 - o Develop a schedule of compliance for existing non-conforming uses in Aquifer Protection Areas;
 - o Develop an administrative exemption procedure for prohibited uses which, for special reasons, do not pose contamination risks to existing or future water supplies;

- o Develop, in conjunction with DOHS, a statewide education strategy on groundwater protection which should include utilities, public service organizations, state education institutions, environmental and other non-profit organizations, regional planning agencies, municipal groups, corporate leaders and the regulated community;
- o Develop a program in conjunction with DOHS to provide technical assistance to regional health districts, municipalities, utilities, and the regulated community for implementing all aspects of the program;
- o Develop in conjunction with DOHS, water utilities, and the regulated community, a strategic groundwater monitoring plan to be implemented within one year of completion of level A mapping;
- o Develop model aquifer protection ordinances and a procedure for approving local protection ordinances for Aquifer Protection Areas to insure consistency and compliance with minimum state standards;
- o Direct farms located within Aquifer Protection Areas to develop and implement Farm Resource Management Plans;
- o Enforce state minimum standards in municipalities which do not institute acceptable protection ordinances for Aquifer Protection Areas;
- o Work with the Department of Transportation to develop protection programs for public wells near interstate highways and state roads;
- o Develop a positive incentive program to provide recognition for successful efforts within the regulated community to promote protection of public drinking water resources;
- o Develop in conjunction with DOHS and DPUC land acquisition guidelines for lands surrounding existing or proposed public water supply wells and to encourage acquisition of title and development easements;
- o Develop amendments to the water diversion policy act to permit the reservation of diversion rights by utilities engaged in the mapping and water supply planning process

COST: \$350,000/Yr

POSSIBLE FUNDING SOURCE: Emergency Spill Response Fund
(Would require extension of
statutory authority)

2. Authorize and fund the use of DEP's Geographic Information System (GIS) to support the Aquifer Protection Program.

COST: \$50,000

POSSIBLE FUNDING SOURCE: Federal matching fund program.

3. Authorize and fund research into bedrock aquifers.

COST: \$35,000

POSSIBLE FUNDING SOURCE: Existing Agency Research Funds

FIRST PHASE RECOMMENDATIONS NOT REQUIRING FUNDING

1. Require municipalities to designate Aquifer Protection Areas and to adopt regulations in accordance with minimum state guidelines;
2. Require municipalities to notify the appropriate utility of any pending land use applications within Aquifer Protection Areas;
3. Require utility mapping of future stratified drift public water supplies upon approval of individual water supply plans but before completion of regional plans if no jurisdictional issue exists;
4. Require DEP and other government agencies to provide high priority to aquifer protection in their ongoing programs for land acquisition, land management, water quality classification, and environmental enforcement;
5. Require water utilities to prepare municipal technical assistance programs;
6. Require municipalities to complete land use inventories within one year of receipt of approved level B maps;
7. Require DEP to work with federal agencies to prioritize federal resource related protection efforts in Connecticut;
8. Require one municipal designee from each municipality containing a present or proposed public water supply well in stratified drift to receive technical training on aquifer protection through DEP or other DEP approved training programs prior to municipal adoption of aquifer protection ordinances;

9. Require existing agricultural cost-sharing programs to include development of individual resource management plans;
10. Require inspection and enforcement coordination among DEP, DOHS, municipalities, utilities, and regional health districts utilizing DEP's delegation statute where appropriate;
11. Authorization for water utilities to explore state owned lands for the purpose of determining their potential as future public drinking water supplies;
12. Require DOHS to review the resources currently committed to the water planning process and to redirect current resources to this program where feasible; and
13. Authorize DOHS to take measures to expedite the approval procedure for the individual water supply plans.

RECOMMENDATIONS FOR FUTURE LEGISLATION

1. Supplemental Funding of existing agricultural cost-sharing plans commensurate with estimated agricultural lands located within Aquifer Protection Areas.

FUNDING PERIOD: 1990 - 1992

ESTIMATED COST: To be determined upon completion of agricultural land survey

2. Funding for expansion of the Geographic Information System's role in mapping delineated aquifers as well as analyzing aquifer and other land use information.

FUNDING PERIOD: Through 1994

ESTIMATED COST: \$50,000 per year

3. Funding to DEP for conducting research in developing better modeling techniques for Aquifer Protection Areas in fractured bedrock conditions.

FUNDING PERIOD: Through 1992

ESTIMATED COST: \$150,000

4. Implement aquisition recommendations developed by DEP and DOHS including funding if required.

FUNDING PERIOD AND COST: To be determined upon receipt of recommendations

RECOMMENDED AMENDMENTS TO PUBLIC ACT 88-324

Require public or private water supply companies serving between one thousand and ten thousand persons to complete level A mapping of existing stratified drift wells by July 1, 1994;

Require public and private water supply companies serving between one thousand and ten thousand persons with potential wellfields identified and approved as a future water supply source, complete level B mapping two years and level A mapping five years subsequent to approval of the plan;

Authorize the Commissioner of Environmental Protection to map at level B, all potential wellfields located in stratified drift aquifers.

Authorize mapping of public and private water supply wells to commence subsequent to approval of individual water supply plans where no jurisdictional conflict exist.

RECOMMENDED AMENDMENT TO DOHS WATER SUPPLY LEGISLATION

1. Require the reports of the Water Utility Coordinating Committees to specify recommendations for land acquisition for lands surrounding proposed stratified drift wells.

PART IX: APPENDICES

APPENDIX 1 - CHEMICALS OF CONCERN

CERTAIN CHEMICALS ARE COMMON CAUSES OF GROUND WATER CONTAMINATION. ANY ACTIVITIES INVOLVING THE USE, STORAGE, HANDLING, OR DISPOSAL OF SUCH SUBSTANCES MAY BE SUBJECT TO ADDITIONAL CONTROLS IN AQUIFER PROTECTION AREAS. A LIST OF THE CHEMICAL SOURCES OR TYPES IS PRESENTED BELOW.

LEACHATE FROM WASTE STORAGE AND DISPOSAL (this can include all the chemical groups listed below)

SODIUM CHLORIDE (uses: de-icing and snow clearance, water softeners)

PESTICIDES (uses: agriculture, landscaping)

FERTILIZERS AND ANIMAL WASTES (uses: agriculture and landscaping)

FUEL/PETROLEUM PRODUCTS, CONSTITUENTS AND BYPRODUCTS (waste oil, benzene, MBTE - methyl tertiary butyl ether, EDB
(uses: transportation, heating, lubrication, power generation)

SOLVENTS OR CHLORINATED HYDROCARBONS (see also pesticides) (common contaminants include tetrachlorethylene, trichlorethylene, trichloroethane, toluene, benzene)
(uses: machinery and parts cleaning and degreasing, dry cleaning, industrial laundering, paint thinners)

PCBs (uses: transformer oils)

PHENOLS AND CREOSOTES (uses: wood preserving)

METALS (uses: metal plating, dyes, paints)

ACIDS (changes pH, and may release contaminants)

ALKALIES (changes pH, and may dissolve metals)

CYANIDES (found in industrial wastes)

ALCOHOLS (uses: anti-freeze)

PHARMACEUTICAL CHEMICALS

HAZARDOUS MATERIALS

ORGANIC/INORGANIC CHEMICALS

APPENDIX 2

Appendix 2 is organized by Standard Industrial Classification (SIC) codes. These codes should only be used as a preliminary guide, as the classifications are often quite broad and may contain both high and low risk uses. The actual list of uses in Column 2 and activities in Column 5 is a more accurate indicator for whether a use should be banned or regulated.

| SIC NUMBER | LAND USES OF CONCERN | BAN | REG | ACTIVITY/CHEMICAL CONCERN | RECOMMENDATION |
|------------|----------------------|-------------------------------------|-----|------------------------------------------------|-------------------------------|
| 1 | N.A. | WASTE DISPOSAL | X | | |
| 2 | | - SANITARY LANDFILLS | X | Act. - Leachate generation from waste disposal | Prohibit - Adopt AA ground |
| 3 | | - SEPTAGE LAGOONS | X | | water quality classification |
| 4 | | - HAZARDOUS WASTE DISPOSAL | X | Chem.- Numerous chemical constituents | of GAA for AOC and direct |
| 5 | | - BULKY & SPECIAL WASTE DISPOSAL | X | | recharge area |
| 6 | | - SLUDGE DISPOSAL | X | | |
| 7 | | - WATER SOFTENER BRINES | X | Salt contamination. | Prohibit discharge to ground. |
| 8 | | | | | |
| 9 | | - STUMP DUMPS | | R Chem.- Modest natural organic leachate | Site Plan review, limited |
| 10 | | | | | to immediate property needs |
| 11 | | | | | |
| 12 | N.A. | SEPTIC SYSTEM DISCHARGE OF NON- | X | Act. - Discharge of non-biodegradable wastes | Prohibit - Adopt GAA ground |
| 13 | | DOMESTIC WASTE | | to groundwater. | water quality classification |
| 14 | | | | Chem.- Persistent organics and inorganics. | of GAA for AOC and direct |
| 15 | | | | | recharge area. |
| 16 | | | | | educate citizens |
| 17 | | | | | |
| 18 | N.A. | UNDERGROUND LEACHING SYSTEMS FOR | X | Act. - Parking lot runoff leaching systems for | Prohibit - Prevent during |
| 19 | | STORMWATER FROM LARGE PAVED | | stormwater runoff management | Site Plan review process |
| 20 | | HIGHWAYS AND PARKING AREAS | | Chem.- Sodium chloride, benzene and other gas, | |
| 21 | | | | oil, or other automotive chemicals, | |
| 22 | | | | transportation spills | |
| 23 | | | | | |
| 24 | N.A. | FLOOR DRAINS | X | Act. - Illegal or inadvertent disposal of | Prohibit discharge to ground |
| 25 | | | | various pollutants through dry wells or | allow floor drains where dis- |
| 26 | | | | septic systems. | charge is connected to public |
| 27 | | | | | sewers or part of a DEP regu- |
| 28 | | | | Chem.- Organics and inorganic contaminants | lated treatment system. |
| 29 | | | | | |
| 30 | N.A. | WASTE PROCESSING SYSTEMS | | R Act. - Spills, leaks and possible leachate | Require - design considera- |
| 31 | | - RESOURCE RECOVERY FACILITIES FOR | | from storage and processing of wastes. | tions for waste and process |
| 32 | | MUNICIPAL SANITARY WASTES | | Chem.- Potential organic & inorganic | material storage and handling |
| 33 | | SOLID WASTE TRANSFER STATION | | contaminants. | |
| 34 | | - RECYCLING PROCESSING CENTERS | | | |
| 35 | | - SEWAGE TREATMENT PLANTS & ASSOC | | | Plans for increased inspe- |
| 36 | | FACILITIES, INCL. PUMP STA. | | | tions, spill response plans |
| 37 | | | | | |
| 38 | N.A. | UNDERGROUND STORAGE OR TRANSMISSION | X | Act. - Tank, pipeline or joint leaks or breaks | Prohibit |
| 39 | | OF LIQUID FUELS AND HAZARDOUS | | | |
| 40 | | CHEMICALS | | Chem.- Liquid fuels, hazardous materials | |
| 41 | | - UNDERGROUND STORAGE TANKS | X | | |
| 42 | | - UNDERGROUND DISTRIBUTION SYSTEMS | X | | |
| 43 | | - LIQUID FUEL PIPELINES | X | | |
| 44 | | | | | |
| 45 | N.A. | OUTDOOR, UNPROTECTED STORAGE OF | X | Act. - Exposure of materials to precipitation, | Require indoor storage with |
| 46 | | COMMERCIAL, INDUSTRIAL OR INSTITU- | | and subsequent generation of leachate; | special safeguards against |
| 47 | | TIONAL CHEMICAL PRODUCTS OR WASTES | | spills; leaks; accidents | spills, or special outdoor |
| 48 | | ABOVE GROUND | | Chem.- Various organic and inorganic contam. | protection measures. |
| 49 | | | | | |
| 50 | N.A. | STORAGE OF GASOLINE, DIESEL AND | | R Act. - Leaks, drips, tank ruptures | Prohibit permanent gas tanks |
| 51 | | FUEL OIL | | Chem.- Hydrocarbons, benzene and other contam. | Diesel & Fuel Oil - Inside |
| 52 | | | | | storage or special outdoor |
| 53 | | | | | above ground protection |
| 54 | | | | | measures required |
| 55 | | | | | |
| 56 | 82xx | EDUCATIONAL FACILITIES | | | |
| 57 | | - ELEMENTARY & SECONDARY SCHOOLS | R | Chemistry/physics/biology labs, automotive | Site Plan review, spill |
| 58 | | - COLLEGES AND UNIVERSITIES | R | repair shops, industrial arts, hazardous | prevention plans, material |
| 59 | | - JUNIOR COLLEGES | R | material storage and use, school, lab, and | storage and waste management. |
| 60 | | - VOCATIONAL SCHOOLS | R | shop wastes. | |

| SIC NUMBER | LAND USES OF CONCERN | BAN/REG | ACTIVITY/CHEMICAL CONCERN | RECOMMENDATION |
|------------|---------------------------------------------------------------------------------------------|---------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| 61 | | | | |
| 62 | N.A. PRISONS | | | |
| 63 | | R | Similar to educational facilities - see above | Site Plan review - see above. |
| 64 | N.A. ROAD SALT STORAGE | X | | |
| 65 | | | Act. - Stockpiling of road salt for de-icing of roads and parking areas. | Prohibit |
| 66 | | | Chem.- Sodium chloride, de-caking agents | |
| 67 | | | | |
| 68 | N.A. MUNICIPAL & STATE GARAGES FOR HIGHWAY & PUBLIC WORKS DEPARTMENTS | X | | |
| 69 | | | Act. - Road maintenance related equipment storage and maintenance, fuel storage. | Prohibit |
| 70 | | | Chem.- Cleaning solvents, hydrocarbons, pesticides, and other organic chemicals. | |
| 71 | | | | |
| 72 | | | | |
| 73 | N.A. ROADS, TRANSPORTATION CORRIDORS, INSTITUTIONAL, COMMERCIAL OR INDUSTRIAL PARKING AREAS | | | |
| 74 | | R | Act. - De-icing, highway runoff, drainage systems transportation spills/accidents. | Restrict use of sodium chl. |
| 75 | | | Chem.- Sodium chloride, hydrocarbons, hazardous materials. | Design review - greater environmental safeguards. |
| 76 | | | | |
| 77 | | | | |
| 78 | N.A. AIRPORTS | X | | |
| 79 | | | Act. - De-icing, maintenance of aircraft and equipment, fuel storage & distribution. | Prohibit. |
| 80 | | | Chem.- Hydrocarbons, solvents, waste oils, de-icing chemicals, and other wastes. | |
| 81 | | | | |
| 82 | | | | |
| 83 | 15xx-17xx CONSTRUCTION | | | |
| 84 | - HIGHWAY AND STREET CONSTRUCTION | R | Act. - Fuel, Vehicle Storage & Maintenance. | Management plan for vehicle refueling and maintenance and spill response |
| 85 | - BRIDGE, TUNNEL, ELEVATED HIGHWAY | R | Chem.- Hydrocarbons, cleaning agents | |
| 86 | - WATER, SEWER, AND UTILITY LINES | R | | |
| 87 | - HEAVY CONSTRUCTION, NEC | R | | |
| 88 | | | | |
| 89 | 01xx AGRICULTURAL PRODUCTION - CROPS | R | | |
| 90 | | | Act. - Pesticide/Fertilizer Storage and Application | Farm Resource Management Plan |
| 91 | | | | |
| 92 | | | Chem.- Nitrates and certain pesticides such as EDB that can leach into ground water. | |
| 93 | | | | |
| 94 | | | | |
| 95 | 02xx AGRICULTURAL PRODUCTION - LIVESTOCK | R | | |
| 96 | | | Act. - Animal Waste Management. | Farm Resource Management Plan |
| 97 | | | Chem.- Nitrates | |
| 98 | | | | |
| 99 | 07xx AGRICULTURAL SERVICES | | | |
| 100 | - VETERINARY SERVICES, LIVESTOCK | R | Act. - Disposal of medical wastes, use of pesticides | Site Plan Review to address storage and disposal of pesticides and medical waste. |
| 101 | - VETERINARY SERVICES, SPECIALTIES | R | Chem.- Pharmaceutical chemicals, pesticides, alcohols | |
| 102 | | | | |
| 103 | | | | |
| 104 | 10xx-14xx MINING ACTIVITIES | R | | |
| 105 | | | Act. - Fuel, Vehicle Storage & Maintenance. | Management plan for vehicle refuel/maint./spill response |
| 106 | | | Chem.- Hydrocarbons, cleaning solvents | |
| 107 | | | | |
| 108 | 20xx FOOD AND KINDRED PRODUCTS | R | | |
| 109 | | | Act. - Raw material storage, processing wastes | Site plan review & management Plan for hazardous materials. |
| 110 | | | Chem.- Nitrogenous wastes, preservatives | |
| 111 | | | | |
| 112 | 22xx TEXTILE MILL PRODUCTION | | | |
| 113 | - DYEING | X | Act. - Storage and use of hazardous materials, equipment cleaning, and hazardous wastes. | Prohibit listed uses. |
| 114 | - TANNING | X | | |
| 115 | - TEXTILE COATING | X | | |
| 116 | - FABRIC PRINTING | X | Chem.- Strong acids and alkalis, solvents, metals and hydrocarbons | |
| 117 | | | | |
| 118 | * ALL OTHER TEXTILE PRODUCTION * | R | | Site plan review & management Plan for critical chemicals |
| 119 | | | | |
| 120 | 23xx APPAREL AND OTHER TEXTILE PRODUCTS | | Act. - Storage and use of hazardous materials, | Prohibit banned uses. |

| SIC NUMBER | LAND USES OF CONCERN | BAN | REG | ACTIVITY/CHEMICAL CONCERN | RECOMMENDATION |
|------------|---------------------------------------------------------------|-----|-----|----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| 121 | - DYEING | X | | equipment cleaning, and hazardous wastes. | |
| 122 | - TANNING | X | | | |
| 123 | - TEXTILE/APPAREL COATING | X | | | |
| 124 | - FABRIC/APPAREL PRINTING | X | | Chem.- Strong acids and alkalis, solvents, metals and hydrocarbons | |
| 125 | | | | | |
| 126 | * ALL OTHER APPAREL PRODUCTION * | | R | | Site Plan review & management plan for critical chemicals. |
| 127 | | | | | |
| 128 | 24xx LUMBER AND WOOD PRODUCTION | | | Act. - Chemical treatment of wood, chemical storage | Prohibit banned uses. |
| 129 | - HARDWOOD VENEER AND PLYWOOD | X | | | |
| 130 | - SOFTWOOD VENEER AND PLYWOOD | X | | | |
| 131 | - WOOD PRESERVING | X | | Chem.- creosotes, tars, trichlorophenol, pentachlorophenol, metals, solvents, oils | |
| 132 | - RECONSTITUTED WOOD PRODUCTS | X | | | |
| 133 | | | | | |
| 134 | * ALL OTHER ACTIVITIES * | | R | | Site Plan review. |
| 135 | | | | | |
| 136 | WOOD HOUSEHOLD FURNITURE | | R | Act. - Painting and finishing of wood, cleaning and maintenance of equipment. | Site Plan review hazardous material and waste material management plan. |
| 137 | | | | Chem.- Solvents, preservatives, paint wastes | |
| 138 | | | | | |
| 139 | | | | | |
| 140 | | | | | |
| 141 | 26xx PAPER AND ALLIED PRODUCTS | | | Act. - Storage and use of hazardous and non hazardous materials, large quantities of waste generation. | Prohibit listed activities. |
| 142 | - PULP & PAPER MANUFACTURING | X | | | |
| 143 | | | | | |
| 144 | * ALL OTHER ACTIVITIES * | | R | Chem.- Toxic organic and inorganic chemicals metals, chlorinated hydrocarbons | Site Plan review, hazardous material and waste material management plan. |
| 145 | | | | | |
| 146 | | | | | |
| 147 | | | | | |
| 148 | 27xx PRINTING AND PUBLISHING | | | Act. - Storage and use of organic chemicals, equipment cleaning, engraving | Prohibit banned uses. |
| 149 | * INCLUDING PLATE MAKING, COMM'L LITHOGRAPHIC, PHOTOENGRAVING | X | | | |
| 150 | COMMERCIAL PRINTING, GRAVURE | | | Chem.- Chlorinated solvents, phenols, hydrocarbon compounds | |
| 151 | | | | | |
| 152 | * ALL OTHER ACTIVITIES * | | R | | Site Plan review, hazardous materials, fuels, and waste management plan. |
| 153 | | | | | |
| 154 | | | | | |
| 155 | | | | | |
| 156 | | | | | |
| 157 | 28xx CHEMICALS AND ALLIED PRODUCTS | X | | Act. - Storage, use & production of chemicals, equipment cleaning and maintenance, hazardous waste generation. | Prohibit. |
| 158 | | | | | |
| 159 | | | | Chem.- Organic and inorganic chemicals. | |
| 160 | | | | | |
| 161 | | | | | |
| 162 | | | | | |
| 163 | 29xx PETROLEUM AND COAL PRODUCTS | X | | Act. - Storage & use of fossil fuels, machine shops, equipment cleaning & maintenance | Prohibit. |
| 164 | | | | Chem.- Hydrocarbons, solvents | |
| 165 | | | | | |
| 166 | | | | | |
| 167 | | | | | |
| 168 | 30xx RUBBER AND MISC. PLASTIC PRODUCTS | | | Act. - Raw material storage, process hazardous waste generation, machine shops | Prohibit banned uses. |
| 169 | - RUBBER MANUFACTURING, E.G. | X | | | |
| 170 | FABRIC COATING, ELASTOMER AND | | | Chem.- Waste oils, solvents, phenols | |
| 171 | RESIN CEMENTS, TIRES AND TUBES | | | strong organic and inorganic wastes | |
| 172 | | | | | |
| 173 | * ALL OTHER ACTIVITIES * | | R | | Site Plan review hazardous material and waste material management plan. |
| 174 | | | | | |
| 175 | | | | | |
| 176 | | | | | |
| 177 | 31xx LEATHER AND LEATHER PRODUCTS | | | Act. - Storage and use of toxic chemicals | Prohibit. |
| 178 | - LEATHER TANNING AND FINISHING | X | | | |
| 179 | | | | Chem.- Strong acids and alkalis | |
| 180 | * ALL OTHER ACTIVITIES * | | R | | |

| SIC NUMBER | LAND USES OF CONCERN | BAN | REG | ACTIVITY/CHEMICAL CONCERN | RECOMMENDATION |
|------------|----------------------|-----|-----|------------------------------------------------|-----------------------------|
| 181 | | | | | |
| 182 | 32xx | | | Act. - Machine shops, chemical processes for | Prohibit banned uses. |
| 183 | | X | | mirror and coating manufacturing | |
| 184 | | | | | |
| 185 | | | R | Chem.- Strong acids and alkalies | Site plan approval. |
| 186 | | | | | |
| 187 | | | | | |
| 188 | 33xx | | X | Act. - Foundaries, metal forming, machine | Prohibit. |
| 189 | | | | shops, equipment cleaning & maintenance | |
| 190 | | | | use and storage of fuels, hazardous | |
| 191 | | | | and non hazardous waste generation. | |
| 192 | | | | | |
| 193 | | | | Chem.- Strong acids and alkalies, metals, | |
| 194 | | | | chlorinated solvents, cyanides, waste | |
| 195 | | | | oils | |
| 196 | | | | | |
| 197 | 34xx | | | Act. - Storage and use of hazardous materials, | Prohibit banned uses. |
| 198 | | X | | hazardous waste generation, equipment | |
| 199 | | | | cleaning and maintenance, machine shops | |
| 200 | | | | | |
| 201 | | | | Chem.- Heavy metals, chlorinated hydrocarbons, | |
| 202 | | | R | strong acids and alkalies, waste oils, | Site Plan review, hazardous |
| 203 | | | | paint and thinner wastes, cyanides | materials, fuels, and waste |
| 204 | | | | | management plan. |
| 205 | | | | | |
| 206 | 35xx | | | Act. - Storage and use of hazardous materials, | Prohibit banned uses. |
| 207 | | X | | hazardous waste generation, equipment | |
| 208 | | | | cleaning and maintenance, machine shops | |
| 209 | | | | | |
| 210 | | | | Chem.- Heavy metals, chlorinated hydrocarbons, | |
| 211 | | | R | strong acids and alkalies, paint and | Site Plan review, hazardous |
| 212 | | | | thinner wastes, waste oils | materials, fuels, and waste |
| 213 | | | | | waste management plan. |
| 214 | | | | | |
| 215 | 36xx | | | Act. - Storage and use of hazardous materials, | Prohibit banned uses. |
| 216 | | X | | hazardous waste generation, equipment | |
| 217 | | | | cleaning and maintenance, machine shops | |
| 218 | | | | | |
| 219 | | | R | Chem.- Heavy metals, chlorinated hydrocarbons, | Site Plan review, hazardous |
| 220 | | | | strong acids and alkalies, waste oils, | materials, fuels, and waste |
| 221 | | | | paint and thinner wastes | waste management plan. |
| 222 | | | | | |
| 223 | 37xx | | | Act. - Storage and use of hazardous materials, | Prohibit banned uses. |
| 224 | | X | | hazardous waste generation, equipment | |
| 225 | | | | cleaning and maintenance, machine shops | |
| 226 | | | | | |
| 227 | | | R | Chem.- Heavy metals, chlorinated hydrocarbons, | Site Plan review, hazardous |
| 228 | | | | strong acids and alkalies, waste oils, | materials, fuels, and waste |
| 229 | | | | phenols, PCB's, cyanides | management plan. |
| 230 | | | | | |
| 231 | 38xx | | | Act. - Storage and use of hazardous materials, | Prohibit banned uses. |
| 232 | | X | | hazardous waste generation, equipment | |
| 233 | | | | cleaning and maintenance, machine shops | |
| 234 | | | | | |
| 235 | | | R | Chem.- Heavy metals, chlorinated hydrocarbons, | Site Plan review, hazardous |
| 236 | | | | strong acids and alkalies, oils | materials, fuels, and waste |
| 237 | | | | | management plan. |
| 238 | | | | | |
| 239 | 39xx | | | Act. - Storage and use of hazardous materials, | Prohibit banned uses. |
| 240 | | X | | hazardous waste generation, equipment | |

| SIC NUMBER | LAND USES OF CONCERN | BAN | REG | ACTIVITY/CHEMICAL CONCERN | RECOMMENDATION |
|------------|----------------------------------------------|-----|-----|-------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| 241 | ETCHING, AND DEGREASING | | | cleaning and maintenance, machine shops | |
| 242 | | | | | |
| 243 | * ALL OTHER ACTIVITIES * | | R | Chem.- Heavy metals, chlorinated hydrocarbons, strong acids and alkalis, oils | Site Plan review, hazardous materials, fuels, and waste management plan. |
| 244 | | | | | |
| 245 | | | | | |
| 246 | | | | | |
| 247 | | | | | |
| 248 | N.A. MACHINE OR MAINTENACE SHOPS AS A | | R | Act. - Accidental or illegal discharge of | Site Plan Review - hazardous |
| 249 | SUPPORT ACTIVITY (no contract work) | | | cleaning solvents and waste oils. | material storage and use, |
| 250 | | | | Chem.- Solvents, waste oils | waste handling, records of |
| 251 | | | | | waste material management, |
| 252 | | | | | spill control plan |
| 253 | | | | | |
| 254 | 40xx-49xx TRANSPORT; COMMUNICATIONS; UTILITY | | | | Prohibit banned uses. |
| 255 | - TRANSPORTATION SYSTEMS MAINTEN. | X | | Fuel storage/distribution, solvents, waste oil | |
| 256 | - CRUDE PETROLEUM PIPELINES | X | | Hydrocarbon contamination. | |
| 257 | - REFINED PETROLEUM PIPELINES | X | | Hydrocarbon contamination. | |
| 258 | | | | | |
| 259 | - FOSSIL FUEL POWER PLANTS | X | | Risks asso. with fuels stor./use, large quan- | Prohibit. |
| 260 | | | | ties of waste generation, machine shops, | |
| 261 | | | | equipment maintenance. | |
| 262 | | | | | |
| 263 | - ELECTRIC SERVICES | | R | | Site Plan review, hazardous |
| 264 | - ELECTRIC & OTHER SERVICE COMB. | | R | | materials, fuels, and waste |
| 265 | - COMBINATION UTILITIES, NEC | | R | | management plan. |
| 266 | | | | | |
| 267 | - SEWERAGE SYSTEMS | | R | Leaky pipes - exfiltration of contaminants | Require Watershed equivalent |
| 268 | | | | | pipe specifications in AOC. |
| 269 | | | | | |
| 270 | 50xx-51xx WHOLESALE TRADE | | | | Prohibit banned uses. |
| 271 | - COAL AND OTHER MINERALS & ORES | X | | Large volumes of various materials and | |
| 272 | - METAL & AUTO PARTS SALVAGE | X | | products handled, stored and distributed that | |
| 273 | - CHEMICALS & ALLIED PRODUCTS, NEC | X | | might contaminate groundwater as a result of | |
| 274 | - PETRO. BULK STATIONS/TERMINALS | X | | accidents, poor management practices, flooding | |
| 275 | - PETROLEUM PRODUCTS, NEC | X | | or fires. Solvents, organic and inorganic | |
| 276 | - PAINTS, VARNISHES & SUPPLIES | X | | chemicals, and hydrocarbon contamination | |
| 277 | | | | threats. | |
| 278 | * ALL OTHER WHOLESALE TRADE * | | R | | Site Plan Review |
| 279 | | | | | |
| 280 | 52xx-59xx RETAIL TRADE | | | | |
| 281 | - NEW OR USED CAR DEALERS | X | | Act. - Maintenance and repair of vehicles, use | Prohibit banned uses (ideal). |
| 282 | - GASOLINE SERVICE STATIONS | X | | of solvents, lubricants, paints, brake, | or prohibit those activities |
| 283 | - BOAT DEALERS | X | | and transmission fluids, generation of | and chemicals of concern. |
| 284 | - RECREATIONAL VEHICLE DEALERS | X | | waste oils, hazardous and non-hazardous | |
| 285 | - MOTORCYCLE DEALERS | X | | wastes. | |
| 286 | - OTHER AUTOMOTIVE DEALERS | X | | Chem.- hydrocarbons, solvents, benzene, waste | |
| 287 | - FUEL OIL DEALERS | X | | oil and other organic chemicals. | |
| 288 | | | | | |
| 289 | - LUMBER & OTHER BLDG. MATERIALS | | R | | Site Plan review. |
| 290 | - PAINT, GLASS & WALLPAPER STORES | | R | | Special storage provisions, |
| 291 | - HARDWARE STORES | | R | | no dry wells or floor drains |
| 292 | - RETAIL NURSERIES AND GARDENS | | R | | |
| 293 | - MOBILE HOME DEALERS | | R | | |
| 294 | - DEPARTMENT STORES | | R | | |
| 295 | - AUTO AND HOME SUPPLY STORES | | R | | |
| 296 | - OTHER FUEL DEALERS | | R | | |
| 297 | | | | | |
| 298 | | | | | |
| 299 | 70xx-89xx SERVICES | | | | |
| 300 | | | | | |

| SIC NUMBER | LAND USES OF CONCERN | BAN | REG | ACTIVITY/CHEMICAL CONCERN | RECOMMENDATION |
|------------|-------------------------------------|-----|-----|------------------------------------------------|-------------------------------|
| 301 | PERSONAL OR BUSINESS SERVICES | | | | |
| 302 | - DRY CLEANING PLANTS, EXCEPT RUG | X | | Dry cleaning solvents, storage, use, disposal. | Prohibit banned uses. |
| 303 | - INDUSTRIAL LAUNDERERS | X | | Industrial strength cleaning solvents/agents. | |
| 304 | - LAWN CARE BUSINESS | X | | Storage & mixing of chemicals, equip. cleaning | |
| 305 | - HEAVY CONSTRUCTION EQUIP RENTAL | X | | Heavy equipment fueling and maintenance. | |
| 306 | | | | | |
| 307 | - POWER LAUNDRIES (FAM./COMM'L.) | | R | Chemicals & wastes associated with service, | Site plan review, require |
| 308 | - COIN OPERATED LAUNDRIES/CLEANING | | R | e.g. chlorinated solvents and hydrocarbons. | connection to public sewers. |
| 309 | - BEAUTY SHOPS | | R | | |
| 310 | - FUNERAL SERVICE & CREMATORIES | | R | | |
| 311 | - PHOTOFINISHING LABORATORIES | | R | | |
| 312 | | | | | |
| 313 | - PHARMACIES | | R | Waste management, secondary services. | Site Plan review. |
| 314 | | | | | |
| 315 | 75xx AUTOMOTIVE SERVICES: | | | | |
| 316 | - TOP AND BODY REPAIR/PAINT SHOPS | X | | Act. - Fuel storage, use and storage of oils, | Prohibit banned uses. |
| 317 | - AUTO EXHAUST SYSTEM REPAIR SHOPS | X | | paints, thinners, various solvents, | |
| 318 | - TIRE RETREADING AND REPAIR SHOPS | X | | brake and transmission fluids. | |
| 319 | - AUTOMOTIVE TRANSMISSION REPAIR | X | | Chem.- hydrocarbons, solvents, benzene | |
| 320 | - GENERAL AUTOMOTIVE REPAIR SHOPS | X | | | |
| 321 | - OTHER AUTOMOTIVE REPAIR SHOPS | X | | | |
| 322 | - RADIATOR REPAIR | X | | | |
| 323 | | | | | |
| 324 | - OTHER AUTOMOTIVE SERVICES | ? | R | | |
| 325 | - TRUCK RENTAL & LEASING, NO SERV. | | R | | Evaluate case by case. |
| 326 | - PASSENGER CAR RENTAL | | R | | Prohibit vehicle engine ser- |
| 327 | - PASSENGER CAR LEASING | | R | | vicing and repair, require |
| 328 | - UTILITY TRAILER RENTAL | | R | | Site Plan review. |
| 329 | - AUTOMOTIVE GLASS REPLACEMENT | | R | | |
| 330 | - CAR WASHES | | R | | |
| 331 | | | | | |
| 332 | 76xx MISCELLANEOUS REPAIR SERVICES: | | | | |
| 333 | - FURNITURE STRIPPING | X | | General use of cleaning solvents, hazardous | Prohibit banned uses. |
| 334 | - ARMATURE REWINDING SHOPS | X | | materials, methylene chloride | |
| 335 | - MARINE SERVICE AND REPAIR | X | | | |
| 336 | | | | | |
| 337 | - RADIO AND TELEVISION REPAIR | | R | Cleaning, lubricating and regeneration of | Site Plan review, mngmt plan |
| 338 | - REFRIGERATION SERVICE & REPAIR | | R | equipment and parts. Solvents, oils and other | for storage and use of |
| 339 | - OTHER ELECTRICAL REPAIR SHOPS | | R | materials. | hazardous materials, waste |
| 340 | - REUPHOLSTERY & FURNITURE REPAIR | | R | | oil and hazardous waste mngmt |
| 341 | | | | | |
| 342 | 8xxx HEALTH/MISC. SERVICES: | | | | |
| 343 | | | | Miscellaneous spills, leaks, illegal dis- | Site Plan review, regulate |
| 344 | | | | charges, hazardous material storage, use, con- | to provide for spill preven- |
| 345 | | | | tainer disposal, lawn care including use of | tion, proper waste handling, |
| 346 | | | | fertilizers and pesticide use, hazardous and | storage and disposal. |
| 347 | | | | non-hazardous waste disposal. | |
| 348 | - HEALTH SERVICES | | R | | |
| 349 | - BIOLOGICAL OR CHEMICAL RESEARCH | X | | Laboratory chemicals and waste materials. | - Prohibit |
| 350 | | | | | |
| 351 | - TESTING LABORATORIES | | R | Laboratory chemicals and waste materials. | - Spill prevention plans, |
| 352 | | | | | connect to public sewers |
| 353 | | | | | |
| 354 | - GOLF COURSES | | R | Act. - Lawn care including storage/use of | Mngmt Plan for lawn care. |
| 355 | | | | fertilizers and pesticides, equipment | fertilizer/pesticide storage. |
| 356 | | | | maintenance, and waste management. | equipment maintenance, waste |
| 357 | | | | Chem.- pesticides/nitrates, waste oils, | management. |
| 358 | | | | hydrocarbons | |
| 359 | | | | | |

APPENDIX 3 - POSSIBLE REGULATORY APPROACHES

THE TYPES OF REGULATIONS THAT MAY BE NEEDED TO REDUCE THE THREATS OF GROUND WATER CONTAMINATION ARE LISTED BELOW.

REGULATIONS FOR NEW USES ONLY

REQUIRE CERTAIN FACILITIES TO BE CONNECTED TO PUBLIC SEWERS
SPECIAL EQUIPMENT SPECIFICATIONS, E.G. SEWER EXFILTRATION RATES
SITE PLAN REVIEW - ALL NEW DEVELOPMENT EXCEPT SINGLE LOT RESIDENTIAL
PROHIBITION OF NEW UNDERGROUND FUEL AND CHEMICAL STORAGE

REGULATIONS FOR BOTH NEW USES AND NON-CONFORMING USES

PROHIBITION OF ALL NON DOMESTIC WASTEWATER TYPE DISCHARGES TO GROUNDWATERS
PROHIBITION OF DRY WELLS
OUTSIDE STORAGE REQUIREMENTS
STORMWATER MANAGEMENT PLAN
PROHIBITION OF CERTAIN CHEMICALS, e.g. certain pesticides, others?
MATERIALS MANAGEMENT PLAN (SARA TITLE III MODEL?), INCLUDE:
HAZARDOUS MATERIALS OR SUBSTANCES - STORAGE, TRANSPORT AND USE
HAZARDOUS AND NONHAZARDOUS WASTE MANAGEMENT, HANDLING AND DISPOSAL
RECORDS KEEPING REQUIREMENTS
EMERGENCY SPILL RESPONSE
FIRE PROTECTION AND RESPONSE
RESOURCE MANAGEMENT PLAN (see Agriculture Matrix)
CONSTRUCTION RELATED EQUIPMENT FUELING AND MAINTENANCE REQUIREMENTS

REGULATIONS FOR NON-CONFORMING USES ONLY

REGULATION OF EXISTING UNDERGROUND FUEL AND CHEMICAL STORAGE
GROUND-WATER MONITORING

General Description of DEP's Geographic Information System

Geographic Information Systems (GIS) are powerful computer aided tools that facilitate the use and analysis of map data in state environmental planning, management and regulatory programs.

A typical GIS includes specialized computer hardware (digitizers, plotters, color graphics terminals) and software designed to encode, maintain, analyze and output map data. These systems provide the capability to perform complex spatial analyses over any geographic area; to determine and evaluate spatial relationships among a variety of data; to maintain extensive data bases; and to streamline numerous agency programs.

In 1986, the DEP acquired ARC/INFO, a proprietary state of the art general purpose GIS. It consists of two major groups of software; ARC modules manage the geographic component of the data base (i.e. points, lines, areas, and other features typical of maps) while INFO manages the attribute data that describe what the map features are (e.g. well depth, soil type, utility name, aquifer material, etc.).

ARC/INFO provides programs to efficiently encode, store, update and analyze environmental and related data. Maps are encoded as points and lines thereby preserving the resolution of the original data. Each digital map is stored as one in a series of geographically registered overlays. Each overlay consists of a basic type of data such as land use, zoning, wetland boundaries, roads, well locations, etc.

Attribute data that describe unique map features are maintained in INFO files that are associated with the appropriate digital map. Data can be accessed by geographic location (e.g. by town) and/or by physical characteristics (e.g. all wells that yield over 500 gallons/minute).

The system includes a number of analytical GIS functions. Maps can be overlaid to determine the coincidence of data (E.G. how many public water supply wells and leachate and waste sources are in a particular drainage basin); proximity analyses can be performed (e.g. find all endangered species habitats within 500 feet of class B streams); data can be generalized and/or reclassified (e.g. reclassify a detailed surficial materials map to show only areas of coarse grained texture possibly suitable for ground water development).

The GIS can produce highly accurate cartographic output in a variety of formats. Maps can be displayed on a color graphics terminal, printed on low cost copiers or, when scale accurate large format output is required, they can be plotted by multicolor pen plotters. Output can be produced on paper, mylar, and other media and can be generated at any scale.

The DEP is using the ARC/INFO GIS to develop the Connecticut Digital Cartographic Data Base (CDCDB). It is a standardized quality controlled data base that maintains the high resolution of existing printed maps. Maps are digitized in-house and through cooperative programs with the US Geological Survey and

the USDA Soil Conservation Service. Most basic data are digitized from 1:24,000 scale 7.5 minute quadrangle maps and are maintained in the GIS in Connecticut Grid Coordinates.

Use of GIS in Connecticut's Aquifer Protection Program

A variety of GIS maps, many of which have already been digitized by DEP, will be available to support specific activities of the Aquifer Protection Program. These maps have been digitized for the State's area wide water supply planning program or as part of the ongoing GIS program. They include: community water supply well locations, areas served by water companies, water company exclusive service areas, sewerage areas, reservoir locations, water quality classification, DEP owned lands, drainage basin boundaries, surficial materials, municipal zoning, town boundaries, roads, water features, pollution sources, landfills and other related environmental data.

A valuable application of the DEP's GIS will be the management and analysis of public water supply information. These data have been collected through cooperative efforts with the US Geological Survey Water Resources Division, and the Dept. of Health Services. Data include: water supply well locations, reservoir locations, reservoir watershed boundaries, areas served by water utilities and attribute data that quantify annual and monthly water use, utility ownership data and well and reservoir characteristics. These data are useful in determining the distribution, magnitude and mix of public water supply/use in the state and will be particularly useful in identifying important groundwater supplies requiring protection.

As part of the Aquifer Protection Program, the GIS will be used to produce base maps upon which water utilities will delineate aquifer boundaries for existing wells. Base maps will be plotted at scales of 1:24,000 and 1:12,000 and will include town boundaries and roads for reference. The maps will be sent to utilities and aquifer boundaries and well/wellfield locations will be drafted on them. These will then be digitized by DEP and entered into the GIS.

A second series of 1:24,000 scale base maps will then be produced by the GIS to be used by municipalities to delineate land use above aquifers. The base maps will depict town administrative boundaries, roads and aquifer activities above that portion of the aquifer(s) within their town. The land use data will be digitized by DEP and the GIS will append adjacent town maps thereby producing a regional map. Use of the GIS for these mapping activities will insure consistency and integration of data from the above sources.

The GIS will be used to evaluate potential impacts to groundwater based on the type and distribution of existing land use above each aquifer and from future land use permitted under existing zoning. Conflicts will be identified so remedial and/or protection strategies can be developed for all or parts of each aquifer. The GIS will permit the development and testing of various protection strategies and will aid in quantifying the environmental, social and economic costs associated with them. Because of the speed that GIS technology can conduct spatial analyses, numerous strategies can be designed and modeled within the computer prior to specific plans being adopted. The GIS will also facilitate the production of customized maps for municipalities to aid their general groundwater protection programs.

APPENDIX 5

Substitute Senate Bill No. 423

PUBLIC ACT NO. 88-324

AN ACT REQUIRING AQUIFER MAPPING.

Be it enacted by the Senate and House of Representatives in General Assembly convened:

Section 1. (NEW) As used in sections 2 to 6, inclusive, of this act, "existing well fields" mean well fields in use by a public water supply system when mapping is required pursuant to section 3 of this act and "potential well fields" mean those well fields identified as future sources of supply in the water supply plan of the public water supply system approved pursuant to section 25-32d of the general statutes.

Sec. 2. (NEW) The commissioner of environmental protection shall establish standards for two levels of modeling and mapping of the location in aquifers of well field areas, zones of contribution and recharge areas. Standards for mapping at level A shall be established by regulations adopted by the commissioner in accordance with the provisions of chapter 54 of the general statutes and shall be based on hydrogeological data of aquifer geometry, hydraulic characteristics and connection to surface water features, groundwater level data and surface water discharge information for model calibration and pump test data for model verification. Standards for mapping at level B shall be established by guidelines developed by the commissioner and shall be based on existing geologic mapping of known aquifer characteristics, limited field verification, the location of existing and potential well fields and pumping rates.

Sec. 3. (NEW) (a) On or before July 1, 1990, each public or private water company serving one thousand or more persons shall map at level B all its existing well fields located within its water supply service area. On or before July 1, 1992, each public and private water company serving ten thousand or more persons shall map at level A all its existing well fields located within its water supply service area. The commissioner of environmental protection may map at level B all existing well fields located within the water supply service area of any public or private water company serving less than one thousand persons.

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(b) Each public or private water company serving ten thousand or more persons shall map all potential well fields that are located within stratified drift aquifers identified as future sources of water supply to meet their needs in accordance with the plan submitted pursuant to section 25-33h of the general statutes (1) at level B two years after approval of such plan and (2) at level A four years after approval of such plan. The commissioner of environmental protection shall identify and make recommendations for mapping all remaining significant well fields not identified by a public or private water company as a potential source of water supply within the region of an approved plan. Mapping of potential well fields by the commissioner shall be completed at a time determined by the commissioner.

Sec. 4. (NEW) The mapping of aquifers by a public or private water company at level B and level A required pursuant to section 3 of this act shall not be deemed to be complete unless approved by the commissioner of environmental protection.

Sec. 5. (NEW) Not later than three months after approval of the commissioner of environmental protection of mapping of aquifers at level B, each municipality in which such aquifers are located, acting through its legislative body, shall authorize any board or commission, or shall establish a new board or commission to inventory land uses overlying the mapped zone of contribution and recharge areas of such aquifers in accordance with guidelines established by the commissioner pursuant to section 6 of this act.

Sec. 6. (NEW) The commissioner of environmental protection shall develop guidelines to be used by municipal boards or commissions in conducting the inventory of land uses required under section 5 of this act.

Sec. 7. Section 1 of special act 87-63 is amended to read as follows:

(a) There is established a task force to study and review the development of groundwater strategy. Said task force shall (1) [solicit public review and comment on the report submitted to the general assembly pursuant to special act 84-84 entitle "Protection of High and Moderate Yield Stratified Drift Aquifers", (2) define the implementation costs of recommendations of said report, (3) review implementation of the aquifer program conducted by the department of

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environmental protection, and (4)] propose legislation on aquifers, if appropriate, (2) STUDY THE USE OF WATER SOFTENERS ON WATER QUALITY, (3) CONSIDER MINIMUM PROTECTION STANDARDS FOR EXISTING AND FUTURE ACTIVITIES FOR WELL FIELD AREAS, ZONES OF CONTRIBUTION AND RECHARGE AREAS AND (4) RECOMMEND PROGRAMS FOR EDUCATION AND TRAINING OF UTILITIES, LOCAL AGENCIES AND OFFICIALS.

(b) The task force shall consist of [twenty-one] TWENTY-FIVE members as follows: The cochairmen and ranking members of the joint standing committees of the general assembly having cognizance of matters relating to the environment and public health, the commissioners of environmental protection, agriculture and health services and the chairman of the department of public utilities control, the secretary of the office of policy and management or their respective designees, A MUNICIPAL PLANNER, one member of the senate and one member of the house of representatives, two representing municipalities, two representing the public, one representing a private water utility company, [and] one representing a public water utility company, ONE REPRESENTING AGRICULTURE, AND ONE REPRESENTING BUSINESS AND INDUSTRY AND ONE REPRESENTING REAL ESTATE DEVELOPMENT INTERESTS. The members shall be appointed as follows: The member from the house of representatives, [and] a representative of a municipality AND A REPRESENTATIVE OF AGRICULTURE shall be appointed by the speaker of the house of representatives, the member of the senate, [and] a representative of a municipality AND THE MUNICIPAL PLANNER shall be appointed by the president pro tempore of the senate; a public member, [and] the representative of a private water utility AND THE REPRESENTATIVE OF BUSINESS AND INDUSTRY shall be appointed by the minority leader of the senate and a public member, [and] the representative of a public water utility AND THE REPRESENTATIVE OF REAL ESTATE DEVELOPMENT INTERESTS shall be appointed by the minority leader of the house of representatives.

(c) The task force shall submit a PRELIMINARY report AND A FINAL REPORT of its findings and recommendations to the general assembly on or before February 15, [1988] 1989.

Sec. 8. The sum of twenty-five thousand dollars is appropriated to the joint committee on legislative management, for the fiscal year ending June 30, 1989, from the sum appropriated to the

Substitute Senate Bill No. 423

finance advisory committee under section 1 of special act 88-20, for 1988 acts without appropriations, for the purposes of section 7 of this act.

Sec. 9. This act shall take effect from its passage except that section 8 shall take effect July 1, 1988, and sections 1 to 6, inclusive, shall take effect October 1, 1988.

Certified as correct by

Legislative Commissioner.

Clerk of the Senate.

Clerk of the House.

Approved _____, 1988

Governor, State of Connecticut.