SURVEY AND ANALYSIS OF STATE GROUND-WATER CLASSIFICATION SYSTEMS AND PROGRAM OPERATIONS

Prepared by the

Environmental Law Institute

for the

Office of Ground-Water Protection
U.S. Environmental Protection Agency

February 1990

TABLE OF CONTENTS

I. INTRODUCTION 1

Objective of Report 1
Major Findings 2
Study Approach & Methodology 6
Definition of Study Terminology 8

II. RELATIONSHIP OF GROUND-WATER CLASSIFICATION TO STATE PROGRAMS 10

Legal Basis For Ground-Water Classification 11
Implementation of Classification 12

III. LEGAL BASIS FOR GROUND-WATER CLASSIFICATION 14

Overview 14
California 15
Connecticut 15
Delaware 16
Florida 16
Minnesota 17
Montana 17
New Jersey 18
New Mexico 18
Vermont 19
Wisconsin 19

IV. STATE GROUND-WATER CLASSIFICATION SYSTEMS AND PROGRAM IMPLEMENTATION 26

Overview 26
Description of Classification Systems 26
Legal Basis 33
Relation to Ground-Water Protection Policy 33
Role of Classification in Program Implementation 35
Use of Classification in Ground-Water-Related Programs 48

Summaries of Selected States' Classification Systems and Program Operations 53

California 54
Connecticut 59
Delaware 63
Florida 66
Minnesota 73
Montana 76
New Jersey 80
New Mexico 85
Vermont 90
Wisconsin 94

APPENDIX A - Fifty-State Ground-Water Program Matrices

EXECUTIVE SUMMARY

In response to a growing recognition of the myriad threats to ground-water quality, thirty-three states have developed or are in the process of developing a ground-water classification system to assist in the protection of this vital resource. An understanding of how states are using these classification systems is important for the coordination of state and federal activities which concern ground water. This analysis of state classification systems is based on a study conducted in two phases. The objective of the first phase was to identify the statutory and regulatory underpinnings of each state's classification system. In the second phase, ten selected state programs were examined in-depth to determine the relationship of classification to ground-water protection activities.

Types of Classification Systems

Twenty-two states have a formal system for designating ground-water classes; this is termed explicit classification. An additional eleven states distinguish between ground-water resources based on use, quality, or hydrogeologic factors, but do not assign them a class designation. This approach is termed implicit classification. Ten of the 22 states with explicit classification systems have also adopted an implicit system as a component of their ground-water programs.

Legal Basis for Classification

In the majority of states, the legal basis for classification exists within a general water pollution control statute which addresses all "waters of the state." Twelve states,

however, have enacted legislation specific to ground-water protection which provides the legal basis for classification. The specifics of classification systems are generally developed through the administrative rule-making process.

Implementation of Classification

State environmental regulatory programs use ground-water classification in four ways. These are: 1) to provide guidance for the establishment of discharge permit conditions; 2) to prohibit specific activities and/or discharges in designated areas; 3) to assist in the establishment of regulatory priorities; and 4) to provide guidance for remediation activities.

The most common use of classification is as a guide for discharge permit conditions. Nine of the ten selected states issue discharge permits related to ground-water protection. (Vermont has established a program of discharge permits tied to classification which has not been implemented to date.) Permitted dischargers are prohibited from violating the designated use or quality standards for the underlying ground waters. Design and operation conditions are established in these permits to protect the designated class, use, or quality.

Classification is applied as a "reactive" guide to permit conditions in nine of the selected study states. This means that the determination of the use or class of the ground water at a proposed site and associated permit conditions are determined when a permit application is received.

Classification is applied as an "anticipatory" guide in two states - Connecticut and New Jersey. In the case of Connecticut, the state has mapped its ground-water classes and defined permissible discharges for each class. Therefore, certain types of land use

activities have been restricted prior to the receipt of a permit application. New Jersey practices anticipatory classification in its Central Pine Barrens area through land use restrictions, while it applies reactive classification to the rest of its ground-water resources.

All of the selected study states require that permitted discharges not exceed the ground-water standards, including drinking water standards, established for the designated class, use or quality at the discharge site. While the states have the authority to prohibit discharges that may violate standards, only Connecticut and New Jersey have delineated areas overlying aquifers where specific types of discharges are not permissible. Permit applications in these states are considered on a case-by-case basis and an application can be denied if the permit writer believes that design parameters will not ensure that quality standards are not violated.

The use of classification to assist in the establishment of regulatory priorities is proposed only in New Jersey. The state is planning to redefine its ground-water classes to help them establish priorities to reduce their discharge permitting backlog.

Six of the ten selected states apply their classification schemes to remediation activities. In clean-ups required by the states of California, Connecticut, Florida, New Jersey, and New Mexico, the ground-water quality standard associated with the designated ground-water class or use is applied to establish concentration limits for remediation. In other states, case-by-case determinations are made or clean-up to background concentrations is required.

I. INTRODUCTION

Thirty-three state ground-water programs classify ground-water resources based on use, quality, or hydrogeologic factors for the purpose of defining different levels of activity to protect ground water. The two basic approaches used by the states to classify ground waters are: 1) a formal system with classes defined by state statute or regulation, and 2) a method which distinguishes between ground waters by use, quality, or hydrogeologic characteristics without formal class designations. This document refers to these two basic types of ground water differentiation as "explicit" and "implicit" classification, respectively. Twenty-two states have explicit classification systems; ten of these states have programs which also include implicit classification. The remaining eleven of the 33 states have implicit classification systems.

Classification in both of these forms provides a framework for integrating regulatory mechanisms into a differential protection program. These mechanisms, including discharge permits, water quality and design standards, and land use restrictions, are applied to achieve the level of protection associated with the designated ground-water class.

Objective of Report

The primary objective of this report is to examine the relationship of state classification systems to ground-water protection activities. The key questions to be answered are:

1) What type of classification system or other method of designating ground waters for focused protection efforts have states established?

2) What is the legal basis of state classification systems?

3) What regulatory mechanisms are being applied to implement states' classification systems?

Major Findings

The major findings associated with the key study questions are stated below. They are listed as findings regarding the type of classification system and legal basis of classification for both the fifty state analysis and the ten selected state analysis. The ten states are California, Connecticut, Delaware, Florida, Minnesota, Montana, New Jersey, New Mexico, Vermont, and Wisconsin. Findings related to the implementation of classification are for the ten selected states.

Type of Classification System

Fifty State Analysis

1. Thirty-three states have established explicit or implicit ground-water classification systems.
   a. Twelve of these states have explicit systems established in law or regulation.
   b. Eleven states apply implicit classification to distinguish between ground-water resources for protection purposes without an explicit system.
   c. Ten states have protection programs which use both explicit and implicit classification.
2. Twenty-two of the 33 states with explicit and/or implicit systems classify ground waters according to existing use and water quality factors. Seven

of these states also consider hydrogeologic factors in their classification systems.

3. Only one state - Connecticut - designates classes in terms of types of permissible discharges in addition to ground-water use or quality.

4. Fifteen of the 33 states with classification have a method for designating ground-water areas for special protection purposes. This includes states that designate "critical areas", "wellhead areas", "recharge areas", or other areas for the purpose of instituting source control measures to protect ground water. Ten of these states also classify other ground waters according to use, water quality, or hydrogeologic factors.

5. Eighteen of the 22 states with explicit systems classify ground water at a site when a discharge permit application is received. Two states - Connecticut and New Jersey - have anticipatory classification systems in place. Anticipatory classification refers to a system which delineates ground-water areas and permissible uses or discharges within such areas as the basis for future discharge permitting and land-use decisions.

Ten Selected State Analysis

1. Four of the selected states - Connecticut, Florida, Montana, and New Jersey - have explicit classification systems. Two states - California and New Mexico - have implicit systems. One state - Vermont - has a proposed explicit system and an existing implicit system. One state - Delaware - has a proposed implicit system. Two states - Minnesota and Wisconsin - have no classification system in place.

Legal Basis

Fifty State Analysis

1. All 33 states with either explicit or implicit classification systems have established a legal basis for incorporating a differential protection approach for their ground-water resources.
2. Of the 22 states with explicit classification, ground-water classes are designated in state statutes in four states, in regulations in 16 states, and in ground-water strategy documents in two states.
3. Among the 21 states with implicit classification, distinctions are made between ground-water resources for protection purposes by statute in 14 states, by regulation in five states, and by policy document in two states.

Ten Selected State Analysis

1. In the four selected states with explicit classification systems - Connecticut, Florida, Montana, and New Jersey - the legal basis for classification is the state's water pollution control statute.
2. The legal basis for California and New Mexico's implicit systems is also the state's water pollution control statute.
3. Vermont, the only selected state which sets forth a specific classification system in its water quality statute, has not implemented its system to date.

Implementation of Classification

1. Classification systems are used as the basis for three types of regulatory activities:
   a) establishing discharge permit conditions;

b) establishing remediation levels for contaminated ground water; and

c) restricting the siting of potential sources of contamination.

2. Six of the seven selected states with classification systems apply them to permitting and remediation decisions. The remaining state of Vermont has a proposed system that applies to these decisions.

3. Discharge permits are the primary regulatory mechanism used to implement classification systems. In six states, proposed dischargers are required to meet conditions that they not exceed water quality standards for the designated ground-water use or class.

4. Seven selected states with classification systems define ground-water classes according to water quality and use. One state - Connecticut - also defines class according to permissible types of discharges. Two states - Florida and New Jersey - have additional provisions for designation of ground waters for special protection by restricting potentially polluting activities within delineated areas. Delaware proposes a similar type of classification.

5. Federal and state drinking water standards are most commonly applied as the basis for discharge permitting conditions to protect drinking water and other uses. Health advisory levels or narrative standards are applied in those cases where a numeric standard does not exist for a specific contaminant. Surface water quality criteria are applied as ground-water discharge permit conditions in cases where ground-water recharge impacts surface water. Connecticut applies surface water quality criteria in most cases based on the assumption that ground water will eventually discharge to surface water.

6. Several states allow discharges to ground water to have a mixing zone which exceeds ground-water standards at a specified distance from the facility.

Study Approach & Methodology

The analyses presented in this report are based on a study of state ground-water programs conducted in two phases. The objective of the first phase of the study was to identify the statutory, regulatory, and policy underpinnings of state programs and classification systems. The objective of the second phase of the study was to examine the relationship of state ground-water classification systems to ground-water protection activities. This information was analyzed to:

1) compare the similarities and differences in state programs and classification systems; and

2) determine how classification systems are implemented in state programs.

Study Methodology

In the first study phase, project staff collected and analyzed all available documents for the 50 states to identify the components of each program. The analysis concentrated on the ground-water program elements of: statutory authority, protection policies, implementation strategies, classification systems, ground-water standards, and selected source-control regulations. The relationship between these elements was examined to determine:

1) whether states are using a system of ground-water classification or some other means of designating ground waters for protecting this resource;

2) what statutory or regulatory authorities have been adopted to support the implementation of the state's program and classification system; and

3) what programmatic linkages exist between ground-water classification systems and regulatory tools of ground-water quality standards and source controls.

The information collected and analyzed for each state program was arranged in matrix form. The matrix consists of brief descriptions of actual statutory language for each state program element. These state matrices are compiled in Appendix A.

In the second phase of the study, ten state ground-water programs were selected for in-depth analysis on the basis of the following criteria:

1) that the states represent a range of geographic, demographic, and hydrogeologic variations in the U.S.;

2) that a state program has sufficient elements and regulatory authority to indicate that it is established and operating; and

3) that the state programs incorporate different forms of the program elements of classification, ground-water standards and discharge permits.

In order to identify state programs which fit these criteria, a matrix was developed to catalog and compare state classification systems, and the mechanisms for implementation through standards and discharge permits. The ten states selected for this evaluation are California, Connecticut, Delaware, Florida, Minnesota, Montana, New Jersey, New Mexico, Vermont, and Wisconsin.

The procedure used to collect information on each of the selected state programs was to:

1) develop a general questionnaire to define the type of information to be obtained in order to understand the practical connection between programmatic elements and their implementation;

2) prepare interview scripts for each of the selected states by tailoring general questions to the specific elements of each state's program identified in the first phase of the study;

3) conduct interviews in each state using the scripts as a starting point for discussions. The interviews were conducted over a one-to-two day period with from one to fifteen state personnel representing a wide range of program perspectives.

Definition of Study Terminology

The following terms are used in this report as defined below:

1. Ground-water classification - the distinction of different types of ground water for protection purposes.

2. Explicit classification system - the designation of different types of ground water by classes defined according to use, water quality, or hydrogeologic factors as specified in law, regulation or policy statement. One example of an explicit system is that established in Connecticut. The State has adopted water quality standards pursuant to its Clean Water Act which establish four classes of ground waters, GAA, GA, GB, and GC. The water quality standards document states the designated use and water quality criteria for each class and restrictions on the types of discharges allowed for each class.

3. Implicit classification system - the recognition of different types of ground water for protection purposes without a formal designation of classes. There are two basic types of state programs that are termed implicit systems. One type of implicit system applies to all of the state's ground-water resources. The other type designates a small portion of the resource for special protection. The first type is represented by the example of the State of New Mexico which has adopted ground water protection regulations, pursuant to the State's Water Quality Act, "to protect all ground water of the state which has an existing concentration of 10,000 mg/l or less TDS". Although, no formal system has been adopted the state distinguishes between ground waters based on water quality.

The second type of implicit system is represented by the state of Vermont. The state has conducted a project under a grant from a Section 208 Federal Water Quality Program, to define aquifer protection areas (APAs) for protection purposes. The state has outlined 209 APAs for 136 of the 316 public water supply systems that use ground water. Although no formal classification system has been put into place, these APAs may be incorporated into the proposed explicit system.

4. Selected state analysis - the examination undertaken for this study of ten states' (California, Connecticut, Delaware, Florida, Minnesota, Montana, New Jersey, New Mexico, Vermont and Wisconsin) ground-water programs and classification systems. These states are referred to as "selected states" in this document.

5. Legal basis - the statutory and regulatory authority for state programs and classification systems.

6. Regulatory mechanisms - methods of achieving a regulatory objective including issuance of discharge permits, application of ground-water quality standards, application of facility design standards, and designation of protected ground-water areas.

7. Discharge permits - permits issued by the state authority allowing the operation of a facility that may discharge to ground water in accordance with design and water quality conditions included in the permit.

8. Ground-water standards - drinking water or other standards established to protect ground water.

9. Protected area designation - the delineation of an area within which land uses are restricted for the purpose of protecting ground water.

10. Anticipatory classification - the designation and mapping of ground water to serve as a basis for future water quality and land-use decision-making.

11. Reactive classification - the assignment of ground water to a designated class after the proposal of specific uses of the land overlying the resource.

II. RELATIONSHIP OF GROUND-WATER CLASSIFICATION TO STATE PROGRAMS

This study focuses on the form and function of ground-water classification in state programs. An analysis of these classification approaches requires an examination of the relationship of classification to other key program elements, including statutory authority, ground-water protection policy, and regulatory mechanisms. It is important to identify

the connections between these elements in order to understand how classification is applied to achieve differential protection.

Classification is implemented through the legal authority and regulatory mechanisms established to protect ground-water resources and control sources of contamination. The following overview of the general relationship found between these elements in the selected study states is intended to provide the reader with a context for the more detailed discussions of state programs to follow.

Legal Basis for Ground-Water Classification

The first step in determining whether a state has a classification system which guides a differential protection program is to find language in the state water quality statute that differentiates among ground waters of the state for protection purposes. The legal basis for classification may be established in one of the following ways:

State Water Quality Statute		
(1)	(2)	(3)
Policy	Ground-Water Classification	Regulations
Classification		Classification

In the first case (1), the state statute, which may apply to all waters or may be specific to ground water, establishes a policy of protecting a portion of the state's ground-water resources. This portion is usually identified in terms of water quality -- "waters having less than 10,000 mg/l total dissolved solids" -- or use -- "waters that may be put to beneficial use."

The second case (2) is one in which ground-water classes and associated uses or permissible discharges are defined in the statutory language. The third case (3) is one in which regulations written to implement the state statute designate ground-water classes for the protection program.

Implementation of Classification

The next step in determining how a state applies classification to guide a differential protection program is to identify the regulatory mechanisms tied to ground-water classes. The relationships between classification and regulatory mechanisms of discharge permits, ground-water standards, and protected area designations found in the selected study states are diagrammed on the following page:

IMPLEMENTATION OF CLASSIFICATION

Reactive Classification	Anticipatory Classification	
Establish ground-water class system	Establish ground-water class system	Establish ground-water class system
(1)	(2)	(3)
Receive discharge permit application	Identify and map ground water classes	Identify specific ground waters for special protection
	Identify land use restrictions by class	
Identify class of ground water involved	Receive permit application for discharge to appropriate class	Designate and delineate protected area
Establish permit conditions to protect ground-water use and quality for class	Establish permit conditions to protect ground-water use and quality for class	Define and apply land-use restrictions

In the first case (1), the application for a discharge permit is received and the state determines the class of ground water that would be affected by the proposed discharge. The ground-water class may be defined according to water quality, beneficial use and/or hydrogeologic factors. The approval of the permit application is contingent upon the permit writer's determination that ground-water quality standards associated with the ground-water class will not be violated. Seven of the eight selected states with classification systems implement classification in this way.

The second case (2), which starts the implementation process with the mapping of ground-water according to class represents only one state - Connecticut. Discharge permit applications are received by the state only for facilities with the types of discharges allowed in the designated class. The permit writer then determines whether

the proposed design will meet surface and ground-water quality standards for the designated class. This type of classification is referred to as anticipatory because it guides siting and land use decisions from the outset of the implementation process.

The third case (3) represents two states where ground water underlying a particular area has been designated as a protected class of ground water. In the states of New Jersey and Florida land use restrictions have been imposed to protect the existing ground-water quality in such protected areas. Delaware proposes to establish a similar program. This type of classification is also anticipatory because the designation and delineation of such protected areas guides all future activities within the area.

III. LEGAL BASIS FOR GROUND-WATER CLASSIFICATION

Overview

State environmental agencies are responsible for developing and implementing ground-water classification systems, which must have a relationship to legislative authority. The law a state agency relies upon to provide authority for the development of its classification system is that system's legal basis. For most states, this legal basis exists within a general water pollution control statute which addresses all of the "waters of the state," whether ground or surface water. Twelve states have enacted statutes specific to ground-water protection which provide the legal basis for classification. As the following summaries from the ten selected states indicate, however, the precise language forming this legal basis varies greatly from state to state, regardless of the type of statutory source. Table 1 shows the legal authority established by statute and regulation for the classification systems in each of the selected states, while Table 2 provides the statutory authority for classification in the 50 states.

State Legal Summaries

California

California has implicit ground-water classification, whereby the regional Water Quality Control Boards determine the beneficial uses of ground water and the corresponding levels of protection these uses merit. Authority for this classification system is contained in the Porter-Cologne Water Quality Control Act, which concerns all "waters of the state" -- surface or "underground." Cal. Water Code § 13050(e). Specifically, Section 13241 of the Water Code states that "[e]ach regional board shall establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance." "Beneficial uses" may include -- but are not limited to -- domestic, municipal, agricultural and industrial supply and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. Id. § 13050(f).

Connecticut

The legal basis for Connecticut's explicit classification system is the Connecticut Clean Water Act. Section 22a-426 directs the Department of Environmental Protection to adopt "standards of water quality applicable to various waters of the state or portions thereof." The standards are to "provide clear and objective public policy statements of a general program to improve the water resources of the state; provided no standard . . . shall plan for, encourage or permit any wastes to be discharged into any of the waters of the state without having first received the treatment available and necessary for elimination of pollution." Id. In 1980, the DEP amended its Water Quality Standards and Classification System to include ground-water classification and standards.

Delaware

Delaware is developing an implicit classification system whereby "Resource Protection Areas" (RPAs) would be designated in ground-water recharge areas and surface-water watersheds that feed public drinking water supplies. Special protective measures would be implemented in the RPAs, mostly land use controls to be administered at the county level. The legal basis for the development of this system is Section 6001 of the Delaware Environmental Protection Law, which directs the Department of Natural Resources and Environmental Control to provide programs for managing land, water, underwater and air resources; for controlling pollution of those resources; for protecting and conserving them; and for encouraging their maximum utilization.

Florida

Florida has two different methods of classifying its ground waters, one explicit and one implicit. The state's explicit classification system has four classes based upon use and total dissolved solids. The state's Air and Water Pollution Control Act provides the system with a precise legal basis. In Section 403.061, the Act specifically authorizes development of a classification system by granting the Department of Environmental Regulation the power to "[d]evelop a comprehensive program for the prevention, abatement, and control of the pollution of the waters of the state. In order to effect this purpose, a grouping of the waters into classes may be made in accordance with the present and future most beneficial uses." "Waters of the state" are defined to include "underground waters." Fla. Stat. § 403.031(12).

The Environmental Land and Water Management Act authorizes Florida's implicit method of ground-water classification. Under the Act, "areas of critical concern"

may be designated in locations with a significant impact upon environmental or natural resources, including aquifer recharge areas. Id. § 380.05(2)(a).

Minnesota

Minnesota has classified all of its ground-water for drinking water use, although the state also occasionally applies its use-based surface-water classification system to ground water. The Minnesota Water Pollution Control Law contains the specific legal basis for classifying ground water. Section 115.03(11)(b) gives the Pollution Control Agency the power to "investigate the extent, character, and effect of the pollution of the waters of this state and to gather data and information necessary or desirable in the administration or enforcement of pollution laws, and to make such classification of the waters of the state as it may deem advisable." Minn. Stat. § 115.03(1)(b). "Waters of the state" include "underground" waters. Id. § 115.01(9).

Montana

Montana has an explicit classification system consisting of four classes based on existing water quality or use on October 29, 1982. The Montana Water Quality Act provides the legal basis for this system by explicitly directing the classification of "all waters." Section 75-5-301 states that the Board of Health and Environmental Sciences "shall establish and modify the classification of all waters in accordance with their present and future most beneficial uses." Although the statute does not define "all waters," "State waters" are defined to include "underground" waters. Mont. Code Ann. § 75-5-103(9).

New Jersey

New Jersey has both an explicit system and an implicit system. Since 1981, New Jersey has had an explicit, four-class system based upon natural total dissolved solids and suitability for certain specified uses. The Water Pollution Control Act states the legal basis for New Jersey's classification system in Section 58:10A-4: the commissioner (of the Department of Environmental Protection) may include in codes, rules and regulations "[t]he classification of the surface and ground waters of the State and the determination of water quality standards for each such classification."

In addition, New Jersey also has authority under its Water Supply Management Act to establish "critical areas, " in which special measures are taken to protect water supplies, whether ground or surface water, from adverse conditions. The designation of these critical areas is a form of implicit classification.

New Mexico

New Mexico employs implicit classification by protecting, for domestic and agricultural use, only ground water of up to 10,000 mg/l total dissolved solids. The state's Water Quality Act provides the legal basis for this classification in Section 74-6-4, which requires the Water Quality Control Commission to "adopt water quality standards as a guide to water pollution control."

Vermont

Vermont employs three methods of classifying its ground- water. The state's explicit four-class, use-based system is set forth in Section 1394 of the Vermont Water Quality Act. Vermont is the only selected state which establishes and defines its specific ground-water classes within a statute. This provision was added to the Water Quality Act with the enactment in 1985 of Act No. 53, a ground-water protection statute.

Vermont's Aquifer Protection Area Project implicitly classifies ground-water by mapping areas around community wells and providing guidance for local protection efforts. The legal basis for this project is provided by Section 1250 of the Water Quality Act, which states that it is state policy to "maintain the purity of drinking water." The state also implicitly classifies ground water through the requirement in its statewide land use law that recharge areas be considered in the development permit process. 10 Vt. Stat. Ann. § 6086.

Wisconsin

Wisconsin does not have a ground-water classification system. Act 410, the 1983 legislation which governs the state's ground-water protection program, requires each state agency to adopt a range of responses to contamination by substances for which two-tiered ground-water standards have been established. The "enforcement standard" is the level at which a regulatory response is required to achieve compliance. The "preventive action limit" is a fraction of the enforcement standard and informs agencies of potential problems, establishes levels requiring efforts to control contamination, and provides a basis for design and management criteria.

TABLE 1

LEGAL AUTHORITY FOR STATE GROUND-WATER CLASSIFICATION FOR TEN SELECTED STATES

	STATUTES		CLASSIFICATION EXPLICIT/ IMPLICIT	REGULATIONS		
STATE	CITATION	PURPOSE		CITATION	OBJECTIVES	REQUIREMENTS
CA	Porter-Cologne Water Quality Act, Cal. Water Code §13000 et seq.	Protect all waters of the state	Implicit	Regional - Not Available	Attain highest reasonable water quality	Discharges must comply with water quality control plans and objectives Discharges to drinking water may not exceed dw standards
CT	Water Pollution Control Act, Conn. Gen. Stat. § 22a-422-462 et seq.	Protect all waters of the state	Explicit	Water Quality Standards and Classifications, Conn. Dept. of Env't. Prot.	Restore or maintain quality consistent with drinking water use without treatment	Permissible discharges specified for each class Three most restrictive classes protected for drinking water use Discharges to least restrictive class permitted as long as surface water standards not violated
DE	Title 7, Chapter 60, Environmental Control, Del. Code Ann. § 6001 et seq.	Protect land, water, underwater and air resources	Implicit*	No regulations	No regulations	No regulations
FL	1. Air and Water Pollution Control Act, Fla. Stat. § 403.11 et seq. 2. Environmental Land and Water Management Act, Fla. Stat. § 380.05(02)(a).	1. Protect air and water resources 2. Insure water management system that will reverse water quality deterioration and provide optimum utilization	1. Explicit 2. Implicit	1. Water Quality Standards 2. Not Available	1. Protect beneficial uses 2. Not Available	1. All groundwater must be free from discharges which cause specified harmful conditions 2. Not Available
MN	Pollution Control Laws, Minn. Stat. Ann. § 9:115:01 et seq.	Protect air and water resources	Not applicable	Not applicable - All groundwater classified for drinking water use	Not applicable	Not applicable
MT	Water Quality Act, Mont. Code Ann. Title 75, Chapter 5	Protect waters of the state	Explicit	Groundwater Pollution Control System, Mont. Admin. R. § 16.20.10	Maintain existing groundwater quality	Establish 4 classes to protect present and future most beneficial uses, based on existing quality or use on 10/29/82. Discharge permits required

* Proposed

LEGAL AUTHORITY FOR STATE GROUND-WATER CLASSIFICATION FOR TEN SELECTED STATES

	STATUTES		CLASSIFICATION EXPLICIT/ IMPLICIT	REGULATIONS		
STATE	CITATION	PURPOSE		CITATION	OBJECTIVES	REQUIREMENTS
NJ	1. Water Pollution Control Act N.J. Stat. Ann. § 58:10a-1 et seq.	1. Protect waters of the state	1. Explicit	1. Groundwater Quality Standards	1. Maintain and protect existing and potential uses; upgrade quality where inadequate to support designated uses.	1. Discharge permits required. Dischargers may be required to re groundwater to minimum quality fo class.
	2. Water Supply Management Act, N.J. Stat. Ann. § 58:1A-1 et seq.	2. Protect drinking water supplies	2. Implicit	2. N.J. Admin. Code § 7:19-6 et seq.	2. Manage ground-water use to ensure adequate supply	2. Withdrawals restricted, conserva required.
NM	Water Quality Act, N.M. Stat. Ann. § 74-6-1 et seq.	Protect waters of the state	Implicit	Water Quality Control Commission Regulations	Protect groundwater with TDS of 10,000 mg/l or less for present and potential water supply use.	Discharge plans required. Cannot violate standards at any pl of present or foreseeable future us
VT	1. Act No. 53 (10 Vt. Stat. Ann. Ch. 48)	1. Protect groundwater, establishes classification	1. Explicit	1. No regulations in force.	1. Statutory objective - minimize risks of groundwater deterioration by limiting human activities that present unreasonable risks to use classifications.	1. Statutory requirement - creatio 4 class system; adoption of permit restrictions, standards and criteria groundwater protection in existing permit programs.
	2. Water Quality Act, 10 Vt. Stat. Ann. § 1250	2. Maintain purity of drinking water	2. Implicit	2. None - advisory program		
	3. Act 250, 10 Vt. Stat. Ann. § 6086	3. Manage growth and development (land use law)	3. Implicit	3. Not applicable	2. Not applicable	2. None - advisory program
					3. None	3. None
WI	1983 Wisconsin Act 410	Protect groundwater	No classification system	Not applicable - no classification system	Not applicable	Not applicable

* Proposed

TABLE 2

LEGAL AUTHORITY FOR STATE GROUND-WATER CLASSIFICATION FOR THE 50 STATES

STATE	STATUTE		CLASSIFICATION SYSTEM	
	Citation	Type	Explicit	Implicit
Alabama	No classification system (classification proposed)			
Alaska	Environmental Conservation Law, Alaska Stat. tit. 46	E	X	
Arizona	1. Groundwater Management Act, Ariz. Rev. Stat. Ann. tit. 45 2. Water Quality Control Law, Ariz. Rev. Stat. Ann. § 49-201 et. seq.	1, 2. G	1	2
Arkansas	Water and Air Pollution Control Act, Ark. Stat. Ann § 82-1901 et seq.	E	X	
California	Porter-Cologne Water Quality Act, Cal. Water Code § 13000 et seq.	W		X
Colorado	Water Quality Control Act, Colo. Rev. Stat. § 25-8-101 et seq.	W	X	
Connecticut	Water Pollution Control Act, Conn. Gen. Stat. § 222:422-462	W	X	
Delaware	Environmental Protection Law, Del. Code Ann. tit. 7, § 6001 et seq.	E		X (Proposed)
Florida	1. Air and Water Pollution Control Act, Fla. Stat. § 403.11 et seq. 2. Environmental Land and Waste Management Act of 1972, Flat. Stat. § 380.12 et seq.	E	1	2
Georgia	Water Quality Control Act, Ga. Code § 12-5-20 et seq.	W		X
Hawaii	State Water Code, Laws of 1987, Act 45	W		X
Idaho	1, 2. Water Pollution Control Law, Idaho Code § 39-3601 et seq. (additional classification method proposed)	W	1	2
Illinois	Senate Bill 1482 (1987)	G		X
Indiana	Water Pollution Control Law, Ind. Code § 13-1-3-1 et seq.	W		X

E - General Environmental Protection Statute
W - Water Quality Statute (Surface and Ground Water)
G - Ground-Water Protection Statute

LEGAL AUTHORITY FOR STATE GROUND-WATER CLASSIFICATION FOR THE 50 STATES

STATE	STATUTE		CLASSIFICATION SYSTEM	
	Citation	Type	Explicit	Implicit
Iowa	Groundwater Protection Act, Iowa Code § 455E.1 et seq.	G		X
Kansas	1, 2. State Water Plan, Kan. Stat. Ann. § 82a-927 et seq.	W	1	2
Kentucky	No classification system (classification proposed)			
Louisiana	No classification system			
Maine	Protection and Improvement of Waters Act, Me. Rev. Stat. Ann. § 38:361 et seq.	W	X	
Maryland	Water Resources Law, Md. Ann. Code § 8-101 et seq.	W	X	
Massachusetts	Clean Waters Act, Mass. Gen. Laws ch. 21	W	X	
Michigan	Water Resources Commission Act, Mich. Comp. Laws § 323.1 et seq.	W		X
Minnesota	No classification system (all water "classified" for drinking water use)			
Mississippi	No classification system (classification proposed)			
Missouri	Clean Water Law, Mo. Rev. Stat. § 204.006 et seq.	W		X
Montana	Water Quality Act, Mont. Code Ann. tit. 75, ch. 5	W	X	
Nebraska	1, 2. Ground Water Management Act, Neb. Rev. Stat. § 46:656 et seq.	1, 2. G	1	2
Nevada	No classification system			
New Hampshire	No classification system			
New Jersey	1. Water Pollution Control Act, N.J. Stat. Ann. § 58:10a-1 et seq. 2. Water Supply Management Act, N.J. Stat. Ann. § 58:1A-1 et seq.	1, 2. W	1	2
New Mexico	Water Quality Act, N.M. Stat. Ann. § 74-6-1 et seq.	W		X
New York	Environmental Conservation Law, art. 17	E	X	

E - General Environmental Protection Statute
W - Water Quality Statute (Surface and Ground Water)
G - Ground-Water Protection Statute

LEGAL AUTHORITY FOR STATE GROUND-WATER CLASSIFICATION FOR THE 50 STATES

STATE	STATUTE		CLASSIFICATION SYSTEM	
	Citation	Type	Explicit	Implicit
North Carolina	Water and Air Resources Law, N.C. Gen. Stat. ch. 143, art. 21	E	X	
North Dakota	No classification system			
Ohio	No classification system			
Oklahoma	Water Pollution Control Laws, Okla. Stat. § 63-1-901 et seq.	W	X	
Oregon	Water Pollution Control Laws, Or. Rev. Stat. § 468.700 et seq. (additional classification method proposed)	W		X
Pennsylvania	No classification system			
South Carolina	1. Pollution Control Act, S.C. Code § 48-1-10 et seq.	1. E	1	2
	2. Groundwater Use Act, S.C. Code § 49-5-10 et seq.	2. G		
South Dakota	No classification system			
Tennessee	No classification system (classification proposed)			
Texas	1. Water Quality Control Law, Tex. Water Code § 26.001 et seq.	1. W	1	2
	2. Water Code, Article 5, Underground Water, § 52.001 et seq.	2. G		
Utah	No classification system			
Vermont	1. Groundwater Protection, 10 Vt. Stat. Ann. ch. 48	1. G	1	2, 3
	2. Water Quality Act, 10 Vt. Stat. Ann. § 1250 et seq.	2. W		
	3. Land Use and Development Law, 10 Vt. Stat. Ann. ch. 151	3. E		
Virginia	1. State Water Control Law, Va. Code § 62.1-44.2 - 44.34:10	1. W	1	2
	2. Groundwater Act of 1973, Va. Code § 62.1-44.83 et seq.	2. G		

E - General Environmental Protection Statute
W - Water Quality Statute (Surface and Ground Water)
G - Ground-Water Protection Statute

LEGAL AUTHORITY FOR STATE GROUND-WATER CLASSIFICATION FOR THE 50 STATES

STATE	STATUTE		CLASSIFICATION SYSTEM	
	Citation	Type	Explicit	Implicit
Washington	1. Regulation of Public Ground Waters, Wash. Rev. Code § 90.44 2. Aquifer Protection Areas, Wash. Rev. Code § 36.36 (additional classification method proposed)	1, 2. G		1, 2
West Virginia	No classification system			
Wisconsin	No classification system			
Wyoming	Environmental Quality Act, Who. Stat. 35-11	E	X	

E - General Environmental Protection Statute
W - Water Quality Statute (Surface and Ground Water)
G - Ground-Water Protection Statute

IV. STATE GROUND-WATER CLASSIFICATION SYSTEMS AND PROGRAM IMPLEMENTATION

Overview

Classification is the method by which a state classifies its ground-water resources and designates the different levels of protection those resources will be accorded. It serves as an organizational framework for the state program by guiding the application of regulatory authorities and tools. In order to understand how a state classification system is used, one needs to identify: 1) the type of system a state uses to classify its ground-water resources, 2) the legal authority established for classification, and 3) the specific regulatory tools used to control discharges to ground water in various classes.

Description of Classification Systems

The type of system states use to classify their groundwaters differ in three primary ways: 1) the explicit or implicit nature of the system, 2) the number of classes and 3) the factors used to define ground-water classes. The study findings concerning the different types of classification systems states have adopted are discussed below. This information is the prerequisite to the analysis of how states are implementing classification as a component of their ground-water protection programs.

Explicit and Implicit Classification

Thirty-three states have adopted explicit and/or implicit classification systems. Twenty-two of these states have adopted explicit classification systems. These systems have been formally established by the states, with each class identified by ground-water use, quality or hydrogeologic factors. The existence of an explicit system indicates that

the state intends to use classification as the basis for the differential protection of its resources. Five of the ten selected states - Connecticut, Florida, Montana, New Jersey, and Vermont - have explicit systems. Vermont has established an explicit system by law which has yet to be implemented.

Twenty-one states (including ten states which also have explicit systems) practice implicit classification whereby the state's differentiation between its ground-water resource is not the stated ground-water protection objective but different regulatory measures are ascribed to these ground-water "classes" based on their use, quality, or hydrogeologic factors. Five of the ten selected states - California, Florida, New Jersey, New Mexico, and Vermont - employ implicit classification. Minnesota has established an implicit system in its ground-water legislation enacted in 1989. Delaware has proposed implementation of an implicit system.

Ten of the thirty-three states with classification systems have established programs with both explicit and implicit systems. For example, a state may designate ground-water classes by statute or regulation and have another program which provides added protection to ground-water that is identified within "special or critical" areas. Three of the ten selected states - Florida, New Jersey, and Vermont - have established programs incorporating explicit and implicit classification.

Number of Classes

The number of ground-water classes states choose to designate varies from one to seven classes. Of the 22 states with explicit classification systems; one state has established seven classes, one has six classes, three states have five classes, six states have four classes, seven states have three classes, and four states have two classes. Of

the five selected states with explicit classification systems, four have designated four different classes and one has two classes.

Factors Defining Class

The most common factors used by states to define ground-water classes are use and quality. Of the 22 states with explicit systems, 18 designate classes according to use and/or associated water quality. Four states use hydrogeologic factors as well as water quality to designate classes. Hydrogeologic factors include vulnerability, source of recharge, and instantaneous yield. One state - Connecticut - designates classes according to use, quality and permissible types of ground-water discharges. Similar factors are used to define classes whether the state's system is implicit or explicit.

Table 3 describes the classes and factors used by the ten selected states to classify ground water. All of the selected states with explicit classification systems use factors which relate to current or potential ground-water use as follows:

Connecticut - Four classes based on existing and potential use, water quality and permissible discharges. Two classes are suitable for public water supply. One class is suitable for industrial use. One class is designated as suitable for receiving specific types of wastewater discharges.

Florida - Four classes based on potability and total dissolved (TDS) solids concentration. Two classes are designated as potable and two as nonpotable with increasing levels of TDS.

Montana - Two classes based on use and specific conductivity. One class is suitable for public water supply and one class is "marginally suitable" for water supply and other uses.

New Jersey - Four classes based on potability and total dissolved solids concentration. The highest class is also based on vulnerability and only includes the Central Pine Barrens area. This and one other class are suitable for drinking water supply. A third class is suitable for conversion to potable water and other reasonable uses. The fourth with TDS greater than 10,000 mg/l is suitable for any reasonable beneficial use.

Vermont - Four classes based on use, water quality and exposure to potentially degrading activities. Two classes are suitable for present public drinking water supply. The highest class has no exposure to activities which could degrade quality. The third class is suitable for private domestic supply and other uses and lies under areas not otherwise classified. The fourth class is defined as "suitable for some uses".

TABLE 3

STATE GROUND-WATER CLASSIFICATION SYSTEM FACTORS

State	Explicit/ Implicit	Description of Classes	FACTORS USED IN DETERMINING CLASSIFICATION									
			High Vulnerability	Recharge	Quality Parameters	Ecolog. Vital	Current Drinking Water	Potential Drinking Water	Salinity	Inst. Yield	Treatability	Other
CA	Implicit	No designated classes - protection of highest beneficial use			X		X	X	X	X		
CT	Explicit	Class GAA - Designated for existing or potential public drinking water supply use			X		X	X				Proximity to water supply wells suitable for consumption without treatment
		Class GA - Existing private and potential public water supply			X		X	X				Within area of influence of private and potential public wells. Suitable for consumption without treatment
		Class GB - Industrial process and cooling waters										Located within urban or industrial areas. May be suitable for consumption without treatment
		Class GC - Designated for use for treatment and assimilation of certain wastewaters										Areas with permitted discharges. Unsuitable for consumption without treatment
FL	1. Explicit	1. GI. TDS less than 3,000 mg/l, potable					X	X	X			1. Single source aquifer
		GII. TDS less than 10,000 mg/l, potable					X	X	X			
		GIII. TDS 10,000 mg/l or greater, or between 3,000 and 10,000 and nonpotable					X	X	X			Unconfined aquifer. Designated UIC exempt aquifer
		GIV. TDS 10,000 or greater, nonpotable					X	X	X			Confined aquifer
	2. Implicit	2. Areas of critical concern	X	X	X							
DE	Implicit	Proposed - Water	X	X			X	X	X			Proximity to wellheads

State	Explicit/ Implicit	Description of Classes	FACTORS USED IN DETERMINING CLASSIFICATION									
			High Vulnera-bility	Recharge	Quality Parameters	Ecolog. Vital	Current Drinking Water	Potential Drinking Water	Salinity	Inst. Yield	Treatability	Other
MN	No System	One class-potable water supply	X	X	X							
MT	Explicit	Class I - Suitable for public and private water supplies, irrigation, livestock, and industrial purposes with little or no treatment. Specific conductance of less than 1,000 micromhos/cm										
		Class II - Marginally suitable for most Class I uses. Specific conductance from 1000-2500 micromhos/cm						X				May be used for municipal domestic supplies where better quality not available
NM	Implicit	Protection of all groundwaters with TDS of 10,000 mg/l or less for present and potential use as domestic and agricultural water supply			X	X	X	X	X			
NJ	1. Explicit	1. GW1. Central Pine Barrens - potable water, agricultural water supply, surface water replenishment, other reasonable uses	X				X	X	X			
		GW2. Potable water, TDS less than 500 mg/l, industrial and agricultual water supply, surface water replenishment, other reasonable uses					X	X	X		X	
		GW3. Suitable for conversion to potable water, TDS between 500 and 10,000 mg/l, other reasonable beneficial uses					X	X	X			
		GW4. Any reasonable beneficial use, TDS greater than 10,000 mg/l							X			
	2. Implicit	2. Critical areas for water supply management					X			X		

State	Explicit/ Implicit	Description of Classes	FACTORS USED IN DETERMINING CLASSIFICATION									
			High Vulnerability	Recharge	Quality Parameters	Ecolog. Vital	Current Drinking Water	Potential Drinking Water	Salinity	Inst. Yield	Treatability	Other
VT	1. Explicit (proposed)	1. Class I - Present or potential public water supply source, uniformly excellent character, no exposure to activities which pose risk to current or potential use as public water supply			X		X	X				1. No exposure to contamination sources
		Class II - Present or potential public water supply source, uniformly excellent character, exposed to activities which pose risk to use as public water supply			X		X	X				Exposure to potential contamination sources Exposure to contamination sources
		Class III - Suitable for private domestic supply, agriculture, industrial and commercial use, lies under areas not classified as I, II, or IV areas			X		X	X				Sources of private drinking water supply Exposure to contamination sources
		Class IV - Suitable for some uses, lies under mapped Class IV areas					X					2. Proximity to wellheads
	2. Implicit	2. Aquifer Protection Areas										
	3. Implicit	3. Consideration of ground-water concerns in development permit process	X	X								
WI	No system											

Legal Basis

"Legal basis" refers to the legislation a state environmental agency relies upon to provide authority for promulgating a ground-water classification system. The legislation may set forth the classification system or may require its creation. More frequently, the statute simply gives the agency broad powers to protect the waters of the state, and the agency uses this authority to develop a ground-water classification system.

Among the twenty-two states with explicit classification systems, four systems are specifically set forth in the statutory language, sixteen are contained in regulations adopted pursuant to statutory authority, and two are contained in advisory ground-water strategy documents. Among the twenty-one states with implicit classification systems, fourteen have been established by statute, five by regulations, and two are contained in policy documents. The specific legal basis for classification in the ten selected states is discussed above under the preceding section titled Legal Basis for State Ground-Water Classification.

Relation to Ground-Water Protection Policy

A ground-water protection policy is a statement of the principles and goals guiding the implementation of a state's classification system and the other elements of its ground-water protection program.

Eight of the ten selected states have formally adopted policies that are specific to ground-water protection, the exceptions being California and Delaware. Three of the policies are contained in state statutes -- those of Florida, Vermont, and Wisconsin. The remaining ground-water-specific policies -- those of Connecticut, Minnesota, Montana, New Jersey, and New Mexico -- are contained in regulations adopted pursuant to existing statutory authority.

Protection policies guiding state programs are either stated in a statute or regulation specific to ground water or in a general statute applicable to "all waters of the state" including ground water. Thirty-six of the states have adopted protection policies specific to ground water. Eleven states have established a protection policy applicable to "all waters of the state". Three states have no policy applicable to ground water.

The three basic types of ground-water protection policies are: (1) nondegradation, (2) limited degradation, and (3) differential protection. These terms are generally defined as:

> Nondegradation: No degradation of existing ground-water quality is allowed.
>
> Limited Degradation: Maintenance of as high ground-water quality as possible, allowing contamination to a specified water quality standard.
>
> Differential Protection: Provision of different levels of protection based on the specific use, water quality and/or hydrogeologic characteristics of particular ground-water resources.

Thirty-nine states have established policies which provide for differential protection of ground water. Nineteen of these states have established explicit classification systems to implement this policy. One state has proposed an explicit system. Twelve of these states have implicit classification systems to implement differential protection. One state has proposed an implicit system. The remaining five states have not adopted a classification system to implement their policy or are in the process of developing one.

Six states have policies which allow for limited degradation. Two of these states have explicit classification systems which have no clear relationship to their protection policies. Two other states have implicit classification systems which apply to one part of their protection program.

One state - West Virginia - has adopted a policy of nondegradation. Eight of the ten selected states follow differential protection policies. These states have established explicit or implicit systems to guide the implementation of these policies. Wisconsin and Minnesota maintain a limited degradation policy and protect all of their ground-water resources for drinking water use.

The selected states' policies differ in terms of the stated protection objectives for different classes of ground water. Connecticut, New Jersey, and Vermont specifically tie protection levels to explicit ground-water classification in their policy statements. In addition, both Connecticut's and New Jersey's policies direct that where water quality is not consistent with certain uses it must be upgraded. New Mexico's policy statement establishes protection for waters of the state with equal to or less than 10,000 mg/l total dissolved solids, which is the basis for its implicit classification system. The policy states that this class of ground water will be protected for drinking water and agricultural use. Protection of water for drinking water purposes is also mentioned in the policies of Connecticut and Florida.

Role of Classification in Program Implementation

Classification systems have four primary uses within state ground-water programs:

1) to provide a basis for discharge permit conditions;

2) to provide a basis for prohibiting specific activities or discharges from areas designated for protection;

3) to provide guidance for the designation of regulatory priorities; and

4) to provide guidance for aquifer remediation activities.

The uses made of classification in each of the ten selected states are shown in Table 4.

TABLE 4
IMPLEMENTATION OF CLASSIFICATION

STATE	EXPLICIT/ IMPLICIT SYSTEM	TIMING OF CLASSIFICATION	CLASSIFICATION FACTORS	RELATIONSHIP TO STANDARDS		DISCHARGE LIMITS			OTHER USES
				Standards Related to Classes	Drinking Water Standards Applied	Ground-Water Permits	Facility Permits	Exempted Activities	
CA	Implicit	Reactive	NA-Regional boards establish water quality objectives to protect beneficial uses	Yes		Yes	No	Oil, gas, and geothermal injection wells	Guide remediation activities
CT	Explicit	Anticipatory	4 classes, based on suitability to accept specified discharges	Yes	Yes	Yes, but rarely used	Yes	Irrigated agriculture	Guide remediation. Prohibit specific discharges in class areas
DE	Implicit*	Anticipatory*	Under development--will protect wellhead and recharge areas	No	Yes	No	Yes		Adopt zoning ordinances to incorporate "Resource Protection Area" restrictions, e.g. minimum density*
FL	1. Explicit	1. Reactive	1. 4 classes based on TDS and geological confinement	1. Yes	1. Yes	1. Yes, but rarely used	1. Yes	1. Domestic and agricultural discharges, septic systems, stormwater, pesticides, spills, and saltwater intrusion	1. Guide to remediation activities
	2. Implicit	2. Anticipatory	2. "Areas of critical concern"	2. No	2. NA	2. No	2. No		

* - Proposed
NA - Not Applicable

STATE	EXPLICIT/ IMPLICIT SYSTEM	TIMING OF CLASSIFICATION	CLASSIFICATION FACTORS	RELATIONSHIP TO STANDARDS		DISCHARGE LIMITS			OTHER USES
				Standards Related to Classes	Drinking Water Standards Applied	Ground-Water Permits	Facility Permits	Exempted Activities	
MN	NA	NA	NA-all groundwater classified for drinking water use	NA	NA	No	Yes	NA	NA
MT	Explicit	Reactive	4 classes based on existing quality or use as of 10/29/82; groundwater classed as suitable to specified uses	Yes	Yes	Yes		Solid waste management systems, UIC regulated, family septic systems, oil and gas injection wells, stormwater, irrigated agriculture	Guide remediation activities
NJ	1. Explicit	1. Classes GW2, GW3, GW4 - Reactive Class GW1 - Anticipatory	1. 4 classes, based on use and TDS	1. Yes	1. Yes	1. Yes	1. No	1. Family septic systems, nonpoint agri-cultural discharges, aquatic animal and aquacul-ture projects, silvicultural discharges, irrigation return flows	1. Guide remediation activities; basis for land use controls in Central Pine Barrens; deter-mine regulatory policies priorities
	2. Implicit	2. Anticipatory	2. "Critical areas" under Water Supply Management Act	2. NA	2. NA	2. No	2. No		

NA - Not Applicable

STATE	EXPLICIT/ IMPLICIT SYSTEM	TIMING OF CLASSIFICATION	CLASSIFICATION FACTORS	RELATIONSHIP TO STANDARDS		DISCHARGE LIMITS			OTHER USES
				Standards Related to Classes	Drinking Water Standards Applied	Ground-Water Permits	Facility Permits	Exempted Activities	
NM	Implicit	Reactive	Only groundwater of 10,000 mg TDS or less is protected	Yes	Yes	Yes--discharge plans	No	Discharges related to coal surface mining, oil and natural gas production, irrigated agriculture	Guide remediation activities
VT	1. Explicit	1. Reactive	1. 4 classes, based on suitability for specified uses	1. NA-system not implemented	1. Ground-water standards equivalent to Federal drinking water standards have been adopted.	1. No	1.Yes*	NA-system not implemented	Guide remediation activities
	2. Implicit	2. Anticipatory	2. Wellhead areas mapped to guide local protection efforts	2. NA			2. No		
	3. Implicit	3. Reactive	3. Consideration of soil, subsoil, and recharge areas in development permit process	3. NA	2. Yes 3. NA		3. No		
WI	NA	NA	NA-same two-tiered standards applied to all groundwater	NA	NA	No	Yes	NA	NA

* - Proposed
NA - Not Applicable

Discharges to Ground Water

Discharge permits are the primary regulatory tool used to implement state classification systems. Forty-six states have authority to issue ground-water discharge permits. At least twenty-two states are currently issuing ground-water discharge permits. Twenty of these states have explicit or implicit classification systems.

All of the selected states require permits for point-source discharges. These permits are of two types - ground-water specific and facility specific. A separate permit specific to ground-water discharges is required by six of the states -- California, Connecticut, New Jersey, New Mexico, Wisconsin, and Montana. These states also require permits for land-based facilities regulated pursuant to other statutory programs. In these cases, ground-water quality is one of the factors considered in permit issuance. The states of Delaware, Florida, Vermont, and Minnesota require permits for facilities that may discharge to ground water, but these are not referred to as ground-water discharge permits. In the cases of Florida and Vermont, the states' enabling legislation indicates that ground water should be protected through existing permitting programs rather than establishing a separate permitting program. The limitations inherent in this approach are that (1) permits cannot be issued for sources not regulated under existing statutes, and (2) a regulatory entity whose primary focus is not ground-water protection is generally responsible for permit issuance. In the case of Vermont, the statute does not provide authority for the ground-water division to take enforcement action for permit violations related to ground-water quality. In Florida, permits are administered and enforced by the Department of Environmental Regulation's nine district offices. This division of responsibility initially resulted in disparities in permit restrictions, most of which have been eliminated with the development and adoption of detailed standard procedures.

Ground-water standards are considered to varying degrees in most states whether or not the permit is for a ground-water discharge or a facility. Standards are generally not included as permit restrictions but instead are considered by the permit writer in making a determination whether the proposed facility design and site will violate standards for the designated beneficial use or class of the underlying ground-waters. In New Jersey, applicable ground-water quality criteria may be referenced in a permit. In Wisconsin, the ground-water standard associated with design and management practice criteria may also be referenced in a permit.

Classification has varied importance as a factor in modification or approval of a discharge permit. Fourteen of the fifty states link permit conditions to an explicit classification system, generally by requiring adherence to standards that are tied to the class of ground-water involved. Of the selected states that have explicit classification systems, only three - Connecticut, Montana, and Florida - incorporate ground-water classification into permit determinations. Connecticut is the only one of these states which has classified its waters in advance of receiving an application. Applicants in Connecticut also know in advance which waters may be considered for which type of discharges and do not submit discharge applications for restricted classes of ground water. Florida and Montana make a determination of the class of water involved when they receive a permit application. Montana requests background quality information from the applicant to help it make this judgment.

Ground-Water Standards

Ground-water standards are narrative and/or numeric criteria for measuring ground-water quality. Standards may be tied to ground-water classification, with the standards varying according to ground-water class. They are used to establish permit

conditions and remediation goals, to determine ground water's suitability for drinking water supplies and other uses, and to gauge risks to public health and the environment posed by ground-water contamination. Thirty-three states have adopted standards specific to ground-water quality. These are indicated as ground-water quality standards in state documents or as drinking water or other standards applied directly to ground-water quality. All thirty-three states have numeric standards, while twenty-six of them also have narrative standards. Eighteen states link their ground-water standards with an explicit classification system, with different standards applicable to the different classes of ground water. There is no uniformity among the states as to the type and range of standards adopted.

Each selected state has adopted standards it applies to ground-water quality. Both narrative and numeric standards exist in seven selected states -- California, Connecticut, Florida, Minnesota, Montana, New Jersey, and New Mexico. The narrative standards generally are referred to when a numeric standard does not exist for a particular substance. Delaware, Vermont, and Wisconsin rely solely upon numeric standards. Drinking water standards are the primary ground-water quality standards in every selected state. The following standards are used in the selected states to define ground-water classes and/or to restrict ground-water discharges:

California - Applies state drinking water standards to most discharge permit applications. Drinking water standards consist of state and federal standards as well as health-based levels established by state for other drinking water contaminants. Ambient standards may be applied in recharge areas.

Connecticut - Applies drinking water standards and advisory levels to two classes (GAA and GA) that have drinking water use.

Drinking water standards consist of federal and state drinking water standards and state health advisory levels. No standards applied to other two classes because of presumption of degradation. Applies levels to prevent further degradation on a case-by-case basis.

Delaware - Applies drinking water standards to all ground waters.

Florida - Applies State and Federal drinking water standards or ambient quality to two classes (G1 and G2) used for drinking water. Water quality levels are the same for these classes except for total dissolved solids concentration.

Narrative criteria of "free of harmful contaminants" is applied to G1, G2 and G3 classes for those contaminants for which there is no standard. Standards do not generally apply to Class G4 because of presumption of existing contamination.

Minnesota - Apply state and federal drinking water standards to all ground water.

Montana - Different standards for specific conductivity define the three classes of ground water. Federal drinking water standards and health advisory levels are applied to the two classes suitable for drinking water use.

New Jersey - Applies different state health-based standards to each class.

GW1 - State drinking water standards and background levels apply to Central Pine Barren area.

GW2 - State drinking water standards with less stringent levels for some parameters.

GW3 - State standards with less stringent levels for some parameters than GW2 levels.

GW4 - Evaluated on a case-by-case basis because of presumed contamination.

New Mexico - Applies forty-seven numeric ground-water quality standards which include federal and state drinking water standards and state health-based standards. If the existing concentration of a substance in ground-water exceeds a numeric standard, that concentration becomes the standard which is not to be exceeded by a proposed discharge. Also apply narrative standard "that toxic pollutants not be present in ground water at a place of present or foreseeable future use."

Vermont - Applies two-tiered numeric standards (preventive action limit and enforcement standard). Enforcement standards which are largely equivalent to federal drinking water standards.

Wisconsin - Applies two-tiered numeric standards (preventive action level and enforcement standard) to all ground water. These standards are calculated as a percentage of federal and state drinking water standards. The preventive action level is the more stringent "warning" limit.

Ground-water standards are used to protect ground water through permit programs whether those permits are issued specifically for ground-water discharges or for facilities under other statutes. Six of the selected states -- Connecticut, Delaware, Florida, Minnesota, Vermont, and Wisconsin -- require their ground-water standards to

be incorporated into existing permitting programs for specific facilities, such as solid waste landfills. Generally, permit conditions include adherence to ground-water standards, which are measured through monitoring requirements. One problem with this approach is that compliance with ground-water standards has to compete for priority with other regulatory goals of the different permitting programs, sometimes resulting in inconsistent application of standards. Four of the selected states - California, Montana, New Jersey and New Mexico, issue separate ground-water discharge permits (under their water pollution control statutes) for facilities or activities that discharge to ground water. While this can ensure greater consistency in the application of standards, the states note that the large number of discharge sources has forced them to prioritize their ground-water permitting activities, with some types of sources remaining unpermitted in California and New Jersey and some older pre-1977 discharges remaining unpermitted in New Mexico.

Standards are also used to guide remediation efforts, although strict adherence to the standards is not the general rule. Rather, each selected state maintains that the level of cleanup required is determined on a case-by-case basis, with ground-water standards serving as a guidance. Cost, feasibility, and impact upon the ground water's beneficial uses are other factors in deciding upon the cleanup standard.

Five selected states -- Connecticut, Florida, Montana, New Jersey, and New Mexico -- tie their ground-water standards to their classification systems, with standards varying according to ground-water class. The state agencies, when assessing contamination, permitting facilities, or determining cleanup standards, will initially determine the class of ground water involved in order to ascertain the applicable ground-water standard.

Protected Area Designations

The use of classification to prohibit specific types of discharges and/or activities in designated areas is found in only two of the selected states, Connecticut and New Jersey. In Connecticut, the entire state has been mapped according to its classification system. Ground-water classes in Connecticut are based on permissible discharges. The regulated community can thereby identify which areas of the state are not available for the siting of a specific type of facility. The state also designates a class of ground water that is suitable for industrial discharges because of existing degraded water quality. However, as a result of public pressure against downgrading, the state has not delineated these areas on its state map. New Jersey has designated its ground-water classes based on quality and use. The highest class is reserved for the Central Pine Barrens. No discharges are permitted in this area which would cause degradation of the existing ground-water quality. Delaware, through its proposed Resource Protection Areas concept, would have local governments protect vulnerable ground-water resources through prohibitions on activities and other land use restrictions. Similarly, Florida is attempting to revise its explicit classification system to provide special protection for wellhead areas.

Most states do not use their classification systems as a discharge prohibition mechanism because this results in land use control. Although they have the authority to take this action pursuant to their police powers to protect public health, most states prefer to leave this to the exercise of local zoning authorities. Each of the selected states indicated a new emphasis on informing local officials of their existing land use authorities and encouraging them to exercise it. Connecticut requires that municipalities consider ground-water impacts in designing their land use ordinances.

Remediation Activities

Six out of the ten selected states use their classification systems as a guide to establishing clean-up levels in state remediation activities. California, Connecticut, Florida, Montana, New Jersey, and New Mexico evaluate remediation sites on a case-by-case basis but require clean-up to the level associated with the designated class or use of the ground-water. In most cases, cleanup to state drinking water standards would be required. New Jersey requires cleanup to background in their Pine Barrens class, the class designated for the most stringent protection. In the case of Connecticut where all ground water is regarded as surface water recharge, surface water quality criteria associated with the down-gradient surface water class may also be applied. Connecticut is the only state that assumes all discharges will eventually contaminate ground water and estimates a contaminant plume as part of the permitting process. This plume is regarded as a subsurface water treatment "system" and the permittee is required to own the property overlying the projected plume or to obtain an easement in order to expedite remediation efforts if the plume threatens to contaminate another portion of the ground-water resource.

Mapping and Data Management

The implementation of a classification system is enhanced by the existence of a statewide hydrogeologic database, as well as a contaminant source database. This information enables states to use classification in an anticipatory manner, instead of simply in a reactive way. By using the information to create a statewide classification map, states can direct activities away from vulnerable areas, guide permit conditions in an anticipatory manner, and predict remediation needs.

Connecticut is the only state which has gathered sufficient information on hydrogeology, ground-water quality, and sources of contamination to be able to map the entire state according to its classification system. The state finds its classification map to be an invaluable, timesaving aid. Other selected states are in the process of developing databases and maps, but they stress the time and expense involved, in addition to the complexity of the task. In the meantime, the applicable ground-water class is determined on a site-by-site basis in those states.

Use of Classification in Ground-Water-Related Programs

All of the states have established programs or are participating in federal programs which regulate specific sources of ground-water contamination. These programs are not generally considered part of a state's ground-water protection program because they operate under separate legal authority. However, these programs established under CERCLA, RCRA and state laws have a significant impact on ground water through the regulation of hazardous waste and solid waste disposal facilities, and underground storage tanks. Regulations for hazardous and solid waste and underground storage tank programs in the fifty states were reviewed to determine whether there is a connection between a state's classification system and the requirements and restrictions established by these regulatory programs. Each state's regulations were examined to determine the following:

1) whether ground-water use, water quality and hydrogeologic factors were cited as considerations for regulatory decisions in these programs; and
2) whether there is a legal basis for considering ground-water classification in discharge permit, siting, or monitoring requirements of these programs.

Additional analyses were undertaken in the ten selected states to determine whether different permit conditions, siting restrictions or monitoring requirements were being applied according to established ground-water class. The findings of this regulation review and program analysis may be grouped into -- "types" with different relationships between classification and ground water-related programs.

1) The first type of relationship describes one state - Connecticut where there is a direct relationship between classification and these other regulatory programs. Permits are required for the siting and operation of waste facilities and storage tanks and a permit application can be denied if inconsistent with State water quality standards which are associated with a designated class of ground water. Further, siting of waste disposal facilities is restricted to the one class of ground water identified as permissible for certain types of waste disposal.

2) The second "type" is one in which ground-water use, value, or vulnerability factors are to be considered on permit application but there is no legal basis for application of ground-water classification. The regulations state that depth to ground-water, permeability or other hydrogeologic characteristics must be considered but there is no reference to protecting a designated ground-water class, use or associated water quality standards.

3) The third "type" is one in which facilities are required by permit conditions to be designed and operated in such a way that any discharge or leachate will not exceed ground-water quality standards. Although no explicit reference may be made to ground-water classes, the legal basis for its application is the tie-in to water quality standards. However, in most of these cases, drinking water standards are applied so that permit

conditions are not modified according to the class of underlying ground-water.

4) The fourth "type" is one in which conditions are established for design and siting of a waste facility to protect "existing and potential drinking water supplies" but no classification system exists. Generally, in these cases all ground-water is considered to be in a single drinking water supply class.

The following discussion provides a brief summary of the use of classification in programs regulating hazardous waste treatment, storage and disposal (TSD) facilities, solid waste disposal facilities, and underground storage tanks.

Hazardous Waste TSD Facilities

Forty states have regulatory provisions requiring the consideration of ground-water use, value or vulnerability factors in permit applications. Therefore, standard design and siting requirements dictate ground-water protection measures rather than the class of ground-water underlying a proposed facility.

Four states have established a legal basis for the application of classification to facility permitting decisions:

Arizona - Siting restrictions are based on protection of drinking water class.

Connecticut - Permit application can be denied if inconsistent with water quality standards which include designated ground-water classes. Waste disposal discharges are permissible in only one class.

Massachusetts - No facility permitted to violate standards for classified waters. Ninety-nine percent of the state's ground-water is classified for existing or potential drinking water use.

Nebraska - State rules established that "ground-water quality standards and use classification are intended to be the foundation for other ground-water regulatory programs . . . classifications shall apply to all ground-waters of the State". Not clear how this is specifically applied.

Solid Waste Disposal Facilities

Forty-six states have regulations which require that use, value, or vulnerability factors be considered in evaluating siting, design and operation plans in permit applications. Six states specifically tie their classification systems to these regulations:

Alaska - Facility must be operated so that it does not violate the drinking water standard for the drinking water class of ground-waters.

Arizona - Facility must be designed so discharges do not violate the "aquifer water quality standard" tied to the designated use.

Connecticut - Permit application can be denied if inconsistent with water quality standards and designated class. Only one class is designated for certain waste disposal use.

Nebraska - Designated ground-water use cannot be impaired by the design or site proposed by permit applicant.

New Jersey - Landfills must adhere to New Jersey Pollutant Discharge Elimination System (NJPDES) requirements which include

water quality standards tied to established ground-water classes.

Wyoming - Sites must be designed and operated so that materials will not violate water quality standards tied to class.

Underground Storage Tanks

Thirteen states have established regulations which refer to use, water quality or hydrogeologic factors for design, siting, testing, or monitoring requirements. Four states have established a legal basis for applying their classification systems to their underground storage tank program:

Connecticut - Discharge permit for tanks can be denied if inconsistent with water quality standards and designated class.

Florida - Monitoring plan requirements differ according to ground-water classification.

Nebraska - Regulations shall consider hydrogeology and depth to ground-water. Ground water standard classes are intended to be foundation of all ground water-related regulatory programs.

Vermont - UST rules may distinguish between types of tanks, based on hydrogeologic factors. "Secondary containment standards are to be waived if applicant can demonstrate proposed tank is located in Class IV area".

SUMMARIES OF SELECTED STATES' CLASSIFICATION SYSTEMS AND PROGRAM OPERATIONS

CALIFORNIA SUMMARY

Description of Classification System

The State has an implicit classification system whereby ground waters are protected to the highest reasonable use (this is drinking water in most cases). Reference is made to the beneficial use to be protected in state discharge permits (called "waste discharge requirements).

The primary purpose of the classification is to underscore permit compliance or remediation with standards or other criteria associated with that beneficial use. The beneficial use designation does not serve to direct activities away from designated areas but may guide priorities when resources are short and numerous permits need to be issued or problems investigated.

Legal Basis

The primary statutory authority for both surface and ground-water quality in the state is the Porter-Cologne Water Quality Act which has been codified in the California Water Code. Statutory authority for a variety of ground-water-related regulatory programs including waste disposal, injection well disposal, underground storage tanks, ground-water recharge, pesticide management, and septic systems, is established under a number of state codes including the Health and Safety Code, the Food and Agricultural Code, and the Public Resources Code.

The California Water Code assigns the State Water Resources Control Board (State Board) the responsibility for developing policy and formulating a California Water Plan which incorporates statewide and regional water quality control plans. The State Board issues regulations, water quality policies and plans, and procedures to assist the

nine Regional Water Quality Control Boards (Regional Boards) in their task of developing and implementing water quality planning and regulatory activities in their respective regions.

The nine Regional Boards are given the responsibility for developing regional water quality control plans (called "basin plans") for surface and ground-water basins under their jurisdiction. Part of this planning process is designating beneficial uses and associated water quality objectives within each basin.

Relation to Ground-Water Protection Policy

The State's statutory policy is contained in the California Water Code which applies to both surface and ground waters. It states that "activities and factors which may affect the quality of the waters of the state shall be regulated to attain the highest water quality which is reasonable considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible" (CWC § 13000). This policy establishes an implicit classification system which allows different levels of protection depending on the designated beneficial use. In most cases, this use is drinking water.

The State Board, which has statewide responsibility for protecting ground water, adopted a resolution (Res. 68-16) for purposes of supplementing the policy language in Porter-Cologne and termed the State's policy as "antidegradation." The policy, in practice, is that the highest use of water is considered to be drinking water and no degradation is allowed beyond drinking water standards except for special cases of greater economic or social need for an activity. The State Board has also adopted a policy (Res. 88-63) which defines sources of drinking water.

Implementation

Discharge Permits

The State Board has adopted regulations for discharges to ground water in the California Code of Regulations, Title 23, Chapter 3, which include waste discharge reports and requirements (Subchapter 9), discharge of waste to land (Subchapter 15), and underground storage tanks (Subchapter 16). Discharge permits termed "waste discharge requirements" are issued and enforced by the nine Regional Boards. Under the Subchapter 15 regulations, applicants for waste management units such as landfills, waste piles, surface impoundments, and land treatment facilities are required to submit a facility plan which meets the siting and construction criteria established by the regulations. The Regional Boards make a determination that such criteria have been met and that water quality objectives for the designated beneficial use will not be impaired before approving the application. Appropriate conditions are incorporated into the permit to protect the beneficial uses of the receiving water body. Generally, the beneficial use of ground water is considered to be domestic drinking water (as defined by the State Board's Sources of Drinking Water Policy) unless it is saline or otherwise previously degraded or designated for another use under the regional water quality control plans.

Ground-Water Standards

The Regional Boards have adopted ambient water quality objectives to protect surface and ground water which are generally based on numeric federal and state criteria and health advisory levels. The Regional Boards also maintain narrative standards preventing the degradation of quality necessary for the designated beneficial

use. Beneficial use designations and associated water quality objectives are written into permits issued for regulated sources of pollution.

Water quality criteria associated with the highest beneficial use are adopted as water quality objectives in most cases. Background concentrations are also considered. For ground water designated as drinking water supply, state and federal drinking water standards are generally adopted as water quality objectives. An individual quality evaluation is made in those limited cases where the beneficial use is not designated for drinking water.

Some applicants are required to meet construction and siting standards which have been defined for those regulated facilities discharging to land, unless they can demonstrate that an alternative design would not impair water quality objectives. Effluent limitations and associated monitoring requirements for specific indicator parameters and chemical constituents are also included in permits. Applicants are required to submit background quality data for these constituents before final permit approval to assist the Regional Boards in ensuring compliance.

Remediation

When State or Regional Boards determine remediation is required to restore quality to meet the designated beneficial use, all pertinent numerical quality criteria are used to define clean-up levels. Generally, drinking water standards, health advisory levels, or background levels will be applied. Each case is evaluated on an individual basis.

Ground-Water Mapping and Data Management

The Regional Boards apply their implicit classification system during their water quality planning and regulation process. In addition, the State Department of Water Resources is updating the maps of statewide ground-water resources previously compiled in its Bulletin No. 118. The State and Regional Boards utilize these and other large-scale maps of surface and ground-water resources as part of the statewide and regional water quality planning process. In some cases, these maps include locations of existing sources of pollution and existing land and water uses. The State uses STORET and the State Water Quality Information System (SWQIS) to allow the exchange of data management information between ground-water-related programs.

CONNECTICUT SUMMARY

Description of Classification System

The State has a classification system which limits discharges to ground water according to the following categories:

Class GAA areas - Suitable for domestic sewage, acceptable agricultural practices, cooling or clean water discharges.

Class GA areas - Suitable for GAA discharges plus septage (wastes of predominantly human or animal origin) and effluents containing substances of natural or biodegradable materials which pose no threat to untreated ground-water supplies.

Class GB areas - Suitable for GAA and GA discharges plus treated industrial process waters which will not preclude future uses of the ground-water for drinking supplies without treatment. Likely to be unsuitable for drinking supplies but prevent further degradation from new discharges.

Class GC areas - May be suitable for other class discharges plus other permitted discharges which will not cause a violation of a surface water classification.

The State has an anticipatory classification system whereby all ground-water resources are mapped and color-coded according to their class designation. This system serves as the basis of their ground-water protection activities in three primary ways: 1) to direct certain activities away from classified areas, 2) to provide guidance for discharge permit issuance; and 3) to provide guidance for remediation levels.

About 95% of the state is included in Class GAA and GA areas. Most types of industrial discharges are not allowed in these areas and industrial facilities generally do not apply for permits in these areas knowing that they will be denied. The system does not cover all potential sources of contamination but rather the permitted discharges from existing or proposed activities. Thus, the siting of unpermitted sources of

contamination which includes most nonpoint sources is not restricted in accordance with this classification scheme.

Some localities have adopted zoning prohibitions on GC classification areas. The State does not designate areas on the map as GC but may classify as such once a discharge permit application is received. If a competing higher use is approved of in advance, a GC permit application would be denied.

Legal Basis

The State's primary statutory authority for its ground-water protection program is the Connecticut Clean Water Act. Pursuant to Section 22a-426 of the Act, water quality standards have been adopted for ground waters of the state. These standards establish four classes of ground water defined by use, water quality and allowable discharges. The Clean Water Act requires discharges to state waters conform to these standards.

Relation to Ground-Water Protection Policy

The State's policy is "to restore or maintain quality consistent with use for drinking without treatment, although restoration to drinking water is not necessary if water has been designated for a less sensitive class." (Water Quality Standards, Policy 3.) Regulatory programs implementing this policy are applicable to both surface and ground water.

The State's policy provides an underlying guide for its program by establishing the premise that regulatory activities should be directed toward ensuring that ground water is acceptable for use as drinking water without treatment. This policy coincides with the protection objectives of the classification system and waters designated GAA

and GA. Coupled with the regulatory standards adopted for drinking water quality, this policy provides a regulatory basis for state program activities.

Implementation

Discharge Permits

Connecticut prohibits any person to "initiate, create, originate or maintain any discharge into [surface and ground] waters of the state without a permit." A permit application can be denied if the state determines it to be inconsistent with class designations and associated water quality standards.

Most discharge permits are issued for surface water discharges with only a small proportion specific to ground-water discharges. This is due to two primary factors: 1) the lack of permit requirements for nonpoint sources and 2) the fact that, due to the nature of the state's hydrologic basins, land discharges are assumed to travel relatively rapidly to surface water. Therefore, a permit may be issued for a land-based discharge by defining an expected plume of contamination and establishing permit conditions on the quality of the receiving water body. The plume is essentially permitted as a part of the facility's treatment works. The state assumes that liners and other technologies will eventually fail and will not issue a permit if hydrogeologic characteristics are such that it cannot define a plume. A permit may also be denied if the water quality impact of a particular waste stream constituent cannot be ascertained. An owner/operator is required to maintain ownership or access to the land surface overlying the plume. Easements are most often obtained to meet this requirement.

The State believes that most of the facilities within the state have been permitted and the state's classification system has helped to eliminate applications for GAA and GA designated areas.

Ground-Water Standards

Connecticut uses both federal and state drinking water standards for clean-up and protection activities. The primary goal established by the classification system is to protect waters so they are acceptable for drinking without treatment.

Drinking water standards are generally used to support professional judgment in making a determination about an acceptable level of discharge for permit issuance. The State may also use more stringent numerical criteria, if available, for vulnerable ground waters in GAA or GA areas on a case-by-case basis. For classes designated for uses other than drinking water because of assumed contamination, the State applies less stringent standards (such as ambient levels) on an individual case basis.

Ground-Water Mapping and Data Management

The State has developed a statewide map of surface and ground-water resources, class designations, land uses, and existing point and nonpoint sources. This map is actively used in the water quality management program and is an essential tool for implementing the State's anticipatory classification system. The state has begun the gradual process of digitizing the information recorded on the map for increased accessibility and accuracy.

DELAWARE SUMMARY

Description of Classification System

Delaware has no explicit classification system. However, the New Castle County Water Resources Agency, with oversight and technical assistance from the Department of Natural Resources and Environmental Control (DNREC), has developed a method for identifying and protecting "Water Resource Protection Areas" (RPAs). RPAs are designed to protect surface and underground drinking water supply sources. This implicit method of classification singles out wellhead, recharge, and other hydrogeologically significant areas for special protection through local land management measures.

Legal Basis

The RPA concept was developed by the New Castle County Water Resources Agency, which is a cooperative program between the cities of Newark and Wilmington and New Castle County to provide water resources planning and management. The Agency has developed model zoning ordinances for the implementation of RPAs, which counties and municipalities may adopt pursuant to their delegated police powers over local land use. The DNREC participated in the development of the RPA program pursuant to its authority under Section 6001 of the Delaware Environmental Protection Law, which directs the DNREC to provide programs for managing land, water, underwater and air resources; for controlling pollution of those resources; for protecting and conserving them; and for encouraging their maximum utilization.

Relation to Ground-Water Protection Policy

Delaware has not formally adopted, by statute or regulation, a statement of policy concerning ground-water protection. The RPA program adheres to the general requirement in the Delaware Environmental Protection Law that "[t]he development, utilization, and control of all the land, water, underwater and air resources shall be directed to make the maximum contribution to the public benefit, and . . . the state . . . should control the development and use of [these] resources . . . so as to effectuate full utilization, conservation, and protection of the water and air resources of the State."

Implementation

Protected Area Designation

The Water Resources Agency has developed model land use controls that would be applied to RPAs through local zoning ordinances. Each type of ground-water RPA -- wellhead area, recharge area, or hydrogeologically significant area -- has distinct "restricted land uses" and "controlled land uses," such as prohibitions on underground storage tanks and minimum residential density. The model proposes that existing potential sources of contamination be treated as nonconforming uses for zoning purposes.

The model zoning ordinances have not yet been adopted by either New Castle County or any incorporated municipality, although they are currently under consideration by local authorities. There is considerable opposition from developers over the minimum density requirements.

Delaware DNREC has developed a Statewide Wellhead Protection (WHP) Program in order to expand the New Castle County RPA concept to Kent and Sussex Counties. The WHP Program, developed in June 1989, addresses all seven statutory requirements of the Federal Wellhead Protection Program.

Delaware is in the early stages of implementing its WHP program. Examples of initial implementation activities are:

1. creation of a new position in DNREC solely for purpose of WHP Program implementation;
2. development of a WHP Bill which is currently pending in the State legislature;
3. development of a State Water Resource Protection Area Advisory Board;
4. sponsorship of educational programs for the regulated community and interested parties including a State WHP Seminar (Sept. '88) and a State WHP Workshop (Nov. '89); and
5. mapping primary recharge areas in the state and studying the vulnerable Cockeysville Limestone Aquifer in New Castle County. Both of these studies will help the state refine existing WHPA delineations in New Castle County and delineate WHPA's in Kent and Sussex Counties.

FLORIDA SUMMARY

Description of Classification System

Florida has two different means of classifying its ground water -- one is explicit and the other is implicit. The State's explicit classification system was introduced in 1983 through Department of Environmental Regulation (DER) rulemaking. Total dissolved solids was chosen as a basis for the explicit classification system, as follows:

> CLASS G-I Potable water use, ground-water in single source aquifers which has a total dissolved solids content of less than 3,000 mg/l.
>
> CLASS G-II Potable water use, ground-water in aquifers which has a total dissolved solids content of less than 10,000 mg/l, unless otherwise classified.
>
> CLASS G-III Non-potable water use, ground-water in unconfined aquifers which has a total dissolved solids content of 10,000 mg/l or greater, or which has a total dissolved solids of 3,000-10,000 mg/l and either has been reclassified as having no reasonable potential as a source of drinking water, or has been designated as an exempted aquifer.
>
> CLASS G-IV Non-potable water use, ground-water in confined aquifers which has a total dissolved solids content of 10,000 mg/l or greater.

Classes G-I and G-II were designed to protect any potential potable water supplies, including water that is potable following treatment. Shallow coastal aquifers that have been subject to saltwater intrusion are generally designated as Class G-III. Class G-IV is generally applicable to cavernous limestone aquifers. An applicant requesting reclassification must show that it will "establish the present and future most beneficial use of the ground-water." A fact-finding workshop, accompanied by public notice, must be held prior to a decision to reclassify.

Legal Basis

The legal basis for Florida's explicit classification system is Section 403.061 of the state's Air and Water Pollution Control Act. This provision states that the DER has the power to "develop a comprehensive program for the prevention, abatement, and control of the pollution of the waters of the state. In order to effect this purpose, a grouping of the waters into classes may be made in accordance with present and future most beneficial uses."

The designation of areas of critical concern, the State's implicit classification method, is specifically authorized by Section 380.05(2)(a) of the Florida Environmental Land and Water Management Act.

Relation to Ground-Water Protection Policy

Policy statements applicable to ground-water protection are found in both Florida's Air and Water Pollution Control Act and House Bill 1338, passed in 1985, which outlines the State Comprehensive Plan to address growth and environmental issues. In addition, the DER's Agency Functional Plan contains specific ground-water protection goals. None of these three documents, however, specifically references ground-water classification. Rather, they basically direct the DER to protect ground-water for drinking water use. The effect of these policies on the explicit classification system is difficult to gauge with precision, but they undoubtedly influenced the system's emphasis on potable water use.

Implementation

Discharge Permits

Permitting for facilities discharging to ground water is tied to both the State's explicit ground-water classification system and ground-water quality standards. Discharges to ground water cannot cause a violation of standards for receiving ground water except within a zone of discharge established by a permit. Fla. Admin. Code § 17-4.245. Standards vary according to the class of ground water involved.

While the DER has the authority to issue specific ground-water discharge permits, it has done so only twice. Instead, the permit regulations state that "[i]t is the intent of the Department wherever possible to incorporate ground-water considerations into other appropriate Department permits, and not to require a separate permit for ground-water discharges." Id.

The zone of discharge may not extend beyond the installation owner's property, unless, among other things, the public is notified and the discharge will not impair the ground water's designated use. For new sources, the boundary of the zone of discharge is generally measured laterally 100 feet from the site boundary and vertically to the first confining bed. The ground-water standards which must be met outside of the zone of discharge vary according to ground-water class.

The DER exempts from permit requirements domestic discharges of less than 100,000 gallons per day, agricultural fields, ditches and canals, septic tanks, livestock waste lagoons, and stormwater facilities. A permit is granted in two steps; a temporary operating permit is granted for six months, followed by a five-year permit.

The ground-water classification applicable to a permitted site is determined at the time of permit application. Applicants are required to submit, as part of their monitoring plan proposal, hydrogeological and design information which satisfies up to

thirteen criteria, depending upon the complexity of the project. Special monitoring requirements apply to installations in Classes G-III and G-IV.

Ground-Water Standards

Groundwater standards were adopted in 1983 along with the explicit classification system. Standards are tied to classification as follows:

17-3.402 Minimum Criteria for Ground Water

(1) All ground-water shall at all places and at all times be free from domestic, industrial, agricultural, or other man-induced non-thermal components of discharges in concentrations which, alone or in combination with other substances, or components of discharges (whether thermal or nonthermal):

(a) Are harmful to plants, animals, or organisms that are native to the soil and responsible for treatment or stabilization of the discharge relied upon by Department permits; or

(b) Are carcinogenic, mutagenic, teratogenic, or toxic to human beings, unless specific criteria are established for such components in 17-3.404; or

(c) Are acutely toxic to indigenous species of significance to the aquatic community within surface waters affected by the ground-water at the point of contact with surface waters; or

(d) Pose a serious danger to the public health, safety, or welfare; or

(e) Create or constitute a nuisance; or

(f) Impair the reasonable and beneficial use of adjacent waters.

(2) The minimum criteria shall not apply to Class G-IV ground-water, unless the Department determines there is a danger to the public health, safety or welfare.

17-3.404 Standards for Class G-I and Class G-II Ground-Water.

(1) In addition to the minimum criteria provided in Section 17-3.402, F.A.C., waters classified as Class G-l and Class G-II ground-water shall meet the following standards:

(a) The primary and secondary drinking water quality standards for public water systems established pursuant to the Florida Safe Drinking Water Act. . . .

(b) The following maximum contaminant levels: (Reserved).

(2) If the concentration for any constituent listed in (1) in the natural unaffected background quality of the ground-water is greater than the stated maximum, or in the case of pH is also less than the minimum, the representative background value shall be the prevailing standard for Class G-I and Class G-II ground-water.

(3) These standards shall not apply within a permitted zone of discharge as provided in Section 17-3.245, F.A.C. The minimum criteria specified in 17-3.402 shall apply within the zone of discharge.

17-3.405 Standards for Class G-III Ground-Water. The criteria established in Section 17-3.402, F.A.C., shall apply to all Class G-III ground-water.

17-3.406 Standards for Class G-IV Ground-Water. The Department shall specify applicable standards on a case-by-case basis for discharges to Class G-IV ground-water. The minimum criteria in Section 17-3.402 will not apply unless the Department determines there is danger to the public health, safety or welfare.

Discharges in violation of the ground-water standards are prohibited, and standards are incorporated into State permit programs, as discussed under Discharge Permits, above. Ground-water standards also serve as a guidance in remediation, although strict adherence to the standards in cleanup may not be required, depending upon the feasibility study results. The approach in setting cleanup is case-by-case, based upon a site analysis.

The State has adopted federal MCLs as its primary drinking water standards, and also has promulgated eight additional MCLs for the most commonly found contaminants. Secondary standards refer to substances affecting aesthetic suitability for drinking water purposes, such as copper, taste, and odor. The narrative standards contained in the minimum criteria for ground water address those contaminants for which numeric standards are unavailable.

Protected Area Designation

"Areas of critical concern" are a form of implicit classification and are authorized by the Environmental Land and Waste Management Act. Such designated areas can be used to single out vulnerable ground-water resources for special protection, and generally involve restricting ground-water withdrawals.

The DER plans to implement wellhead protection through a restructuring of its explicit classification system. Class G-I designation would be applied to areas surrounding major public water supply wells (at least 100,000 gallons per day) in unconfined or leaky confined aquifers. Two zones of protection would be established around the well, one based on a set distance, the other based on hydrogeologic travel time. Stringent source controls, the prohibition of some sources, and land use controls would be applied to the zone of protection.

The proposed G-I Rule proposes a 200 ft. inner zone of protection, with an outer zone based on five-year travel time. More stringent controls would apply to the inner zone. The rule has been successfully challenged at the administrative level by a coalition of pro-development interests, and its future status is a matter of speculation.

Ground-Water Mapping and Data Management

Florida has not been mapped according to its explicit classification system, although the entire state has been ranked according to the DRASTIC system. The State has been involved in mapping G-1 ground waters and is now mapping high recharge areas and future public water supplies. An ambient ground-water monitoring network consists of wells owned by the state. The monitoring system is divided into two sub-networks. One, the background network, consists of 2,000 wells and is used for assessing background quality in areas considered relatively unaffected by anthropogenic

sources. The other is used for assessing quality in selected areas subject to significant human activity -- "very intensely studied areas," or VISAs. The VISA network is relatively new, and the intent is to monitor those areas for specific parameters based on land use. The DER wants to use data from the VISA network to advise local entities on the impact of various land uses on ground-water quality.

The DER has extensive computerized information systems. Regulatory data is entered by the district offices onto the GMS (Groundwater Management System). Nonregulatory data is entered on the Water Quality Analysis database, which consists primarily of ambient ground-water data. The DER also has access to computerized land use maps, and can use its "Intergraph" computer system to produce maps indicating contamination and potential sources by combining DRASTIC, land-use data, contamination sources, and water supply wells.

MINNESOTA SUMMARY

Description of Classification System

Minnesota classifies all of its ground water for drinking water use, as stated in Rule 7060.040:

> The waters of the state are classified to their highest priority use, which for underground waters of suitable natural quality is their use now or in the future as a source of drinking, culinary, or food processing water. Suitability is to be construed as meaning that the waters in their natural state can be used for such purposes after such . . . treatment processes as may be prescribed. . . . This classification is established to protect the underground waters as potable water supplies by preventing and abating pollution. In making this classification, the agency recognizes that the underground waters of the state are contained in a series of related and often interconnected aquifers, such that if sewage, industrial waste or other pollutants enter the underground system, they may spread both vertically and horizontally. Thus, all underground waters are best classified for use as potable water supply in order to preserve high quality waters by minimizing spreading of pollutants, by prohibiting further discharges of wastes thereto, and to maximize the possibility of rehabilitating degraded waters for their priority use.

In addition, Rule 7050.0220, which is addressed primarily toward surface water, contains a use-based classification system which the Minnesota Pollution Control Agency (MPCA) also considers applicable to ground water. Classes listed under Rule 7050.0220 include domestic consumption, fisheries and recreation, industrial consumption, agriculture and wildlife, aesthetic enjoyment and navigation, and limited resource value waters (limited quantity).

Legal Basis

Both Rules 7060.0400 and 7050.0220 were promulgated pursuant to authority contained in Section 115.03 of the Minnesota Pollution Control Law. This provision

gives the MPCA the ability to "make such classification of the waters of the state as it may deem advisable."

Relation to Ground-Water Protection Policy

Minnesota's Underground Waters regulations contain two policy statements, as follows:

> 7060.0200 POLICY.
> It is the policy of the agency to consider the actual or potential use of the underground waters for potable water supply as constituting the highest priority use and as such to provide maximum protection to all underground waters. . . . [I]t is necessary and proper for the agency to employ a nondegradation policy to prevent pollution of the underground waters of the state.
>
> 7060.0500 NONDEGRADATION POLICY
> It is the policy of the agency that the disposal of sewage, industrial waste, and other wastes shall be controlled as may be necessary to ensure that to the maximum practicable extent the underground waters of the state are maintained at their natural quality unless a determination is made by the agency that a change is justifiable by reason of necessary economic or social development and will not preclude appropriate beneficial present and future uses of the waters.

Neither policy mentions classification. According to the MPCA, nondegradation serves as an overall goal for the state's ground-water protection efforts. However, the agency recognizes that there are situations where degradation must be allowed to promote societal interests and that, in these situations, adherence to ground-water standards based upon protection of beneficial uses is appropriate. Within the MPCA, there has been no effort to link the ground-water policy statements with the classification of all ground water for drinking water use.

Implementation

The MPCA does not use either Rule 7060.0400 or Rule 7050.0220 in its ground-water protection activities. Rather, public drinking water standards are the primary

means of determining necessary degrees of ground-water protection. A final document entitled "Minnesota Ground Water Protection Strategy" (March 10, 1988) recommends the development of a new classification system, as follows:

> The revisions to [Rule] 7050 should include a ground-water classification system based upon Minnesota's ground-water conditions and use. Classification would be done only for specific sites or locales, not for whole aquifers or regions. Classification criteria would be established in the rule based in part on geologic suspectibility to contamination from potentially polluting activities. The goal would be to protect all ground-water from degradation which threatens its use as a source of drinking water.

NOTE:

Following the completion of research for this document, the Minnesota Legislature enacted a statute which authorizes the state to designate "sensitive areas" for ground-water protection. Ground-Water Protection Act, ch. 326 of 1989 Laws of Minnesota. The Act thus provides Minnesota with an implicit method of classification; it also strengthens the state's ground-water protection program, especially in the area of nonpoint sources. To date, however, the regulations discussed in the above summary remain unchanged, and state personnel indicate that the new legislation does not significantly affect existing regulatory programs. The discussion of Minnesota in the text of this document was not revised to reflect the new legislation since the state was initially selected as an example of a state that has not implemented a classification system, the new legislation has yet to be implemented by state agencies, and the discussion of other state programs does not reflect any developments which may have occurred since research was completed in 1988.

MONTANA SUMMARY

Description of Classification System

Montana has established a ground-water classification system under the Groundwater Pollution Control System rules (ARM 16.20.1002) for the purpose of protecting "the present and future most beneficial uses of water, i.e., the highest classification level into which ground-water may be placed upon existing quality or use on October 29, 1982." Four classes of ground water are established based on specific conductance (100 micromhos/cm - 15,000 micromhos/cm at 25°c) and suitability for various beneficial uses. Class I ground waters are suitable for domestic water supplies and other uses with little no treatment. Class II ground waters are marginally suitable for domestic water supplies where better quality is not readily available. Class III ground waters are suitable for some industrial and commercial uses, irrigation of salt-tolerant crops, and in some cases may be the only economically feasible source for domestic water supplies. Class IV waters may be suitable for some industrial. . . and other uses but are unsuitable or untreatable for higher beneficial uses. The State's classification system is applied through the conditions placed on discharge permits which are issued on a site-by-site basis.

Legal Basis

The State relies on the regulations established under the Montana Water Quality Act and other source-specific statutes for regulating mining activities, hazardous waste, storage tanks and solid waste disposal. The Water Quality regulations establish a four-class system for protection purposes.

The Montana Groundwater Pollution Control System rules were established in 1982 because of public and environmental outcry that the surface water regulations were not being adequately applied to protect ground water. The State maintains that it now has adequate authority to regulate sources in accordance with its classification system except for nonpoint agricultural sources, mining activities, and oil and gas production.

Relation to Ground-Water Protection Policy

The State's policy, established by the Montana Water Quality Act, is based on the requirement "that any state waters whose existing quality is higher than the established water quality standards be maintained at that high quality unless it has been affirmatively demonstrated to the board that a change is justifiable as a result of necessary economic or social development and will not preclude present and anticipated use of these waters." The policy states further that

> "changes in ground-water quality resulting from nonpoint sources pollutants from lands or operations where all reasonable land, soil, and water conservation practices have been applied do not constitute degradation."

The State's policy is implemented through its classification system and discharge permit program. Although the policy is termed "nondegradation," the State assumes contamination will occur at permitted sites. The permit applicant must establish background quality levels at the site as part of the application procedure and demonstrate that the proposed site design will not result in an exceedance of background quality levels at the property boundary.

Implementation

Discharge Permits

Montana requires that the owner or operator of any source (except for agricultural sources and those regulated under other state statutes) discharging pollutants into State ground-waters apply for a discharge permit. The application must include, among other types of information, a site plan indicating topography, location of water supply wells and springs within one mile and existing ground-water quality and uses within one mile, proposed measures to be taken to provide alternative water supplies or treatment in the event of contamination, and a written evaluation of alternative disposal practices to maximize environmental protection.

The State rules indicate that "discharges of pollutants to ground-water may be entitled to a mixing zone." The extent of the zone is established by the department to "prevent adverse effects on existing or reasonably anticipated beneficial uses."

The State Department of Health and Environmental Sciences has issued 45 ground-water discharge permits since the rules became effective in 1982. Approximately half of these are for currently active sites. This compares to about 400 surface water NPDES permits. Some NPDES permits address ground-water discharges if the discharge is in close proximity to surface water. Ground-water monitoring requirements based on background quality are generally written into ground-water permits. Monitoring is often required near the source as well as at the property boundary (which is usually regarded as the edge of the mixing zone). Permit violations are usually discovered from monitoring data submitted by the owner/operator. The state also conducts periodic monitoring inspections of the facilities.

Only small mining operations (36,500 tons/year or less than 5 acres) are covered by ground-water discharge permits. Larger mines are regulated by the Mining Bureau

of the Department of State Lands. There is a memorandum of understanding between the departments on evaluating water quality impacts to ensure that the Water Quality Act is not violated. The Mining Bureau has never issued a water quality violation.

Ground-Water Standards

The State has adopted federal drinking water standards "to protect the present and future most beneficial uses" of its ground waters. A narrative standard has been established for substances for which no drinking water standard exists: "Concentrations . . . must not exceed levels which render the waters harmful, detrimental or injurious to public health . . . must not exceed acute or chronic problem levels which would adversely affect existing beneficial uses or the designated beneficial uses of ground-water of that classification." These standards and specific conducting levels are applied in regulatory decisions regarding the first two classes.

In the case of the third class, state and federal surface water quality criteria documents are referenced as a guide to determine problem levels "unless local conditions make these values inappropriate."

Ground-Water Mapping and Data Management

Montana has not developed a map of its ground water resources or potential sources of contamination. This is not regarded by the State as an important tool for the implementation of its reactive classification system. Staff rely on their general knowledge of hydrogeology and water quality in the state and specific information supplied by permit applicants.

NEW JERSEY SUMMARY

Description of Classification System

Section 7:9-6.5 of New Jersey's Ground Water Quality Standards sets forth the State's explicit ground-water classification system, which is based upon natural TDS and suitability for certain specified used, as follows:

> (c) Class GW2 ground-water having a natural total dissolved solid concentration of 500 mg/l or less shall be suitable for potable, industrial, or agricultural water supply, after conventional water treatment (for hardness, pH, Fe, Mn, and chlorination) where necessary, or for the continual replenishment of surface waters to maintain the quantity and quality of the surface waters of the State, and other reasonable uses. Quality criteria for these waters may be found in N.J.A.C. 7:9-[6.6].
>
> (d) Class GW3 ground-water having a natural TDS concentration between 500 mg/l and 10,000 mg/l shall be suitable for conversion to fresh potable waters, or other reasonable beneficial uses. Quality criteria for these waters maybe found in N.J.A.C. 7.9-[6.6].
>
> (e) Class GW4 ground-water having a natural total dissolved solids concentration in excess of 10,000 mg/l shall be suitable for any reasonable beneficial use. Effluent limits and quality criteria will be determined on a case-by-case basis for these waters.
>
> (f) Class GW1 ground-water in the Central Pine Barrens shall be suitable for potable water supply, agricultural water supply, continual replenishment of surface waters to maintain the existing quantity and high quality for the surface waters in the Central Pine Barrens, and other reasonable uses. . . .

TDS was chosen as the basis for classification because the information was readily available and it was thought that TDS would provide a good initial screen for potability.

In addition, the Department of Environmental Protection (DEP) may also designate "critical areas" for the protection of surface and ground water supplies from adverse conditions. This designation acts as an implicit classification of the State's ground water.

Legal Basis

The explicit classification system was promulgated in 1981 pursuant to authority in Section 58:10A-4 of New Jersey's Water Pollution Control Act, which gives the DEP the power to classify the surface and ground waters of the State and determine quality standards for each class. The Water Supply Management Act contains authority for making critical areas designations based upon a DEP determination of aquifer pollution. See N.J. Admin. Code § 7:19-6.10.

Relation to Ground-Water Protection Policy

In 1981, the DEP promulgated a series of specific "Statements of Policy" concerning ground-water protection. These statements have a direct impact upon New Jersey's explicit classification system in that they direct the agency to classify ground water according to designated uses and to apply numerical or descriptive criteria to those classifications. The policy statements, located at Section 7:9-6.4 of New Jersey's Ground Water Quality Standards, are also specific concerning the application of classification and related quality standards in DEP permitting and remediation activities, as follows:

> (g) Existing ground-water quality which exceeds those levels necessary to support designated uses shall be maintained and protected unless the State chooses to allow lower water quality as a result of necessary and justifiable economic or social development. In no event, however, may degradation of water quality interfere with or become injurious to existing designated uses.
>
> (h) Where existing ground-water quality does not meet the criteria listed herein, due primarily to man's activities, it is the policy and objective of the Department that the quality be restored and upgraded to the minimum levels of quality [according to the ground-water quality criteria].

Along with other program elements, the protection policies are under revision. Proposed changes include the addition of an antidegradation policy which will direct the

implementation of "antidegradation levels." "Antidegradation levels" are actually standards defining the maximum degradation allowed in a class of ground water over a long time period. They would be a fraction of the background between natural quality and the numerical criteria for the class.

Implementation

Ground-Water Standards

There is a direct relationship between New Jersey's classification system and its ground-water standards (called "criteria"). New Jersey's ground-water quality criteria vary according to ground-water class and are both numeric and descriptive. Up to 36 numeric criteria are applicable to a class, although numeric criteria are lacking for a number of organic chemicals frequently found in ground water. Class GW1 areas, in the largely undeveloped Central Pine Barrens, are protected to an extent that exceeds public health requirements. For classes GW2 and GW3 there are both primary and secondary numeric standards. The primary standards may be exceeded only as a result of natural conditions, while the secondary standards may be exceeded as long as there will be no adverse effects on the designated uses of the ground water, as determined on a case-by-case basis.

Discharge Permits

New Jersey's Pollutant Discharge Elimination System Regulations, promulgated pursuant to the Water Pollution Control Act, govern discharges to both surface waters and ground water. A specific ground-water discharge permit must be obtained before a facility may discharge any pollutant "onto the land or into the ground-water, either directly or indirectly." Ground-water quality criteria must be referenced in discharge

permits, and permit conditions are designed to protect ground-water quality according to the class of ground water involved.

In the permitting process, special attention is given to aquifer recharge areas when effluent limitations are developed. In addition, where the existing quality of ground water in an area is consistently better than the ground-water quality criteria, effluent limitations should be designed to protect that higher quality. Similarly, where existing quality is equal to or worse than the applicable criteria, an applicant may request the that the DEP establish a less stringent effluent limitation than that necessary to maintain the applicable criteria. A public hearing is required for such a less stringent limitation, however, and the applicant must demonstrate that the existing designated use is not attainable because of irretrievable man-induced conditions.

The DEP has identified a large universe of both potential and confirmed ground-water discharge sources and has attempted to prioritize permit issuance based upon the threat to ground-water an activity poses. New construction and existing sources are permitted through different DEP subdivisions. Currently, the existing source program is concentrating on permitting types of activities and has issued permits for landfills (400), lagoons, impoundments, and industrial/commercial septic systems. Since there are over 10,000 industrial/commercial septic systems in the state, they are permitted as they are discovered. There are approximately 1,500 ground-water discharge permits in effect.

Remediation

In the event of ground-water contamination, classification and the related ground-water quality criteria are used to determine appropriate clean-up standards in remediation activities. However, regulations provide the DEP with the latitude either to apply the appropriate quality criteria or to fashion a cleanup standard specific to an

individual contamination incident after consideration of the public health threat and the interference with the ground water's present or potential uses.

Ground-Water Mapping and Data Management

In New Jersey, mapping according to the classification system is in an initial stage of development: currently, only one class designation is assigned per municipality. Approximately 99% of the State falls within classes GW1 and GW2. The classification system is generally not used for anticipatory purposes such as regional planning or facility siting, but is implemented on a site-by-site basis.

The State has a number of databases that track ground-water quality and quantity, but they serve limited program objectives and do not provide a comprehensive ground-water data system.

Protected Area Designation

Class GW1 of the State's explicit classification system singles out the Central Pine Barrens, a relatively undeveloped area with exceptionally pure and highly vulnerable ground-water resources, for special protection. The DEP may not approve any activity in the Central Pine Barrens which would cause degradation of existing ground-water quality characteristics. N.J.A.C. 7:9-6.4.

New Jersey's other, implicit classification method is implemented through designation in the Water Supply Management Act's "critical areas" program. Restrictions are placed upon ground-water withdrawals in critical areas.

NEW MEXICO SUMMARY

Description of Classification System

New Mexico has not adopted a classification system but recognizes only ground water of 10,000 mg/l TDS or less as suitable for protection for domestic and agricultural use. Protected water is subject to standards based on its use for domestic purposes and irrigation. The State's designation of 10,000 mg/l TDS waters for domestic and agricultural uses provides basic guidance for implementation of discharge plan requirements. The designation itself is not used to prohibit activities from sensitive areas or establish regulatory priorities. Determinations of the acceptability of a specific discharge plan are made on a case-by-case basis.

The distinction between domestic and agricultural uses is not one which is often applied. All applicants for a new permit are expected to meet the State's domestic use standards. They must also meet agricultural use standards except where the applicant can demonstrate that there is no foreseeable future agricultural use for the ground water. Where contamination in excess of domestic or irrigation standards has already occurred, applicants are not permitted to contaminate beyond the background level existing in 1977 regardless of the intended use. Determinations regarding remediation required at pre-existing sites are also made on a case-by-case basis.

Legal Basis

The primary statutory authority used to protect ground-waters of the State is the New Mexico Water Quality Act and the Water Quality Control Commission regulations. The regulations state that "no person shall cause or allow effluent or leachate to discharge so that it may move directly or indirectly into ground-water unless he is

discharging pursuant to a discharge plan approved by the director." Specific types of discharges are exempted from this requirement (see Table 4).

Most of the sources that the state has identified as contamination problems are regulated under the Water Quality Act or other source-specific regulations. The sources identified as not having adequate coverage are septic tanks of less than 2,000 gallons in high density areas, solid waste landfills, agricultural activities (although little data exists on the severity or extent of problem), sources existing prior to 1977 and federal facilities. Leaking underground storage tanks are identified as a significant problem and the state has recently adopted regulations and established a program to address this.

Relation to Ground-Water Protection Policy

New Mexico's policy is based on a 1971 amendment to the state's Constitution (1912) which requires protection of water quantity and quality to ensure maximum beneficial use of these waters. Ground-water protection regulations, adopted in 1977 under the New Mexico Water Quality Act to control discharges onto or below the ground surface, are intended "to protect all ground-water . . . which has an existing concentration of 10,000 mg/l or less TDS for present and potential future use as domestic and agricultural water supply and to protect those segments of surface waters which are gaining because of ground-water inflow" for uses designated in the New Mexico Water Quality Standards.

This policy provides the foundation for the State's regulatory programs which are intended to protect the majority of the state's ground-water resources to drinking water quality.

Implementation

Discharge Permits

Since 1977, New Mexico has required that discharge plans be submitted for all new or newly modified discharges that may affect ground water. This is the primary regulatory mechanism the State uses to protect its class of ground water with 10,000 mg/l or less TDS. Applicants are required to submit a proposed discharge plan. Approval of the discharge plan is contingent upon the state's determination that the ground-water standards will not be exceeded due to the siting, design, or operation of the proposed facility.

Discharge plans are required for discharges to surface impoundments and leachfields, application of wastes to land, and well injection. A number of discharges which are regulated under different statutes are exempted from the discharge plan requirement including discharges related to coal surface mining, oil and natural gas exploration, and production, domestic septic tank discharges of under 2,000 gallons per day, and water used in irrigated agriculture. Discharge plans are not required for solid waste disposal facilities.

After the passage of the 1977 Water Quality Act regulations, the regulatory focus was on permitting of new discharges. The State has since identified a priority subset of dischargers existing prior to 1977, which included several large mining operations, and has required a discharge plan for those activities. In those cases where ground-water quality already exceeds numerical standards because of past practices, the permit is conditioned on the requirement that the discharge not be allowed to exceed water quality levels existing in 1977. Remediation may be required as a condition of a permit. The level of clean-up required, whether to 1977 background levels (if data is available) or state water quality standards, is determined on an individual case basis.

Ground-Water Standards

New Mexico had adopted 47 numeric water quality standards as of 1987. Of these, 27 were adopted in 1977 and include federal drinking water regulations. Eight toxic organic compounds were added in 1982 and twelve additional compounds were added in 1986. These standards were developed by the State and adopted after a public hearing process. The State has also adopted a narrative standard which requires that "toxic pollutants not be present in ground-water at a place of present or reasonable foreseeable use."

The State standards are used in the process of discharge plan development and approval. One of the primary factors of permit approval is whether, in the judgment of the permit writer, the siting and design proposed by the applicant for its discharge will prevent standards from being exceeded. Monitoring requirements included in the permits specify parameters that the owner/operator must test for on a scheduled basis.

Remediation orders generally require cleanup to ground water standard levels or background if no standard exists.

Ground-Water Mapping and Data Management

In the late 1970's, maps of; (1) the relative vulnerability of New Mexico aquifers to contamination and (2) major sources of potential ground water contamination (existing in 1979) were developed as part of the New Mexico Water Management Plan. Over the years, extensive additional ground-water information has been collected including; 1) detailed studies of selected problem areas, 2) general contaminant source locations, 3) precise locations and other inventory information on known contamination incidents, and 4) public wellfield locations.

The State is in the process of putting much of this information on computer to make it more accessible for coordinated program implementation. They plan to eventually develop a geographic information system to allow for computer mapping and analysis of ground-water information.

VERMONT SUMMARY

Description of Classification System

Vermont is required by 10 VSA, Chapter 48 to develop a comprehensive ground-water program in accordance with the guidelines set forth in the statute. One of the key elements required is a classification system with the following four classes:

- Class I - Suitable for public water supply. No exposure to activities which pose a risk to quality.
- Class II - Suitable for public water supply but exposed to activities which may pose a risk.
- Class III - Suitable as a source of water for individual domestic water supply, irrigation, agricultural and industrial uses.
- Class IV - Not suitable as a source of potable water but suitable for some uses.

The four-tier classification system has been incorporated into the State's proposed rules and strategy. The existing statute classifies all ground water as Class III. Ground-waters may be reclassified by rule after public hearing. At the present time the state does not plan to reclassify all ground waters, but rather to reclassify on the basis of local government request. The State expects there are very few Class I waters which could be regarded as pristine. The Class II designation will primarily be used to protect public water supply aquifers. There may be a subclass of Class II for wellfield or aquifer protection areas. The state expects there will be very few, if any, Class IV waters because of public pressure against downgrading.

The State's rules for implementing this system have not been completely approved. Therefore, it is not certain what types of management measures or zoning restrictions will be required within classified areas.

Legal Basis

The primary statutory authority for ground-water protection is 10 VSA, Chapter 48, enacted in 1985 which requires the State to "protect its ground-water resources to maintain high quality drinking water and [to] manage its ground-water resources to minimize the risks of ground-water quality deterioration by limiting human activities that present unreasonable risks to the use classifications of ground-water in the vicinity of such activities while balancing the state's ground-water policy with the need to maintain and promote a healthy and prosperous agricultural community." The appointed agencies are still in the process of reaching agreement on how to coordinate ground-water programs. When all the appropriate rules are finally ratified, their regulatory impact may be limited because the statute (10 VSA Chapter 48) does not contain language: 1) prohibiting ground-water contamination; 2) establishing requirements for ground-water discharge permits; 3) including restrictions for agriculture and forestry practices; 4) establishing protection goals for Classes II, III or IV; or 5) providing enforcement authority for protection activities. Therefore, the comprehensive State program requires interagency agreements between those programs that have been delegated regulatory authority.

Relation to Ground-Water Protection Policy

Vermont's policy as set forth in 10 VSA, Chapter 48 recognizes that the primary use for which ground water should be protected is for drinking water supplies, that a use

classification system should be used as a means of restricting polluting human activities, and that a balance should be struck between protection and agricultural development interests in restricting such activities.

Implementation

Discharge Permits

The Vermont Water Quality Standards state that "new discharges of waste may be allowed only when there is no alternative disposal method or location which would have a lesser impact on surface and ground-water quality."

The State legislature directed the Department of Environmental Conservation not to develop a new ground-water discharge permit program but to use existing permit authorities and other mechanisms to protect ground water. The class of ground water at a proposed discharge site and associated quality standards would therefore be considered in the issuance of discharge permits on a case-by-case basis. Permits are currently required under state statutes or local ordinances for hazardous waste facilities and facilities discharging to surface waters, disposal of sludge or septage, domestic sanitary sewage, and land application of wastewater.

Ground-Water Standards

The State has now adopted numeric standards as part of their ground-water protection program. Enforcement standards are largely equivalent to the Federal drinking water standards. A two-tiered standards system with a preventive action limit and an enforcement standard, similar to Wisconsin's approach, has been incorporated into the State's program by rule. The statute does not provide new enforcement authority or new discharge permit authority so the standards are being used in other

rules with permitting authority to restrict activities or control sources in classified areas. Additional monitoring requirements will be included in existing permits.

With respect to remediation actions, ground-water enforcement standards are considered when defining clean-up levels on an individual case basis.

Ground-Water Mapping and Data Management

Vermont has not mapped its aquifers and maintains that it would be difficult to do so because of the prevalence of fractured bedrock aquifers throughout the State. It is planning to map unconsolidated aquifers to identify potential public water supply sources, when requested by local governments.

Wellhead protection areas (WHPA's) have been delineated and, for larger municipal systems, mapped as part of a State project to enhance state and local protection of drinking water supplies.

Water quality and contaminant source data has been collected for purposes of water supply permitting but it is stored in individual files and is difficult to access. A state-wide Geographic Information System will enhance the agencies' capability to identify potential contamination problems.

WISCONSIN SUMMARY

Description of Classification System

Most of Wisconsin's aquifers are interconnected (except for those in a relatively small eastern portion of the state) and all are used for drinking water. The State therefore supports uniformly high standards for all ground water and does not classify ground-water resources on the basis of either use or the application of a range of standards. Wisconsin has an active ground-water protection program which provides uniform protection to its ground-water resources.

Ground-Water Protection Policy

While Wisconsin enacted legislation in 1983 specifically addressing ground-water protection, known as Act 410, the statute does not contain a policy or goal statement. The statutory policy considered applicable to ground water is found in the Water Pollution Control Law, which establishes the Department of Natural Resources [DNR] as the lead agency for ground-water protection and directs it to "protect, maintain and improve the quality and management of the waters of the state, ground and surface" through the implementation of a comprehensive program directed at all present and potential pollution sources. The DNR considers a nondegradation policy to be implicit in the Water Pollution Control Act and Act 410, and adheres to nondegradation as the goal driving its ground-water activities.

Ground-Water Standards

Ground-water standards are the primary regulatory mechanism for the protection of ground water in Wisconsin. Act 410 directs the DNR to "minimize the concentration

of pollution substances in ground-water through the use of numerical standards in all ground-water regulatory programs." The DNR has developed a two-tiered set of standards for substances of either public health or public welfare concern. The "enforcement standard" is the level at which a regulatory response is required to achieve compliance. The "preventive action limit" [PAL] is a fraction of the enforcement standard and informs agencies of potential problems, establishes levels requiring efforts to control contamination, and provides a basis for design and management criteria.

When an enforcement standard or a PAL is established, Act 410 directs that "each agency shall review its rules and commence promulgation of any rules or amendments" necessary to ensure compliance. The agencies must also develop a range of responses in the event standards are exceeded. Responses may vary depending on the type of activity, the site conditions, and cost-effectiveness, but they must take into account background water quality, uses of the aquifer, degree of risk, and probability of whether, if a PAL is exceeded, the enforcement standard will also be exceeded.

Discharges to Ground-Water

Wisconsin issues separate ground-water discharge permits only for discharges of municipal or industrial wastewater. For other sources of discharges to ground-water, adherence to ground-water standards must be incorporated into the regulatory requirements of the program that addresses the particular source, such as solid waste disposal, pesticide storage, or underground storage tanks. For each facility, activity or practice affecting ground-water, a point of standards application is established. The point of standards application used to determine whether an enforcement standard has been exceeded is 1) any point of ground-water use, 2) any point beyond the property

boundary, and 3) any point beyond the established "design management zone." For a PAL, the point of standards application is any point at which ground-water is monitored.

Remediation

The use of the ground-water standards in clean-up situations is currently under review by a DNR internal subcommittee. While Act 410 requires remediation to attain compliance with enforcement standards at the point of standards application, in some situations it cannot be economically justified, according to the DNR. At present, the following remediation steps are taken when a violation of standards is detected: 1) new contamination must cease, 2) there is an attempt to recover contaminants, and 3) further remediation is determined on a site-by-site basis. The DNR does not consider itself in violation of the clean-up requirements of Act 410 since the statute does not specify any timeframe for clean-up to enforcement standards. In spill situations, there is no point of compliance, and ground-water standards apply at the point of the spill.

Ground-Water Mapping and Data Management

Wisconsin has statewide maps on a 1:1,000,000 scale depicting bedrock types, soil association, and depth to bedrock. A computerized contamination susceptibility map using the same scale was also prepared using an analysis similar to DRASTIC. While useful for public education purposes, the scale of the susceptibility map is too small to be of practical use in facility siting or land use decision-making. For the past five years, the DNR has been working with the State Geological and Natural History Survey in preparing county-level maps of unconsolidated deposits on a scale of 1:100,000 showing ground-water flow and depth to ground water. Approximately six counties out of 72 have been completed; the process is time-consuming and costly.

The DNR is initiating a computerized Groundwater Information Network, which it sees as a three-year effort. The Network will concentrate on water quality and related locational data, and input from other agencies will be sought, particularly concerning the implementation of a numbering system for all wells. The DNR sees no need for one database to serve all agencies' purposes, but feels there is a need for further data-sharing.

Act 410 established funding for extensive ground-water monitoring by the DNR; current funding is approximately $1 million per year. There are five monitoring functions undertaken by the DNR: problem assessment, regulatory monitoring, at-risk well monitoring, management practice monitoring, and monitoring planning.