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LEGAL AND INSTITUTIONAL APPROACHES TO WATER QUAILTY MANAGEMENT PLANNING AND IMPLEMENTATION

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE APR 1 1 1977

SUBJECT Legal and Institutional Approaches to Water Quality Management Planning and Implementation

FROM Edmund M. Notzon, Acting Director
Water Planning Division (WH-554) Robert Hardaker for

TO: All Regional Water Division Directors

ATTN: Regional 208 Coordinators

Technical Guidance Memorandum: TECH-35

Purpose

This memorandum transmits the recently completed report, "Legal and Institutional Approaches to Water Quality Management Planning and Implementation." It is intended for use by state and areawide agencies in the development of their water quality management programs.

Background

This handbook offers examples of a variety of documented control techniques for pollution problems required to be covered by the water quality management planning program. Differences in the source and magnitude of pollution problems and in the legal and political setting across the country make it impossible to recommend a single most desirable solution to each water pollution problem. Instead, this handbook evaluates different possible legal and institutional approaches to the control of a particular source of pollution according to a number of criteria including administrability, enforceability and constitutionality.

It is not likely that any single planning area will need to regulate all the sources of water pollution discussed in the handbook. State and areawide water quality management agencies will choose from the regulatory agenda those elements that solve their water quality problems and fit their region's governmental style, institutions, and citizen preferences. Section 208 recognizes the great diversity of these conditions around the country and provides states and localities with great flexibility to tailor the management system, including regulatory programs, to respond to these varying needs.

The handbook includes evaluations of various local and state laws and programs. These evaluations represent the viewpoint of the authors and not necessarily those of the Environmental Protection Agency. Nevertheless, draft chapters of the handbook have been reviewed both within and

outside EPA and we believe that the material in the handbook is informative and provides useful guidance. While a revision is not planned at this time, we are interested in receiving comments on the handbook.

If you would like further information on this handbook, please contact Bill Lienesch of the Program Development Branch (426-2522). Additional copies are available from the Water Planning Division Library (755-6993).

Enclosure

cc: State and areawide agencies

LEGAL AND INSTITUTIONAL APPROACHES TO WATER QUALITY MANAGEMENT PLANNING AND IMPLEMENTATION

Contract No. 68-01-3564

Project Officer

William C. Lienesch

U.S. Environmental Protection Agency
Washington, D.C. 20460
March 1977

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LEGAL AND INSTITUTIONAL APPROACHES TO WATER QUALITY MANAGEMENT PLANNING AND IMPLEMENTATION

INTRODUCTION

1.0 The Section 208 Framework

As interpreted by the U.S. Environmental Protection Agency (EPA) and the courts,1/ section 208 of the Federal Water Pollution Control Act Amendments of 1972 (FWPCA) requires preparation of water quality management plans (1) by areawide water quality management planning agencies in areas specially designated because they have "substantial water quality control problems" as a result of "urban-industrial concentrations or other factors" and (2) by state water quality management planning agencies in those areas of states which have not been so designated. The required water quality management plans will both encompass and go beyond other planning programs mandated by the act. The key element of the section 208 planning program* is its requirement that every plan be capable of implementation: that it identify the control techniques (permits, incentives, performance standards, etc.) and the institutions through which comprehensive water pollution management will be carried out at the areawide or statewide level. The combination of control techniques and the institutional arrangements for their implementation are here called "management strategies."

While the choice of control techniques and institutions identified in water quality management plans will be limited for some sources by the existing regulatory framework established under other provisions of the FWPCA, many of the sources of pollution which must be dealt with in section 208 water quality management programs are not covered elsewhere in the act. To take the most significant examples, most point source discharges are already regulated under section 402 via the National Pollutant Discharge Elimination System (NPDES), while nonpoint sources named in section 208 such as agricultural and silvicultural runoff have so far been controlled largely through private, state, and local initiative, where they have been regulated at all.

Moreover, the NPDES focuses primarily on the implementation of effluent limitations on individual discharges. Section 208 is directed towards the need for comprehensive planning to meet water quality goals. For example, section 208 includes a requirement for locational controls that recognizes the importance of the spatial distribution of discharges

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*Throughout the course of this handbook the terms "section 208" planning agencies or programs, management agencies or plans, etc. and the terms "water quality" planning agencies or programs, management agencies or plans, etc. will be used together and interchangeably.

on water quality. Finally, section 208 provides for control of sources of groundwater pollution.

In sum, section 208 requires water quality planning agencies to identify concrete approaches for filling in the gaps in the existing management structure. The planners must also identify agencies which have or should be given the authority to undertake the programs necessary to supplement the existing regulatory approaches so that all sources of water pollution which stand in the way of attaining federal water quality goals and state water quality standards can be controlled. Thus water quality management plans generally must identify and include:

- treatment works necessary to meet anticipated municipal and industrial waste treatment needs for a 20 year period with provision for annual updating;

- construction priorities for such treatment works with time schedules for initiation and completion;

- a regulatory program to 1) control or treat all point and nonpoint pollution sources, including in place or accumulated pollution sources; 2) control the location, modification, and construction of any facilities which may result in any discharge within the area; and 3) assure that industrial or commercial waste discharges into any publicly owned treatment works meet applicable pretreatment requirements;

- measures necessary to execute the plan (including financing), the time required, costs, and its economic and environmental impact upon the residents of the area;

- a process to identify agriculturally, silviculturally, mine, and construction related nonpoint sources of pollution, and proposed procedures and methods (including land-use requirements) to control such sources to the extent feasible;

- a process to identify salt water intrusion into rivers, lakes, and estuaries, and proposed procedures and methods to control such intrusion to the extent feasible;

- a process to control the disposition of all residual waste generated which could affect water quality; and

- a process to control the disposal of pollutants on land or in subsurface excavations to protect ground and surface water quality.

Of course, different states and different substate or interstate areas will have a different mix of pollution problems and different pollution control priorities. EPA's regulations allow for the tailoring of individual planning processes to fit the specific water quality problems to be solved.

After certification by the governor of the particular state and approval by the EPA Regional Administrator, the water quality management plan is to guide EPA's construction grant program for municipal treatment works and the NPDES permit program for point source discharges in the area. Approval of construction grants and discharge permits is made expressly contingent upon their conformity with the plan. Once the initial plan is completed, one or more "management agencies" are to be designated to implement the plan. Management agencies must satisfy several criteria listed in the act. As a group, they must be able to carry out the management plan; design, construct, and manage waste treatment works; raise revenues and incur indebtedness; assure that communities participating in waste treatment management pay their proportionate share of treatment costs; and refuse to receive wastes from municipalities which fail to comply with any provisions of an approved plan.

2.0 Scope of the Handbook

This handbook will offer examples of a variety of documented control techniques for pollution problems which will be covered by the planning process for water quality management. Clearly, differences in the source and magnitude of pollution problems and in legal and political settings across the country make it impossible to recommend a single most desirable solution to each water pollution problem. Instead, different possible legal and institutional approaches to the control of a particular source of pollution are analyzed according to a number of criteria which will be outlined below in section 3.0. These criteria will help to present the relative advantages of different techniques from different perspectives and will enable planning agencies to evaluate the usefulness and appropriateness of different approaches to their particular needs.

The choice of specific water pollution problems for this handbook required some selectivity. Section 208 does not itself establish any particular programs but rather speaks in general terms about the need to control a variety of pollutant sources. The potential scope of a regulatory program is therefore vast and uncertain. Limitations of time and space have precluded treatment of all the possible sources of water pollution. The following list of chapters describes the scope of each and suggests some of the areas which are not covered.

Overview Chapters

Chapter One: Choice of Appropriate Levels and Agencies of Government for Performance of Section 208 Management Tasks--This chapter gives a general overview of the existing institutional structure for water pollution control and suggests criteria which may help in choosing an institutional structure for the implementation of a water quality management program. Section 4.0 below provides a brief introduction to these institutional issues.

Chapter Two: Legal Issues--In this chapter the basic legal issues respecting statutory authority to undertake management programs and constitutional restraints on the form of such programs are summarized. A brief overview of the legal issues discussed in chapter 2 may be found in section 5.0 below.

Chapters on Control Techniques and Management Strategies

Chapter Three: Locational Controls for Point and Nonpoint Sources--This chapter presents controls on the location of both point and nonpoint sources as a means of controlling pollution. Zoning approaches as well as more innovative performance oriented devices are discussed.

Chapter Four: Municipal Wastewater Treatment Facilities--This chapter focuses on controls on the timing, number, and location of hookups to and extensions of the municipal wastewater treatment system. Since publicly-owned treatment works are subject to the NPDES, the chapter does not discuss effluent limitations on the plants themselves. Nor does it discuss controls on the location of treatment plants, which are discussed generally in chapter 3. Finally, industrial pretreatment requirements are not discussed in view of forthcoming EPA guidance on the subject.

Chapter Five: Onsite Wastewater Disposal Systems--Improperly installed or maintained or installed in unsuitable locations, such systems, which include but are not confined to septic tanks, threaten ground and surface water quality. The elements of a comprehensive control program are discussed, including: soil testing; locational controls; requirements for innovative individual and community systems; licensing requirements; maintenace requirements; and controls on the pumping and disposal of septage. In addition, considerable attention is given to the concept of management entities for individual and community onsite systems.

Chapter Six: Management of Stormwater as a Nonpoint Source--In this chapter, management strategies are explored for controlling pollution from stormwater runoff in both urban and developing areas. The emphasis is on preventive approaches for detaining stormwater or retarding its flow at or near the sites on which it falls, where it can still be considered as a nonpoint source, rather than on centralized collection and treatment of stormwater as a point source. In some circumstances, preventive approaches may be the best means of controlling erosion and sed-

imentation, combined sewer overflows, and runoff of various surface pollutants into receiving waters. Preventive controls also raise difficult questions of land use regulation, with which the chapter accordingly deals.

Chapter Seven: Agriculture and Silviculture--This chapter focuses on the control of erosion and sedimentation from farming and forestry activities. While such controls will help keep fertilizer, herbicides, and pesticides out of water, other more focused controls on such substances (such as restrictions on their application) are not covered. Incentives are among the control techniques discussed, as are critical areas programs. Since section 208 specifically addresses the problems of runoff from manure disposal areas, controls on animal feedlots and manure spreading areas are treated briefly.

Chapter Eight: Salt Water Intrusion--This chapter suggests management approaches for the prevention of salt water intrusion into both subsurface and surface waters. Various mechanisms for aquifer protection and restrictions on withdrawals of ground and surface water are discussed. Irrigation return-flow, which is subject to the NPDES, is not covered.

Chapter Nine: Mining--Controls on both surface and deep mining are discussed, including controls adopted under reclamation statutes, mine sealing statutes, and water pollution control statutes. The elements of a comprehensive permitting program are described, including controls on exploration and operating and provisions for reporting, inspecting, permit renewal, and bonding. The legal issues peculiar to abandoned mines, often the source of acid mine drainage, are discussed.

Chapter Ten: Land Disposal of Solid Wastes and Sludges-- This chapter discusses many of the elements of comprehensive planning for the management of residual wastes, with special emphasis on landfill regulation and the regulation of municipal and industrial sludge disposal/reuse. While section 208 provides authority for states and designated areas within states to plan for the implementation of programs to resolve water-related residuals problems, continual reference is made in this chapter to the requirements of the recently enacted Resource Conservation and Recovery Act of 1976. Regulations to be promulgated by EPA pursuant to the 1976 act have not yet been drafted, but it can be expected that this legislation will necessitate significant changes in many existing state and local programs and policies, particularly in the areas of mandatory planning, regionalization of residuals management, resource recovery, and hazardous waste management.

Chapter Eleven: Well Injection of Liquid Residual Wastes--This chapter is a general introduction to the water pollution concerns raised by the well injection of liquid residual wastes. The use of environmental impact statements as well as more traditional permitting requirements are explored. As is noted in the introduction to the chapter, another important source of authority over the subsurface injection of liquids is the federal Safe Drinking Water Act.

It is not likely that any single planning area will need to regulate all the sources of water pollution discussed in the handbook. Areawide planning organizations will choose from the regulatory agenda those elements that meet their water quality needs and fit their region's governmental style, institutions, and citizen preferences. Section 208 recognizes the great diversity of these conditions around the country and provides states and localities with great flexibility to tailor the management system, including regulatory programs, to respond to these varying needs.

As part of a comprehensive system, the regulatory elements should support other water pollution control steps to constitute a complete water quality management system. The clear aim of Congress in writing section 208 was to overcome irrational fragmentation of water quality responsibilities, in which jobs are unnecessarily duplicated, or, as is more often the case with nonpoint sources, left undone. Various regulatory programs are meant to be coordinated to achieve clean water goals at the lowest cost, in the most fair and administratively workable manner. Furthermore, regulation is just one of several approaches that belong in a comprehensive water quality management program. Data-gathering and water quality standard setting; wastewater treatment facilities planning, construction, financing, and operation; and maintaining public participation, information, and education programs are all part of the process but are all subjects beyond the scope of this handbook. Administration of an antidegradation program is also the subject of a separate project.

The primary focus of the handbook is on control techniques: including the state and local enabling authority, regulations, licensing procedures, and incentives which have been used around the country to control the sources of water pollution discussed. However, since such "control techniques" are only as effective as the agency or level of government which implements them, each chapter discusses at some length the choice of appropriate level and agency of government for each control technique as well as any intergovernmental or interagency strategies for strengthening management effectiveness. This is the "institutional" part of the analysis. The "legal" component extends beyond description of the types of state and local legislation underlying most control techniques to an assessment of fundamental questions of enabling authority and constitutional issues raised by the control under discussion. The general issues treated in the description of control techniques, including institutional and legal ramifications, are summarized below.

3.0 Description of Control Techniques: Organizational and Analytical Approach

Of necessity, differences in subject matter and scope required some flexibility in the organization of individual chapters. Throughout the course of the handbook, however, certain perspectives for description and criteria for analysis recur, and it is important that these perspectives and criteria be described briefly.

3.1 Planning

One concern of the authors throughout the handbook has been the extent to which long-range planning can be integrated with particular control strategies which depend on ad hoc decisionmaking. Just as section 208 attempts to connect a continuing planning process to day-to-day decisions - be they development decisions or methods of undertaking activities on the land - so this handbook attempts, wherever possible, to identify ways in which data-gathering and forecasting by planners can have an impact on individual permit grantings, plan reviews, etc. Control techniques which themselves embody this marriage of planning and decisionmaking are singled out for special attention. This is the case, for example, with adequate public facilities ordinances, discussed at length in chapter 4, which key controls on development (e.g., building permits, subdivision approvals) to long-term plans for the provision of public facilities.

All the chapters stress the relationship between agency data-gathering - surveys of groundwater resources and critical areas identification, for example - and the operation of a regulatory program. The appropriateness of a particular institution to undertake a particular regulatory function is often gauged by the breadth and depth of its planning expertise.

3.2 Standard Setting

While many of the control techniques discussed in this handbook involve the issuance of licenses or permits and hence are superficially similar, the real heart of a particular regulation may be the standards it sets or allows to be set, to which the proposed activity must conform. Readers will find frequent references to the "performance standard" discussed as a control technique in and of itself. Limits on the amount of soil which can be allowed to erode from a site as a result of earth-disturbance or limits on the amount of stormwater runoff discharged from developed areas are two examples of water quality related performance standards. Several chapters evaluate the pros and cons of adopting a performance standard approach to regulation, in which the discharger is given a free hand to devise his own technical method of control, versus the detailed code approach, in which the regulating agency decides which is the most appropriate method of pollution abatement. For example, section 4.1 of chapter 6 discusses this issue in depth in the stormwater runoff context. The use of soil loss limits for control of erosion and sedimentation from agriculture and silviculture is discussed in section 2.1.3 of chapter 7.

Where a need is felt for detailed standards, there remains the problem of drawing the line between necessary and helpful detail and inflexible, innovation-stifling specificity. For this reason, the authors frequently recommend that only general standards be included in state and local legislation, with detailed standard-setting left to the expertise of an implementing agency. In comparison with legislation, agency regulations

can be more easily amended if standards are found too confining, become obsolete, or are discovered to be otherwise deficient in light of trial-and-error experience.

3.3 Administrability

The goals of section 208 will not be served simply by putting more state and local legislation on the books. Difficult administrative problems must be anticipated, and the chapters suggest some of them. For example, plan reviews, inspections, monitoring, and other activities may be required of the implementing agency. Wherever possible, the general magnitude of budgetary and staff demands involved is discussed, although for the most part such matters are beyond the scope of this handbook. Chapter 3, "Locational Controls," for example, discusses the difficulty of relating land use planning to water planning goals and the costliness of sophisticated attempts to do so.

Where the number of operations to be regulated is particularly great, methods of assigning priorities and sharing the administrative burden between different levels and agencies of government are explored. Thus chapter 10 suggests a sharing of state and local responsibility for sanitary landfill regulation with the state taking a leading role in supervising disposal of hazardous and other special wastes. Wherever pertinent, the use of a critical areas approach to water pollution control is explored with a view both to focusing attention on areas most prone to damage from water-borne contaminants and also to maximizing the effectiveness of existing environmental management structures and staff.

In some cases a realistic assessment of the difficulties of following up a regulatory program with adequate monitoring and inspections will lead to a conclusion that mere regulation is not enough. Thus chapter 5 indicates that a permitting program for onsite wastewater disposal systems may not be enough in some situations in view of the typical lack of expertise and follow-up capacity at the local level. Alternatives for institutional assumption of installation and maintenance functions are described.

3.4 Enforceability

In the same vein, control techniques will be analyzed from the standpoint of their relative ease of enforcement. While traditional court-imposed penalties will be discussed, emphasis will be placed on enforcement techniques that may be less familiar to drafters of legislation but easier for implementing agencies to use and, therefore, more effective. Such techniques include enforcement bonds, discussed at length in chapter 9 on mining, and provisions allowing the enforcing agency to undertake and charge for remedial work, which are found in a number of forest practices acts described in chapter 7.

In addition, the individual chapters explore methods for enlisting the enforcement assistance of private institutions and individuals as well as that of levels and agencies of government other than the one principally charged with implementation of the control technique under discussion. To illustrate: chapter 5 ("Onsite Wastewater Disposal Systems") discusses the ways in which those involved in real estate transfers can be instrumental in enforcing permit and maintenance requirements for onsite wastewater disposal, while chapter 7 ("Agriculture and Silviculture") describes the complaint process developed in the mid-west to alert soil conservation districts to violation of soil loss limits or soil conservation standards.

4.0 Institutional Considerations: Choosing the Appropriate Level and Agency of Government to Enact, Administer, and Enforce Controls

No two institutional frameworks for water quality management will be the same. While the management structure must possess the powers enumerated in section 208(c)(2),* no one agency need possess all the requisite authority and probably most will not. By definition, moreover, the mix of point source discharge controls, locational controls, and controls on nonpoint sources called for under section 208 will require enlisting the powers and unique virtues of a number of levels and agencies of government. The range of possible combinations is infinite.

Chapter 1, the general discussion of institutional issues, does not attempt, therefore, to offer models for assigning water pollution functions. Instead, it suggests certain evaluative criteria by which such assignments might well be made. The discussion then proceeds to catalogue the general strengths and weaknesses of different levels and agencies of government, of different professional orientations in agency staffing, and of nongovernmental entities such as citizen boards.

The control and source-specific chapters that follow take this general framework as a point of departure. Where the actual history of involvement of a particular agency or level of government in the implementation of a particular control technique differs from the generalized view of that institution, however, the general focus will be traded for the more narrow one in keeping with the empirical approach of the individual chapters. Since the primary focus of each chapter is on control techniques, moreover, no attempt will be made to evaluate the suitability of every

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*That section stipulates that management agencies as a group must be able to 1) carry out the management plan; 2) design, construct, and manage waste treatment works; 3) raise revenues and incur indebtedness; 4) assure that communities participating in waste treatment management pay their proportionate share of treatment costs; and 5) refuse to receive wastes from municipalities which fail to comply with any provisions of an approved plan.

possible governmental institution to the task of performing a particular task according to the criteria set out in the institutional overview chapter. That is a task which can only be performed by each water quality planning agency. Instead, the existing and possible institutional arrangements for the effectuation of a particular control will be discussed.

Generally the discussions in the individual chapters attempt to highlight the following features of an institution or institutional arrangement:

1. Mission orientation and position in the political spectrum;
2. Scope of the institution's jurisdiction by comparison with the scope of the problem or problems with which it deals;
3. Relationship to other institutions with parallel, complementary, or conflicting responsibilities; and
4. Availability of necessary resources or ability to acquire them.

4.1 Mission Orientation and Position in the Political Spectrum

The effectiveness of any management agency will depend in part upon its objectives and position in the political spectrum. A soil conservation district, for example, may perceive its primary mission as increasing the productivity of farmland through voluntary assistance programs, and it may not be enthusiastic about taking on a regulatory role in a broadly focused anti-erosion program designed primarily to protect and improve water quality. Ways in which such a change in traditional mission may be "sold" to the districts are discussed in chapter 7 on agriculture and silviculture, as are methods to involve other agencies, such as state water pollution control agencies, whose mission is environmental protection.

Appointed planning boards may be less accountable to a variety of public constituencies than elected city councilors. Zoning boards will look more favorably upon development proposals than conservation commissions. Local boards of health, which ordinarily regulate subsurface disposal of sewage, are primarily concerned with abatement of public nuisances and protection of public water supplies from pathogens, not with avoidance of nitrate or sulfate pollution which can hasten eutrophication of surface waters. In many parts of the country, moreover, health boards seem to lack either the expertise or the political independence required to protect groundwaters against malfunctioning or improvidently located septic systems. Chapter 4, dealing with sewer systems, and chapter 5, dealing with onsite wastewater disposal, emphasize the need to tie zoning and planning approvals to adequate sewer capacity or appropriateness of onsite systems and to give more politically independent state agencies an oversight role.

4.2 Scope of Jurisdiction by Comparison to Scope of the Problem

State, regional, or county governments may have a broader perspective than cities and towns on problems of areawide concern, such as cumulative pollution from numerous nonpoint sources located in a number of municipalities, as is noted in chapter 6 on stormwater runoff. Similarly, metropolitan areawide governments, such as those established in the Minneapolis-St.Paul and Dade County areas, may be the most effective organizations for the performance of waste disposal services and for the setting of minimum standards that the member municipalities must follow with respect to the preservation of environmental amenities. However, the federated form of local government has been hampered by controversies over the division of powers, especially with respect to zoning, subdivision controls, and building codes.

Special districts may also be organized on a broad enough scale to comprehend areawide problems, can be given fiscal powers that enable them to circumvent local debt limitations, and, because of their relative political insulation, can take a highly focused approach to their mission. On the other hand, in some areas the proliferation of quasi-autonomous, special-purpose districts has fragmented local government and forestalled the emergence of comprehensive approaches to areawide problems. For some problems, a coordinated statewide program administered through local districts may be an effective compromise approach. This is illustrated, for example, by the groundwater management districts in Florida, which "follow as nearly as practicable" natural river basin boundaries; which are authorized to do anything necessary to protect and replenish groundwater; and which may be delegated additional powers by the state Department of Natural Resources, which, in turn, may exercise directly any powers granted to the districts (see chapter 8).

4.3 Relationship to Other Institutions with Parallel, Complementary, or Conflicting Responsibilities

As noted previously, the aim of water quality management programs is to promote more effective and more comprehensive water quality management at the areawide level, not to add another level of review to further fragment the present institutional structure. Accordingly, every opportunity will be taken in the chapters that follow to encourage the use of existing institutions and to suggest ways of forging links between existing agencies and levels of government.

Chapter 1, the institutional overview chapter, points out that typically no one management agency will have all the necessary powers and necessary breadth of scope to undertake the total water quality management task. Instead, inter-institutional strategies must be devised. Chapter 4 takes a particularly detailed look at the relationship between state, regional, and local controls over the timing and location of sewer hookups and extension. Chapter 10 suggests ways of resolving the

jurisdictional conflicts over solid waste management which exist in many areas through state programs which assure that localities cannot block necessary regional waste disposal facilities.

4.4 Availability of Necessary Resources or Ability to Acquire Them

Finally, at any level of local government the effectiveness of an agency will depend largely upon the resources at its command, including budget, manpower, expertise, and data input. Here again, governments of state or regional scope may command more impressive resources than municipalities and may be able to employ their resources in a more cost-effective manner.

Where the level or agency of government otherwise best suited to implement a particular control technique is lacking in expertise or other resources, suggestions are made in the handbook for tapping what resources may exist in other levels or agencies of government via shared jurisdiction, cooperative agreements, or other means. For example, the appropriate management agency for a suburban erosion and sediment control program may well be the local or county general purpose government. Chapter 6 notes the way in which Montgomery County, Maryland has tapped the special erosion control expertise of the local soil conservation district and made the most of the district's and the U.S. Soil Conservation Service's resources. The silviculture section of chapter 7 suggests the importance of involving the state water pollution control agency and fish and wildlife agency in the drafting and enforcement of regulatory provisions relating to logging work in and around streams.

5.0 Legal Issues

Matching pollutant sources with appropriate control techniques will repeatedly raise key legal and constitutional issues which will be briefly summarized here. A much more detailed discussion of legal questions may be found in chapter 2. That chapter establishes a common vocabulary and description of the state of the law in key areas so that fundamental legal concepts do not have to be repeated in each of the later chapters.

Some legal issues, such as the extent to which statutes and regulations must contain specific standards in delegating discretionary powers to regulatory agencies, vary so little from one control context to another that not much need be said about them outside the "Legal Issues" overview chapter. Other issues vary from one control context to another and are, therefore, discussed first in the overview chapter and then in each of the later chapters in turn. Still other legal issues arise only in a particular control context, and so the discussion of them is confined to the appropriate individual chapter. An example of such a specialized legal issue is the problem of legal liability for continuing acid drainage from abandoned mines.

The legal issues that arise most often in connection with the descriptions of individual controls in the handbook are:

1. whether the state, regional entity, local or special purpose unit of government chosen to exercise a particular control technique has the power necessary to do so;
2. whether the proposed control technique serves a valid governmental objective and whether it is reasonably calculated to meet that regulatory objective; and
3. whether the proposed control technique operates to "take" private property for public use without payment of just compensation.

5.1 Sources of Authority

State and sub-state agencies and authorities and local units of government possess only those powers expressly granted or necessarily implied from enabling statutes and, in the case of local units of government, from state constitutional provisions and "home rule" authorizations. Regulations that exceed the scope of such authority violate state and federal due process requirements and are invalid. The precise wording of each individual statute will have to be analyzed, taking into account any judicial gloss upon it, before a water quality planning agency can determine whether or not a particular agency or level of government has the authority necessary to implement a particular control technique. In some cases the statute will be ambiguous or silent, and a statutory amendment will be required.

The "Legal Issues" overview chapter and the chapters devoted to different control techniques for different sources of pollution can do no more than outline the general powers of different agencies and units of government. Examples of particular control techniques which states or localities have adopted under broadly representative enabling legislation may suggest to another state or locality with similarly-worded authority the reach of its power. This is the case, for example, with timing and locational controls on development and with stormwater runoff controls adopted under the typical enabling statutes for zoning and subdivision control described in chapters 5 and 6, respectively.

In other cases a state agency or locality may find that its general enabling authority is not general purpose enough. One such case would be a state wishing to regulate sedimentation from certain agricultural, silvicultural (forestry), and dredge and fill activities under a water pollution control statute that defined "water pollution" in terms of point source discharges only. Chapter 2, the "Legal Issues" overview chapter, chapter 3 on locational controls, and chapter 7 on agriculture and silviculture suggest other possible sources of authority, such as shoreland or wetlands protection statutes, wild and scenic river legislation, and general state land use programs.

In those cases where no existing authority can be found for the adoption of a particular control technique, the citations to individual states' enabling laws in the "Legal Issues" overview chapter and in the chapters that follow will provide state and local water quality planners with a number of models to look to, ranging from the conservative to the highly innovative.

5.2 The Legitimacy of the Goal and the Reasonableness of the Means to Achieve It

The close relationship between the protection of water quality and the protection of public health means that the more direct approaches to regulation of polluting activities, such as discharge limitations, will not be called into question by the courts as unrelated to legitimate governmental objectives. In recent years, moreover, the relationship of land use to water quality has been recognized by many legislatures and many courts. Leading opinions which may serve as precedents for communities seeking to enact wetlands protection statutes or ordinances and other critical areas protection programs, for example, are referenced in chapter 3 on locational controls.

A more frequent ground for attacking innovative approaches to control of water pollution is that they are not reasonably related to the harm sought to be avoided. End-of-the-pipe controls — discharge limitations and treatment requirements — are clearly calculated to minimize pollution. The cause-effect relationship behind preventive measures such as controls over the location, conduct, and maintenance of development — generally the only measures available for nonpoint sources — may be harder to visualize. Wherever there may be a question about the appropriateness of a particular control technique to solve a particular pollution problem, an effort has been made to include persuasive judicial precedent attesting to the measure's reasonableness. It is for this reason, for example, that the language from court decisions describing the relationship between water quality and controls on the timing and location of sewer hookups and extensions is quoted at such length in chapter 4.

5.3 The "Taking" Issue

The constitutionally protected right not to have one's private property taken by the government without the payment of just compensation is a familiar one. In some extreme cases the effect of a regulation may be to prohibit virtually all productive use of a particular piece of property. The "Legal Issues" overview chapter suggests that state and local officials' fears that strong regulatory programs will be struck down as uncompensated "takings" have little basis in the actual decisions of the highest courts in most states. Since much has been made of the "taking" issue in recent years, however, every chapter attempts to cite judicial approval for the types of controls discussed and to suggest ways in which both the landowner's right to some use of his property and the public's right to water quality can be protected.

6.0 Coordination of Section 208 and Other Federal Programs

EPA regulations require that state water quality management plans be coordinated with numerous other federal requirements for resource and development planning.2/ This requirement is due in part to the possibility of needless duplication or conflict between programs. In addition, a review of other relevant planning programs may reveal opportunities for achieving water quality goals more efficiently. Some programs, such as coastal zone management, may serve multiple objectives. The purpose of this section is to briefly describe the relationship between section 208 and other particularly relevant federal programs. There are, of course, other federal programs that are related to section 208 but because of limitations of space only those thought most relevant by the authors are discussed here. See EPA program guidance memo SAM-11 (Jan. 23, 1976) for a more exhaustive list of federal and other programs related to the 208 program. Other applicable EPA program guidance memoranda will be noted where appropriate.

At the outset, it should be noted that federal law requires that funds appropriated for a program be spent for the purposes of that program.3/ Thus, program coordination cannot be used to shift funds in a way that is inconsistent with federal objectives. In most cases, however, there are substantial opportunities for avoiding duplication of similar tasks and procedural requirements within each program.

6.1 Section 404 Dredge and Fill Regulation

Section 404 of the FWPCA provides the Secretary of the Army with authority to regulate the discharge of dredged or fill material into waters of the United States through the issuance of permits.4/ Under this program the Corps has asserted jurisdiction over fresh water wetlands adjacent or contiguous to other navigable waters and any other waters necessary to protect water quality.5/

There are several ways in which the section 404 program can be coordinated with the needs of water quality management planners.6/ First, the Corps program can serve as a wetlands protection plan that includes water quality considerations. (See chapter 3, section 4.2). Dredge and fill regulation should also be noted as part of the process required by section 208 to identify and control pollution from construction activity. The 404 program already provides a mechanism for some coordination since no federal permit may be issued until any necessary state approval has been obtained.7/ The Corps regulations also provide for the creation of federal-state agreements to jointly process permit applications.8/

6.2 The Coastal Zone Management Act

The Coastal Zone Management Act ("CZM")9/ provides funding for states to develop coastal zone programs. The program is a voluntary one but participating states must satisfy criteria promulgated by the Office of

Coastal Zone Management in the National Oceanographic and Atmospheric Administration of the Department of Commerce. For example, states are required to prepare an inventory of coastal resources, to define permissible land and water uses in the regulated areas, to designate areas of special concern, and to establish procedures protecting these areas. Additional funding is available to deal with the effects of new or expanding energy facilities in coastal areas under amendments passed in 1976.10/

The Coastal Zone Management Act is directed more towards funding state planning than to direct regulation, but there are many opportunities for coordination with 208 requirements.11/ For example, the determination of permissible uses and use priorities required for CZM plans could be integrated with similar decisions required for water quality purposes in section 208 plans. In addition to coordination of plans, regulatory requirements can also be designed to serve dual purposes. Water quality considerations are likely to be a substantial part of a CZM program, and the addition of criteria to reflect the special needs of coastal ecosystems may not require significant changes in the regulatory framework.

The Coastal Zone Management Act is explicit regarding the resolution of any conflict between its goals and requirements of the FWPCA. Section 207(f) dictates that the FWPCA is controlling. Thus, water quality standards will not be affected by CZM plans. However, CZM funding can be used to supplement areawide planning efforts, and the two planning processes should be done in close cooperation to avoid needless duplication of effort.

6.3 The Clean Air Act

The Clean Air Act Amendments of 1970 12/ require states to develop implementation plans ("SIPs") for the attainment and maintenance of national ambient air quality standards. In areas with serious air quality problems, states must prepare long term projections that indicate the sources and allocation of different emissions.13/

For several reasons, the attainment of air and water quality goals requires close coordination of the respective programs for each type of pollution.14/ Disposal of pollutants generated by power plant scrubbers may result in water pollution, while burning of sludge from sewage treatment plants may lead to an air pollution problem. Less directly, the location of waste treatment facilities can have major growth inducing impacts creating subsequent air pollution problems. In a similar fashion, air pollution requirements may direct industry toward areas with water pollution problems, trading one problem for another.

Several mechanisms can be used to coordinate programs and avoid these problems as much as possible. First, specific tasks required for both programs should be handled by the same agency wherever possible. For example, population projections, public participation programs, and

program development strategies could be done in common.15/ Second, common geographic boundaries should be used for planning wherever feasible. Finally, where responsibility is divided, representation of both interests should be involved in major policy decisions.16/

6.4 The National Flood Insurance Program

Under the National Flood Insurance Program, communities with areas designated as subject to serious flood hazards must adopt adequate land use control measures or lose access to loans from federally supervised lending institutions.17/ Participation in the program is also necessary in order to be eligible for federally subsidized flood insurance. Land use requirements will vary to some extent with the flood problem, but in most cases communities will have to adopt procedures to regulate all new development or construction; to assure that new or replacement water supply and/or sewage systems are designed and located to avoid impairment or contamination during flooding; and to prohibit fill or encroachments in a floodway that would increase the water elevation of the 100 year flood more than one foot.18/ Restrictions will also be necessary to limit flood related erosion.19/

Although the flood insurance program is not directly concerned with water quality, its requirements will be compatible with section 208 water quality management programs in many areas. Restrictions on development, for example, may serve both goals by providing a buffer area around streams. (See chapter 3, note 10 and accompanying text.) Regulation of impermeable surfaces could also serve dual objectives. (See chapter 6, section 2.3.) Finally, the accepted importance of protection from floods may provide an additional rationale for water quality programs challenged in court. (See chapter 2, section 3.6.)

6.5 The 701 Comprehensive Planning Assistance Program

Section 701(c) of the Housing Act of 1954 20/ has provided substantial planning monies to hundreds of communities in the past 20 years. Although the program is not primarily concerned with the environment, it does provide funding that could be used for water quality purposes.21/ The focus of 701 assistance is similar to that of section 208 in its emphasis on areawide planning. With some exceptions, only one areawide planning organization is eligible for funding in each metropolitan area.22/

The Housing and Community Development Act of 1974 provides that 701 plans must include a land use element. After August 22, 1977 no grant can be given unless HUD is satisfied that the plan includes an adequate land use element. This element must include studies and procedures necessary for effectively guiding decisions with a significant impact on where growth will or will not take place.23/ In addition, planning activities must include an environmental assessment that indicates the impacts of the proposed plan.24/ The environmental conclusions must be reflected in the land use plan.25/

701 plans also must provide for coordination of local, areawide, and state land use policies, including capital investment policies.26/ Specifically, the land use plan is required to demonstrate consistency with capital improvement programs and any transportation, open space, and public utility plans.

HUD regulations require that 701 plans be consistent with a completed 208 plan.27/ This may necessitate use of a common data base and some agreement on growth policies. Although this requirement technically comes into effect only after completion of the 208 plan, the opportunity to share resources should be an adequate incentive to justify cooperation at all stages. Moreover, the difficult policy choices and implementation strategies required for both programs will be practical only if there is a unified approach.28/

INTRODUCTION

FOOTNOTES

1. See EPA regulations governing Policies and Procedures for Continuing Planning Process, 40 C.F.R. Part 130, and Part 131, Preparation of Water Quality Management Plans. And see Natural Resources Defense Council v. Train, 7 Envir. Rep. cases 2066, 5 ELR 20405 (D.D.C. 1975).

2. 40 C.F.R. § 130.34(a)(2).

3. 31 U.S.C. § 628.

4. The scope of the program was defined to include "all waters of the United States" in Natural Resources Defense Council v. Callaway, 392 F. Supp. 685 (D.D.C. 1975). Regulations were issued by the Corps of Engineers in accordance with this opinion. 40 Fed. Reg. 31320 (July 25, 1975).

5. 40 Fed. Reg. 31320, 31324, § 209.120(d)(2), (July 25, 1975).

6. See EPA Program Guidance Memorandum SAM-11, Attachment 5, "Corps of Engineers/Environmental Protection Agency Joint Guidance for Cooperative Action for Water Quality Management."

7. 33 C.F.R. § 209.120(f)(3).

8. Id. § 209.120(f)(3)(v).

9. 16 U.S.C. §§ 1451-1464.

10. Pub. L. No. 93-370, adding a new section 308 to the Coastal Zone Management Act. Proposed implementing regulations appear at 41 Fed. Reg. 46724 (1976).

11. See EPA Program Guidance Memorandum SAM-11, Attachment 2, "Guidance on Coordination between CZM and EPA Water Quality Management Programs" (1976).

12. 42 U.S.C. § 1857 et seq.

13. 40 C.F.R. §§ 51.44, 51.45.

14. U.S. Environmental Protection Agency, Revised Program Guidance Memorandum SAM-8, "Relationship between Air Quality Planning and the State and Areawide Water Quality Management Program; Eligible Uses of Section 208 Funds for Water Quality Analyses" (Nov. 15, 1976).

15. Id. at 2.

16. For an example of a 208 agency attempting to coordinate air quality problems in the planning process, see George Hagevik, "Achieving an Integrated Planning Program: An Issue Paper for the 208 Areawide Water Quality Management Workshops" (workshops sponsored by EPA and conducted by National Association of Regional Councils, 1976).

17. 42 U.S.C. § 4001 et seq.

18. 24 C.F.R. § 1910.3, 41 Fed. Reg. 46976 (1976).

19. See generally, Tierney, "The National Flood Insurance Program: Explanation and Legal Implications," 8 Urb. Law. 279 (1976).

20. 40 U.S.C. § 461.

21. See Larry Houston, "Relationship of the 701 Comprehensive Planning and the 208 Program," in Proceedings of a Symposium on the Role of the Environmental Protection Agency in Land Use Planning 27 (1975).

22. 24 C.F.R. § 600.40.

23. 42 Fed. Reg. 6099 (Feb. 1, 1977).

24. 24 C.F.R. § 600.65.

25. 42 Fed. Reg. 6096 (Feb. 1, 1977).

26. 24 C.F.R. § 600.72(b)(4). See also 42 Fed. Reg. 6100 (Land Use and Housing Element Guidelines § D, Feb. 1, 1977).

27. 24 C.F.R. § 600.73(c)(6)(ii), 42 Fed. Reg. 6096 (Feb. 1, 1977).

28. See EPA Program Guidance Memorandum SAM-11, Attachment 1, "Integrating 208 Planning and 701 Comprehensive Planning" (May 2, 1975).

CHAPTER ONE

CHOICE OF APPROPRIATE LEVELS AND AGENCIES OF GOVERNMENT FOR PERFORMANCE OF SECTION 208 MANAGEMENT TASKS

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CHAPTER ONE

CHOICE OF APPROPRIATE LEVELS AND AGENCIES OF GOVERNMENT FOR PERFORMANCE OF SECTION 208 MANAGEMENT TASKS

1.0 Introduction: The Existing Institutional Framework

Clearly, techniques for controlling water pollution are not likely to be effective unless the task of implementing them is entrusted to appropriate agencies. These become more variant and more numerous as one moves from the federal down to the local level of government. In fact, the institutional inventory of even a relatively small substate region may reveal a patchwork of agencies at different levels of local government, each exercising some part of the authority necessary for the success of an areawide wastewater control technique.

Typically, water pollution regulation is exercised by general-purpose state and local governments and by the U.S. Environmental Protection Agency (EPA). Point source regulation is carried out mostly by state and federal environmental agencies through the National Pollutant Discharge Elimination System (NPDES) permitting process. Most NPDES states and EPA are emphasizing compliance-monitoring and enforcement rather than permit issuance. 1/ A few states, such as New York and Florida, authorize local as well as state regulations and permits for point source dischargers. In addition, sanitary districts, such as the Metropolitan Sanitation District of Greater Chicago, may issue permits to dischargers for their sewer systems. All municipal dischargers must now enforce pretreatment standards for industrial sources discharging to municipal sewers.

Local governments (municipalities and some counties) are the main regulators of nonpoint sources that result from the urbanization process, such as surburban erosion, septic tanks, and stormwater runoff. In general, there is much less regulation of nonpoint sources than point sources. Regulatory techniques used include zoning, subdivision ordinances, grading and fill requirements, and other land use and performance controls. (Figure 1 shows the number of local governments with planning, zoning, and building regulations in 1968.) The typical objectives of these local land use and building regulations have had less to do with water quality than with the protection of property values, traffic flow, safety, or the avoidance of nuisances. Yet local land use controls can affect the character, direction, and sometimes the rate of growth of suburbs, commercial buildings, industries, recreation and health facilities, and impacting point and nonpoint sources of water pollution.

Figure 1

—PROPORTION OF GOVERNMENTS WITH PLANNING, ZONING, AND BUILDING REGULATION ACTIVITIES, BY SMSA LOCATION AND TYPE AND SIZE OF GOVERNMENT, 1968

Coverage group	Number of governments	Percent of governments with—					
		Planning board	Zoning ordinance	Subdivision regulation	Building code	Housing code	Any building regulation [1]
Total [2]	17,993	59.6	53.3	44.9	46.4	27.3	78.3
Within SMSA's	7,609	65.2	68.3	59.3	59.5	36.5	82.3
Outside SMSA's	10,384	55.4	42.3	34.4	36.8	20.5	75.3
County governments	3,049	52.3	23.3	29.1	13.6	6.9	58.9
Within SMSA's	404	80.0	49.3	62.9	39.4	18.6	86.1
Outside SMSA's	2,645	48.1	19.4	23.9	9.7	5.1	54.7
Municipalities	9,984	66.8	68.9	53.1	64.9	39.8	89.2
Within SMSA's	4,977	67.7	74.8	61.2	69.0	44.8	86.2
1960 population of—							
50,000 or more	314	98.4	98.7	92.7	98.7	85.3	100.0
5,000 to 49,999	1,303	92.9	97.0	90.0	91.8	53.3	99.9
Under 5,000	3,360	54.9	54.0	47.7	57.4	37.8	79.5
Outside SMSA's	5,007	66.0	63.0	45.0	60.9	34.8	92.2
1960 population of—							
5,000 to 49,999	1,352	91.8	90.5	81.9	73.5	54.4	98.4
1,000 to 4,999	3,675	56.5	52.9	31.3	51.3	27.6	89.3
New England-type townships	4,960	49.4	40.4	38.4	29.1	14.5	68.3
Within SMSA's	2,228	57.1	57.3	54.3	41.9	21.2	73.0
1960 population of—							
5,000 or more	765	79.1	81.0	74.0	58.7	22.7	91.5
Under 5,000	1,463	45.7	44.8	44.0	33.5	20.4	63.3
Outside SMSA's	2,732	43.0	26.6	25.4	18.7	8.9	64.4
1960 population of—							
5,000 or more	333	79.3	73.9	72.7	52.9	16.2	84.4
1,000 to 4,999	2,399	37.9	20.1	18.8	15.2	7.9	69.4

[1] These figures cover units reporting any of the other specified types of activity or a local building-permit system.

[2] The "total" relates to governments subject to sample survey representation, and thus omits (a) all municipalities and townships of less than 1,000 population located outside of SMSA's; and (b) township governments located in States where these governments lack municipal-type powers

Source: "Local Land and Building Regulation," Allen D Manvel, Commission Research Report No 6

Source: National Commission on Urban Problems, Building the American City 209 (Washington, D.C.: Government Printing Office, 1968).

Local governments rarely regulate rural nonpoint sources (agriculture, mining, silviculture.) As Chapter 2, the legal overview chapter, points out, 20 states forbid the application of local zoning or subdivision ordinances to agricultural lands. Twenty-six states exempt existing uses from local land use regulations. When agriculture, mining, and silviculture are regulated for pollution abatement, state natural resource and agriculture departments usually perform the task. In the past, their regulations were designed to maximize harvests and production and to increase extraction of minerals, not to protect water quality. More recently, however, state erosion control and mine reclamation laws have been adopted which seek to prevent water pollution, among other problems.

Since 1970, state governments have become more involved in the regulation of urban and suburban land uses that had previously been in the exclusive domain of local governments. States' actions usually apply to particular polluting sources, such as power plants or stripmines; to vulnerable environmental areas such as wetlands, flood plains, or coastlines; or to large-scale development and key facilities considered to influence regional growth substantially. Only a few states, such as Vermont, Florida, Hawaii, Oregon, and Maine, have more comprehensive state land use programs. Typically, local development review is retained, with state or regional review added. Alternatively, a state may mandate that localities take specific land use regulatory action. Even these incremental moves engender state/local conflicts as mayors and planning and zoning officials move to protect local prerogatives, and as small landowners and developers resist additional regulation. (Figure 2 identifies state land use programs adopted as of January 1974.)

There are very few areawide regulatory bodies. Existing ones include the Twin Cities Sewer Board and Metropolitan Council, the San Francisco Bay Conservation and Development Commission, and the Lake Tahoe Regional Water Quality Agency. While some special-purpose sanitary districts may regulate point sources, they are rarely authorized to regulate nonpoint sources and land uses. Flood control districts usually construct and operate flood control facilities, but these districts, along with soil and water conservation districts, primarily provide technical assistance and education, or direct services to abate erosion and storm runoff.

Regional councils usually perform planning, coordination, and technical assistance tasks, and rarely implement water quality protection or provide service delivery. Most state and local governments have been reluctant to give areawide planning bodies regulatory duties and have been particularly reluctant to delegate land use control authority to regional planning or special-purpose agencies. 2/

2.0 Criteria for Evaluating Institutional Arrangements and for Assigning Regulatory Functions

This handbook suggests a variety of techniques and agencies for regulating nonpoint sources, point source location, and construction and use of sewers. Some examples show the need for decentralizing controls, while

Figure 2

STATE LAND USE PROGRAMS*

(January 30, 1974)

	Statewide[1] Land Use Planning and Control	*Coastal[2] Zone Management*	*Wetlands[3] Management*	*Power[4] Plant Siting*	*Surface[5] Mining*	*Designation[6] of Critical Areas*	*Land Use[7] Tax Incentives*	*Flood[8] Plain Management*
Alabama	P	—	—	—	yes	—	—	—
Alaska	—	—	—	—	—	—	yes	—
Arizona	P	NA	—	yes	—	—	—	yes
Arkansas	—	NA	—	yes	yes	—	yes	yes
California	P	yes	—	yes	—	—	yes	yes
Colorado	P	NA	—	—	yes	yes	yes	yes
Connecticut	P	—	yes	yes	—	—	yes	yes
Delaware	P	yes	yes	—	—	—	yes	—
Florida	P and R	yes	yes	yes	—	yes	—	—
Georgia	P	—	yes	—	yes	—	—	—
Hawaii	P and R	yes	—	yes	—	yes	yes	yes
Idaho	—	NA	—	—	—	—	—	—
Illinois	—	—	—	yes	yes	—	yes	—
Indiana	—	—	—	—	yes	—	yes	—
Iowa	—	NA	—	—	yes	—	yes	—
Kansas	—	NA	—	—	yes	—	—	—
Kentucky	—	NA	—	—	yes	—	yes	—
Louisiana	—	—	yes	—	—	—	—	—
Maine	P and R	yes	—	yes	yes	—	yes	yes
Maryland	R(limited)	—	yes	yes	yes	—	yes	—
Massachusetts	—	—	yes	—	—	—	—	—
Michigan	P	yes	—	—	yes	—	—	yes
Minnesota	P and R	yes	—	yes	yes	yes	yes	—
Mississippi	—	yes	—	—	—	—	—	—
Missouri	—	NA	—	—	yes	—	—	—
Montana	—	NA	—	yes	yes	—	yes	yes
Nebraska	—	NA	—	yes	—	—	—	yes
Nevada	—	NA	—	yes	—	—	—	—
New Hampshire	—	—	yes	yes	—	—	yes	—
New Jersey	—	—	yes	yes (cz)	—	—	yes	yes
New Mexico	—	NA	—	yes	yes	—	yes	—
New York	P	—	yes	yes	—	yes	yes	—
North Carolina	—	—	yes	—	yes	—	yes	—
North Dakota	—	NA	—	—	yes	—	—	—
Ohio	—	—	—	—	yes	—	—	—
Oklahoma	—	NA	—	—	yes	—	—	yes
Oregon	P and R	yes (Partial)	—	yes	yes	yes	yes	—
Pennsylvania	P	—	—	yes	yes	—	yes	—
Rhode Island	—	yes	yes	yes	—	—	yes	—
South Carolina	—	—	—	yes	—	—	—	—
South Dakota	—	NA	—	—	yes	—	yes	—
Tennessee	—	NA	—	—	yes	—	—	—
Texas	—	yes	—	—	—	—	yes	—
Utah	—	NA	—	—	—	—	yes	—
Vermont	P and R	NA	yes	yes	—	—	yes	yes
Virginia	—	yes	yes	—	yes	—	yes	—
Washington	—	yes	yes	yes	yes	—	yes	yes
West Virginia	—	NA	—	—	yes	—	—	—
Wisconsin	P	yes	yes	—	—	yes	—	yes
Wyoming	—	NA	—	—	—	—	yes	—
Guam	P and R	yes	—	yes	yes	—	—	yes
Puerto Rico	P and R	—	—	yes	yes	—	—	yes

*Table Explanation

Indications that a State has a program in one of the above categories does not constitute an evaluation of the effectiveness of the program.

1. P indicates the State has a land use planning program under way. R indicates the State has authority to review local plans or has direct control. NA, not applicable.
2. State has authority to plan or review local plans or the ability to control land use in the coastal zone.
3. State has authority to plan or review local plans or the ability to control land use in the wetlands.
4. State has authority to determine the siting of power plants and related facilities.
5. State has authority to regulate surface mining.
6. State has established rules, or is in the process of establishing rules, regulations, and guidelines for the identification and designation of areas of critical state concern (e.g., environmentally fragile areas, areas of historical significance).
7. State has adopted tax inducements to withhold or delay development of open space (e.g., tax on present use, rollback penalty, contract between the State and landholders to provide preferential tax for commitment to open-space usage).
8. State has authority to regulate the use of floodplains.

Source: Council of State Governments, The Land Use Puzzle 34 (1974).

others show the need to centralize regulatory functions with other governmental responsibilities in areawide or state agencies with a broader geographic perspective. For instance, there are powerful arguments for regulating the extension of sewer facilities at the county or other substate regional level, while activities like mining or well disposal are often best approached from a statewide perspective. Still other examples, such as regulation of onsite wastewater disposal and erosion control, illustrate ways that state and local agencies can jointly regulate a single pollution source by sharing responsibilities for standard-setting, monitoring, and enforcement.

The best that this handbook can offer, however, is very generalized guidance or very focused evaluations. Clearly, a general observation that soil conservation districts are generally unacustomed to and leery of an enforcement role may be irrelevant to a locality with a particularly aggressive district which wants enforcement authority. Similarly, the selection of a county-administered sewer regulation program in one state should not suggest the county as the appropriate level of government in a state without a strong county governmental framework. For water quality management planners struggling with the particular dilemmas raised by their unique institutional setting, this institutional overview chapter offers generalized guidance on the assignment of water quality functions to management agencies. Just as important as <u>what</u> is done to regulate pollution is <u>who</u> performs the work, because the organization chosen as regulator will determine significantly the effectiveness, acceptability, and fairness of the program.

To select who shall regulate water quality, these three institutional questions need to be answered:

1. What level of government has existing powers that can be used for water quality or should assume new functions? Should the regulatory functions be shared? If shared, what level could best establish standards, issue permits, conduct surveillance and monitoring, and bring enforcement actions?

2. Which agency at each level of government should be the regulator? For example, should new regulatory power over nonpoint sources be assigned to a sanitary district or public works department, a soil conservation district, a flood control district, a zoning board, or a regional council? Or should all these agencies be involved? Should a completely new regulatory agency be established?

3. Within each of these agencies, what should be the roles of an elected or appointed board as compared with a full time professional staff? For example, should erosion permits and standards be issued by an appointed zoning board or elected city council, or should they be handled exclusively by the city's planning department or building permit office?

There is no one institutional model, or even a dozen, to answer these questions for each area. As geography, population, land use, economy, political preferences, water resources, and pollution sources differ, so must water quality institutions. Rather than offering models to guide placement of water pollution regulatory functions, five institutional design criteria are suggested to help officials decide who should regulate in their region or state. These criteria are ways to think about organizations and are objectives to be achieved when establishing governmental structures of any kind. The criteria are:

2.1 Administrative Effectiveness

The agencies assigned regulatory tasks must have the administrative and legal capability to perform the assignment effectively and efficiently. Administrative effectiveness can be best achieved when:

-Agency(s) can set standards; hold hearings; issue permits or licenses; set charges or fees; conduct monitoring, surveillance and site inspections; bring administrative and judicial enforcement actions; impose penalities; or take whatever regulatory steps are called for in the water quality management plan.

-Agency(s) has adequate funds to carry out the assignment or is likely to have such funds approved to provide sufficient trained manpower, data, equipment, and administration.

-Agency(s) has technical/managerial competence to conduct policy and program planning and to evaluate its own performance.

-Other functions and missions of the Agency(s) are compatible with and support the water quality regulatory functions. For example, promotion of industrial development and pollution regulation are usually incompatible, conflicting government missions and should be organizationally separate. In general, regulatory functions (standard-setting and enforcement) need to be separated organizationally from the construction and operation of public treatment facilities. Chapter 4 points out that water and sewer planning are compatible with comprehensive land use planning and calls for their placement within the same jurisdiction. Chapter 5 suggests that regional sanitary or utility districts can also be effectively assigned administration and maintenance of community onsite waste disposal systems.

-Interagency and intergovernmental coordination and flexibility occur between the water quality regulatory agency and related water agencies, solid waste managers, public facilities suppliers, land use planning and regulatory bodies, and power and transportation agencies. The number of governmental agencies will be kept to a minimum, reducing duplication of activities and offices.

-Agency(s) can communicate clearly and frequently its program goals and requirements to other governmental agencies and affected private individuals. Minimum time and money is required for regulated parties to gain governmental regulatory approvals or to meet governmental requirements to secure authorized financial or technical aid.

-Minimal personnel disruptions and program slowdown occur when any new governmental program is established.

2.2 Political Acceptability

There should be a reasonable likelihood that the proposed regulatory agency will be designated or, if necessary, created or strengthened within a reasonable period of time, according to the areawide water quality management plan. In order to ensure this, it is important that:

-Organizations and assignments are compatible with the governmental style of the city and state, and their structural and procedural traits.

-Regulation is financially affordable to affected jurisdictions.

-Regulatory powers exist or are likely to be authorized.

2.3 Comprehensiveness and Effectiveness: Environmental, Economic, and Social

There should be maximum attainment of water quality goals by the regulatory means chosen at the lowest overall cost to society (including environmental, social, and economic costs, and costs to government.) Balanced, comprehensive decision-making is likely to result when:

-Long-range planning for water quality can be integrated with the regulatory control strategy.

-Every level of government that regulates water quality is responsible also for a sufficient number of other functions so that conflicts and tradeoffs between water quality and other environmental, economic, or social objectives can be evaluated and resolved to the overall benefit of the community. A balance of governmental objectives results. This process internalizes the external diseconomies that can occur when water quality is achieved, but costs are passed along in terms of air pollution, sprawl, or other environmental or social problems.

-The agency's jurisdiction is similar to the natural boundaries of the region in which the regulated pollutant occurs and is sufficiently large to allow consideration of all relevant natural environment, economic, and political factors. The jurisdiction of the agency assigned regulation should also be large enough to enable the benefits of water pollution regulation to be largely consumed within the jurisdiction. Flexibility to choose the

most advantageous regulatory solution for most effective performance should be possible. For example, if stormwater problems are generated by flows from surrounding mountains, calling for a regional control strategy, as in Denver, then stormwater management and regulation need to be assigned to an areawide agency and not to each of dozens of municipalities in the region. On the other hand, if downspout disconnection is the desired technical solution, as in Springfield, Illinois, the municipality, with its power to adopt local ordinances, may be the most logical regulatory jurisdiction.

-The agency's jurisdiction is large enough to permit economies of scale in government program administration, such as hiring inspectors and purchasing monitoring equipment.

2.4 Equity

The costs and benefits of the governmental regulatory program should be fairly distributed among affected groups and various geographical areas. This can best be achieved when:

-Similar pollution sources are regulated in a similar manner and to the same degree throughout the region and state. Fair standards are adopted and enforcement strategies are evenhanded as to size and type of source.

-Improved water quality that results from regulation is fairly distributed among user groups and geographical areas of the state and region.

-Those who create water pollution problems bear the costs of control.

-Due process requirements are met; agency's procedures are fair.

2.5 Political Accountability

Key regulatory decisionmakers in governmental organizations should be accessible to and controlled by affected individuals and groups, in proportion to their stake in the outcome of a governmental decision. Such accountability is most likely to be attained when:

-Adequate communication is available to private individuals and groups about forthcoming governmental decisions, such as adoption of standards and regulations, along with the choices available and the costs and benefits of each alternative.

-Frequent formal and informal opportunities are extended to citizens to participate in water quality decisions. Multiple points of access exist, such as through political parties, direct administrative processes, elections, and advisory groups.

-Some procedure exists for affected citizens to control decisionmakers, such as through election of officials, recall of appointed leaders, and referenda.

Some of these five criteria might produce conflicting requirements for institutional design, and so the planning process must rank the five as to their importance locally. For example, political accountability may favor allocation of regulatory responsibilities to smaller local jurisdictions, while jurisdictional and cost-effectiveness may argue for assignment to larger regional agencies or state governments.

3.0 Assessment of Agencies' Past Performance

Which of the institutional design criteria from the previous section point toward assignment to municipal governments? To regional agencies? To state agencies? To help answer these questions, reflections on the past administrative, political, and economic performance of these levels of government are summarized here.

The conclusions and research cited are based, generally, on evaluations of agencies performing traditional pollution control functions, such as regulation of point sources, construction and operation of treatment facilities, water quality and land use planning, and regulation for purposes other than water quality. There is very little history, and consequently much less evaluation in the literature, of agencies regulating nonpoint sources or land use for water quality protection. Accordingly, the evaluative conclusions about institutional performance must be extrapolated to regulation of nonpoint sources in the section 208 planning process.

3.1 Municipalities

In the past, general-purpose municipalities have demonstrated the following strengths that argue for their involvement in nonpoint source regulation:

-Political acceptability. Regulation of nonpoint sources associated with urban growth through such techniques as zoning, building regulations, and performance standards are traditionally local prerogatives. Displacing or even sharing these with regional or state governments engenders opposition from local officials, builders, chambers of commerce, as well as other home rule proponents. Local regulation will often be most compatible with an area's governmental style. The political acceptability that would result will be critical to a regulatory program's implementation.

In 1966 Matthew Holden concluded that pollution control is essentially a bargaining process in which successful regulation depends on the consent of the regulated, who have the power to frustrate officially declared objectives if they choose. 3/ In 1975 Irwin, Selig et al. confirmed

that this process still exists, but with government agencies' hand slightly strengthened since 1966. 4/ If this bargaining approach continues, and local governments are better able to generate the political acceptance for nonpoint source regulation, then municipalities could have more success in gaining voluntary compliance. That may be particularly true when such previously uncontrolled sources as urban stormwater and suburban erosion are concerned. However, if regulatory emphasis shifts from political bargaining to increased reliance on administrative and judicial adversary proceedings, then state and federal enforcement may be needed.

-Recognition of Political Interests. Majority views can be mobilized and exerted best within smaller, local jurisdictions. However, minority political interests are most often recognized in a larger, more heterogeneous jurisdiction, such as a region or state.

-Administrative Efficiencies. Government cost and manpower savings can result if existing local regulatory agencies, such as health departments, zoning boards, and building inspectors, can take on water quality regulatory work, piggybacking related water quality assignments on current tasks. Regional or state agencies may need completely new program staffs to regulate urban nonpoint sources. It is also easier and usually quicker for regulated parties to deal with their local agencies.

-Comprehensiveness and Equity. These result from balance of interest and assessment of tradeoffs among several government missions. General-purpose local and state governments, unlike special-purpose districts, are in a position to weigh water quality pursuits against other governmental functions, such as land use programs, growth strategies, housing, employment, educational, health, and recreational objectives. The tradeoffs among these objectives can then be better understood and communicated to citizens in the area, raising the quality of public debate concerning the performance of government. 5/ Priorities among governmental programs can be set and overall economic effectiveness promoted. General-purpose governments are less likely to be controlled by private or minority interests than special districts, since the former are the focus of many differing groups and demands. General-purpose governments tend to be more concerned with overall governmental equity than are special-purpose governments.

The institutional design criteria that argue against assigning key water quality regulation to municipalities include:

-Geographic Inadequacy. Many local jurisdictions are smaller than the hydrologic/economic region in which pollution problems occur and cannot select the most cost-effective regulatory strategy or evaluate program

impacts on the region.

-Inability to Control Externalities. Small local jurisdictions cannot control externalities that occur when the costs and benefits of a governmental program are not contained within the same jurisdiction. Externalities argue for the assignment of functions to jurisdictions large enough to contain the costs and benefits of a given service, such as water pollution control. A study performed by the Advisory Council on Intergovernmental Relations calls the control of externalities the responsibility of an areawide or state unit. 6/ However, this control can take the form either of direct administration of a program or of regulations that require smaller units of government to compensate other jurisdictions for spillover effects. 7/

-Inability to Take Advantage of Economies of Scale. Small towns and cities are unable to benefit from economies of scale in administering regulatory programs. Economies of scale occur not only in construction and operation of facilities, but also in governmental program administration, in provision of monitoring facilities, data collection, personnel, and in overhead.

-Inadequate Funds and Technical Expertise. Many smaller jurisdictions lack money to acquire technical expertise, data, and adequate monitoring and enforcement personnel, and they are not likely to have additional money available for these purposes in the near future. Even asking existing local agencies, such as health departments, to carry out water quality regulatory tasks may put unmanageable financial burdens on local governments. Local agencies have very little history and thus very little expertise in regulating point sources of water pollutants.

-Lack of Political Will. Many small jurisdictions lack the political desire to adequately regulate a major local industry or builder that is also a major polluter, or to impose pollution control costs on friends and neighbors. Localities compete to attract "desirable" residents, such as new industries, commercial developments and housing, that will increase local revenues and may not wish to impose strict environmental performance standards or land use controls, fearing the affected party may not locate in the jurisdiction.

-Poor Local Record on Land Use Planning and Zoning. The history of local planning and zoning has been one of ineffective controls in many areas. Although more than 75 percent of all local governments have planning boards, zoning ordinances, or other land use and building controls, these mechanisms have not served to manage metropolitan growth in most instances. 8/ The indirect influence on land use decisions of real estate taxes and provisions and pricing of public services has

had a greater effect on the direction and type of land development than have zoning and other direct controls. Public services, however, tend to be determined by other economic and political forces, instead of being used consciously to guide urban growth to suit environmental and social objectives.

-Inadequate Legal Power to Regulate all Nonpoint Sources. Smaller localities lack the legal power to regulate nonpoint sources such as agriculture, mining, and existing uses. To be sure, municipalities could be granted such powers by state legislatures, but this might be politically difficult in states where agricultural and mining interests are very strong.

-Inability to Assure Equity. Similar pollution sources located in different local jurisdictions may be regulated in a different manner with varying requirements.

-Poor Coordination with Other Local Governments. Although almost all localities participate in some type of council of governments or other type of regional coordinating body, local governments voluntarily cooperate with one another on only the most essential issues. Day-to-day coordination of regulatory programs would probably not occur among jurisdictions in the same region.

3.2 Special Districts

The desire to achieve economies of scale and fiscal equalization, to control externalities, and to provide geographic adequacy within the metropolitan region, riverbasin, or watershed argue for some assignment of water quality regulatory functions to regional or state agencies, or to achieve areawide cooperation by procedural agreements. Creation of independent special districts has been the most popular, most expedient approach to securing areawide services. The range of techniques to secure governmental cooperation and areawide service delivery of various types includes:

-informal cooperation;
-service contracts and joint services agreements;
-regional councils of local elected officials;
-federally encouraged substate districts;
-state planning and development districts;
-local special districts;
-transfer of functions;
-annexation;
-areawide special districts;
-regional councils;

-urban county;
-city-county consolidations;
-federated areawide governments.

A 1973 report of the Advisory Commission on Intergovernmental Relations has evaluated the effectiveness of these coordination techniques and their conclusions appear in Figure 3. This same study favors general-purpose regional governments to solve urban problems, including water pollution. These structures have been politically unacceptable. Although special-purpose regional agencies are more acceptable, they are judged by the report to be administratively inefficient. The study concludes that there is "an inverse relationship between effectiveness and political feasibility and acceptance" in solving areawide urban problems on an areawide basis. 9/ However, many other economists and political scientists no longer favor total metropolitan reorganization as the most desirable solution to urban problems. Lack of a sense of community at the regional level and little agreement on common goals have been cited as problems. 10/ The most common approach to solving regional problems is the special district. In 1972, there were over 300 areawide sanitation districts, which were collecting, treating, and disposing of wastewater, such as the Metropolitan Sanitation District of Greater Chicago. 11/ Seattle Metro (the Municipalities of Metropolitan Seattle) is a dual-purpose, areawide special-purpose agency, providing sewage treatment and disposal as well as transportation services throughout King County. The agency regulates discharges to its sewers, but must accept all volumes from its municipal dischargers.

There are other special districts based on riverbasins. The Miami (Ohio) Conservancy District is an intrastate basin arrangement, and the Delaware River Basin Commission is an example of an interstate basin agency. The Miami District includes both commercial and industrial dischargers, as well as municipal and nonpoint sources. These basinwide organizations and sanitation districts usually do not have explicit regulatory authority and would need additional state legislation in order to perform regulatory functions.

Advantages of these special districts include their ability to:

-use a broader base for financing construction work than municipalities (could use part of their user fees to finance regulation);

-achieve economies of scale in construction, maintenance, administration, and monitoring work;

-account better than a municipality for the geographic/hydrologic nature of the pollution problem;

-internalize economic externalities involving water pollution spillovers from one municipality to another within a region;

Figure 3

Table I

Areawide Service Delivery Approaches and Objectives

Type of areawide approach	Adequate geographic area of jurisdiction	Legal and administrative ability to perform assigned services and implement plans	Contain spill-over costs and benefits within jurisdiction responsible for providing service	Permit realization of economies of scale: Staff/Line		Multifunctional; governing processes involve resolution of conflicting interests and balancing of needs and resources	Increase coordination of local projects with areawide functional and comprehensive development plans	Ensure equitable distribution of public goods and services	Maximize citizen participation	Performance of functions remains controllable by and jurisdiction is accountable directly to residents
Informal Cooperation	–	–	–	–	–	–	–	–	–	–
Service contract/joint services agreement	0	+	0	+	+	–	–	0	–	–
Regional council of local elected officials	+	–	–	+	–	+	+	–	0	–
Federally encouraged substate district	+	–	–	0	–	–	+	–	0	–
State planning and development district	+	0	–	0	–	+	+	–	0	–
Local special district	+	+	0	+	+	–	–	0	–	–
Transfer of functions	0	+	0	+	+	–	0	0	+	+
Annexation	+	+	0	+	+	+	0	0	+	+
Areawide special district/ public authority	+	+	+	+	+	–	–	0	–	–
"Umbrella" regional council	+	+	0	+	+	+	+	–	0	–
Urban county	0	+	0	+	+	+	0	+	+	+
City-county consolidation	0	+	0	+	+	+	0	+	+	+
Federated areawide government	+	+	+	+	+	+	+	+	+	+

KEY + = successful 0 = occasionally successful – = unsuccessful

Source: Advisory Commission on Intergovernmental Relations, Regional Decision-Making: New Strategies for Substate Districts 13 (Oct. 1973).

-provide greater technical expertise and management competence than many municipalities;

-link water quality regulation with other wastewater management responsibilities that they may perform, such as controlling sewer connections, and sewer use, and imposing pretreatment requirements;

-provide service uniformity throughout the region and, if given regulatory powers, ensure equity of treatment of water polltuion sources in the area.

While special-purpose districts can achieve these economic and administrative efficiencies, emphasizing technological solutions, they are considered to have these problems:

-They provide little citizen access and control, and thus have low political accountability. While over 40 percent of regional districts surveyed by the Advisory Commission on Intergovernmental Relations (ACIR) in the 72 largest metropolitan areas have governing boards chosen by direct election, voters usually are apathetic about special-district elections. 12/ As a result, these districts can be dominated by special economic interests. Special districts have been more unwilling to accede to public demands in the performance of their functions than general-purpose units. 13/

-There is little interagency and intergovernmental cooperation and coordination. Single functional special districts generally do not coordinate their services with related local government units. Also, regional special districts are often state-imposed. Thus, tensions and administrative conflicts occur between special districts and general local governments, as well as regional planning bodies and other special districts.

-They are unable to balance water quality objectives with related land use, growth, housing, transportation, and economic missions. Independent districts serve narrow functional interests rather than those of the entire metropolitan area.

-Regulation by special districts is not in keeping with traditional governmental style in most areas, and these units may have no experience, expertise, or legal staffs to conduct regulatory work. It may also be politically difficult for them to acquire such expertise and powers.

-The water quality regulatory role may conflict with the special district's past primary mission as, for example, that of constructing and operating publicly owned treatment facilities.

Because of these disadvantages, ACIR advocated that special districts be abolished, consolidated, or subordinated to general-purpose units of government. 14/ Studies in California, Massachusetts, Michigan, and elsewhere have also called for such action. 15/

Figure 4 reports on evaluations of selected regional special districts, including five that provide sewer services. It should be noted that the greatest strength of special districts, their economic efficiency, applies more to facility construction and operation than to regulatory programs.

3.3 Urban County

Much of the metropolitan governmental reform literature supports expanded urban functions for counties. Hein, et al., in a recent study of regional arrangements for environmental protection, judged urban counties the most effective institutional arrangement in the United States for solving emerging environmental problems. 16/ The reorganized or comprehensive urban county--the county given the functions of the city--is seen as able to achieve the economic and technological advantages of areawide approaches while overcoming the inability of special districts to ensure public accountability and to conduct water quality work in a broader governmental context. Montgomery County, Maryland is an example of an urban county that has taken an aggressive role in environmental protection, as described in chapters 4 and 6. City-county governmental reorganizations have produced urban counties in Miami (Dade), Jacksonville, Indianapolis, and Nashville (Davidson). Such reorganizations have been judged to have generally positive functional impacts. 17/ In these situations, a large municipality forms the backbone of the urban county.

There are several advantages of counties taking on additional wastewater management, land use controls and other regulatory and planning responsibilities. They include the following:

-Geographical jurisdictions are large enough to be effective taxing and service units and to provide regulatory services.

-They achieve equity of regulation throughout the county.

-Boundaries of counties more nearly match the boundaries of the natural and economic region in which pollution problems occur than do municipalities, although, to be sure, the problem remains of making boundaries coincide with the boundaries of multicounty problems.

-Some county agencies, such as health departments, perform inspections and permitting, and could assume water quality regulatory tasks with minimum additional cost and staff.

-All the advantages that accrue to general-purpose governments--accountability, flexibility, ability to assess tradeoffs and to set priorities among many governmental missions--apply to counties, as the largest general-purpose governments below the state level.

The principal disadvantage of assigning water quality regulatory programs to counties is that most counties do not now have the necessary statutory authority to perform city-type functions. Counties have been generally

Figure 4

Study Appraisals of Selected Regional Special Districts. 1958-1972

District	# Of Jurisdictions	Functions	Economies of Scale	Economic Externalities	Access and Control	Citizen Participation	General Purpose Character	Geography Adequacy
Bay Area Rapid Trans District[1]	3 counties	Transportation	+	+	–	–	–	+
	Two counties (Marin and San Mateo) withdrew from BARTD due to an unresponsiveness to their transportation needs or lack of BARTD's facilities.							
Boston MDC[2]	–	water sewer park	+	+	–	–	–	+
	Since appointment of commissioners is from the State level, communities have been unable to participate in MDC activities and therefore the district has not been able to meet regional needs							
Hartford Metro District[3]	Hartford and 7 towns	water sewer	+	+	–	–	–	+
	One of the major findings of a commission studying the MDC was that it has lost rapport with electors and recommended election of commissioners							
Milwaukee Metro Sewerage District[4]	–	sewer	+	+	–	–	–	+
	Statistics show the MSD was more efficient in terms of waste treatment programs than any other plants studied							
Port of N.Y and New Jersey Authority[5]	12 counties	Transportation	+	+	–	–	–	+
	Local governments have no control over the Port Authority. The board members are appointed by the governor of both States. Robert G. Smith evaluated this governmental unit as the most independent of all public authorities in New York City.							
Washington Suburban Sanitary Commission[6]	2 counties	water sewer storm drain refuse	+	+	–	–	–	+
	A consultant group recommended that the WSSC utilize its present unified system for service delivery but it should increase county control over district operations							
The Municipality of Metro Seattle[7]	11 cities 18 sewer districts	sewer transportation	+	+	+/–	–	+/–	+
	The composition of membership represents a balance of central city and suburbs—Seattle has 9 councilmen and the Mayor as members, and the suburban and county governments have 10 members "Metro" may perform any or all of six functions—comprehensive planning, sewage disposal, garbage disposal, parks and parkways, water supply, and transportation							

+ = favorable evaluation
– = negative evaluation

Sources
[1]Smith, *Public Authorities in Urban Areas,* (Washington National Association of Counties Research Foundation, 1969).
[2]Wakstein, "Boston's Search For A Metropolitan Solution" *Journal of the American Institute of Planners* (September, 1972).
[3]Metropolitan District Study Commission, Report on the Metropolitan District Commission and Government Functions Committee of the Capital Region Planning Agency, *Governmental Organization for the Capital Region.* (Hartford, 1965)
[4]Metropolitan Study Commission Committee on Metropolitan Functions, *Report on Sewage Disposal In The Milwaukee Metropolitan Area.* (Milwaukee, 1958).
[5]Smith
[6]Report on the Governmental Structure for the Exercise of Functions Performed by the Washington Suburban Sanitary Commission. (Booz-Allen Public Administration Service, 1972)
[7]National Technical Information Service, *Metropolitan Water Management—Case Studies and National Policy Implications* pp 295-316 (Cambridge, Massachusetts, 1971)

Source: Advisory Commission on Intergovernmental Relations, Governmental Functions and Processes: Local and Areawide 75, Substate Regionalism and the Federal System, vol. 4 (Washington, D.C.: Government Printing Office, 1974).

unable or unwilling to take on additional urban and regional functions. Most metropolitan counties perform traditional and often state-mandated functions. Only 20 to 40 percent perform various urban functions, and only 10 to 30 percent perform assorted regional functions. Metropolitan home rule counties are notable exceptions and have taken on considerable urban responsibilities. 18/ State legislative action would be required to establish urban counties or to make existing urban counties effective environmental regulators. 19/ Political difficulty may be involved in acquiring urban powers. While metropolitan regional reorganization has occurred in over 20 percent of the states, it has never been without major political problems.

While any strategy that involves areawide governmental arrangements will be difficult, the most politically feasible regional approaches are judged to be those based on the urban county and larger cities. 20/ The least feasible are those that seek multipurpose special districts or give regulatory powers to regional councils. 21/

If urban counties exist, strong arguments can be made for assigning them water quality regulatory powers. If they do not exist, areawide planning agencies must assess the political realities of urging major governmental overhaul in the context of water quality planning. Attempts at general governmental reorganization in the context of federally-mandated water quality planning could irritate local officials and political groups as an unwarranted federal intervention in local affairs. Needed political support for pollution control regulation could be undermined in the process.

3.4 Regional Councils

Regional councils such as voluntary councils of governments or associations of local governments established by the state, or substate regional planning districts could be expanded to take on regulatory responsibilities.* Typically, today, they plan for various governmental services, coordinate local governments, administer A-95 commenting procedures, and provide technical assistance to member localities. Their assets, as regulators, would be:

-Ability to coordinate planning. Regional councils are able to coordinate water quality management planning, comphrehensive land use planning, and other

*Another type of regional council in the United States is the Twin Cities Metropolitan Council. This council, created by the state, has authority over some multicounty special-purpose agencies, including the Metropolitan Sewer Board. It also has acquired some powers over land use in the region. While this is an interesting institutional approach to solving areawide problems, it is the only body of this type in the United States and so is excluded here.

regional planning. Most areawide wastewater management planning organizations are regional councils, and if water quality planning countinues after the initial two years of effort, regulation could be closely linked with planning. The likelihood of plan implementation would increase if the planning and regulatory functions were conducted by the same agency. While local public works departments or sanitary districts can coordinate regulation with their other water quality operational functions, regional councils can better coordinate water quality regulation with water quality planning and other planning tasks.

-Geographic adequacy. Regulatory programs could be established, conducted, and evaluated in a large enough region to more closely match the boundaries of the pollution problem. A regional council usually includes several counties and municipalities in its jurisdiction.

There are disadvantages to assigning regulatory powers to regional councils including:

-Lack of Constitutional Authority to Regulate. Most COG governing boards apportion representation of member governments on a one government, one vote basis, to appease smaller units that fear central city domination. Although the one-person, one-vote standard applies to local governments, courts have thus far refused to extend it to COGs, reasoning that COGs perform a purely advisory role and do not exercise governmental power. However, courts might think that water quality regulation satisfies the governmental power test. 22/

-Little experience in water pollution control and lack of technical expertise.

-Inability to coordinate effectively with local governments. Regional councils may have difficulty coordinating their activities with local governments and may sometimes seem to be rivals for service delivery assignments.

-Political difficulty of giving most regional councils regulatory powers. Today, these agencies have no regulatory and few implementation powers, and local governments and states are not likely to approve their addition. Hein sees councils of government as the least likely institution to be built into strong regional governmental structures. 23/ He describes the nebulous character of the umbrella-type regional council:

> If floats above the counties and cities with no visible means of support. To the cities and counties of the region, it is a voluntary association of local government,

> which they control . . . . [R]egional government as an agency of various federal programs and agencies . . . is an umbrella suspended from the federal ceiling, held up by cords of federal money . . . . As a clearinghouse (A-95 review) it is expected to make judgements and take actions that may be perceived as harmful by member counties and cities. This contradicts its original function of protecting and serving its members. 24/

Mogolof has listed five forms of government that appear stronger than councils of government: the urban county, transfer of functions to state government, metropolitan special districts, federations, and city-county consolidations. 25/

3.5 The State

The institutional design criteria favoring assignment of regulatory powers to state agencies include:

-Geographic adequacy. State agencies have a broader geographical perspective than localities or substate regions. Solutions based on riverbasins or watersheds can increase the economic effectiveness of the regulatory program.

-Coordination of controls and planning. Coordination of water quality regulatory controls with water quality planning is assigned in most states to a water pollution control agency. Also, regulation of point sources, which involves the state water pollution control agency, could be better coordinated with regulation of nonpoint sources, if performed by the same agency.

-Comprehensiveness and effectiveness. The state, operating through the governor's office, state planning office, and budget office, can coordinate water quality pursuits with planning and regulation of water supply, natural resource protection, and other economic, social, and environmental objectives. As in any general-purpose government, trade-offs can be assessed, a balance sought, and priorities set among many governmental responsibilities.

-Equity. All similar sources within the state are likely to receive similar regulatory treatment.

-Legal sufficiency. States have police powers that allow them constitutionally to regulate private lands, if that is needed for nonpoint source control and location of sewer lines, for example.

-Pollution regulatory experience. States have the most experience regulating rural dispersed sources, such as agriculture, silviculture, and mining. Also, regulation of point sources for water pollution control is traditionally a state responsibility. In some states that have regulated erosion and environmentally sensitive areas, regulation of urban nonpoint sources (stormwater and erosion), as well as rural sources, would be in keeping with the existing governmental style and tradition. These states are exceptions, however. In most states where urban stormwater and suburban erosion are regulated, local governments are the main regulators. In those states, one of the main arguments against a state regulatory role is that nonpoint source regulation associated with urban growth is politically unacceptable for state government. In these states, regional or state regulation of nonpoint pollution associated with urban and suburban growth is considered an unwarranted infringement on local rights and traditions.

Other problems with additional state regulation are:

-Lack of accessibility. Local citizens have less access to and control over state regulatory agencies than local ones because of geographical and political distance. However, minority interests may receive more attention from state agencies than from local ones.

-Less political acceptance. States may prove less politically acceptable than localities as drafters of regulations over previously uncontrolled sources. 26/ The cost of carrying out a regulatory program may be much higher if a state has to hire surveillance and enforcement personnel to inspect all urban nonpoint source sites rather than if a local agency, using mostly existing staff and local administrative processes, carries out these tasks.

3.6 Summary

The functions that localities perform best are generally considered to be the ones that have minimal impact on neighboring jurisdictions or require considerable political accountability, popular participation, and continuing political support for efffective performance. 27/ Permitting, site inspections, and surveillance for urban and suburban erosion prevention can be conducted locally. However, some municipalities may lack the technical expertise to develop standards for these urban/suburban sources and to conduct instream water quality monitoring. When large polluters are involved, localities may suffer incapacitating political pressures which prevent effective standard-setting and enforcement.

States have the expertise to set standards, to perform in-stream monitoring and to bring major enforcement actions for stormwater and suburban erosion control, but they are often unable to tap local public opinion or encourage needed citizen participation to support controversial land use related programs. State action may be required

to ensure equitable treatment of pollution sources throughout the state, to stimulate local action on urban nonpoint pollution, and to provide localities with the technical assessment of pollutants and water quality impacts. States will likely have a greater role in regulation of rural nonpoint sources, including standard-setting, permitting, monitoring, and enforcement of controls on agriculture, silviculture, and mining pollution.

Areawide planning agencies are best able to conduct and coordinate planning for land use and water quality through a continuing planning process. Some regional councils are also able to coordinate water quality planning with capital improvement plans for their region. However, these agencies may lack the experience and state and local political support required to take on direct pollution regulation.

As a rule, regulatory functions are most compatible with the other responsibilities and capabilities of general-purpose city, county, or state governments, rather than with those of special-purpose districts and regional planning agencies which have less public accountability, political support, and program flexibility. The experience of the U.S. Soil Conservation Service illustrates the strengths of political rather than natural resource boundaries. The service started with a preference for watershed boundaries for its local soil conservation districts, based on hydrological and technological considerations. However, the service shifted to countywide districts, which fitted better into the political and legislative system of the states. Political and legislative support turned out to be more important to the service than natural environmental considerations. 28/

4.0 Intergovernmental Strategies

As the foregoing discussion illustrates, state, local, and areawide governments have assets and capabilities which differ from state to state. The answer to the question "Which level of government should regulate?" usually is "All."--a sharing of responsibilities with each level performing the functions it handles best. Environmental success stories point to the strength of intergovernmental action. The issue becomes how to draw the levels of government together into specific institutional arrangements.

4.1 The Existing Institutional Setting for Intergovernmental Strategies

Today's institutional maze in which water quality agencies will operate consists of many agencies of general-purpose local, state, and federal governments; regional planning bodies; and a wide array of special-purpose authorities, some serving small local jurisdictions and others serving entire metropolitan regions, river basins, or watersheds. Local government fragmentation has greatly increased since the 1960s, mainly because of the continued proliferation of special districts for sewage treatment, water supply, fire protection, and other services. By 1972, there were over 1,000 areawide special districts and authorities in metropolitan regions. Sanitary districts were the most common, numbering over 300.29/ Most special districts are located within a single county.30/ The fragmentation process has been stimulated by federal areawide grants and planning requirements, combined with local governmental reluctance to reorganize themselves to meet demands for regional services. Furthermore, the boundaries of most of these special districts differ. Each was established to optimize the economic efficiencies and political necessities of one particular governmental service, and each type of service has its own optimum jurisdiction from these standpoints.

Excessive fragmentation of governmental agencies has produced inefficient and inequitable services and regulations. One town or county passes along the costs of poor waste management to its neighbor in the form of pollution. These external diseconomies, as they are called, also occur when provision of one service is promoted to the detriment of other governmental objectives in the same community. In some cases, functions are assigned to jurisdictions that do not have the management expertise, sufficiently broad geographic perspective, or adequate legal authority to regulate or perform the required service.

Federal, state, and local units have pursued regional strategies that often work at cross-purposes and create tensions between general-purpose local governments and special districts, or between planning agencies and operating authorities. Plans are drafted by regional councils that can neither implement the plans nor ensure conformance of special districts and substate

entities with those plans. Affected individual citizens and groups have been shut out from effective participation in governmental decisions and are unable to recall or otherwise control some decisionmakers, such as those administering special districts.

Many different procedures and structures have been utilized in an attempt to increase intergovernmental cooperation and overcome problems of metropolitan fragmentation. Multipurpose special districts, single-purpose special districts over several counties, intergovernmental agreements, voluntary metropolitan councils of government, and urban counties have been established in some instances. Twenty percent of the states have sought metropolitan regional reorganization. 31/ Researchers and metropolitan reformers have urged multipurpose regional governments, but few have been created. Recent research has identified the county, reorganized and given urban powers, as the core of what is called metropolitan governments in the United States. 32/ There are no multicounty general-purpose metropolitan governments in the United States, nor are there any multicounty, multipurpose metropolitan special districts. 33/ The Municipality of Metropolitan Seattle (Seattle Metro), a special district, has two functions, wastewater and transportation management, but operates essentially in one county, King County.

Local elected officials and the voters have opposed major reorganizations of local governments into larger, unified governments. Since 1945, only seven city-county consolidations have been approved by the voters in areas with populations over 100,000. 34/ Creation of metropolitan federations is even rarer. The Twin Cities (Minnesota) Regional Council, along with its Metropolitan Sewer Board, is often cited as an example of a two-tiered metropolitan federation in which a multicounty regional council controls a special-purpose multicounty district. It is, however, the only instance of this governmental structure in the United States, and it has been characterized as a state agency, not a regional one. 35/ Usually, it has been more politically acceptable for local decisionmakers to act on a function-by-function basis and establish an independent special district or to enter into an interlocal contract than to seek multipurpose regional governmental approaches.

Intergovernmental service agreements--procedures to achieve cooperative actions--are a common practic among local governments, particularly for sewage and solid waste disposal and water supply, often because there is no practical alternative. Cooperation is more apt to come in areawide rather than local aspects of a function. A 1972 survey showed over twice as many agreements in the sewage disposal function as in the construction of sewage lines. 36/ Metropolitan and suburban jurisdictions are most frequently involved in service agreements. Rural municipalities in at least 16 of the 71 functions surveyed made heavier use of state agencies for interjurisdictional coordination. 37/

4.2 Representative Intergovernmental Strategies

While bold government restructuring may be the only way to achieve truly

comprehensive regional environmental management, initial water quality management planning efforts may want to focus on improving the effectiveness of any communication and coordination between existing institutions. Once the present structure has been rationalized, more innovative approaches will be easier to accomplish.

A particularly successful intergovernmental regulatory strategy for control of certain pollution sources, including erosion, septic tanks, and stormwater, might be to have the state set minimum standards and implementation guidelines. Local governments, soil conservation commissions, or sanitary districts could then adopt standards at least as strict as the state's, and establish a permitting, surveillance, and enforcement process. The state could share enforcement powers or maintain an appeals process to hear complaints about local decisions. Local ordinances would be approved by the state agency, and local performance reviewed periodically. If the local agency failed to adopt such an ordinance or did not administer it adequately, the state agency would assume responsibility for that jurisdiction. State standards would be in effect until a local ordinance was adopted. Localities could adopt more stringent standards. Typically, mining, forestry, and agricultural practices would be covered by state permitting and enforcement processes, not local ones. State agencies might also provide the localities with funds, technical assistance, access to computers,and environmental data, upon request.

Virginia uses this general approach to control erosion from large-scale construction activities (most other erosion sources are exempt). 38/ The Virginia Soil and Water Conservation Commission sets minimum standards and guidelines for local implementation. Conservation districts, after approval of their erosion control program by the state commission, establish conservation standards for various types of soils and land uses, including control techniques; review and approve control plans of individual construction applicants; issues permits; and conduct monitoring, inspections, and enforcement.

Where there is no conservation district, or where the local govenment has a state-approved program (whether or not a district exists), the locality develops the erosion and sediment control program and exercises the responsibilities of a district. However, the local government can assign any of these jobs to the local conservation district by joint agreement. A town within a county can adopt its own program, establish a joint program with the county, or assign responsibility to the conservation district. The state conservation commission may review erosion and sediment control plans when applicants request commission approval and the plan involves land in more than one local jurisdiction. The state commission also reviews erosion and sediment control plans of state agencies. Final decisions of the conservation districts can be reviewed by the state commission, which are then subject to court review.

Another common sharing of responsibilities between state and local governments is demonstrated by regulation of septic tanks in North Carolina. 39/ The state established standards and guidelines for approval of septic tanks. Local health officers issue permits, conduct site visits, surveillance, and

enforcement for septic tanks up to 10,000 gallons. The larger septic tanks, those for large commercial establishments, must receive permits from the Department of Natural and Economic Resources (DNER) in Raleigh. DNER has been training local sanitarians and providing technical assistance to local programs to help ensure that local permit issuance will not mean reduced pollution control. In other states, septic tank regulation might also involve regional planning agencies which could conduct soil surveys and map an area's acceptability for such disposal. Meanwhile, the state could set standards and legal minimum that localities would enforce through permits.

Intergovernmental approaches may be appropriate for regulating dischargers to public sewer systems. EPA, the state water quality agency, and local governments or sanitary districts could divide responsibilities for standard-setting, permitting, monitoring, and enforcement.

In deciding where to assign land use controls, the literature 40/ generally supports a sharing of powers between regional or state agencies and municipalities, which means an incremental shift of local controls to higher authorities. In almost every case, however, the need for continued local administration is stressed. Recommendations usually call for regional or state standards for local land use controls. Regional standards would govern large-scale developments and critical environmental areas. Some states have sought to have these significant developments first viewed locally and then regulated by a regional or state agency. One analyst suggests an appeal from local zoning action to a regional or state agency or special court. 41/

Other land use reformers suggest that land use controls be granted selectively to local governments, such as only to larger municipalities and those that effectively use the controls. 42/ Some analysts suggest that joint interlocal zoning be conducted or that urban counties be more involved. 43/ By assigning land use controls for water quality to a general-purpose land use regulatory agency, such as a zoning commission rather than a water agency, land use management can pursue multiple objectives and avoid a myopic focus on water quality.

The Dade County, Florida government is an example of an urban county with land use powers. It has subdivision control power over the entire county, including the area inside municipalities. It also zones areas outside incorporated municipalities and sets minimum performance and service standards for municipalities. The county reviews municipal conduct of its powers and can take over inadequately performed functions. Also, Dade County has a coordinated permitting process. The Dade County Development Impact Committee (DIC) is made up of the representatives of various county departments affecting developments, as well as other state and local authorities which influence or are influenced by development. 44/ The DIC reviews all developments of county impact and development impact statements, and either resolves conflicts or refers them to the County Executive Commission for resolution.

The Dade County DIC represents an attempt to provide a key ingredient needed in intergovernmental strategies: effective and improved intergovernmental and interagency coordination. Decentralized governmental systems are more complex than unified approaches with just one regulatory agency. However, these decentralized, intergovernmental patterns are less disruptive of existing governmental roles, can draw on the strengths of all participating jurisdictions, and will likely be favored by water quality management planners.

The means of achieving coordination among water quality actions and agencies can vary from area to area. Some communities may rely on such procedural techniques as the use of A-95 reviews or environmental impact statement reviews. Other coordination techniques include intergovernmental contracts and agreements for the joint exercise of powers. New review and approval procedures may be established that require a water quality coordination agency to approve government grants or construction that affects water quality. Other planning areas may seek organizational solutions involving the transfer and consolidation of functions within a new or existing agency of government.

When several agencies are involved in regulation, planning, and management, some agency, such as the state water quality agency, should be designated as the lead agency or chief coordinator. The coordinating agency must be able to impose sanctions against local, regional, and state agencies that fail to comply with provisions of the plan. The states are ultimately responsible for adoption and implementation of effective areawide water quality plans. 45/

One coordination approach is suggested by the Model Land Development Code, which calls for local governments to be allowed to exercise additional land use controls if they develop their controls in accordance with state or regional standards. 46/ The Virginia erosion control law, previously discussed, utilizes such an approach.

In Washington, 47/ Virginia, 48/ and Vermont, 49/ permit coordination laws are used to link state agency procedures, hearings, and deadlines when more than one state agency issues a development or construction permit. Local agencies could be allowed to participate in these permit coordination processes. These states' coordination laws are limited, however, because the coordinated process is optional with the applicant. If the state would benefit but the applicant would not, no coordination is achieved. Other coordination techniques that could be used include adoption of state and local growth policies to achieve environmental, as well as other social and economic goals; coordination of state agency planning; and environmental appellate review. 50/

5.0 Appropriate Agency: Politics, Personalities, and Professions

The previous section discussed the impact of structure and governmental form on regulatory programs. However, in assigning regulatory powers structure may

not be as important as the politics, personalities, and professions that characterize the regulatory agency and its staff. These considerations are particularly important in deciding which agencies should regulate which water pollutants after the level(s) of government are selected.

A regulatory agency's relationship with political parties, legislators, mayors, and pressure groups is critical, as are the personalities of the top managers and the behaviorial aspects of agency personnel. Indeed, Hein concludes that structure appears to be less important than "political, personality and situational factors" in raising the issue of limiting growth and enforcing noise and visual pollution controls. 51/ If a state or local agency has received substantial political support in the past, it may be more politically acceptable as a water quality regulator. Governing bodies may be more inclined to give that agency the necessary statutory authority and funds for regulation.

The professional makeup of the regulatory agency will influence its approach to regulation. Engineers tend to perform differently from lawyers. As Irwin, Selig, et al. point out, engineers will emphasize the need for cooperative relationships with dischargers to achieve compliance and stress negotiations between engineers. 52/ Engineers as regulators tend to settle for less than perfect compliance, while keeping one eye on utimate objectives. Engineers tend to view available resources for abatement as fixed and not to be challenged. On the other hand, lawyers may fear that agency cooperation will be misused by sources to gain unnecessary delays. They tend to focus on what the law says must be done and less on limits to available resources. Lawyers are more likely than engineers to favor adversary proceedings of both the judicial and administrative sort and to view sanctions and adversary proceedings as deterrents to other potential polluters.

The effect of interest groups will vary from agency to agency. It is relatively easy for a special technological constituency and professional staff to control a special district which is based on the paramount importance of technological solutions. Nontechnological constituencies will be less influential with special districts. On the other hand, general-purpose governments will likely involve more persons and interest groups than just the technologists.

Different administrative styles result from different agency histories, constituencies, legal authority, and professional disciplines. In state government, the water pollution control agency is likely to be staffed largely by sanitary and other engineers and to a lesser extent by biologists and other scientists. More recently, these agencies have added attorneys to the staff as regulation has been stepped up. State health departments also hire engineers and public health school graduates, and have a close relationship with the local health departments which, in many instances, carry out state regulations for septic tanks, water supply, and solid waste disposal sites.

Conservation departments, with responsibility for fish, wildlife, wetland, forestry, and parks, are staffed more by natural resource managers. They tend to emphasize direct land and water management approaches, technical assi-

stance, and charges to users and to have a less adversarial regulatory style. Planning agencies at all levels have a mix of professional disciplines, including natural scientists, economists, and political scientists; however, most are planning school graduates. The legal staff is minimal or nonexistent since these agencies have no regulatory responsibilities.

Agencies that have traditionally conducted regulatory programs are usually best able to quickly assimilate a regulatory perspective over nonpoint sources. The agencies that have provided farmers, mining companies, and foresters with technical and financial assistance, as well as direct management aid, may be unable to adopt enough of an adversary posture to conduct an effective regulatory program over the same parties. The assistance function could continue to dominate the regulatory responsibility.

For example, in some regions, the soil conservation districts have such strong ties to farmers as technical assistants that it would be extremely difficult for them to adopt a regulatory posture and to add concern for water quality to their previous mission of soil conservation. In other areas, the soil conservation districts may be more inclined to regulate erosion than a state water pollution control agency which regulates point sources but resists nonpoint source controls. Attitudes often vary with the personality and viewpoint of agency staff and leadership.

The same consideration applies at the local level. A city's public works department or sanitary district, which traditionally has been a service organization, may find it difficult to adopt an administrative style and professional mix to regulate the same municipal and industrial users. However, building inspectors, county health departments, zoning commissions, and environmental departments have a history of local regulation and have the staff, procedures, and attitudes to regulate water pollution sources.

State water pollution control agencies' styles also vary from state to state. Where pollution problems are particularly severe, and political support for tough enforcement is strong as, for example, in Illinois, New York, and California-the state has an enforcement style based on administrative proceedings and court actions. Other states emphasize cooperative compliance in which state's engineers work with sources in a technical assistance mode. Here, sources comply voluntarily for the most part. The staff works with the discharger on his problem and does not confront him with the full force of the law. In some states, statutes emphasize informal negotiation. In any state, however, a considerable amount of compliance depends on voluntary compliance by sources, negotiation, and consent orders, a negotiated agreement enforced in the courts. If this regulatory pattern is applied to nonpoint sources, then a major consideration in assigning regulatory jobs is who can strike the best bargain with the dischargers to achieve a solution the regulatory and regulated parties can accept.

Irwin, Selig, et al. point out that bargaining style has important substantive ramifications for enforcement. They identify as characteristics of an effective enforcement program: (1) visibility of pressures (the willingness to seek penalties in response to violations); (2) consistency (and therefore

predictability); and (3) a certain amount of distance between the regulators and the regulated.53/ Ultimately, the question must be asked, "Which agency and administrators have a history of political stamina to enforce pollution controls effectively?" Hines, in his 1971 study of water pollution regulation, concludes that "the problem with administration of water quality laws has not been too much flexibility, but too little backbone to use coercive measures when conciliatory approaches fail to produce compliance."54/

6.0 Role of Citizen Boards and Professional Agencies

After levels of government and agencies are selected as water quality regulators, a third institutional issue arises: what should be the role of elected or appointed boards and fulltime professional staffs? State and local governments use a variety of citizen boards and commissions to regulate water pollution, to administer zoning and other land use controls, and to direct special districts. Some boards are elected, others appointed by the governor, city or county council, or mayor. These boards exercise a variety of policy setting, budgetary, regulatory, adjudicatory, planning, and review powers. Some are purely advisory to full time agency staff.55/

A 1974 survey of cities indicates that more cities are likely to expand existing boards (51 percent) than to create new ones to perform environmental functions.56/ Environmental matters are assigned to planning commissions, parks and recreation commissions, or historic preservation boards. However, in only 14 percent of these cities were boards given any enforcement functions Most employ education, investigation, and advisory techniques.

These state and local citizen bodies can be particularly useful in generating political support and voter acceptance for regulatory programs and in expanding citizen participation in decisionmaking. Thus, some states have found them useful in adopting regulations, environmental performance standards, and land use plans. An advantage of local and state boards is that their business is usually conducted in public, opening up governmental decisionmaking processes to the view and participation of the public.

However, citizens who serve part time and who are usually unpaid are less effective in making decisions that require considerable technical expertise or investment of time, such as issuing permits, conducting surveillance, or bringing enforcement actions. Professional agencies do these jobs better. Citizen boards tend to operate in an ad hoc manner and may treat similar pollution sources differently. Their decisions tend to be based on personal points of view and less on policy implications and rigorous analysis. A group of decisionmakers acts less decisively than a full time professional staff and moves more slowly in abating a pollution crisis. A department that must await a consensus from a governing board is slowed in its regulatory process. A major criticism of appointed boards is their lack of political accountability and their dilution of the chief executive's administrative abilities. Since members serve staggered terms and can be removed only for "cause," it takes a

governor, city council or mayor several years to appoint a majority.

Furthermore, some board members may have conflicts of interest between their regulatory duties and their full time jobs. For example, many realtors and builders serve on zoning commissions. An ordinance requiring public financial disclosure and forbidding conflicts of interest may be appropriate if regulatory powers are assigned citizen boards.

In conclusion, boards composed of appointed or elected members could adopt goals and policies, while the day-to-day implementation of those policies should be left to professional, technical staffs.

CHAPTER ONE

CHOICE OF APPROPRIATE LEVELS AND AGENCIES OF GOVERNMENT FOR PERFORMANCE OF SECTION 208 MANAGEMENT TASKS

FOOTNOTES

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9. Advisory Commission on Intergovernmental Relations, Regional Decision-Making: New Strategies for Substate Districts 12, Substate Regionalism and the Federal System, vol. 1 (Washington, D.C.: Government Printing Office, 1973) [hereinafter cited as 1 ACIR].

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12. 4 ACIR, supra note 5.

13. Id.

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18. Id. at 49.

19. Hein et al., supra note 10, at ii.

20. Id. at 225.

21. Id.

22. Michael Jungman, "Areawide Planning Under the Federal Water Pollution Control Act Amendments of 1972: Intergovernmental and Land Use Implications," 54 Tex. L. Rev. 1047, 1070 (1976).

23. Hein et al., supra note 10, at 225.

24. Id.

25. Melvin Mogulof, Governing Metropolitan Areas: A Critical Review of Council of Governments and the Federal Role (Washington, D.C.: Urban Institute, 1971); and id., Five Metropolitan Governments (Washington, D.C.: Urban Institute, 1972).

26. The lack of an areawide planning element in the Clean Air Act has caused some persons concern. For example, Roger Strelow, in "Reviewing the Clean Air Act," 4 Ecol. L. Q. 583, 589 (1975), wrote, "There is growing recognition that if regulations impacting heavily on people's lifestyles are developed too far away from the 'grass roots,' the public will neither support nor accept them."

27. 4 ACIR, supra note 5, at 68.

28. Robert J. Morgan, Governing Soil Conservation: Thirty Years of the New Decentralization (Ames, Iowa: Iowa State University Press, 1965).

29. 4 ACIR, supra note 5, at 46.

30. While, in 1972, 2,418 special districts had boundaries extending into two or more counties, three-fifths of these were soil conservation districts located in nonmetropolitan areas. 1 ACIR, supra note 9, at 2.

31. Hein et al., supra note 10, at ii.

32. Id. See also Mogulof, Five Metropolitan Governments, supra note 25.

33. Hein et al., supra note 10.

34. 1 ACIR, supra note 9, at 12.

35. Hein et al., supra note 10, at 225.

36. 4 ACIR, supra note 5, at 32.

37. For additional information on governmental arrangements in metropolitan areas, see Hein et al., supra note 10; 1 and 4 ACIR, supra notes 9 and 5; Roscoe Martin, Metropolis in Transition: Local Government Adaptation to Changing Urban Needs (Washington, D.C.: Government Printing Office); Mogulof, Governing Metropolitan Areas: A Critical Review of Council of Governments and the Federal Role, supra note 25; Committee for Economic Development, Modernizing Local Government (New York, 1966); id., Reshaping Government in Metropolitan Areas (New York, 1970); and National Commission on Urban Problems, Building the American City (Washington, D.C.: Government Printing Office, 1968).

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42. David Heeter, Toward a More Effective Land Use Guidance System: A Summary and Analysis of Five Major Reports (Chicago: American Society of Planning Officials, 1969).

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48. For a description of the Virginia law, see Hearings Before the Subcomm. on Fisheries and Wildlife Conservation and the Environment of the Virginia House Comm. on Merchant Marine and Fisheries (Sept. 18, 1975) (testimony of Gerald P. McCarthy, Chairman, Va. Council on the Environment, and appendix).

49. For a description of the Vermont law, see Interagency Permit Committee: Interim Report, Part II, to Honorable Thomas P. Salmon (Oct. 30, 1975).

50. For a description of these various land use and environmental coordination techniques, see Bosselman, Feurer, and Siemon, supra note 44.

51. Hein et al., supra note 10, at 212.

52. Irwin et al., supra note 1, at 37.

53. Id. at 8.

54. Hines, Public Regulation of Water Quality in the United States, supra note 2, at 580.

55. Elizabeth H. Haskell and Victoria Price, State Environmental Management: Cases Studies of Nine States 270-71 (New York: Praeger, 1973).

56. Steve Carter, Murray Frost, Claire Rubin, and Lyle Sumek, Environmental Management and Local Government 35 (Washington, D.C.: Government Printing Office, 1974).

CHAPTER TWO

LEGAL ISSUES IN WATER POLLUTION REGULATION

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CHAPTER TWO

LEGAL ISSUES IN WATER POLLUTION REGULATION

1.0 Introduction

Water pollution regulation for point and nonpoint sources raises a number of legal issues pertaining to the scope of regulatory powers and the compliance of regulations with broader constitutional requirements. Five common questions regarding the scope of enabling authority are discussed below:

1. Are state agencies delegated sufficient power to regulate point and nonpoint pollution sources?

2. Are local, general purpose units of government delegated sufficient power to regulate point and nonpoint sources under (a) general land use control statutes, (b) special enabling statutes, or (c) home rule powers?

3. Are regional planning agencies or other regional entities delegated sufficient powers under one or more sources of enabling authority?

4. Are special purpose units of government delegated such powers?

5. Do state pollution regulations preempt local regulations across the board or under certain circumstances?

Assuming adequate enabling authority, state and local regulations must meet added constitutional tests. Common issues also discussed below include:

1. To what extent must regulations comply with statutory procedures?

2. Do point and nonpoint controls serve valid police power objectives?

3. To what extent must regulatory standards (the means) be related to regulatory goals (the ends)?

4. To what extent must regulation treat similarly situated property owners equally?

5. To what extent must regulations contain specific standards in delegating discretionary powers to regulatory boards?

6. To what extent may pollution controls diminish property values without invalidly "taking" private property?

Each issue will be discussed in turn.

2.0 Sufficiency of Enabling Authority

2.1 Sufficiency of Pollution Control Power Delegated to State Agencies

State agencies possess only those regulatory powers expressly granted or necessarily implied from enabling legislation.1/ Regulations which exceed the scope of enabling legislation violate state and federal due process requirements and are invalid. Authority for adoption of point and nonpoint pollution control regulations may be found in specific water pollution control legislation or other land use control statutes.

2.1.1 State Water Pollution Control Laws

A 1975 report prepared for the United States Environmental Portection Agency, Compilation of Federal, State and Local Laws Controlling Nonpoint Pollutants 2/ analyzes and quotes statutes authorizing state regulation of point and nonpoint water pollution. This report concludes that states have adequate water pollution control enabling authority for most point sources but not for nonpoint sources. The report places water pollution legislation in four main categories with regard to nonpoint sources: 3/

1. Statutes which deal only with point source pollution and are not broad enough to include pollution from nonpoint sources. The report suggests, but does not conclude definitively, that the statutes of Nevada, Iowa, and Kansas fall in this category.4/

2. Statutes which specifically cover both point and nonpoint sources. Only Massachusetts and Georgia apparently qualify.5/

3. Statutes which do not specifically consider point or nonpoint sources of pollution (since no specific reference is made to the source of pollution). The report indicates that the legislation of more than half of the states falls into this category and that "[b]ecause the statutes are broadly drawn and not limited by references to specific types or sources of pollution, the state agency responsible for administering the statute apparently has a sufficiently broad legislative mandate to regulate and abate pollution from both point sources and nonpoint sources."6/

4. Statutes which do not specifically address point or nonpoint pollution or which include a definition of point source pollution but no corresponding reference to nonpoint sources in the legislation.

The report ambiguously concludes that:

> It is certainly arguable in states with such legislation that, although specific types of pollution are referenced in the legislation, the general purpose clause and the general definition of pollution are sufficiently broad to include nonpoint sources of pollution. However, it is also arguable that when the legislatures enacted statutes which specifically mention one or more types of sources of pollution, the legislative intent was merely to control pollution from those sources which were specifically identified.7/

2.1.2 Other Sources of Enabling Authority for State Water Pollution Control

Despite the uncertain scope of explicit water pollution statutes with regard to nonpoint sources, authority for regulation of nonpoint pollution may be found in statutes authorizing state control of critical areas or of particular uses. Pollution control is often an explicit although secondary regulatory objective in these statutes. These statutes usually authorize a natural resource, state planning, or other agency rather than a pollution control agency to adopt regulations:

1. Shoreland (inland lake and stream) statutes - State agencies in Wisconsin, Minnesota, Vermont, Maine, Michigan, and Washington are authorized to adopt standards for local regulation of shoreland areas (inland lakes and streams) for the purpose of protecting aquatic life, reducing water pollution, and meeting other objectives.8/ Pollution control is usually an express objective. A variety of provisions have been adopted pursuant to such statutes to reduce nonpoint pollution including fill and grading controls, tree-cutting regulations, and sanitary codes.

2. Flood plain legislation - Twenty-four states authorize state agencies to directly regulate or adopt standards for local regulation of floodway or broader flood plain areas.9/ Pollution control is often an express, albeit secondary, objective. Regulations are often adopted pertaining to storage of flammable or polluting materials on the flood plain. Onsite waste disposal systems are usually prohibited in all or a portion of the flood plain.

3. Wetland legislation 10/ - Fifteen states authorize state agencies to directly regulate coastal wetlands or establish local standards for such regulation; four authorize state regulation or state standard-setting for local regulation of inland wetland areas. Many programs reduce water pollution by regulating dredge and fill and location of onsite waste disposal systems in tight soil and high groundwater areas.

4. Coastal Legislation 11/ - Every coastal and great lake state has adopted legislation directly regulating certain coastal zone areas

or uses or establishing standards for local regulation of such areas or uses. Examples of direct regulation include Rhode Island, Delaware, and New Jersey. State standard-setting for local regulation is authorized in Maine, North Carolina, Washington State, Wisconsin (Great Lakes), and other states. Many of these acts list pollution control as a primary or secondary objective. Programs often adopt standards pertaining to nonpoint sources such as dredge and fill, onsite waste disposal, tree-cutting and alteration of wetlands.

5. Scenic and Wild River Statutes 12/- Almost one half of the states authorize a state agency to regulate directly or establish standards for local regulation of scenic and wild river areas. Control of pollution is often an express objective. Most programs tightly control industrial, commercial, and mining uses in such areas, prohibit dams and other waterway improvements; establish minimum lot sizes and setbacks for residential structures; and control tree-cutting.

6. Legislation Pertaining to Development of Regional Impact 13/ - Florida and Vermont have adopted legislation authorizing the control of development of regional impact by state agencies or regional commissions. The Vermont act contains a variety of provisions related to point and nonpoint sources of pollution. Conditions pertaining to grade and fill, wetland protection, tree-cutting, and other types of conditions are commonly attached to development permits.

7. Plumbing and Sanitary Codes - Virtually all states authorize state agencies to adopt sanitary and/or plumbing codes. Administrative regulations adopted pursuant to these statutes typically prohibit onsite water disposal systems in high groundwater, near surface bedrock, or under tight soil conditions.14/

8. Subdivision Control Statutes 15/ - State subdivision review or interstate land sales acts have been accepted in at least thirteen states. Typically these acts require that proposed lots be suitable for onsite waste disposal (if sewage disposal systems are not provided). Grading and fill controls may also be required.

9. Mining Control Statutes 16/ - Statutes in thirty-eight states authorize the adoption of surface mining controls. Most list pollution control as a primary objective. The pollution impact of each proposed mining operation is evaluated.

10. Utility Plant Siting Controls - Statutes in over half the states authorize the regulation of utility plants.17/ Many of these list water pollution control as a principal objective.

2.2 Sufficiency of Pollution Control Power Delegated to Local General Purpose Units

Like state agencies, local units of government generally possess only those regulatory powers expressly granted or necessarily implied from

enabling statutes and state constitutional provisions.18/ Legislatures delegated local units regulatory powers through (a) general land use enabling statutes for zoning, subdivision controls, and building codes; (b) special enabling statutes pertaining to sanitary and plumbing codes, nuisances, erosion controls, and so forth; and (c) constitutional statutory "home rule" provisions which permit local units to exercise "residual powers" (not exercised by the state) pertaining, primarily, to matters of local concern.

It is impossible to lay down iron clad rules concerning the sufficiency of enabling authority for local government control of point and nonpoint sources of pollution throughout the nation, since land use control statutes and case law interpretations differ somewhat from state to state. Nevertheless, several generalizations are possible.

2.2.1 General Land Use Enabling Authority

General land use enabling statutes authorizing cities, villages, towns, or boroughs to adopt zoning, subdivision controls, and building codes appear sufficiently broad to permit adoption of several types of nonpoint pollution controls in most states. Only a small portion of the general enabling acts specifically mention pollution, but authority for adoption of such controls may be found in broad statutory language authorizing the adoption of regulations to protect public "health and safety", protect the "public welfare", and "promote the most suitable use of land throughout a community."19/ Subdivision enabling acts commonly authorize regulations requiring the installation of sewage disposal facilities. Many communities have, pursuant to zoning enabling authority, adopted fill and grading controls, control of solid waste disposal sites, controls on mineral operations, and controls on the types and manner of uses in shorelands, slopes, coastal areas, and other areas sensitive to pollution sources. Subdivision regulations are used to control land development practices such as grading and fill (which may lead to sedimentation), drainage, the use of septic tanks, and the installation of sewers.

Despite the sufficiency of delegated powers for control of certain nonpoint pollution sources, general land use control enabling powers are limited in several respects:

1. Zoning enabling statutes for one or more classes of local government units (e.g., cities) specifically exempt agricultural uses in twenty states.20/ The exemptions effectively prevent zoning control of agricultural practices causing point or nonpoint pollution sources such as erosion, feed lots, and application of fertilizers. One court held that the agricultural exemption applied to the application of sewage sludge to a field as fertilizer.21/ Agricultural uses are also typically exempted from subdivision control and building code enabling acts.

2. Zoning enabling statutes for one or more classes of local government partially or wholly exempt existing uses in twenty-six states.22/ As a result,

the power of a local unit to prohibit existing point and nonpoint pollution sources by zoning is restricted. Subdivision regulations and building codes apply prospectively in all states.*

3. In general, zoning, subdivision controls, building codes, and other special codes do not apply to governmental uses such roads and sewage treatment plants which may be major pollutors.23/ In some instances, governmental uses are exempted by enabling acts. More often, courts hold governmental uses exempt from local regulations as a matter of case law based upon theories of "preemption" or the lack of legislative intent to control such uses.24/ Federal uses are invariably held exempt from state and federal controls unless the federal government has agreed to be bound.25/ State uses are also generally exempt from local controls.26/ Local governments are generally exempt from the regulations of another local unit or even their own regulations if they are operating in a governmental capacity.27/ Quasi-public uses such as public utilities are usually considered bound by local regulations but are specifically exempted by some enabling statutes.28/

4. Serious preemption issues may also arise in many states concerning local regulation of point sources of pollution (e.g., industries, municipal sewage treatment plants) where the state simultnaeously regulates such uses. See discussion below.

2.2.2 Special Pollution Control Enabling Authority

Special enabling statutes adopted in a small number of states specifically authorize local point source pollution controls.29/ A larger number authorize sanitary codes 30/ and other nonpoint pollution controls such as shoreland zoning and regulation.31/

The pattern and scope of special enabling authority is highly varied throughout the nation. These regulations are subject to several limitations common to general land use control enabling authority including (1) general inapplicability to governmental uses and (2) possible preemption by state pollution controls. However, nuisance regulations and sanitary codes may, in some instances, apply to existing as well as new uses.

2.2.3 Home Rule Powers

Constitutional and statutory home rule power is delegated to municipalities in thirty-four states and counties in twelve states. See Figure 1. In general, home rule powers are confined to matters of "local" concern.32/ Therefore, the adoption of local point source pollution controls pursuant to home rule powers may, in some instances, be open to dispute, due to the widespread adoption of state-level point source controls and legislative

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*However, certain "housing" and plumbing codes have retroactive application. In addition, a number of states expressly authorize the application of zoning regulations to existing uses through "amortization" or other provisions.

statements that water quality is a matter of statewide concern. Nonpoint pollution controls more clearly lie within home rule powers.

Local nonpoint pollution controls adopted as part of zoning, subdivision controls, or building codes would, in most states, need to comply with broad local land use control enabling authority despite home rule powers since courts generally require that local units comply with specific statutory enabling authority addressing a subject even where granted broad home rule power.33/

The extent to which local units of government have, in fact, adopted pollution regulations pursuant to home rule power is unclear. A wide range of controls might be possible concerning construction, septic tanks, sewer connections, solid waste, sludge disposal, erosion, agricultural uses, and so forth. Nevertheless, regulations adopted pursuant to home rule powers are subject to several limitations common to other regulations including (1) inapplicability to governmental uses, in most instances, and (2) possible preemption by state pollution controls.

2.3 Sufficiency of Pollution Control Power Delegated to Regional Planning Agencies or Other Entities

Apparently every state has authorized the formation of regional planning agencies encompassing several or many local units of government. These agencies are playing a leadership role in 208 water quality management planning but are not authorized to regulate land uses.34/

Several statutes authorize local units of government to delegate regulatory powers to regional planning agencies, 35/ but few have done so.

Despite the general lack of regional planning agency implementation authority, a number of special regional metropolitan units of government and regional regulatory agencies have been created by special enabling acts and vested with regulatory powers, such as the Twin Cities Metropolitan Waste Control Commission 36/ the San Francisco Bay Conservation and Development Commission37/ and the Lake Tahoe Regional Planning Agency Commission.38/

2.4 Sufficiency of Pollution Control Power Delegated to Special Purpose Units of Government

Special purpose units of government such as flood control districts, soil and water conservation districts, and sanitary districts are not generally authorized to regulate land use, or are vested with narrow regulatory powers such as the power to adopt erosion controls held by soil and water conservation districts in many states.39/ However, the scope of special district powers is limited; and districts have been reluctant to regulate land uses, relying instead on public educaton and persuasion.

FIGURE 1*

HOME RULE CONSTITUTIONAL AND STATUTORY POWERS

State	Constitutional Home Rule Provisions	Unit
Alask.	Art. 10 ss. 9, 10, 11	1st class boroughs and cities
Ariz.	Art. 13, s. 2	Cities over 3,500
Calif.	Art. 11, s. 6 et seq.	Cities (including towns) counties
Colo.	Art. 20, ss. 1-6	Cities and towns over 2,000
Conn.	Art. 10 s. 1 (limited)	Towns, cities, boroughs
Dela.		Municipalities over 1,000
Flor.	Art. 8, s. 1 et seq.	Counties, municipalities
Geor.	Art. 15, s. 1	Counties, municipalities
Idaho	Art. 12, s. 2	Counties and incorporated cities and towns
Illi.	Art. 1, s. 6a et seq.	Certain counties, municipalities over 25,000, other municipalities
Iowa	Art. 3, s. 38A Amdt. 25	Cities
Kans.	Art. 12, s. 5	Cities, counties
Louis.	Art. 6, ss. 5, 6, 8, 17	Parishes and municipalities
Maine	Art. 8 s. 1	Municipality

* Extracted from E. Strauss and J. Kusler, Statutory Land Use Control Enabling Authority in the Fifty States (Federal Insurance Admin., U.S. Dep't of Housing and Urban Development, 1976).

FIGURE 1 (cont'd)

	Constitutional Home Rule Provisions	Unit
Mary.	Art. XI-A, ss. 1-7 Art. XI-F, ss. 1-10 Art. XI-E, s. 6	Baltimore, counties
Mass.	104-104H	Cities, towns
Mich.	Art. 7, s. 22	Cities, villages
Minn.	Art. 12, ss. 3, 4, 5	City, village, county
Mo.	Art. 6, s. 18a-18d (county) Art. 6, s. 19 (city)	Counties over 85,000, cities
Nebr.	Art. 11, s. 2 et seq.	Cities over 5,000
Neva.	Art. 8, s. 8	Cities and towns
N.J.		Municipalities
N.Y.	Art. 9, ss. 9, 11-13 Repealed, 1964	Municipalities
Ohio	Art. 18, ss. 3-7	Municipalities
Okla.	Art. 18, ss. 2-7	Cities over 2,000
Oreg.	Art. XI, s. 2-2a Art. VI, s. 10	Counties, cities, towns
Penn.	Art. 15, s. 1 Repealed 1968	Cities of 1st class
R.I.	Art. 28	Cities, towns
Tenn.	Art. 11, s. 9	Cities, counties
Texas	Art. 11, s. 5 Art. 9, s. 3	Cities over 5,000, counties
Utah	Art. 11, s. 5	Cities, towns
Wash.	Art. 11, ss. 10, 11 Amend 21	Counties, cities, towns
W.V.	Art. 6, s. 39a	Municipalities (cities, towns, villages) over 2,000
Wisc.	Art. 11, s. 3	Cities, villages

FIGURE 1

HOME RULE CONSTITUTIONAL AND STATUTORY POWERS

State	Statutory Home Rule Provisions	Specific Reference To Land Use
Alask.	Generally 29.13.010 et seq. Also: 29.08.010, 29.08.050, 29.23.555, 29.73.020, 29.73.030	Statute: 29.13.100 (15) (bldg. code)
Ariz.	Generally 9 281 et seq.	
Calif.	Govt 23700 et seq. (counties) Govt 34400 et seq. (cities)	
Colo.	Generally 36-28-1 et seq. (counties), also 66-31-25	
Conn.	Generally 7-187 et seq.	
Dela.	Generally 22-801 et seq.	
Flor.	166.011 et seq. (cities) 125.001 et seq. (counties)	
Geor.	Generally Chapter 69-10	Constit: Art. 15 s. 2-8404 (zoning)
Idaho		
Illi.	Generally relies on constitution 24 s. 1-1-9	
Iowa	City Code, title XV, Code of Iowa	358A.8 (zoning) 332.3 (bldg. code)
Kans.	Generally relies on constitution. 19-101 et seq. Also 12-137, 12-138, 15-124	
Louis.	Generally 33:1381 et seq.	Constit: Art. 6 s. 17 (zoning)
Maine	Generally 30 s. 1912 et seq.	
Mary.	Generally 23A s. 9 et seq. (city) 25B s. 3 et seq. (county)	Statute: 23A s. 9(c) (zoning)
Mass.	Generally Chapter 43B	
Mich.	Generally Chapter 117	s. 117.4; (zoning)

FIGURE 1 (cont'd)

	Statutory Home Rule Provisions	Specific Reference To Land Use
Minn.	Generally 410.04 et seq.	
Mo.		
Nebr.	Generally relies on constitution 19-501, 19-603, 19-610, 19-606	
Neva.	Appears to rely on constitution 266.005, 266.010	
N.J.	Home Rule Act 40:42-1 et seq.	
N.Y.	Municipal Home Rule Law, Book 35c	
Ohio	701.05, 701.06	
Okla.	11 s. 558 et seq.	
Oreg.	Generally 203.710 et seq. (county)	
Penn.	Generally 53, s. 13101 et seq.	
R.I.		
Tenn.		
Texas	Generally s. 1165 et seq. (cities) s. 1606a et seq. (counties)	Statute: 1175(26) (zoning)
Utah		
Wash.	35.22.030 et seq. (cities over 10,000)	
W.V.	Home Rule Chapt. 8A repealed 1969, now consolidated with: Chapter 8 - Municipal Law (8-12-2)	Statute: 8-12-5(30) Statute: 8-12-13 (bldg. code)
Wisc.	Generally 66.01; also 61.34(5), 64.14	

2.5 Preemption of Local Regulations by State Pollution Controls

The adoption of state-level point source pollution controls in all 50 states raises serious preemption issues for local point source controls, although the issue has not been widely litigated to date. Only a small number of states, such as Florida and New York, expressly authorize local as well as state controls.40/ In general, courts hold that state regulations pertaining to a particular subject "preempt" conflicting local regulations concerning the same subject whether adopted pursuant to general statutes, special statutes, or home rule.41/ But, legislative intent is the real issue.42/ Until recently, point sources of pollution were regulated almost entirely at the state level and major nonpoint sources (e.g., fill and grading) at the local level. However, preemption is an emerging issue relating to nonpoint sources, with increased state regulation of these sources. Enabling statutes may, of course, clarify the matter by expressly providing that state regulations do not preempt local controls which equal or exceed state regulations.

3.0 Other Constitutional Tests

In determining the constitutionality of regulations, courts first look to the sufficiency of enabling authority to authorize, in a general sense, adoption of regulations as discussed above. Having decided this, they determine whether regulations comply with broader constitutional requirements (discussed below).

3.1 Regulatory Compliance with Statutory Procedures

Courts generally require that regulations be adopted and administered in close compliance with statutory procedures.43/ Statutory procedures typically include notice and hearing prior to adoption of regulations in the evaluation of special permits, publication of regulations, voting requirements, amendments, and procedures for issuance of development permits.

Despite the insistence upon close compliance with statutory procedures, courts have not traditionally demanded much in the way of "comprehensive" planning prior to adoption of regulations, 44/ although this position is gradually changing in some states. This is surprising considering the prior planning requirements contained in the zoning enabling acts of 42 states and subdivision enabling acts of 22 states.45/ This reluctance may be due, in part, to the failure of many acts to specifically describe "comprehensive" plans and to the poor quality of many planning efforts. Courts have often found the required "plan" embodied within regulations.46/

3.2 Valid Objectives Served by Point and Nonpoint Source Pollution Regulations

Courts require that regulations serve valid police power objectives to satisfy due process requirements.47/ However, courts now afford legislatures broad discretion in selecting regulatory objectives 48/ and have strongly endorsed protection of health and safety, 49/ prevention of nuisances,50/

and prevention of water pollution.51/ They have given less weight to protection of aesthetic values and protection of wildlife values,52/ but this is slowly changing.

3.3 The Relationship Between Regulatory Standards (the Means) and Regulatory Goals (the Ends)

In order to satisfy due process requirements, regulatory standards (the means) must have some reasonable tendency to achieve the regulatory goals (the ends).53/ The most common ground for invalidation of pollution controls has been the failure of the regulatory standards to accomplish or aid in the accomplishment of the regulatory goals. For example, the Minnesota Supreme Court held invalid a rule of the state pollution commission prohibiting discharge of sewage effluent at a point 1.1 miles downstream from a city water supply intake.54/ The court felt that such prohibition was unreasonable in light of the very remote possibility of pollution of a city's water supply which would require simultaneous (a) low flow conditions in the stream and diverse winds, likely to occur once every 26 years, and (b) breakdown of both the city sewage treatment and water supply treatment facilities.

Reasonable regulations must, of course, be based upon an adequate factual base. For example, the Delaware Supreme Court held invalid the refusal of a zoning board of adjustment to issue a permit for a trailer park because of possible pollution of a nearby creek because of lack of evidence of possible pollution. The court stated:

> The finding concerning pollution of the creek is a finding of nothing more than a possibility, not a probability; the evidence on which it is based is simply the expression of fears of pollution by lay witnesses; no reason appears in the record why any possibility thereof cannot be eliminated by proper safeguards. Although public safety is a proper matter for the Board's consideration, the mere possibility of contamination of a stream is clearly insufficient to justify the denial of an otherwise permitted use, at least when there is no evidence to indicate that the possibility cannot be avoided by adequate methods.55/

Reasonable regulations msut take into account varying conditions and circumstances. For example, the Illinois supreme court held invalid a county pollution control ordinance requiring that all streams and ditches "used for the final discharging of effluent from sewage treatment and disposal systems must be of a continuous flow."56/ The court noted:

> The ordinance would apply inflexibly without consideration of the practical impossibility of compliance and without regard to the quality of treatment that might be obtained

> by other means . . .No specific scientific or other evidence was presented to demonstrate the hygienic necessity for the unusual restriction that effluent be finally discharged into a continuously flowing stream. Rather, the county's attempted justification for the ordinance was through simply generalized expert testimony, that such a requirement tends, through a more rapid process of dissolution, to reduce the potential threat sewage waste poses to public health.57/

Assumptions concerning the "cumulative effects" of potential pollution sources must also be reasonable. For example, the Pennsylvania supreme court held invalid a four-acre minimum lot size requirements for an unsewered area despite arguments the cumulative effects of future development would cause water pollution. The court noted:

> The township engineer's testimony on the subject of drainage and sewage was vague and unconvincing, consisting as it did, of the bald statement that he felt there was a danger of pollution. In addition, this opinion was based upon the hypothetical case of the entire township being developed on the basis of one acre lots maximum, a situation very unlikely to occur in the near future and probably never.58/

The reasonableness of a regulation in a given circumstance may depend upon many other factors including existing uses; natural resource values and hazards at the sites; existing water quality; property values; and broader water and land use policies and plans. Quite clearly the relationship between the ends and means need not be demonstrated with mathematical precision. As noted by the Supreme Court "[i]f the validity of the legislative classification . . . be fairly debatable, the legislative judgement must be allowed to control."59/

Courts have, in some instances, sustained regulations for particular polluting uses even where a comprehensive program addressing all such uses has not been instituted. For example, a county court in New York sustained an air pollution control law regulating the maintenance of incinerators and fuel burning equipment in privately owned dwellings, notwithstanding the alleged fact that privately owned dwellings were responsible for less than 1 percent of total pollution from all sources.60/ The court held that:

> [T]he fact that legislation, which is reasonably related to the public health and welfare, and thus consitutes a proper exercise of the police power under the due process clauses of State and Federal Constitutions, is merely a step in the direction of something which will enure to the public health and comfort, and that it does not go as far as it might, is not a reason for invalidating it.61/

3.4 Equal Protection

In order to satisfy equal protection requirements, regulations must avoid discriminating between similarly situated landowners.62/ Discrimination is a successful basis for constitutional challenge in land use control cases, 63/ although it has rarely been successfully applied in pollution cases.

Although the principle of equal treatment for similarly situated landowners is clear, problems arise in deciding whether landowners are "similarly situated." Courts have, with some exception, held that regulations which apply primarily or exclusively to new uses do not discriminate against existing uses, because retroactive regulation is not favored and existing uses are differently "situated" than new uses.64/ Courts have also not usually demanded that regulations apply to all areas or uses at once and have permitted legislative bodies to address "an existing evil without covering the whole field of possible abuses."65/ Courts have held that identical regulations need not apply to lands with similar natural resources characteristics, since differences may arise in planning goals and the broader regulatory context.66/

3.5 Standards for Delegating Discretionary Powers to Regulatory Agencies and Boards

Statutes and local ordinances typically delegate to regulatory boards "permitting" authority for structures, fills, and other uses with pollution potential without establishing rigid guidelines for allowed and prohibited uses. Regulatory boards exercise a combination of fact-finding and policy-setting power in determining the appropriateness of proposed uses in particular circumstances.

In traditional zoning contexts, courts have often held that quite certain standards must be established to delegate discretionary powers and limit the exercise of such powers.67/ However, with little exception, courts have sustained unquantified standards such as "protection of public safety" or "prevention of nuisances."68/ Similar standards are often contained in pollution prevention statutes and ordinances. Courts have sanctioned broad discretionary pollution control powers in a number of cases. For example, the New York supreme court upheld a state pollution control statute against attack that it did not contain sufficiently specific standards with the following rationale, which is quoted at some length because of its applicability to most pollution controls:

> The Legislature may constitutionally confer discretion upon an administrative agency only if it limits the field in which the discretion is to operate and provides standards to govern its exercise . . . That does not, however, mean that a precise or specific formula must be furnished in a field "where flexibility and the adoption of the (legislative) policy to infinitely variable conditions constitute the essence of the

> program." Lichter v. United States, 334 U.S. 742, 785 . . . It is enough if the Legislature lays down "an intelligible principle,": specifying the standards or guides in as detailed a fashion as is reasonably practicable in the light of the complexities of the particular area to be regulated . . . Obviously, the Legislature cannot "constitutionally [be] required to appraise beforehand the myriad situations to which it wishes a particular policy to be applied and to formulate specific rules for each situation. Necessity therefore fixed a point beyond which it is unreasonable and impractical to compel the Legislature to prescribe detailed rules." American Power & Light Co. v. Securities and Exchange Commission . . . 329 U.S. 90 , 105 . . . If it were otherwise, the Court added the "legislative process would frequently bog down."69/

A similar broad grant of power to an expert agency was sustained in a federal court decision affirmed by the Supreme Court.70/ However, the Illinois supreme court held invalid a broad grant of discretionary power to determine the sufficiency of pollution controls to a nonexpert county zoning board of adjustment.71/

Despite the legal sufficiency of broad discretionary pollution powers, local units of government often find that adoption of a clear statement of regulatory goals, minimum quantified performance standards where applicable, and discretionary powers with regard to other matters are advisable to give certainty to landowners and guide the exercise of administrative discretion.

3.6 The Taking Issue

The issue of regulations "taking" private property without payment of just compensation is an overestimated and overpublicized restraint upon regulations. Courts do, of course, invalidate pollution regulations in some instances, but rarely as a taking of property. Regulations are more often found "unreasonable."

Judicial approval for pollution controls is due to several factors. First, courts often uphold regulations which are soundly conceived and where some economic use remains for land even if the regulations substantially diminish property values.72/ Pollution controls typically establish performance standards for uses or prohibit only limited uses with high pollution potential, while permitting a wide range of existing uses if in compliance with minimum standards (e.g., residences in a lakeshore area if adequately set back from the water and on large lots). Second, courts give great weight to regulations with a reasonable relationship to public safety or prevention of nuisances and invariably support such regulations even where they severely impact upon private property.73/ Courts have reasoned that property owners do not have a property right to threaten public safety or cause nuisances; therefore, regulations preventing such activities do not take property.74/ The Supreme Court has noted that

when human life is involved, legislatures may "adopt the most conservative course which science and engineering have to offer . . ."75/

An additional rationale for support of pollution regulations is found in the landmark Wisconsin case, Just v. Marinette County.76/ In that case, the court sustained state and county shoreland zoning controls containing many land use control standards for protection of water quality including tight control of filling and grading in wetlands adjacent to lakes that caused a substantial decrease in property values. The court held that tight wetland controls did not "take" property because of the relationship between wetlands and water quality and the need to preserve lakes for the common good. The court clearly distinguished contrary wetland cases from other jurisdictions and concluded that no taking occurred because the landowner has no inherent right to destroy the natural suitability of the land at the expense of harm to the public:

> While loss of value is to be considered in determining whether a restriction is a constructive taking, value based upon changing the character of the land at the expense of harm to public rights is not an essential factor or controlling.77/

Despite this overall judicial approval, courts have occasionally disapproved pollution regulations which are not soundly conceived or impose unique and special burdens upon private property owners for the common good. For example, some courts have held that regulations prohibiting riparians from boating, swimming, and fishing to protect the water supply are unreasonable or a taking of property.78/

Courts will no doubt be called upon during the next decade to decide whether particular regulations are valid or invalid as a taking. Nevertheless, based upon existing cases one may expect overwhelming support for soundly conceived point and nonpoint source pollution controls. This is particularly true for prospective regulations.

CHAPTER TWO

LEGAL ISSUES IN WATER POLLUTION REGULATION

FOOTNOTES

1. E.g., A. H. Smith Sand & Gravel Co. v. Department of Water Resources, 313 A.2d 820 (Md. App. 1974).

2. Aspen Systems Corporation, Compilation of Federal, State and Local Laws Controlling Non Point Pollutants (Washington, D.C.: U.S. EPA, 1975).

3. Id. at 9-13.

4. Id. at 10.

5. Id. at 11.

6. Id. at 13.

7. Id.

8. E.g., Wis. Stat. Ann. §§ 59.971, 144.26 (West 1974 & Supp. 1976); Wash. Rev. Code Ann. § 90.58.010 et seq. (Supp. 1976). For a more complete listing, see E. Strauss and J. Kusler, Statutory Land Use Control Enabling Authority in the Fifty States (U.S. Dep't of Housing and Urban Development, Federal Insurance Admin., 1975) [hereinafter cited as Strauss and Kusler].

9. E.g., Ill. Ann. Stat. ch. 19, § 65f (Smith-Hurd Cum. Supp. 1973-76) La. Rev. Stat. Ann. § 455A.35 (West 1971). See also Strauss and Kusler, supra note 8.

10. E.g., Mass. Ann. Laws ch. 130, § 105 (Michie/Law Co-op 1974); Md. Nat. Res. Code Ann. § 9-101 (1974). See also Strauss and Kusler, supra note 8.

11. E.g., N.C. Gen. Stat. § 113A-100 (Supp. 1975); R.I. Gen. Laws § 46-23-1 (Supp. 1976). State coastal zone regulation in Maine, Washington, and Wisconsin (a Great Lake state) is undertaken pursuant to shoreland or shoreline regulation acts which also apply to inland lakes and streams. See note 8 supra.

12. E.g., Cal. Pub. Res. Code Ann. § 5093.50 (West Cum. Supp. 1977); Md. Nat. Res. Code Ann. § 8-401ff (1974 & Supp. 1976).

13. Vt. Stat. Ann. tit. 10, § 6001 (1973 & Supp. 1976); Fla. Stat. Ann. § 380.05.06 (West 1974).

14. See J. W. Patterson, R. A. Minear, and T. K. Nevded, Septic Tanks and the Environment (Springfield, Va.: National Technical Information Service, NTIS PB 204 519, June 1971).

15. Mich. Comp. Laws Ann. §§ 560.105(b), 560.117 (1967 & Supp. 1976); Minn. Stat. Ann. § 83.20 (West Supp. 1976). See also Strauss and Kusler, supra note 8, table 13 at 16.

16. See E. Imhoff, T. Friz, and J. LaFevers, A Guide to State Programs for the Reclamation of Surface Mined Areas (Geological Survey Circular No. 731, 1976).

17. See National Association of Regulatory Utility Commissioners, 1974 Annual Report on Utility and Carrier Regulation 480, table 42 (Washington, D.C., 1976).

18. See, e.g., 1 R. Anderson, American Law of Zoning § 3.05 at 131 (1968) [hereinafter cited as R. Anderson], citing Ball v. Jones. 272 Ala. 306, 132 So.2d 120 (1961); Trust Co. of Chicago v. City of Chicago, 408 Ill. 91, 96 N.E.2d 499 (1951); City of Somerset v. Weise, 263 S.W.2d 921 (Ky. 1954); and other cases.

19. The Standard State Zoning Enabling Act promulgated by the U.S. Department of Commerce in 1926 and adopted by most states authorizes (in section 3) regulations to "secure safety," "promote health and general welfare," and "facilitate the adequate provision of sewage." Regulations are to encourage "the most appropriate use of land throughout . . . [a] municipality."

    A model subdivision regulation act developed by Edward M. Basset et al. and also adopted in part by many states authorizes regulations which will "tend to create conditions favorable to health, safety, convenience, or prosperity." Such regulations may include requirements for "water, sewer, and other utility mains, piping, connections and other facilities." Edward M. Basset et al., Model Laws for Planning Cities, Counties, and States (Cambridge, Mass.: Harvard University Press, 1935).

20. See Strauss and Kusler, supra note 8.

21. Grundy County v. Soil Enrichment Materials Corp., 9 Ill. App. 3d 746, 292 N.E.2d 755 (1973).

22. See Strauss and Kusler, supra note 8.

23. Id.

24. See, e.g., Rutgers State Univ. v. Piluso, 60 N.J. 142, 286 A.2d 697 (1972); Town of Bloomfield v. New Jersey Highway Auth., 18 N.J. 237, 113 A.2d 658 (1955).

25. See E. Yokely, Zoning Law and Practice § 2-25 at 112 (3d ed. 1965) and cases cited therein; 2 R. Anderson, supra note 18, at 119-20 and cases cited therein.

26. See, e.g., Mackie v. Township of Redford, 4 Mich. App. 233, 144 N.W.2d 690 (1966), and cases cited at note 24 supra.

27. See 2 R. Anderson, supra note 18, § 9.03 at 106, and cases cited therein. E.g., State v. Kopp, 330 S.W.2d 882 (Mo. 1960); Appeal of Radnor Township School Authority, 434 Pa. 249, 252 A.2d 597 (1969).

28. 2 R. Anderson, supra note 18, § 9.29 at 173. See generally State ex rel. Kearns v. Ohio Power Co., 163 Ohio St. 451, 127 N.E.2d 394 (1955); Kahl v. Consolidated Gas, Elec. Light & Power Co., 191 Md. 249, 60 A.2d 754 (1948).

29. E.g., Fla. Stat. Ann. §§ 403.021(4) and 403.061(20) (West Supp. 1975); N.Y. Envir. Conserv. Law § 17-1101 (McKinney 1973).

30. E.g., Wis. Stat. Ann. § 59.07(51) (West 1974).

31. See, e.g., Wis. Stat. Ann. §§ 59.971, 144.26 (West 1974 & Supp. 1976); Minn. Stat. Ann. § 105.485 (West Supp. 1976).

32. See, e.g., Willoughby Hills v. Corrigan, 20 Ohio St. 2d 39, 278 N.E.2d 658 (1972).

33. See generally 1 R. Anderson, supra note 18, §§ 3.06, 3.07 at 133 ff., and cases cited therein.

34. However, several states authorize regional agencies to assume zoning and other powers upon agreement of cities, towns, or counties. E.g., Nev. Rev. Stat. § 278.140.

35. E.g., La. Rev. Stat. Ann. § 33:13 (West Supp. 1977); N.M. Stat. Ann. § 14-57-1 (1976); N.D. Cent. Code § 11-35-01 (1976).

36. See Minn. Stat. Ann. § 473.504 (West Supp. 1976) (for powers of the Metropolitan Waste Control Commission). See also 1975 Neb. Laws act 317, which authorizes metropolitan counties to zone lands not otherwise adequately regulated by July 1978. California has established regional water pollution control boards. See Cal. Water Code Ann. § 13200 (West 1971 & Supp. 1977).

37. Cal. Gov't Code Ann. § 66600 et seq. (West 1966 & Supp. 1977).

38. Id. § 66801 et seq.

39. E.g., N.D. Cent. Code § 4-22-27 (1975); Wis. Stat. Ann. § 92.09 (West 1972 & Supp. 1976); Md. Nat. Res. Code Ann. § 8-1104 (1974 & Supp. 1975).

40. See note 31 supra.

41. See 56 Am. Jur.2d Municipal Corporations § 374 at 406 (1971), which states: "An ordinance in conflict with a state law of general character and statewide application is universally held to be invalid." Courts have often held that state licensing and other regulations pertaining to a subject requiring a regional or statewide perspective pre-empt local regulations. E.g., In re Public Serv. Elec. Gas Co., 35 N.J. 358, 173 A.2d 233 (1961) (borough zoning did not apply to transmission lines subject to state regulation); Erbsland v. Vechiolla, 35 App. Div. 2d 564, 313 N.Y.S.2d 576 (1970) (state regulation of uses in navigable waters prevents city regulation of boatyard); Duquesne Light v. Upper St. Clair, 377 Pa. 323, 105 A.2d 287 (1954) (township could not regulate electric transmission lines regulated at state level); Ringleeb v. Township of Parsippany-Troy Hills, 59 N.J. 348, 283 A.2d 97 (1971) (township regulation of solid wastes pre-empted by state regulation). However, courts have upheld more restrictive local regulations where there was no need for a uniform statewide policy. E.g., Miller v. Fabius Township Bd., 366 Mich. 250, 114 N.W.2d 205 (1962) (township regulation of water skiing valid despite less restrictive state regulations pertaining to the subject). Agreements may be made for uniform state pollution control policy, particularly point sources. This was recognized by the Vermont Supreme Court in Kedroff v. Town of Springfield, 127 Vt. 624, 256 A.2d 457 (1969), which held that state pollution controls "amended" or "repealed" local zoning. The court voted that pollution control embraced "the states as a whole, and is not merely a local concern." Id. at 461. On the other hand, the Wisconsin Supreme Court, in State v. Deetz, 66 Wis.2d 1, 224 N.W.2d 407 (1974), recognized that erosion control may be validly exercised through local "zoning and subdivision and land use regulations." Id. at 418.

42. See, e.g., Hartford Union High School v. Hartford, 51 Wis.2d 591, 187 N.W.2d 849 (1971); Golden v. Board of Selectmen of Falmouth, 358 Mass. 519, 265 N.E.2d 573 (1970).

43. See, e.g., County Builders, Inc. v. Lower Providence Township, 5 Pa. Commonw. Ct. 1, 287 A.2d 849 (1972); Hutchins v. Prasifka, 450 S.W.2d 829 (Tex. 1970).

44. See generally discussion of comprehensive plan requirements in 1 R. Anderson, supra note 18, § 5.02 et seq., at 230 ff., and cases cited therein; and C. Haar, "In Accordance with a Comprehensive Plan," 68 Harv. L. Rev. 1154 (1955).

45. Strauss and Kusler, supra note 8, table 37 at 7.

46. See, e.g., De Meo v. Zoning Comm'n of Bridgeport, 148 Conn. 68, 167 A.2d 454 (1961); Cleaver v. Board of Adjustment, 414 Pa. 367, 200 A.2d 408 (1964).

47. E.g., Barney & Casey Co. v. Town of Milton, 324 Mass. 440, 87 N.E.2d 9 (1949); Miller v. City of Beaver Falls, 368 Pa. 189, 82 A.2d 34 (1951).

48. See, e.g., Berman v. Parker, 348 U.S. 26 (1954).

49. See, e.g., Queenside Hills Realty Co. v. Saxl, 328 U.S. 80 (1946).

50. See, e.g., Pierce Oil Corp. v. City of Hope, 248 U.S. 498 (1919); Hadacheck v. Los Angeles, 239 U.S. 394 (1915).

51. See, e.g., Shirley v. New Hampshire Water Pollution Comm'n, 100 N.H. 294, 124 A.2d 189 (1956); Madison Metro. Sewerage Dist. v. Committee on Water Pollution, 260 Wis. 229, 50 N.W.2d 424 (1951).

52. See, e.g., Barney & Casey Co. v. Town of Milton, 324 Mass. 440, 87 N.E.2d 9 (1949); Morris County Land Improvement Co. v. Parsippany-Troy Hills Township, 40 N.J. 539, 193 A.2d 232 (1963). Compare Corsa v. Tawes, 149 F. Supp. 771 (1957); United States v. Joseph G. Monetti, Inc., 331 F. Supp. 151 (1971); Potomac Sand & Gravel Co. v. Governor of Maryland, 293 A.2d 241 (1972); Turnpike Realty Co. v. Town of Dedham, 284 N.E.2d 891 (1972). For cases on wildlife law, see Michael Bean, The Evolution of National Wildlife Law, prepared for the Council on Environmental Quality by the Environmental Law Institute (Washington, D.C.: Government Printing Office, forthcoming).

53. See, e.g., Nectow v. City of Cambridge, 277 U.S. 183 (1928).

54. North Suburban Sanitary Sewer Dist. v. Water Pollution Control Comm'n, 281 Minn. 524, 162 N.W.2d 249 (1968).

55. Zoning Bd. of Adjustment of New Castle v. Dragon Run Terrace, 222 A.2d 315, 318 (Del. 1966).

56. Krol v. County of Will, 38 Ill. 2d 587, 233 N.E.2d 417, 419 (1968).

57. Id., 233 N.E.2d at 419-20.

58. National Land & Investment Co. v. Kohn, 419 Pa. 504, 215 A.2d 597, 609 (1965).

59. Euclid v. Ambler Realty Co., 272 U.S. 365, 388 (1926).

60. Oriental Boulevard Co. v. Heller, 297 N.Y.S.2d 431 (1969).

61. Id. at 437-38.

62. Yick Wo v. Hopkins, 118 U.S. 356 (1886).

63. E.g., Marquette Nat. Bank v. County of Cook, 24 Ill. 2d 497, 182 N.E.2d 147 (1962); Christine Bldg. Co. v. Troy, 367 Mich. 508, 116 N.W.2d 816 (1962).

64. E.g., Zahn v. Board of Pub. Works, 195 Cal. 497, 234 P. 388 (1925), aff'd, 274 U.S. 325 (1927). But see State v. Glidden Co., 228 N.C. 664, 46 S.E.2d 860 (1948).

65. Whitney v. California, 274 U.S. 357, 370 (1967).

66. See, e.g., Kozenik v. Montgomery Township, 24 N.J. 154, 131 A.2d 1 (1957).

67. See generally cases cited in Annot., 58 A.L.R.2d 1083 (1958); D. Mandelker, "Delegation of Power and Function in Zoning," 1963 Wash. U. L. Q. 60.

68. Mandelker, in "Delegation of Power and Function in Zoning," supra note 67, at 74, comments: "Judicial approval of nuisances standards has been overwhelming, and in many instances the fact that a noxious use is being regulated has encouraged the court to uphold the delegation."

69. City of Utica v. Water Pollution Control Bd., 5 N.Y.2d 164, 156 N.E.2d 301, 304-05 (1959).

70. Texas Co. v. Montgomery, 73 F. Supp. 527 (1947), aff'd, 332 U.S. 827 (1947).

71. Krol v. County of Will, 38 Ill. 2d 587, 233 N.E.2d 417 (1968). This ordinance provided that "all sewage treatment or disposal systems to be installed in Will County must be of a design and location that is approved by the Health Authority." The court found that the requirement vested the Health Authority with discretionary power which was "not controlled, limited or guided by any rules, criteria or requirements in the ordinance." Id. at 420.

72. See, e.g., Potomac Sand & Gravel Co. v. Governor of Maryland, 266 Md. 358, 293 A.2d 241 (Md. Ct. App. 1972), cert. denied, 409 U.S. 1090; Spiegle v. Beach Haven, 46 N.J. 479, 218 A.2d 129 (1966); Simon v. Needham, 311 Mass. 560, 42 N.E.2d 516 (1942).

73. See cases cited in notes 51, 52 supra and note 77 infra.

74. See, e.g., Mugler v. Kansas, 123 U.S. 623 (1887).

75. Queenside Hills Realty Co. v. Saxl, 328 U.S. 80, 83 (1946).

76. Just v. Marinette County, 56 Wis. 2d 7, 201 N.W.2d 761 (1972).

77. Id., 301 N.W.2d at 771. The court also noted at 201 N.W.2d 768:

> Is the ownership of a parcel of land so absolute that man can change its nature to suit any of his purposes? The great forests of our state were stripped on the theory man's ownership was unlimited. But in forestry, the land at least was used naturally, only the natural fruit of the land (the trees) were taken. The despoilage was in the failure to look to the future and provide for the reforestation of the land. An owner of land has no absolute and unlimited right to change the essential natural character of his land so as to use it for a purpose for which it was unsuited in its natural state and which injures the rights of others. The exercise of the police power in zoning must be reasonable, and we think it is not an unreasonable exercise of that power to prevent harm to public rights by limiting the use of private property to its natural uses.

78. See, e.g., Bino v. City of Hurley, 273 Wis. 10, 76 N.W.2d 571 (1956); Pounds v. Darling, 75 Fla. 125, 77 So. 666 (1918). Contra, State v. Heller, 123 Conn. 492, 196 A. 337 (1937); Commonwealth v. Hyde, 230 Mass. 6, 118 N.E. 643 (1918).

CHAPTER THREE

LOCATIONAL CONTROLS FOR WATER QUALITY

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CHAPTER THREE

LOCATIONAL CONTROLS FOR WATER QUALITY

1.0 Introduction: Land Use Water Quality Relationships

One means of improving water quality is to focus on reducing the quantity and improving the quality of discharges from particular activities. This is the approach taken by most of the chapters in this handbook which detail methods for controlling pollution from activities like agriculture, silviculture, construction, and mining.

Section 208, however, also recognizes the relationship between the location of activities and their impact on water quality. Section 208(b)(2)(C)(ii), described by Russell Train as "potentially the most far-reaching provision in Section 208," 1/ requires that the areawide waste treatment management plan include "the establishment of a regulatory program to regulate the location, modification, and construction of any facilities within such area which may result in any discharge in such area . . ." Other sections list "land use requirements" among the procedures and methods to be set forth to control pollution from agriculture, silviculture, construction, and mining.2/ These provisions are amplified in EPA regulations which require, in part, that plans include: 3/

- a summary of existing land use patterns;
- a description of regulatory programs to assure that any substantive changes in the use of lands within the planning area which might cause new or deleterious discharges are regulated; and
- identification of necessary changes in state and local land use laws or certification by the Governor that the plan is in conformance with such laws.

Land use restrictions may also be required to satisfy water quality standards, particularly along river stretches designated under anti-degradation provisions.4/

Land use planning is also essential because of the potential impact of discharge requirements on industrial siting decisions. The Fifth Annual Report of the Council on Environmental Quality suggests three factors in this relationship.5/ First, the extra costs associated with introduction of pollution control technology in older plants may cause such facilities to be abandoned sooner in favor of new plants. New plants are most likely to seek locations in less densely populated areas where land is cheapest.

A second possible influence of the act depends on the implementation of cost recovery requirements for waste treatment. If such requirements lead industry to provide their own treatment systems, another incentive for

more decentralized industrial location could result.

Finally, water quality standards in heavily industrialized areas could be so stringent that new manufacturing is effectively precluded. Again, the result could be pressure to locate in areas where water quality is still high — which may mean less densely populated areas.

None of these influences will necessarily determine any individual siting decision. Transportation costs, taxes, and other factors will remain important in the decisionmaking process. But to the extent these pressures do come about, they emphasize the need for close coordination between land use and water quality planning.6/

As a procedural matter, land use decisions that impact water quality will have to mesh with waste load allocations required by section 131.11(f) and (g) of the 208 regulations. Point sources will have to be in compliance with the plan — and therefore the specific waste load allocation — in order to be approved by EPA. No means for coordinating nonpoint sources is provided in the act and specific approaches should be described in the plan.

For purposes of 208 planning, the more important question is how land use controls can effectuate water quality objectives. Siting controls reflect at least two determinants of water quality. First, the spatial distribution of discharges can make a significant difference in impact. Concentrations of particular effluents along a river stretch are more likely to overload the assimilative capacity of the river than are the same effluents distributed along the river.7/ Differences in water levels along the river because of either natural conditions or dams regulating the flow of water also result in different levels of degradation from equivalent amounts of effluent. Second, soil characteristics and geology have a lot to do with how much effluent reaches the water as the result of nonpoint discharges. For any given land use, water quality impacts will be affected by several natural characteristics, such as infiltration rates, climate, soil erosiveness, and geomorphic setting.8/ Soil erodability is a fixed property but sediment can increase drastically due to depletion of ground cover or steep slopes.9/

The relationship between land use and water quality is important at both the macrocosmic, or broad planning level, and the more localized site development level. At the macro level, for example, it has been suggested that in some situations water pollution may be related to the average distance of discharges from a water body, or at least to the existence of a buffer area.10/ Planning that provides for development away from rivers might therefore be used to minimize degradation of water quality.

The relationship between urban form and water quality is being investigated in numerous studies.11/ However, because of the idiosyncratic nature of both urban development and water bodies, general rules may not exist. Development itself can influence the character of the receiving body and therefore its reaction to effluents. To further complicate matters,

higher density development may offer opportunities for economies in treatment that offset higher pollution levels.

At the site specific level, confidence about the availability of measures to predict the consequences of development is much greater. One optimistic assessment of current techniques claims that it is now possible to "accurately predict the consequences of placing various land uses in the natural environment prior to the decision to do so."12/ Other observers are less sanguine about the exactitude, or at least the general applicability, of current methods.13/ One hypothesis (untested) is that the more sophisticated and costly predictive models are the most accurate ones. A recent study prepared for EPA noted that "although increased accuracy does usually imply increased complexity, the reverse is not true and a common fallacy is to mistake complexity for accuracy."14/

This modeling problem must be addressed at the inventory and assessment stage, but it is also relevant to the selection of a regulatory program. The more sophisticated programs, such as overlay mapping, require a great deal of information in return for the promise of much greater sensitivity to land use/water quality relationships. Whether the additional expense is justified by the benefits is a decision that may vary with local needs and the desire for precision. Legal considerations may also be relevant; the adequacy of the technical basis for a regulatory program is likely to be a significant argument in any court challenge. The more technical support there is for a given restriction on development, the better the chances a court will uphold it.15/

A recent review of land use/water quality relationships examined most of the issues raised in prior studies and concluded that mitigative measures and related performance standards should be the focus of planning processes. Land use was considered a relatively inefficient means of water pollution control with three exceptions: location of onsite sewage disposal systems; prevention of direct encroachment upon wetlands; and protection of important aquifers and groundwater resources.16/ Resolution of this important technical issue is outside the scope of this handbook. This chapter will present a range of land use controls for those applications judged appropriate during engineering evaluations.

Five general approaches to land use control will be discussed in this chapter as they relate to water quality: zoning control, critical areas protection, environmental impact review, property acquisition, and taxation and charges. In addition, general legal issues are discussed following the presentation of these five topics. It should be noted that many communities have already adopted or are considering locational controls for other purposes, e.g., growth guidance. The reader is therefore advised to read this chapter in conjunction with the introduction and with chapters 4 and 6, which discuss the relationship of water quality management programs to other planning requirements.

2.0 Zoning and Other Local Land Use Controls

Zoning has been the principal means of land use control in America since 1926 when the Supreme Court decided Euclid v. Ambler Realty Co. 17/ and the Department of Commerce released the Standard State Zoning Enabling Act. Euclid upheld the validity of comprehensive zoning regulations, and the Standard Act provided a model that was enthusiastically received.

The statutory scheme has undergone some significant changes since the 1920's, but the basic principles remain much the same.18/ Land is divided into districts in which certain uses are permitted, often as of right but sometimes subject to conditions. Although originally zoning divided land into only three or four districts, 24 or 25 now seems to be a minimum. The purposes of zoning have also undergone considerable transformation. While use of the zoning power to regulate use without compensation still depends on a showing that the restriction promotes the public health, safety, morals, or welfare of a community, the interpretation of these tests has expanded tremendously.19/

Zoning was originally devised with the idea that conflicting uses in urban areas should be separated. There was little concern for the environment per se. However, environmental values have long been at least implicit in many zoning applications. For example, in granting an injunction against a gravel pit in a residential district, a Massachusetts court noted that "[t]here is no constitutional right to convert wild land into waste land."20/

More recently, courts have emphatically recognized the legitimacy of restricting land use for environmental reasons. In Hackensack Meadowlands Comm'n v. Municipal Landfill Authority,21/ the New Jersey Supreme Court upheld a prohibition on the disposal of waste collected outside the state's territorial limits. One justification for the law was the need to protect ecologically sensitive areas from the increasing pressure for sanitary landfill sites. The court noted that "[t]oday it cannot possibly be questioned that the preservation of the environment and the protection of ecological values are, without more, sufficient to warrant an exercise of [the police] power."22/

As discussed above, technical studies indicate that buffer zones restricting development around water bodies and aquifers may be an important means of protecting water quality. Numerous forms of zoning controls might be incorporated in a waste treatment management plan to reduce or prohibit development in sensitive areas. This section will consider some of the simplest and most traditional approaches, such as restrictions on rezonings and variances, and then suggest some of the newer and more innovative concepts.23/ For purposes of this discussion, it is assumed that at least general technical studies have been done and the necessity for some redirection of development has been demonstrated.

2.1 Rezonings and Restrictions on Existing Development

Where no development has occurred, rezoning may be the simplest way to affect development. A more comprehensive regulatory program may not be necessary, particularly where the land area involved is small. Zoning can be changed despite potential impacts on existing landowners. Numerous legal issues can arise as a result of rezoning, but the basic right of governments to change existing zoning is not in doubt. As one authority notes:

> If the community is to plan its pattern of land use, it must be able to alter its plan, and if courts can nullify zoning changes whenever landowner expectations suffer, plans would either petrify or be much less exacting at the outset. The law assumes that landowners understand this risk and somehow factor it into the price they will agree to pay for the raw land.24/

Rezonings are basically subject to the same legal tests applied to other police power regulations — adequacy of enabling authority, compliance with procedural requirements, and obediance to constitutional limitations.25/ One unique problem is the question of vested rights. A property owner who has begun development acquires a right to continue his use despite changes in zoning. The important legal issue is the point at which rights become vested. For example, the rule in Maryland has been that no development rights attach to property unless there has been "actual construction in reliance upon a building permit." This rule was recently applied where a builder had obtained a building permit and expended over a million dollars but not yet started construction.26/ However, other courts have used a more flexible approach and found that rights inure when substantial expenditures have been made in good faith reliance on the actions of the local government.27/

A rezoning may also be challenged when the change is not in conformance with a comprehensive plan and is alleged to be "spot zoning." Although strict enforcement of comprehensive plan requirements is a more recent phenomenon, 28/ courts have a long history of invalidating zoning amendments that appear arbitrary or discriminatory. In general, Professor Williams notes three tests for the existence of spot zoning:

1) the use permitted under rezoning is very different from the prevailing use in the surrounding area;

2) the area involved is rather small; and

3) the change was to the benefit of a specific developer rather than the community as a whole.29/

Although numerous cases relevant to these specific formulations could be examined, the issue arises most often when more permissive zoning is

adopted. In the context of strengthened regulation to benefit water quality, spot zoning should not be a problem so long as the decision clearly identifies the basis for the change and enabling authority is adequate.

Where development already exists, there may be very little governmental opportunity to eliminate that use other than through purchase or condemnation.30/ Zoning regulation cannot eliminate nonconforming uses unless they amount to a nuisance.31/ However, in many states amortization ordinances may be adopted in conjunction with zoning laws fixing the remaining life of existing uses.32/ The use must terminate once the amortization period expires.

State courts differ on the amortization period that must be allowed and the right of the landowner to make improvements or otherwise prolong the nonconforming use.33/ Some states also prohibit termination of nonconforming uses. This is the case in Massachusetts, although courts there continue to uphold substantial changes in the regulation of uses.34/ In most jurisdictions, a balancing test applies and each case is judged on the importance of the public interest in relation to the private loss.35/

2.2 Large Lot Zoning

Minimum lot size requirements, although an inherently crude regulatory technique, can serve several water quality purposes. First, where septic tanks are used for waste disposal, minimum areas may be necessary for effective absorption. This issue is discussed in chapter 5.36/ Second, stormwater runoff rates can be reduced by restrictions on residential density. This problem can be approached more directly, by performance-oriented planning controls, as described in chapter 6. Third, some types of terrain, particularly hilly areas, may be easily eroded if intensively developed. (Runoff also increases with slope.) 37/ Finally, groundwater may be threatened where development exceeds the filtration capacity of an aquifer.38/

This discussion will consider general requirements for minimum lot sizes or lot area per dwelling unit. These controls are a common use of zoning powers.39/ Where a public health justification for the regulations can be clearly proven, the legal basis for large-lot zoning is indisputable.40/ The basic requirement is a factual one: can the government demonstrate that restriction is justified by the asserted public health benefit? This factual question requires that the government make some evidentiary showing. But whether this showing is closely scrutinized can vary with state court attitudes toward the police power and suspicions about possible exclusionary motives.41/ Very large acreage requirements, such as three acres or more, are also likely to be examined more closely.42/

Even where public health reasons cannot be proven, some state courts have accepted other justifications for lot size requirements. For example, protection against overcrowding and preservation of open space have sometimes been cited as acceptable grounds.43/ However, when the lot size requirements

serve to exclude racial or economic groups by increasing housing costs, many courts will scrutinize the alleged justification much more closely. This is particularly so where the area is currently facing development pressures in a metropolitan area as opposed to being in more rural surroundings.44/ In such cases, making adequate provision for low income housing as part of an overall plan increases the likelihood of judicial acceptance.45/

A recent and important decision involving the obligation of local governments to make low income housing possible explicitly addresses the conflict between ecological goals and limitations on exclusionary zoning. In Southern Burlington County NAACP v. Township of Mount Laurel, 46/ the township included environmental factors among the reasons justifying low density requirements. The court invalidated the zoning and rejected the environmental defense by stating:

> This is not to say that land use regulations should not take due account of ecological or environmental factors or problems. Quite the contrary. Their importance, at last being recognized, should always be considered. Generally only a relatively small portion of a developing municipality will be involved, for, to have a valid effect, the danger and impact must be substantial and very real (the construction of every building or the improvement of every plot has some environmental impact)--not simply a make-weight to support exclusionary housing measures or preclude growth--and the regulation adopted must be only that reasonably necessary for public protection of a vital interest.47/

2.3 Zoning for Protection of Open Space

Zoning to preserve open space is another land use control that could be used to restrict development for water quality purposes. One way in which water quality objectives can be translated into open space requirements is through limitations on impermeable surfaces, an approach considered separately in chapter 6. Some ordinances provide for open space requirements in terms of green areas, but most of them limit only the lot coverage of structures. Paving for parking lots or other purposes is not controlled.48/ Open space requirements also might be used to create holding zones pending completion of studies on land capabilities and limitations.

California requires that all cities and counties in the state adopt both an open space plan and an implementing ordinance.49/ This legislation provides broad authority for restrictions on new development.

The validity of open space requirements depends on the purposes they are designed to serve. Where a clear relationship can be demonstrated between development and water pollution, it may be possible to enact open space controls for water quality purposes.

This may be a technically defensible approach along river bodies where buffer zones provide a valuable filtering service, as discussed above in section 1.0. For example, a prohibition on impermeable surfaces within 150 feet of the Chatahoochee River imposed under Georgia's Metropolitan River Protection Act, 50/ was found to be reasonably related to the safety and health of the community.51/

Water quality benefits may also be achieved through open space programs primarily designed to serve other purposes. For example, agricultural districts are used in some states to help preserve valuable farmland.52/ California's open space program recognizes aesthetic and recreational benefits from open space, but courts in most states may be hesitant to support regulation on these grounds.53/ Courts in California have also rejected open space zoning in some circumstances.54/

The most important justification for open space controls is undoubtedly flood plain management. Flood plains are the areas adjacent to rivers periodically subject to flooding.55/ Development in flood plains risks substantial human and economic losses and increases flood heights and velocities, spreading damage over an expanded area. Dams, flood walls, and other public works projects can prevent or reduce flood damage, but only at great expense and often with significant environmental consequences. Regulation of development in flood plains is therefore a highly desirable approach for controlling flood-related damage.

Under the National Flood Insurance Act, communities within one-hundred-year flood plains 56/ must adopt land use controls for flood plain management in order to qualify their residents for federally financed assistance for construction. The relationship between these requirements and section 208 is discussed in the introduction. Generally, development restrictions under a flood plain program would be similar to those desirable for water quality purposes.57/ Activities with low flood damage potential, such as agricultural, recreational, and other uses that do not require structures or fill, will also be acceptable from a water quality standpoint.

Flood plains are also likely to have important water quality values because the area closest to the river often serves a valuable buffer function. Moreover, flood plains are often particularly susceptible to development pressures because they are relatively flat and because of their obvious aesthetic and recreational attractions. An estimated 5 percent of the U.S. population now lives on flood plains.58/

Flood hazards also may provide a more legally defensible rationale for regulation than water quality objectives alone. Because of the clear threat to public health and safety, courts generally support restrictions on development in floodways. For example, in Turnpike Realty Co. v. Town of Dedham, 59/ the Massachusetts Supreme Judicial Court upheld a zone that allegedly reduced the value of property by over 80 percent. The property was limited to agricultural, horticultural, or recreational

uses. The court stated,"Although it is clear that the petitioner is substantially restricted in its use of the land, such restrictions must be balanced against the potential harm to the community from overdevelopment of a flood plain area."60/

Flood plain regulations thus provide one potentially valuable tool for integrating water quality controls with other programs. The most effective water quality protection may occur when water quality requirements are integrated into a larger, multi-purpose program for regulation of density and design. This issue will be addressed further below.61/

2.4 Planning for New Developments: Subdivision Controls and Performance-Oriented Zoning Techniques

Many states provide local governments the power to regulate subdivisions.62/ The model zoning enabling act developed in the 1930's provided for review of street layout and the adequacy of utility services as a condition for plat approval, and requirements for open space and even dedication of land gradually evolved. Performance bonds are also sometimes used to assure compliance with plans.

These traditional subdivision controls focus primarily on design and services apart from ecological values. However, there may be no obstacle to adding additional requirements to the subdivision approval process. For example, soil tests or other information might be required. More detailed analysis might be required through the use of an environmental impact statement, 63/ an approach discussed separately below.

Using modified subdivision controls to serve water quality objectives offers the advantage of an existing institution. The system is already in place and developers are accustomed to it, whereas a new system may require considerable time to enact and implement. Moreover, a unified subdivision approval procedure facilitates integration of land use and water quality objectives. On the other hand, the planning boards and other institutions traditionally responsible for subdivision review may not be competent to evaluate water pollution issues. The review procedure may be similar, but the expertise required is not.

One approach to integrating these functions more effectively is the use of flexible zoning techniques. Flexible zoning is characterized by substantial administrative discretion.64/ For example, planned unit developments eliminate almost all of the usual zoning restrictions in return for review of the overall desirability of a development. As a trade-off for this flexibility, the developer can be asked to make design changes that might go beyond the usual zoning controls. Moving buildings away from a stream, for example, might merit higher density elsewhere on the site.

This approach offers some opportunity for including water quality objectives, but some criteria are necessary. The land use negotiation process is also a poor forum for discussion of technical water quality issues.

A more innovative approach that is also more expensive and complicated is the use of an environmental inventory and related performance standards. This method attempts to match land uses with land capabilities; the burden of developing this information is assumed by the local government. The developer is then informed of acceptable tolerances, such as maximum quantities of runoff. He then must prepare a design that satisfies this standard. This approach is described in detail in chapter 6 and will not be discussed further. Hammer65/ doubts the usefulness of the environmental inventory approach for water quality planning, primarily because it tends to be oriented towards different objectives and because it does not adequately reflect mitigative measures.66/

Another innovative approach for incorporating water quality goals into zoning is the use of effluent allocations.67/ Under this approach, the necessity of some increases in discharges is recognized and some procedure is provided to allocate water loads. For example, one plan might limit the share of "available" discharge allocated any one applicant to 50 percent so that growth can be accomodated. Under another alternative, the available effluent limit could simply be allocated on a first-come, first-served basis (consistent with conformance to best available technology requirements) to avoid having to set a percentage figure without supporting criteria. After all "emission rights" have been allocated, new growth would then depend on further reductions in existing discharges. Such reductions would have to be implemented through the discharger's permit unless the new applicant chose to pay for improvements by an existing source.

This approach has not been used for water quality purposes but it does have a precedent in the trade-off policy adopted under the Clean Air Act.68/ An analogy also might be drawn to the principles developed for allocation of water rights. (See chapter 8 below.)

Because allocation schemes have not been used, the legal issues are difficult to predict. Equal protection is a probable issue because of the necessity for distributing burdens among dischargers. Taking claims also may be raised by the owners of property no longer able to use their property for any use that results in a discharge.

Allocation approaches, if considered, will also require close coordination by state and local authorities. The state must be involved in any decisions that involve waste load allocations and changes in discharge permits. Local governments will want to maintain control over the basic land use decisions regarding acceptable locations for future dischargers.

2.5 Zoning: Some Conclusions

The preceding analysis has suggested some of the ways that land use controls already in place or being considered for other objectives can be modified to serve water quality goals. However, many localities do not use the land use powers they already have. One authority estimates that only 5,000 out of 60,000 jurisdictions with land use powers exercised them in

1974.69/ Even allowing for some overlap among levels of government, the gap between the few sophisticated communities and the majority of communities is obviously considerable. Thus, many places may be able to make significant progress simply be implementing the powers they already have. On the other hand, it may be asking too much to expect that more than a relative handfull of communities will have the resources and commitment to go beyond these traditional methods and adopt highly technical planning systems.

Even assuming that zoning is implemented, traditional zoning techniques are subject to challenge on numerous grounds.70/ Several criticisms are pertinent to the use of zoning for water quality objectives. One issue is the impact of zoning on land values. Artificial development pressures may be created that bear no relationship to land use and environmental objectives. More fundamentally, the notion that land should be segregated by use ignores differences in the operation of uses. The focus is on segregating activities, not on conforming uses to desired social objectives. The characteristics of different uses also may change over time, so that even consistent administration may produce unintended consequences over time. Finally, zoning has been attacked for its inherent susceptibility to corruption and arbitrary decision-making.71/

Some of the more innovative zoning techniques are one answer to these criticisms. States can also help improve the zoning process. First, they can provide technical assistance to help overcome some of the resource limitations at the local level. A Wyoming statute, for example, explicitly authorizes planning grants to local governments of up to $10,000 per year.72/ Second, states can intervene in the preparation (or condition the exercise) of comprehensive plans by establishing state goals that must be reflected in local plans, an approach used in Oregon.73/ Comprehensive plans are becoming increasingly important in light of the trend among courts and legislatures to require that zoning be in accordance with a comprehensive plan.74/ Finally, states can intervene more directly, by substituting state controls for negligent or recalcitrant localities. For example, a Nebraska law mandates that counties within a standard metropolitan statistical area prepare plans and enforce zoning and subdivision regulations where the responsible municipalities fail to do so.75/

Conditions can also be imposed through requirements in the state enabling act.76/ The Adirondack State Park Agency in New York is governed in part by a regional planning authority.77/ Hawaii has gone even farther and in 1961 instituted a statewide zoning system.78/ The act divides the state into four districts: urban, rural, agricultural, and conservation. Different procedures are provided for regulation of activities in each.

The preceding section reflected the predominant local role in zoning. This may be essential politically in most states, but it also guarantees that much of the delay and inefficiency in past approaches will continue. The following two sections suggest procedures for more formal environmental analysis and for broader state involvement. The necessity for representation of local

interests is, however, recognized throughout this handbook. In almost all of the approaches discussed, state intervention is concomitant with an increase in local authority. Local power is supplemented, not usurped.

3.0 Environmental Impact Review

3.1 Introduction

Implementation of most of the more sophisticated control techniques discussed in this chapter require substantial information. As noted above in section 1.0, the water quality impact of development is a function of many variables. Even rough approximations of effect will require some review of building plans and the geomorphic characteristics of the site. Judicial acceptance of most types of regulation also will depend on evidence of the technical base supporting the control program.

Environmental impact requirements offer a means of integrating information requirements with the operation of a regulatory program. Because of the National Environmental Policy Act (NEPA) and the many state and local laws modeled after it, 79/ the term "environmental impact statement" has assumed a rather specialized meaning. Impact statements are often associated with voluminous documents, lawsuits, and bureaucratic delays. However, the general concept of environmental impact statements is simply to require some systematic attention to the foreseeable consequences of an activity. The format in which such statements are produced, the scope of considerations they address, their level of detail, and the way in which they are reviewed and used will depend on the specific purposes they are intended to serve. Some jurisdictions use them as a decisionmaking document and integrate them with the regulatory process. Others use them primarily for information purposes.

The context of impact statements also varies among the governments that require them. The most common elements are the five required in NEPA:

1. the environmental impact of the proposed action;
2. any unavoidable adverse impacts from implementing the proposed action;
3. alternatives to the proposal;
4. the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and
5. irreversible commitments of resources which would be involved if the proposal is implemented.

Another key feature of environmental impact review procedures is circulation among relevant experts and the public prior to the government's decision. This provides a method for evaluation by affected groups and experts from different disciplines.80/

Impact statements are usually applied to specific projects, such as a dam or housing development, rather than to a program or policy.81/ The impact statement has particular utility for evaluation of specific proposals and sites that cannot be adequately considered through broader techniques.

Such evaluation was always possible through hearings or permit procedures, but the impact statement provides a convenient forum for organizing and clarifying technical and policy issues.

> Having a long range view of [the consequences of] a given decision, and a basis for stopping the project, one may have at hand a strong basis for linking decisions to policies--a connection that has been difficult to achieve under the land use control system that relies on zoning and the general plan.82/

Some authorities also argue that environmental impact statements can facilitate the preparation of comprehensive plans.83/ A good planning process should already accomplish much the same function, but the impact statement approach may provide necessary additional detail regarding water quality issues.

There are at least several ways in which environmental impact statements might be coordinated with water quality programs. Where a statement is already required, water quality objectives might be specifically addressed by requiring that the applicant evaluate the impact of his proposal on the waste load allocations contained in the water quality management plan. The reviewing government should specify the data to be collected and the model(s) used to avoid later disagreements. As indicated earlier, impact statements may be most useful for evaluating issues inadequately handled by performance standards, or where more detailed evaluation is wanted for a specific site. However, they could also be used in conjunction with no discharge rules or other standards as a mechanism for review of the applicant's proposed means of compliance. In this way the statement is integrated with existing licensing requirements and does not become a separate layer of bureaucracy for the applicant. It should also be emphasized that the impact statement cannot substitute for policy; it can only clarify issues and implement policy.84/

A good example of the possible application of an environmental impact requirement is the regulation of septic tanks. In some areas, the topography and soil characteristics may require a general prohibition on the use of septic systems. 85/ However, in many places a general prohibition will not be necessary. Site specific analysis will be necessary, possibly through the use of criteria discussed in the format of an impact statement.86/

An initial question in the formulation of an environmental impact review process is the definition of activities that require a statement. Impact statements can only be required where some governmental approval is necessary, although governmental review may not have included environmental considerations.87/ Many ongoing private activities, particularly most nonpoint sources of pollution, will not trigger the EIS procedure unless some permit requirement is imposed. For those activities that are within the scope of governmental review, two approaches are most commonly used for defining the scope of the impact statement requirement. One method is to define

actions that always require environmental analysis, such as some arbitrary size of new developments. For example, a Bowie, Maryland ordinance requires impact statements for all zoning matters other than actions limited to a single family dwelling.88/ A second approach relates the impact statement requirement to environmental significance; filing is only required if a brief environmental clearance determines that the proposed action has a potentially significant environmental impact. This procedure is used by many California governments and for local projects funded by the Department of Housing and Urban Development.89/

In the context of water quality, both approaches have some merit. Some activities, such as mining and well disposal, are almost inherently associated with water pollution problems and an impact statement should be routinely required. Similarly any development in a wetland probably merits detailed review. On the other hand, residential development is not always a source of pollution. A preliminary general environmental clearance is probably desirable where the risks of development are ambiguous. The impact statement may not necessarily eliminate uncertainty, but it can be the basis for monitoring requirements or other conditions as a precautionary measure.

3.2 Illustrative Environmental Impact Statement Requirements

Although the federal EIS process has received the most notoriety, the impact statement concept is now almost as prevalent among state and local governments. At the state level, California's program is particularly advanced. The California Environmental Quality Act requires state and local agencies to prepare an environmental impact report (EIR) on any project "which may have a significant effect on the environment."90/ California's law is more detailed than NEPA, and specifically requires a discussion of mitigation measures and of the growth-inducing impact of the proposed action.

California is also one of the small minority of states that require the preparation of impact statements on private actions licensed by local governments.91/ The Massachusetts and Washington requirements also have been interpreted to apply to locally licensed private activity.92/ This application results in the use of EIRs for land use decisions and accounts for a large fraction of the estimated 6,000 impact statements prepared annually.93/

The most interesting feature of the California experience is the variation in the way impact statements are used. In Sacramento County, an interdisciplinary team of environmental specialists prepares EIRs. Internalizing the process allows the agency to build on earlier studies for evaluation of broad issues; the focus is therefore on the specific issues in each case.94/

Santa Clara County reviews impact statements within its planning department.95/ Using a relatively small staff, the county uses the impact statement as an opportunity

for detailed negotiations with the developer. County staff become involved in the site planning process. Every effort is made to reach an acceptable agreement of design and mitigation measures prior to the actual EIR review. On rare occasions, the statement serves as an opportunity for the applicant to appeal an unsuccessful initial submission.

Many smaller communities lack the resources to hire full-time experts. They rely on independent consultants by the government as needed.96/ Costs are passed along to the applicant under a provision in the state law.97/ A substantial consultant business has grown to serve this demand.

Although California has accumulated by far the most experience with impact statements, communities in many other states have experimented with EIS procedures. Recent surveys by various authorities uncovered local environmental impact statement requirements in Colorado, New Jersey, Massachusetts, New York, Iowa, Virginia, Washington and Michigan.98/ Bowie, Maryland adopted an ordinance modeled after NEPA in 1973.99/ Zoning and subdivision approvals are covered but applications for building permits are exempted. Review of impact statements is handled jointly by a Commission for Environmental Quality (appointed by the city council) and the Advisory Planning Board. Bowie's procedure is fairly typical of local ordinances in that it is piggy-backed upon zoning and site plan authority rather than upon separate enabling authority.

3.3 Delay and Costs of the Impact Statement Process

Impact statements are sometimes criticized for their cost and for their contribution to bureaucratic delays. Any new paperwork requirement will inevitably add some delay and expense at first. The real issues are whether these problems diminish with experience, and to the extent they do not, whether the costs are justified.

Studies at both the state and federal level indicate that the costs of preparing impact statements decline with use. A review of the California experience suggests that initial uncertainties in the process are a considerable source of delay. As applicants and government reviewers become more familiar with the issues, most projects become relatively routine and the costs decline.100/ A study of the federal experience by the Council on Environmental Quality stressed the importance of integrating the environmental evaluation with the agency's decisionmaking process. In most instances the environmental analysis need not add any time to the project review.101/

The cost of impact statement preparation obviously varies considerably from project to project. Estimated costs in California were approximately 0.5% for housing projects.102/ This cost can be largely transferred to the developer by requiring that he provide the statement. However, this may lead to less than a credible evaluation unless, as is done by some California governments, the reviewing agency specifies the acceptable consultants. If the government takes a more active role, public costs may be substantial. California has addressed this issue with a provision allowing imposition of fees to cover the costs of preparing impact

statements.103/ Fees of $100 to as much as $2500 or more have been cited.104/

The more important question may be whether the costs are justified. If impact statements do in fact produce projects that are more environmentally acceptable, the benefits may be worth the costs. From an economic standpoint, it also makes sense to impose the costs of development on the purchaser.105/

3.4 Legal Issues

The authority to impose impact statement requirements is clearly within the scope of the police power. In many instances, the impact statement may require little more than a change in the format of filing requirements. The procedural changes in review, such as interagency circulation, may also be accomplished by regulation. Numerous local governments have adopted impact statement requirements without specific enabling authority.106/

However, to eliminate uncertainty and provide some assurance of continuity, it may be desirable to adopt specific authority. The North Carolina Environmental Quality Act provides:

> The governing bodies of all cities, counties, and towns acting individually, or collectively, are hereby authorized to require any special-purpose unit of government and private developer of a major development project to submit detailed statements, as defined . . . of the impact of such projects. 107/

Local governments probably do not have the authority to charge fees beyond the actual costs of review unless they are empowered to set taxes.108/ Due process questions have been raised about the improper use of environmental impact statements to delay projects.109/ This has not been a significant issue to date and should not arise if the reviewing agency provides a reasonable and definite period for review and gives adequate notice of the type of information necessary.

3.5 Conclusions

Impact statements can serve the purposes of water quality planning, particularly as a supplement to the site review process. New point sources are already subject to impact statement requirements under the FWPCA* and can supplement the broader process. The impact statement is most efficient as a means of evaluating site specific questions. Areawide problems and land use characteristics should be evaluated in a more general forum. Program-focused impact statements that address policies or problems of general significance may be one approach.

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*EPA has not required impact statements on new point sources when the permit is issued by the state.

Second, some thought to describing in advance situations in which impact statements are and are not required may avoid considerable difficulty at a later stage. Preliminary, skeletal assessments can be required for borderline cases.

Finally, the necessity for expertise in the review process argues for use of some regional or at least metropolitan-wide authority to share the costs. Circulation of statements should include state and federal authorities where possible to gain the widest range of expertise. Reliance on consultants may be a second-best approach. However, costs are likely to be higher and there may be a question regarding the consultant's willingness to criticize a possible future client.

4.0 Designation of Environmentally Sensitive Areas

Zoning is primarily a tool to accommodate development. In many, if not most areas, water quality goals will require more than a minor adjustment to the standard land regulatory process. However, some areas are sufficiently sensitive to development that more than the usual planning and mitigation measures are necessary. The special demands of flood plains, discussed above, have often been incorporated in zoning requirements. Performance-oriented zoning systems also seek to include land capability as a variable in land use planning.

Critical* areas programs focus first on the environmental resource and only secondarily on the type of development that can be accommodated.110/ The function of regulation in these areas is primarily to preserve an ecologically valuable resource, such as a wetland or coastal zone. Control of development in these areas will often also serve water quality objectives. For example, wetlands serve a cleansing function and their destruction may lead to increased pollution.111/ Moreover, critical areas programs often include a data collection and inventory component that could include water quality information. Where these programs already exist, the integration of section 208 water quality management requirements should be seriously considered. In other communities, water quality goals may provide one more reason for adopting such a program.

Another factor in the evolution of some approaches to critical areas management is the realization that important environmental resources often have greater than local significance. Local zoning procedures may therefore lack the broader perspective of statewide interests. Considerable interest exists in procedural reforms along the lines of proposals made in the ALI Model Land Development Code 112/ and the ABA industrial site selection process.113/

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*"Critical" may be an unfortunate term since it suggests severity. As actually implemented, the critical areas concept has much broader application. See Council of State Governments, State of the Art for Designation of Areas of Critical Environmental Concern 1-3 (Lexington, Ky.: Dec. 1974).

Although they differ considerably in their focus and means of implementation, critical areas programs share some common threads for purposes of section 208 water quality management. First, they recognize that growth may have to be carefully regulated or even prohibited in some areas. Second, as already suggested, critical area programs frequently include some state involvement. Although some programs include significant preemption of local authority, the state role is more often part of an expansion of authority at all levels of government. Finally, these programs generally follow a similar procedure: problem identification (such as flooding, secondary impacts of unregulated growth, or destruction of wetlands); an inventory of the resource base; designation of specific areas in need of protection; and creation of a management program, usually including specification of permissible and prohibited uses.

Most of these laws are of relatively recent vintage; serious evaluation is therefore difficult. However, the number and variety of programs do provide a rich source of examples for possible approaches. Most critical area programs have been directed towards the protection of one class or type of resource, such as wetlands. Some single-purpose programs are discussed below; others, including forest and hillside erosion protection, are discussed in other chapters. More recently, states have adopted more comprehensive statutes that can be applied to any area meeting specified criteria, although these programs have in fact been applied very selectively.114/

4.1 Multi-Purpose Critical Areas Programs

A recent survey found 13 states with comprehensive critical area programs in various stages.115/ Although all 13 of these statutes include broad statements of purpose and scope, they differ considerably in their specifics, particularly in the extent to which they create regulatory programs.

The basic operation of the comprehensive critical areas approach is illustrated by the programs in Florida and Colorado. The Florida Environmental Land and Water Management Act of 1972 was enacted "to protect the natural resources and environment" and "to plan for and guide growth and development."116/ The act defines its scope in terms of general goals rather than specific issues.117/ It specifically excludes certain types of land from designation, including agricultural and forest lands.118/ Coverage is also limited to five percent of land in the state. Implementation of the act involves a multi-step procedure. First, areas are nominated. Any individual, group, or agency can make a nomination and, as an example, 72 nominations were received in 1974.

Following nomination the proposal is subject to review and evaluation by the Division of State Planning. Evaluation follows detailed guidelines developed by the agency; every alternative must be exhausted before designation, including acquisition. The process can be extremely lengthy. However, because as of 1975 there was no statewide resource inventory, designations must be judged independently rather than from

among all possible sites. The final decision on designation is up to the cabinet (a unique institution made up of six independently elected officials) rather than the evaluating agency, apparently because of a desire for greater public accountability.119/ Whatever the rationale, decisionmaking by top level public officials does assure high visibility and public awareness. It also complicates the process and may result in fewer applications of the law than would occur under a bureaucratic regime.

The designation process includes enunciation of principles for permissible development. Local governments then have six months to adopt acceptable regulations; if they fail to do so, the cabinet may substitute its own rules.120/ Regulations are administered by local governments but the Division of State Planning may also seek relief for inadequate enforcement.121/

As of early 1976, three areas had been designated.122/ The first area to be designated was actually approved by a special act of the legislature, allowing regulation without using up any of the 5 percent limits.123/ The active involvement of the governor and key legislators reflects the highly political nature of the process.124/ The result is a somewhat ponderous system, but one that has considerable credibility and public support in a highly sensitive area.125/

The Colorado critical areas program, generally referred to by its bill number, H.B. 1041, 126/ differs from the Florida law in several significant respects. A wide-ranging resource inventory was asked of local governments using guidelines developed by appropriate state agencies. Critical areas are also defined in much more explicit terms: natural resource areas are limited to shorelands of major publicly owned reservoirs and significant wildlife habitats.

The most significant departure from the Florida approach, however, is in the respective roles of the state and local governments. The state role is exercised primarily through an independent agency created by the act, the Land Use Commission. While the commission and other appropriate agencies provide technical assistance, local governments retain primary responsibility at all stages of the program. They decide on areas for designation and implementing regulations; the commission can only suggest modifications or additional areas for designation. The commission can seek judicial review if its recommendations are rejected, but it is unclear how much deference its views will be given by the court.127/ Management is by permit from the local government. The only state role is provided in the review of regulations.

Implementation of H.B. 1041 has encountered numerous obstacles. Several counties publicly stated their unwillingness to accept funds provided to counties for the purpose of assisting in the implementation of the act. They resisted on the grounds that the sums involved were not worth the hearings and red tape required in return. The law also did not appear to offer many communities any more than could be accomplished under

existing law.128/ Indeed, by dispensing with formal designation, counties had the advantage of avoiding state review. Even the chairman and director of the Land Use Commission were quoted as having some doubt about the efficacy of the system.129/ Although voluminous guidelines have been produced, actual implementation has been negligible.130/

These experiences may be too limited to form the basis of any major conclusions.131/ One hypothesis is that although specification of goals and an inventory of resources are highly desirable, the implementation process will inevitably be a political one. Technical assistance does not obviate the necessity for state representation of state interests. While the Florida program is superior in this respect, the Colorado program is more advanced in its recognition of the need for priorities and an overall planning framework. These examples also suggest that statewide designation processes are most useful for large or particularly valuable resource areas. They may therefore fulfill part of the purpose of an antidegradation program. The differences in the Colorado and Florida approaches also suggest some of the possible ways to divide authority among state and local agencies. Finally, both programs illustrate the inherent expense and complexity of critical area programs. The information expense is borne entirely by the state rather than by the developer.132/

4.2 Single-Purpose Critical Area Programs

While the multi-purpose critical area programs are a relatively recent development, programs directed at specific problems, like flood plains and wetlands, have been in existence for many years. These programs lack the policy focus and perspective of multi-purpose approaches; protection of one resource may simply direct development into another equally sensitive area elsewhere.133/ For example, limitations on sewer hookups may lead to increased use of septic tanks with their potential seepage and other problems.134/ However, single-purpose programs are likely to be more flexible, less costly, and more politically acceptable. Their operation also offers valuable experience for the design of future programs. The range and variety of these laws is suggested by a list compiled by a recent U.S. Department of the Interior study.135/

Although numerous programs might be profitably considered, only a sampling of those most directly related to water quality objectives are included here.136/ On a statewide level, the California Coastal Act of 1976 137/ and the Delaware Coastal Zone Act adopted in 1971 138/ provide an interesting contrast. The Delaware program may be unique in its simplicity. No new "heavy industry" or offshore bulk-transfer facilities are allowed along a strip one to five miles wide along its coastline. Other development, including expansion of preexisting heavy industry, is allowed if a permit is obtained from a state board following preparation of an environmental impact statement. The act was primarily directed against energy development, which was effectively precluded. Despite the complaints of some corporate officials that performance standards would be more equitable, the law enjoys considerable public support and has withstood a lawsuit and several efforts to amend it.139/

The California Coastal Act imposes regulations on a zone from 1,000 yards inland along the coast outward to the limits of state territorial waters. Any development projects in that area require a permit from either temporary regional commissions 140/ or from the state Coastal Zone Conservation Commission. However, numerous exemptions were provided. Most notably, "urban land areas" having residential areas zoned to a density of four or more units per acre are not regulated. A categorical exemption may also be created by a two-thirds vote of the commission, and a "grandfather clause" exempts projects begun prior to January 1, 1977.

For those areas where the act applies, development is strictly regulated according to several principles. First, construction is to be confined within already developed areas; subdividing is allowed only where half of the parcels in the area have already been developed, based on a similar or larger lot size. Another provision protects "sensitive coastal resource areas" of regional or statewide significance. Such areas are to be designated by the state commission in consultation with the affected regional and local governments when the zoning procedure offers inadequate protection. Additional protective measures must then be adopted by the local government, subject to state review. In deference to local concerns about the extent of state authority, designations of "sensitive areas" must be approved by concurrent resolution within two years of the lapse. Another key feature provides stiff penalities for violations (up to $5,000 per day of intentional violation) and allows enforcement by the state or "any person." Citizens may also sue the state for failure to implement non-discretionary duties.

Although the act was only recently approved, its adoption followed several years experience under a similar regime created as the result of a state-wide initiative in 1972.141/ The initiative provided three years for development of a coastal plan. During that time a permit process governed all construction in a 1,000-yard strip inland, including areas within urban centers. After 10,000 applications, less than 4 percent of proposed projects were rejected, although many more were modified.142/ Several of the projects disapproved were large, controversial proposals, such as a renwal of drilling off the Santa Barbara coast.143/

This approach may demonstrate the value of experience as a source of political support. Proponents of the permanent coastal protection law passed in 1976 could point to the record accumulated during the preceding three years as evidence that the system worked. Similarly, a citizen enforcement procedure also was created by the initiative without causing any great disruption. Three years also allowed time for careful consideration of a detailed plan that could be defended in the legislature.144/

The critical areas program most relevant to water quality may be the various wetlands protection programs. Wetlands serve many valuable purposes, including the natural purification of water.145/ Their protection from uncontrolled development may therefore serve as part of a

section 208 program.

Federal law and policy imposes some regulation on activities in wetlands that should be reflected in the water quality management process. Section 404 of the FWPCA continued the traditional jurisdiction of the Army Corps of Engineers over the disposal of dredged or fill materials. The Corps regulates these activities through a permit program. Since dredging and dumping of fill materials are among the most serious threats to wetlands, this program is of great importance. The scope of the 404 program and its relation to section 208 are discussed in more detail in the introduction to this handbook.

EPA has also recognized the importance of wetlands protection. An agency policy statement provides that funding for construction of waste treatment facilities which will interfere with a wetland ecosystem will be provided only where there is no feasible alternative.146/ Finally, the U.S. Department of Agriculture provides some funding for wetlands maintenance under the Water Bank Statute.147/ These federal programs provide the potential for some control on development in every wetland area.

In many states, wetlands protection programs are well established. Although coastal wetlands programs are most common, an increasing number of states also protect freshwater wetlands.148/ The regulatory approach used in most of these statutes is quite similar. A recent New York law passed to protect freshwater wetlands is typical: the state Department of Environmental Conservation is required to prepare a statewide inventory and map of freshwater wetlands; land use regulations and a permit program must be established by local governments, counties, or the state; an appeals board is established; and tax abatement provisions are provided to relieve the burden on affected landowners.149/ A parallel statute protects tidal wetlands.150/

Regional and local programs for wetlands protection are also relatively common. For example, the San Francisco Bay Area Conservation and Development Commission has regulated development along the city's shoreline since 1965. Operation of the agency was an important model for the state coastal zone law discussed above.151/ The commission also began by drafting a plan and imposing a moratorium on development in the interim.152/ Regulation was later extended to the first 100 feet back from the bay; controls over activities further inland depend on the exercise of authority by local governments. Local governments typically create conservancy districts or overlay maps to regulate development in wetlands. These ordinances frequently specify permitted and restricted uses, the latter including dredging and filling.153/

The initial problem in wetlands protection is to define the affected area; the exact boundaries of wetlands fluctuate with the seasons and manmade disturbances. Wetlands may also be defined in ways that will affect the scope of their boundaries. Connecticut's program describes tidal wetlands

in terms of vegetation, and inland wetlands in terms of soil characteristics.154/ Some other states refer to water levels or tidal action. For example, the Maine program includes "any swamp, marsh, bog, beach, flat or other continuous low land above extreme low water which is subject to tidal action or normal storm flowage at any time excepting periods of maximum storm activity."155/ Some local ordinances use extremely vague and general definitions which may create substantial administrative difficulties.

One answer to the definition problem is to rely primarily on mapping techniques with an opportunity for affected landowners to seek variances from any regulatory requirements. A buffer zone should also be provided to control activity adjacent to the wetland. Preparation of inventories and maps can be a very expensive process,156/ but assistance is available in many parts of the country from the U.S. Geological Survey. The USGS surveys may be insufficiently precise to support a regulatory program, but if too broad an area is included, exceptions can always be made. For example, a Farmington, Connecticut ordinance allows a landowner to avoid regulation through scientific proof that "the land in question, or a portion of it, does not have a soil type [of the type identified by the state enabling statute as characteristic of a wetland] classified by the National Cooperative Soils Survey as poorly drained, very poorly drained, alluvial, or floodplain."157/

From the standpoint of water quality, the most important aspect of wetlands protection laws is the procedure for regulation of development and activities on wetlands. One approach is to spell out activities that are prohibited, permitted subject to governmental approval, and permitted in all cases. For example, a Connecticut statute provides for the regulation of

> [d]raining, dredging, excavation, or removal of soil, mud, sand, gravel, aggregate of any kind or rubbish from any wetland or the dumping, filling or depositing thereon of any soil, stones, sand, gravel, mud, aggregate of any kind, rubbish or similar material, either directly or otherwise, and the erection of structures, driving of piles, or placing of obstructions, whether or not changing the tidal ebb and flow.158/

Permission to conduct any of the listed activities requires a permit from the Commissioner of Environmental Protection. His decision is to be based on a list of general criteria, including the public health and welfare, the impact on wildlife, and the protection of property from flooding.159/

This approach has been criticized on the grounds that regulation should focus on impact rather than activities.160/ As an alternative, performance standards could be used which allow development or activities whenever compatible with the environment. However, obviously compatible or incompatible activities should be specified in order to limit administrative costs. In practice, performance standards may not differ greatly from more traditional regulations since each system depends on the exercise of reasonable administrative discretion. Regardless of the approach, overly harsh or unjustifiable conditions may not be sustained in court.161/

5.0 Acquisition of Property Interests

Previous sections of this chapter suggested numerous noncompensatory regulatory techniques that could be used to control the location of activities with an influence on water quality. Although approaches may be relatively inexpensive to implement (particularly if administrative costs are shifted to the developer), they may not always be politically or legally acceptable. Political opposition may impede passage of stringent land use controls, and it has already been noted that overly harsh regulations may be invalidated as a "taking" of property without just compensation. Government acquisition of land, or at least partial interests in land, may be one answer to this problem.

Property acquisition programs can be categorized two ways. The first distinction is between fee simple acquisition and purchase of a lesser interest. Fee simple ownership is the most complete form of land ownership. In contrast, a partial interest can be transferred that conveys some lesser right, such as the authority to develop the land. Scenic easements are a common example of a less than fee simple interest. In many areas, particularly where pressure for growth is not intense, development rights may be considerably less expensive than full title to the land, 162/ yet adequately serve water quality objectives.

The second distinction between property acquisition programs is between permanent and temporary acquisition. The latter is often referred to as "land banking" and has few precedents in this country. Use of land banking faces some legal obstacles but model enabling legislation has been proposed by the American Law Institute.163/ The primary reason for interest in land banking is the possibility for growth management.164/ However, water quality purposes could also be served if a temporary growth moratorium would facilitate planning.

5.1 Examples of Property Acquisition Programs

At least 38 states have adopted legislation authorizing acquisition of scenic easements.165/ Several states have also enacted laws providing for purchase of development rights from farmers.166/ The state is able to preserve prime agricultural land while the farmer often has his property taxes significantly reduced. Numerous states also allow localities to use condemnation powers to maintain open space.167/ Boulder, Colorado has agressively used a development rights purchase program to preserve a large area of open space, reportedly at a total cost significantly below the fee simple price of the land.168/

The land banking concept is largely uncontested in the United States, although numerous examples exist in Canada and other countries.169/ Puerto Rico has maintained a land bank since 1964.170/ That program is managed by the Puerto Rican Land Administration, a public corporation. Although the project was intended to control the direction of growth as well as to stabilize land prices, speculative pressures have necessitated release of land earlier than planned.171/

Financing is the major obstacle to property acquisition programs. A wetlands acquisition program in the Long Island area of New York had to pay as much as $20,000 per acre in 1968.172/ In addition to the initial purchase cost, a local government that acquires property will also suffer a loss in assessed value for property tax purposes. If the state administers the program, taxes might still be collected, although this will increase the cost of administration.173/ Financing may be provided through a variety of methods. General obligation bonds are a common device; the bonds must be approved by public referendum that assures acceptance of the program as well. However, purchases of property rights have also been financed through a special cigarette tax, 174/ a tax on real estate transfers, 175/ a special assessment, 176/ and a sales tax.177/ (Not all of these mechanisms will be available to all levels of government in all states.178/) Some funding may also be obtained from federal programs, such as the Water Bank Program.179/ The Housing and Community Development Act of 1974 also authorizes use of revenue sharing monies for the acquisition of property for "community development."180/

The mechanics of acquisition programs may add to the cost. If property is purchased gradually in several parcels, the cost may rise because of public knowledge of the government's intent to purchase. Government purchase is often a slow process that may at least temporarily spur rather than slow development.181/ Since water quality protection may require development restrictions over a relatively large area, the damage continuing in one area (particularly in a wetland) may undermine the benefits of purchase elsewhere.182/

Management of property acquisition programs varies with the purpose and scope of the enabling legislation. The administration of selective, locally operated programs can be incorporated within existing organizations. For example, in 1973, Fairfax County, Virginia set aside revenue sharing funds to be used for acquisition of low-income housing sites. The program is administered by a county agency, the Department of Housing and Community Development.183/ The Puerto Rican Land Administration is a public corporation, a status some commentators fear sacrifices political accountability.184/ Whatever agency administers the program, close coordination with local land use planning authorities is essential to avoid conflicts with other public goals.185/

5.2 Legal Issues

An initial obstacle to acquisition of property interests in some states may be the absence of necessary enabling authority. Use of eminent domain powers requires a "public purpose." Most recent court opinions have liberally interpreted this requirement, effectively equating "public purpose" with "public use."186/ Some states have specifically authorized local acquisition of land for open space, a purpose that would effectively serve water quality objectives as well.187/ Although courts are unlikely to question the public purpose in preventing water pollution, clarifying legislation would eliminate any uncertainty. Some legal objections may be raised if negotiations are carried out in secret or through a front

in order to avoid hold outs or inflationary bidding.188/ These problems are avoided if eminent domain authority is available.

One issue specific to land banking approaches is whether an intention to dispose of the land at a later date constitutes an acquisition of property for unspecified use. Arguably, an unspecified future use could not satisfy the "public purpose" test. The issue was raised in a challenge to the Puerto Rican program and decided in the government's favor, based on the pressing need to regulate the land market.189/ Enabling legislation should be adequate to deal with this issue by citing the public interest in preventing water pollution.

5.3 Conclusions

Acquisition of property interests is an invaluable tool in the arsenal of water pollution control techniques. Where regulation is either politically or legally unacceptable, it guarantees that public interests can still be protected.

However, purchase of property interests is also an inherently blunt instrument. Condemnation will often be as politically unpopular as less disruptive forms of regulation. Moreover, the belief that purchase is a possibility may cause landowners to resist regulation in the hope of obtaining a profit for what the state could legally require without compensation.190/

A provision in a Massachusetts wetlands bill suggests a middle ground. It anticipates the possibility that compensation will be required in some instances. However, instead of specifying in advance that compensation should be paid in any given case, the legislation simply provides that the state may pay for the loss in property value beyond the constitutional limit determined by the courts.191/ An early Massachusetts Supreme Court decision suggested that this approach might violate limits on delegation of authority,192 / but the issue has apparently never been raised again.193/ This approach minimizes public expense and avoids inviting resistance from landowners. It does not, however, respond to political opposition or any stringent regulation.

The cost of acquisition is obviously another significant consideration. Protection of water quality may require purchase of development rights over large areas. Public purchase transfers the cost of regulation to the public, which may be expensive but equitable. Where the benefit is of state significance, some mechanism for state financing may be appropriate. Otherwise, the affected locality may be reluctant to deplete its tax base.

Finally, although an open purchase procedure may risk raising the ultimate costs, public review is essential to avoid arbitrary or politically motivated use of the condemnation power. Judicial oversight may not be adequate to meet this need. A better approach may be to list specific criteria for purchase in the statute so that selection of property can be objectively evaluated.

6.0 Taxation and Charges Approaches to Land Use Regulation

At the outset of this chapter it was noted that indirect regulatory devices may be inadequate to meet the requirements of section 208. The problem arises because the act requires section 208 to provide for attainment of 1983 requirements; the impact of taxes, charges, and other indirect approaches is inherently uncertain. However, indirect mechanisms may still be desirable as a supplement to other regulatory techniques, reinforcing the incentives for the desired behavior. The imposition of fees can also be justified by the costs created by the landowner for administration and enforcement. Where a problem is not yet significant but is expected to worsen charges can be used to discourage the undesired activity. Finally, special assessments are a useful means for allocating the costs of public improvements.

Taxes and charges in a variety of forms are a common feature of many environmental programs.194/ Indeed, section 208(C)(2)(E) requires that designated management agencies have the authority to assess waste treatment charges. In the context of land use controls, charges are most common in the form of subdivision exactions and special assessments. For example, the law is generally clear in most states that large subdivisions may be required to dedicate land for parks and schools.195/ However, the law is less clear on the need to earmark funds and on the acceptability of requiring payments in lieu of dedication.196/

Special assessments might be viewed as the opposite of exactions in that the government is charging a fee for benefits provided to a readily identifiable group of landowners. Typically, assessments are imposed for sewers, streets, sidewalks, and the like and are apportioned on the basis of the front footage of the land along the improvement.197/

While the possible forms of fees and assessments are limited only by the imagination of the relevant local government and the scope of enabling authority, there are some significant legal constraints. In addition to the questions about in lieu payments and earmarking requirements already mentioned, assessments should be restricted to no more than the private benefits received. There is also sometimes argument about whether the benefit is public or private.198/ In the case of exactions, the affected locality should be able to demonstrate the connection between new development and the service required.199/ For example, a municipality was held not to have the authority to require a developer to contribute to offsite drainage improvements designed to handle runoff from neighboring property as well as the developer's. However, the court indicated that a special assessment approach might have been acceptable.200/ A California court upheld a $50,000 fee charged a developer for a drainage ditch to serve the subdivision.201/ Courts have also universally disapproved requirements for offsite improvements.202/

Taxes and charges have also been applied directly to the use of land in ways that might be applicable to water quality purposes. For example, many states use preferential taxation schemes to help preserve farmland.203/

Such systems could be used to encourage nondevelopment for water quality purposes, such as buffers along rivers and streams. A more comprehensive taxation scheme was adopted but never implemented in Montana. Under the Montana Economic Land Development Act of 1975, 204/ land was to be categorized for one of six uses--agriculture, recreation, residential, commercial, industrial, and open space. If the land was used in accordance with the designated purpose, the owner was to receive a substantially lower tax rate.205/

In summary, there are numerous precedents for taxation and charges approaches in the land use field. Where the costs can be fairly allocated to the responsible party, most state courts are willing to uphold such requirements. From the standpoint of economics these regulations make good sense because the party creating the problem is forced to pay for it. Such requirements also may reduce the impact of water quality related improvements (and planning) on fiscally strapped local governments. However, in order to satisfy the requirements of section 208, charges schemes will probably be forced to serve primarily a supplementary function.

7.0 Legal Issues

The principal legal questions involved in locational controls are similar to those discussed generally in chapter 2. The key issue continues to be what restrictions under which circumstances will be upheld, as a permissible exercise of the police power and which will require compensation.

7.1 The Taking Issue

This question must be addressed on a state-by-state, case-by-case basis.206/ Several key cases however, illustrate the range of opinions regarding the permissible scope of the police power. Although most of these cases are drawn from the area of wetlands protection and flood plain regulation, the legal issues are very much the same. In each instance, the ordinance is passed to restrict development on lands that serve important public purposes; the necessity for the restriction is subject to scientific proof and evaluation; and the value of the property owned by the complaining landowner is significantly reduced by the regulations.

One range of opinion among courts is evident in decisions in Wisconsin and Maine regarding similar wetlands protection laws. The Wisconsin case, Just v. Marinette County, 207/ involved a challenge to the state Shoreland Protection Act described above. The Justs attempted to fill their property in contravention of the county ordinance adopted in compliance with the state law. The court upheld the restrictions provided by the ordinance for reasons very relevant to this type of regulation in general:

> The Justs argued their property has been severely depreciated in value. But this depreciation is not based on the use of the land in its natural state but on what the land would be worth if it could be filled and used for the location of a dwelling. While loss of value is to be considered in determining whether

> a restriction is a constructive taking, value based upon changing the character of the land at the expense of harm to public rights is not an essential factor or controlling.208/

The Maine case, State v. Johnson 209/ reached almost the opposite conclusion of the Wisconsin court. Stressing that the benefits of wetlands protection accrued to the public, the court concluded that the public should foot the bill for its protection. The court did support related restrictions on the draining of sanitary sewage into wetlands, but distinguished these regulations as justified by additional considerations of health. A Connecticut opinion used a similar rationale to invalidate a flood plain ordinance.210/

Judicial attitudes have also fluctuated with greater public understanding of the importance of environmental values. For example, the New Jersey Supreme Court held unconstitutional a "Meadowlands Development District" in 1963.211/ The court noted that the purpose of the regulation was to keep the land in its natural state and concluded that although the purpose was "laudable," compensation was required.212/

Ten years later in an opinion written by the same judge the court noted:

> The approach to the taking problem, and the result, may be different where vital ecological and environmental considerations of recent cognizance have brought about rather drastic land use restriction in furtherance of a policy designed to protect important public interests wide in scope and territory, as for example, the coastal wetlands act [cite omitted] and various kinds of flood plain use regulation. Cases arising in such a context may properly call for a reexamination of some of the statements 10 years ago in the largely locally limited Morris County Land case 213/

The complexity of the taking problem is illustrated by another opinion of the Maine court only three years after the Johnson case. The decision In re Spring Valley Development 214/ involved a challenge to the validity of the Maine Site Location Act. The plaintiff had prepared a site for development, but the state directed a halt in further activity pending application for a permit required by the law. Although the Johnson case was distinguished on the grounds that the Location Act left some reasonable use to the developer, the court used a strikingly different test for determination of the validity of the statute.

> The public welfare demands that the land be used for another purpose or that the impact of the same use be diminished. [The regulation is not unreasonable] in view of the overriding public interest.215/

Judicial reactions to taking cases will continue to hinge on changing definitions of what is a "reasonable use under the circumstances."216/

In some states, a "reasonable use" may be one that provides at least some economic return. However, the rationale in the Just case provides a forceful argument in behalf of more stringent regulation when necessary to protect lands serving a vital public function. The reason has to do with the legitimate expectations of property owners; so long as the regulation is based on scientific evidence rather than subjective evaluations, the landowner can legitimately be required to assume the risk of later regulation.217/

Of course, the crucial burden for the government is to demonstrate the vital purpose of the land in its natural state and the corresponding public harm if the land is developed. Where the benefit is one that has not been recognized before (as contrasted with flood plain regulation and more recently, wetlands protection), or one that requires complex scientific evidence to demonstrate, the government will have to present expert testimony. Because of the expense and possible necessity for similar presentations elsewhere, the state may want to assist in the development of defensible regulations by providing relevant expertise.

Some commentators have suggested the need for a more flexible approach to the taking issue. One solution is partial compensation when the impact of regulation exceeds some legislatively established standard of reasonableness.

Another response to the dilemma posed by regulation and compensation is transferring development rights rather than money. Under this concept, the owner of land forbidden to develop beyond some minimum density receives the right to use that lost potential on another site. The literature supports this concept but there is little actual experience to evaluate. The legality of awarding development rights instead of monetary compensation was considered in a recent opinion by the highest court of New York. In Fred F. French Investing Co. v. City of New York 218/, the court held unconstitutional a New York zoning classification that restricted certain property to use as a park in return for the right to develop another area in midtown Manhattan. However, the court did not reject the concept of transferring development rights, only the ambiguous interest given the property owner. Under the New York scheme, the property owner had no assurance of either an acceptable lot to which to transfer his development rights or of the administrative approvals (there were three tiers) necessary to accomplish the exchange. Since the court appeared to accept the basic validity of the "TDR" concept, a different formulation with more assurances for the developer might fare favorably.

Despite this continued uncertainty in many states, several points should be made about the taking problem. First, taking problems should not be confused with questions of evidentiary sufficiency. Documentation of the need and value of regulation by studies, expert testimony, or other means will always be necessary to support regulation in any particular case. A recent California case, for example, emphasized the importance of testimony by ecology experts:

> The means of preserving such values and insight into the activities by which they may be endangered are probably not within the understanding and competence of the ordinary prudent man who lacks special training.219/

A recent Florida case reached similar conclusions.220/ A related question to that of scientific evidence is the need for careful consideration of boundaries. Arbitrary or ambiguous line drawing may itself be grounds for court challenge.221/

Finally, an effort should be made to explicitly permit all uses which will not interfere with ecological purposes of the law. Since the test for compensation always depends on the availability of reasonable uses of the land, the more uses permitted, the greater the likelihood that reasonable uses will remain. This advantage of specificity in administration indicates the desirability of allowing the implementing agency to issue rules interpreting the act. It is unlikely that the legislature will have the expertise necessary to define all permitted uses, and changing circumstances (such as improved technology or operating procedures) might allow for currently forbidden activities to be undertaken safely in the future. Performance oriented standards should be used if possible so that a development able to make adequate demonstrations of provision for water quality can be allowed.222/

Flexibility should also be maintained in order to allow variances or special permits in cases of undue hardship. Such procedures provide a court with some assurance that the property owner has an adequate opportunity to make his case. Courts are less inclined to overturn administrative determinations of factual questions than broad legislative rulings applied to specific parcels of land.

7.2 Protection of High Quality Waters

A legal question that may arise in critical areas protection has to do with protection of water quality beyond levels necessary to protect the public health and safety. Expert testimony and scientific evidence can demonstrate the benefits of some regulation, but there will undoubtedly be situations where the values being protected include preservation of pristine waters or relatively clean waters. Compliance with the antidegradation requirement, for example, may require it. Experts can attest to the value of wilderness or natural areas, but a legal issue arises as to the acceptability of such values as a justification for regulation.

One answer to this problem is judicial support for regulation for aesthetic benefits. Several state courts have explicitly recognized the validity of legislation based solely on aesthetic benefits.223/ By analogy, a court accepting this approach should also find no problem with water pollution legislation that exceeds the level necessary to protect public health or even the economic value of recreation. However, most courts have yet to adopt this rationale. There also may be some question whether land use restrictions endorsed on this ground will receive the same deference as those adopted for more traditional reasons.

There is also some pertinent language in a recent U.S. Court of Appeals opinion. The case involved the validity of EPA regulations providing for nondeterioration of air quality, a provision that roughly parallels the procedure for water quality. In response to allegations that the law was unconstitutional, the court stated:

> We find the arguments . . . to be insubstantial. Regulation of air pollution clearly is within the power of the federal government under the commerce clause, and we can see no basis on which to distinguish deterioration of air cleaner than national standards from pollution in other contexts . . . . There is a rational relationship between air quality deterioration and the public health and welfare, and there is a proper legislative purpose in prevention of significant deterioration of air quality. Neither can the regulations be construed as an unconstitutional "taking" under the Fifth Amendment, any more than existing emission control regulations represent such a "taking."224/

7.3 Equal Protection

Another legal issue that is most likely to arise in the context of selective critical areas programs or effluent allocation schemes is the question of equal protection. Generally, the Fourteenth Amendment requires that similarly situated landowners should not be treated differently without some rational basis. This standard is usually easily satisfied by the state unless the law impinges on some "fundamental interest," such as race or the right to vote.225/ The issue arose in connection with regulations of the Adirondack Park Agency, designed to protect a part of New York with special scenic and recreational value. A court accepted the need for a hearing to determine whether equal protection standards might be violated because "other areas of similar unique, scenic and environmental values in other parts of the state" were not also subject to regulation.226/ However, a Maryland court found no equivalent problem with a state law regulating dredging in marshlands in one county.227/

A closely related question may arise where a legislative body tackles a problem not susceptible to solution by that government alone. In such cases, it might be argued that the law serves no rational purpose. This issue is relevant to most state and local water pollution laws since water quality is often affected by dischargers in more than one state. For example, a detergent manufacturer argued that a Chicago ordinance banning phosphates in detergents was unreasonable since the city alone could not cure eutrophication in Lake Michigan.228/ A federal court of appeals rejected this argument on the grounds that the city has a legitimate interest in setting an example for other neighboring communities. Legislation was an acceptable means to seek cooperation from other jurisdictions.229/

7.4 Conclusions

The imposition of locational controls for reasons of water quality is sufficiently similar to the use of such controls for other environmental, public health, and recreational benefits that few new legal issues should arise. However, the need for careful statutory drafting and a detailed review of local judicial precedent remains. Although each state must examine its own laws, the trend in the vast majority of states appears to support regulation that is clearly related to important environmental objectives. This is so even where there is some question about the wisdom of the specific legislative approach selected. However, there is still adequate incentive to study legislative options carefully in order to obtain equally essential political support.

CHAPTER THREE

LOCATIONAL CONTROLS FOR WATER QUALITY

FOOTNOTES*

1. R. Train, "The EPA Programs and Land Use Planning," 2 Colum. J. Envt'l L. 255, 275 (1976).

2. Federal Water Pollution Control Act Amendments of 1972, Pub. L. No. 92-500, § 208(b)(2)(F)-(H) [hereinafter cited as FWPCA].

3. 40 C.F.R. Part 131, 40 Fed. Reg. 55343 (1975). See also U.S. Environmental Protection Agency, Guidelines for State and Areawide Water Quality Management Programs ch. 6 (Nov. 1976).

4. See id. ch. 5. A handbook for implementation of antidegradation provisions is also being prepared for EPA by the Environmental Law Institute.

5. Council on Environmental Quality, The Fifth Annual Report of the Council on Environmental Quality 34-36 (Washington, D.C., 1974).

6. See chapter 1 for further discussion of institutional problems related to implementation of a 208 program.

7. Concentrations of dischargers may be desirable--up to a point. Large sewage treatment systems may reduce the per unit cost of treating effluent.

8. See generally notes 12-16 and accompanying text; I. McHarg, Design with Nature (1969); K. Kulp, Environmental Site Planning (Council of Planning Librarians Exchange Bibliography No. 1030, May 1976); and E. Kaiser et al., Promoting Environmental Quality through Urban Planning and Controls (1974). For examples of specific applications, see R. Bailey, Land Quality Classification of the Lake Tahoe Basin, California - Nevada (Forest Service, U.S. Dep't of Agriculture, 1974); and J. Tourbier, Water Resources as a Basis for Comprehensive Planning and Development of the Christina River Basin (1973).

9. These factors are also discussed in the context of particular activities in other chapters. Erosion and sediment control are discussed in chapters 6 and 7.

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*In order to conserve space, publication information pertaining to works included in the suggested readings for this chapter has been omitted from the footnotes.

10. C. Gates and D. Haith, Influence of Land Development and Land Use Patterns on Water Quality 54-55 (Ithaca, N.Y.: Cornell Univ. Water Resources and Marine Sciences Center, 1975); and R. Coughlin and T. Hammer, Stream Quality Preservation through Planned Urban Development (Washington, D.C.: U.S. EPA, EPA-R5-73-019, 1973).

11. Id.; D. Berry et al., Land Use, Urban Form and Environmental Quality (Chicago: Univ. of Chicago, 1974); I. Hoch, Urban Scale and Environmental Quality (Washington, D.C.: Resources for the Future Reprints, 1972); and J. Omernik, Influence of Land Use on Stream Nutrient Levels (Corvallis, Ore.: Corvallis Environmental Research Laboratory, EPA-600/3-76-014, 1976). See also Croke, "An Evaluation of the Impact of Land Use on Environmental Quality," in Environment: A New Focus for Land-Use Planning (D. McAllister ed. 1973); D. McAllister, Survey and Analysis of Location Criteria in Land-Use Planning (Los Angeles: UCLA School of Architecture and Urban Planning, 1974); and S. Bellomo, C. Cheng, and B. French, "Water Quality-Land Use Relationships," 2 Plan. Envt'l Briefs 1 (Sept. 1975). Several major studies on this subject are currently in progress at the Urban Institute in Washington, D.C., at the University of New Mexico Department of Economics in Albuquerque, and at the American Public Works Association.

12. D. Williams, P. Rowe, and C. Sharpe, "Improved Tools for Land Management: Summing Up for the Future," 34 Urban Land 3, 4 (1975).

13. Croke, supra note 11, at 222; and McAllister, supra note 11, at 12.8.

14. G. Grimsrud, E. Finnemore, and H. Owen, Evaluation of Water Quality Models: A Management Guide for Planners 18-19 (Washington, D.C.: U.S. EPA, EPA-600/5-76-004, 1976).

15. See generally chapter 2. This issue is also addressed further infra, notes 206-17 and accompanying text.

16. T. Hammer, Planning Methodologies for Analysis of Land Use/Water Quality Relationships 77 (1976).

17. 272 U.S. 365.

18. See generally D. Hagman, Urban Planning and Land Development Control Law §§ 28-31 (St. Paul: West Publishing Co., 1971).

19. See generally 1 N. Williams, American Land Planning Law §§ 5-6 (1974-75).

20. Town of Lexington v. Simeone, 334 Mass. 127, 134 N.E.2d 123, 125 (1956), discussed in 4 N. Williams, supra note 19, § 91.04.

21. 68 N.J. 451, 348 A.2d 505 (1975), remanded on other grounds, 425 U.S. 910 (February 22, 1977).

22. 68 N.J. at 473, 348 A.2d at 516. Cf. Garton, "Ecology and the Police Power," 16 S.D. L. Rev. 26 (1971); M. Gleeson et al., Urban Growth Management Systems 58-61 (1976); and M. Alford and J. Hudson, Improving Environmental Quality through the Use of Local Ordinances and Regulations 4-7 (Washington, D.C.: U.S. EPA, 1976).

23. For summaries of various zoning techniques, see Management and Control of Growth (R. Scott ed. 1975). For other summaries of available control techniques, the reader is directed to 1 N. Williams, supra note 19, pt. 7; D. Hagman, supra note 18, M. Alford and J. Hudson, supra note 22; M. Meshenberg, The Administration of Flexible Zoning Techniques (Chicago: American Society of Planning Officials Planning Advisory Service No. 318, 1976); Sedway/Cooke Consultants, Guide to Implementation Techniques for Air and Water Quality Management Plans (San Francisco: Ass'n of Bay Area Gov'ts, Jan. 1976); Land Use Planning Reports: A Summary of State Land Use Controls (Silver Spring, Md.: Report No. 5, M. Arnold ed., Jan. 1976); D. Brower et al., Growth Management through Development Timing (Chapel Hill: North Carolina Urban and Regional Planning, 1974); Kaiser et al., supra note 8; and A. Strong and J. Keene, Environmental Protection through Public and Private Development Controls (Washington, D.C.: U.S. EPA, 1974).

24. R. Berger, "The Accommodation Power in Land Use Controversies: A Reply to Professor Costonis," 76 Colum. L. Rev. 799, 821 (1976).

25. See chapter 2.

26. County Council for Montgomery County v. District Land Corp., 337 A.2d 712, 27 Zoning Dig. 551 (1975).

27. Avco Community Developers, Inc. v. South Coast Regional Comm'n, 122 Cal. Rptr. 810, 553 P.2d 546 (Cal. Ct. App. 1975); Board of Supervisors v. Medical Structures, 213 Va. 355, 192 S.E.2d 799 (1972); Clackamas County v. Holmes, 265 Or. 193, 508 P.2d 190 (1973); Diamond v. Town of Cheltenham, 413 Pa. 379, 196 A.2d 363 (1964). See "Ask Plan Landers," Planning, Nov. 1975, at 4; and M. Gleeson et al., supra note 22, at 67.

28. See section 2.5 infra.

29. 1 N. Williams, supra note 19, § 27.02.

30. Compensatory approaches suffer from the obvious limitations on governmental resources. However, there may be situations where purchase or condemnation is desirable. See section 5.0 infra.

31. See M. Gleeson et al., supra note 22, at 62-68 and cases cited therein.

32. See generally 4 N. Williams, supra note 19, §§ 109-116.

33. Id. See, e.g., People v. Gates, 41 Cal. App. 3d 590, 116 Cal. Rptr. 172 (1974) (wrecking yard must be terminated in 18 months).

34. Building Inspector of Malden v. Werlen Realty, 349 Mass. 623, 211 N.E.2d 338 (1965).

35. Grant v. City of Baltimore, 212 Md. 301, 129 A.2d 363 (1957); Naegele Outdoor Advertising Co. v. Village of Minnetonka, 281 Minn. 492, 162 N.W.2d 206 (1968). See M. Gleeson et al., supra note 22, at 67, n. 170.

36. See chapter 5, section 3.5, infra.

37. See C. Thurow, W. Toner, and D. Erley, Performance Controls for Sensitive Lands ch. 7 (American Society of Planning Officials Planning Advisory Service Nos. 307, 308, 1975). (And see ch. 7, section 4.0, infra.)

38. See id. ch. 4; Corsino v. Grover, 148 Conn. 299, 170 A.2d 267 (1961). And see ch. 8, infra.

39. See generally 2 N. Williams, supra note 19, §§ 38-46.

40. Id. at 23-24. But see Appeal of Kit-Mar Builders, 439 Pa. 466, 268 A.2d 765, 767 (1970) (sewerage problems will not excuse exclusionary zoning where alternative methods exist for treating the problem).

41. Compare Board of County Supervisors of Fairfax County v. Carper, 200 Va. 653, 107 S.E.2d 390 (1959) with Flora Realty & Investment Co. v. City of Ladue, 362 Mo. 1025, 246 S.W.2d 771 (1952). These cases are somewhat dated by more sophisticated decisions, but they are still considered to be leading opinions. See 2 N. Williams, supra note 19, § 39.14. For a recent affirmation of the principles in the Cooper case, see Board of Supervisors of Fairfax County v. DeGroff Enterprises, Inc., 214 Va. 235, 198 S.E.2d 600 (1973).

42. See Flora Realty (three-acre tracts upheld); Fairfax County (two-acre minimum invalidated); Steel Hill Dev., Inc. v. Town of Sanbornton, 469 F.2d 956 (1st Cir. 1972) (six-acre temporary restriction upheld); and 2 N. Williams, supra note 19, § 39.14.

43. See 2 N. Williams, supra note 19, § 38.

44. Id. § 38.21-.22.

45. See Golden v. Planning Bd. of Ramapo, 334 N.Y.2d 138, 285 N.E.2d 242 (1972), U.S. cert. den. 411 U.S. 918 discussed in chapter 4.

46. 67 N.J. 151, 336 A.2d 713 (1975).

47. 67 N.J. at 187.

48. See 5 N. Williams, supra note 19, §§ 158.05-.06.

49. Cal. Gov't Code § 65910 (West). See F. Broadhead and R. Rosenfeld, Open Space Zoning Handbook (Sacramento: Cal. Assembly Select Comm. on Open Space Lands, 1973).

50. 1973 Ga. Laws act 66.

51. Pope v. City of Atlanta, 418 F. Supp. 665 (N.D. Ga. 1976).

52. See Alford and Hudson, supra note 22, at 317.

53. See generally Broadhead and Rosenfeld, supra note 49; 5 N. Williams, supra note 19, §§ 157-158 and sources cited in § 157.01; and H. Coston and J. Tourbier, Open Space Controls for the Protection of Water Resources in the Christina River Basin (Newark, Del.: Univ. of Delaware Water Resources Center, 1972).

54. Arastra Ltd. Partnership v. City of Palo Alto, 401 F. Supp. 962 (N.D. Cal. 1975) (open space zoning amounted to inverse condemnation where city had attempted to buy the property but after lengthy negotiation sought to limit all economic uses to achieve the same result).

55. See generally J. Kusler and T. Lee, Regulations for Flood Plains (Chicago: American Society of Planning Officials Planning Advisory Service No. 277, 1972).

56. The one-hundred year flood plain is that area which will be flooded, on average, no more than once every one-hundred years.

57. Kusler and Lee, supra note 55, at 44-65. For detailed legal analysis and model statutory language, see U.S. Water Resources Council, Regulation of Flood Hazard Areas to Reduce Flood Losses (2 vols. 1971); Z. Plater, "The Takings Issue in a Natural Setting: Floodlines and the Police Power," 52 Tex. L. Rev. 201 (1974); and F. Maloney and D. Dambly, "The National Flood Insurance Program: A Model Ordinance for Implementation of Its Land Management Criteria," 16 Nat. Res. J. 681 (1976).

58. Plater, supra note 57, at 204.

59. Turnpike Realty Co. v. Town of Dedham, 284 N.E.2d 891 (1972), cert. denied, 409 U.S. 1108 (1973).

60. 284 N.E.2d at 900. The U.S. Water Resources Council, supra note 57, includes a catalog of relevant cases at 467-71.

61. See also chapter 6.

62. See generally 5 N. Williams, supra note 19, § 156; and Hagman, supra note 18, ch. 9.

63. "The implementation of environmental impact statement (EIS) ordinances has become rather widespread in recent years. Ordinarily, the EIS requirement is appended to an existing subdivision control ordinance." Alford and Hudson, supra note 22, at 299.

64. See generally Meshenberg, supra note 23.

65. Hammer, supra note 16, at 75-79.

66. But see Alford and Hudson, supra note 22, at 267-99; and M. Gleeson et al., supra note 22, at 109-14.

67. See Alford and Hudson, supra note 22, at 320.

68. See Mandelker and Sherry, "Emission Quota Strategies as Air Pollution Control Technique," 5 Ecol. L. Q. 401 (1976).

69. P. Wolf, The Future of the City: New Directions in Urban Planning 149 (New York: Watson-Guptill Publications, Whitney Library of Design, 1974).

70. For a general litany of these problems, see the authorities cited in note 23 supra.

71. R. Babcock, The Zoning Game (Madison: Univ. of Wisconsin Press, 1966).

72. Wyo. Stat. § 9-862.

73. Or. Rev. Stat. § 197.040(2)(a) and (c). Protection of natural resources is one goal.

74. See, e.g., Wyo. Stat. Ann. § 9-856 (Supp. 1975); Baker v. City of Milwaukie, 533 P.2d 772 (Ore. 1975); and D. Mandelker, "The Role of the Local Comprehensive Plan in Land Use Regulation," 74 Mich. L. Rev. 899 (1976).

75. Neb. Stat. Ann. § 84-151.

76. Id.

77. N.Y. Exec. Law. art. 27, § 800 et seq. (McKinney). See generally Land Use Controls in New York State 106-32 (New York: Dial Press, E. Moss ed. 1976).

78. Haw. Rev. Stat. ch. 205. For a general discussion of the Hawaiian experience, see F. Bosselman and D. Callies, The Quiet Revolution in Land Use Control (Washington, D.C.: Council on Environmental Quality, 1971); Robert G. Healy, Land Use and the States (Baltimore: Johns Hopkins University Press, 1976); and P. Meyers, Zoning Hawaii: An

Analysis of the Passage and Implementation of Hawaii's Land Classification Law (Washington, D.C.: Conservation Foundation, 1976).

79. 42 U.S.C. § 4321 et seq. See generally K. Pearlman, "State Environmental Policy Acts: Local Decision Making and Land Use," 43 J. Am. Inst. Planners 42 (1977).

80. See P. Freisema and P. Culhane, "Social Impacts, Politics, and the Environmental Impact Statement Process," 16 Nat. Res. J. 339 (1976).

81. See generally A. Miller, F. Anderson, and R. Liroff, "The National Environmental Policy Act and Agency Policy Making: Neither Paper Tiger Nor Strait-jacket," 6 ELR 50020 (1976).

82. A. Jokela, Self-Regulation of Environmental Quality: Impact Analysis in Local Government 55 (1975).

83. J. Rogers, Environmental Impact Assessment, Growth Management, and the Comprehensive Plan 135-37 (Cambridge, Mass.: Ballinger Publishing Co., 1976). See also Pearlman, supra note 79, at 49-50.

84. R. Burchell and D. Listokin, The Environmental Impact Handbook 91-93 (New Brunswick, N.J.: Rutgers Univ. Center for Urban Policy Research, 1975); and Jokela, supra note 82, at 53-56, 70-76.

85. Specific criteria relevant to different water quality variables are outlined in Burchell and Listokin, supra note 84, at 97-138; and in D. Keyes, Land Development and the Natural Environment (1976).

86. For a discussion of performance standards applied on a site-specific basis, see generally chapter 6.

87. Environmental Defense Fund v. Mathews, 6 ELR 20369 (D.D.C. 1976).

88. City Council of Bowie, Md., Ordinance 0-2-73, § 2 (July 16, 1973), discussed in Bowie, Md. Commission for Environmental Quality, "The Role of Environmental Impact Statements in Local Government Decision Making," 6 Urb. Law. 95 (1974).

89. See generally Burchell and Listokin, supra note 84, at 59-61. For experience in California, see Jokela, supra note 82.

90. Cal. Pub. Res. Code §§ 21000-21174 (West) as amended in 1976.

91. This issue was resolved legislatively following the decision of the California Supreme Court in Friends of Mammoth v. Board of Supervisors of Mono County, 8 Cal.3d 247, 10 Cal. Rptr. 16, 500 P.2d 1360 (1972). See Cal. Pub. Res. Code §§ 21169-21171 (West Supp. 1972).

92. See The Fifth Annual Report of the Council on Environmental Quality, supra note 5, at 403-05.

93. Id. at 407.

94. See Jokela, supra note 82, at 47.

95. Id. at 38-39.

96. Id. at 39-46.

97. Cal. Pub. Res. Code § 21089 (West).

98. American Society of Planning Officials, "Planning Advisory Service Memo 76-11" (Nov. 1976); Burchell and Listokin, supra note 84, at 14-36.

99. See "The Role of Environmental Impact Statements in Local Government Decision Making," supra note 88.

100. Jokela, supra note 82, at 67.

101. Council on Environmental Quality, Environmental Impact Statements: An Analysis of Six Years' Experience by Seventy Federal Agencies 26-33.

102. Jokela, supra note 82, at 66.

103. Cal. Pub. Res. Code § 21089 (West).

104. Burchell and Listokin, supra note 84, at 94.

105. Id.

106. N. Yost, "NEPA's Progeny: State Environmental Policy Acts," 3 ELR 50090, 50093 (1973).

107. N.C. Gen. Stat. § 113A-8 (1971).

108. See, e.g., Jewish Reconstructionist Synagogue v. Village of Roslyn Harbor, 386 N.Y.S.2d 198, 352 N.E.2d 115 (N.Y. Ct. App. 1976).

109. Jokela, supra note 82, at 56-59.

110. Critical areas programs often include "activities" as well as "areas" of special significance. It follows from the preceding discussion that it is primarily the latter that are of greatest interest from the standpoint of waste treatment management.

111. C. Ablard and B. O'Neill, "Wetland Protection and Section 404 of the Federal Water Pollution Control Act Amendments of 1972: A Corps of Engineers Renaissance," 1 Vt. L. Rev. 51, 52 (1976).

112. American Law Institute, A Model Land Development Code art. 7 (1975).

113. American Bar Association Special Committee on Environmental Law, Development and the Environment: Legal Reforms to Facilitate Industrial Site Selection (final report, 1974).

114. For example, Florida's program is limited by statute to a maximum of 5 percent of the state. See generally 1 Institute for Environmental Studies, Data Needs and Data Gathering for Areas of Critical Environmental Concern 11 (Madison: University of Wisconsin, 1975); Council of State Governments, State of the Art for Designation of Areas of Critical Environmental Concern 14-15 (Lexington, Ky., Dec. 1974).

115. W. Matuszeski, "Trends in State Land Use Legislation," Envt'l Com., Sept. 1976, at 2, 4.

116. Fla. Stat. Ann. § 380.012 et seq., § 380.021 (West).

117. This was defended on grounds that the state was too large and complex for comprehensive solutions. See D. O'Connel, "Book Review: Carter, The Florida Experience," 5 Ecol. L. Q. 594, 597 (1976).

118. See chapter 7 infra.

119. L. Carter, The Florida Experience 135 (Baltimore: Johns Hopkins University Press, 1975).

120. This procedure was applied after designation of the Green Swamp. See Healy, supra note 78, at 219.

121. An amendment approved in 1974 allows the state to impose interim controls, but not a moratorium, after designation until the adoption of implementing regulations.

122. Permit systems were adopted in each case that imposed tight constraints on development. A recent review found 24 applications, most for single-family homes, and most of them were approved. U.S. Department of the Interior, Information/Data Handling Requirements for Selected State Resource Management Programs: Technical Supporting Report C 180 (July 1975 draft).

123. This limitation has been criticized as highly arbitrary and a major failing in the law. See Carter, supra note 119, at 133-35; and Council of State Governments, supra note 114, at 14-15.

124. See Carter, supra note 119, at 228-65; and Technical Supporting Report C, supra note 122, at 202-03.

125. Nomination by the public also contributes to credibility and public acceptance, although at the risk of haphazard implementation. See id.

126. Colo. Sess. Laws 1974, ch. 80, § 106-7-101 et seq.

127. The Land Use Commission has been a party to one case before the Colorado Supreme Court, but the results were inconclusive. City of Louisville v. District Court, 543 P.2d 67 (1975).

128. See Denver Post, Dec. 14, 1975, at 2.

129. Rocky Mountain News, Oct. 25, 1975, at 6.

130. For a summary of designations by county, see E. Imhoff, A Review of Selected Laws and Governmental Programs in Colorado, As Related to Mineral Resource Management and Surface Mining 6 (U.S. Geological Survey No. 76-649, 1976).

131. Healy, supra note 78, ch. 8.

132. Id. at 117-18.

133. 1 Institute for Environmental Studies, supra note 114, at 11.

134. See chapters 4 and 5 infra.

135. U.S. Department of the Interior, Methods and Techniques for Critical Area Program Development: Technical Supporting Report A 79 (July 1975 draft).

136. The reader interested in further materials is directed to Technical Supporting Report C, supra note 122; Technical Supporting Report A, supra note 135; and Institute for Environmental Studies, supra note 113.

137. Cal. S.B. 1277, as amended by A.B. 2948 (enacted Aug. 25, 1976).

138. Del. Code tit. 7, § 70.

139. See Healy, supra note 78, at 151-52; and J. Pedrick, "Land Use Control in the Coastal Zone: The Delaware Example," 2 Coastal Zone Management J. 345 (1976).

140. The regional commissions will expire on June 30, 1979, by which time their functions will have been transferred to local government agencies certified by the state.

141. For a review of this experience, see G. Bowden, "Legal Battles on the California Coast: A Review of the Rules," 2 Coastal Zone Management J. 273 (1976).

142. Healy, supra note 78, at 223.

143. Id.

144. See id. at 90-98.

145. See Thurow, Toner, and Erley, supra note 37, ch. 5.

146. U.S. Environmental Protection Agency, Protection of Nation's Wetlands: Policy Statement, 38 Fed. Reg. 10834, 10835 (1973).

147. 16 U.S.C. § 1301 et seq.

148. See generally 1 Institute for Environmental Studies, supra note 114, at 75-89. A model state wetlands protection statute is being prepared for the Fish and Wildlife Service by the Environmental Law Institute.

149. N.Y. Envir. Conserv. Law § 24-0101 et seq. (McKinney).

150. Id. § 25-0101 et seq.

151. See section 4.1 supra.

152. This moratorium was upheld in Candlestick Properties v. San Francisco Bay Area Conservation & Development Comm'n, 11 Cal. App. 3d 557, 89 Cal. Rptr. 897 (Cal. Ct. App. 1970).

153. See Thurow, Toner, and Erley, supra note 37, at 45-47.

154. Conn. Gen. Stat. Ann. §§ 22a-29 and 22a-38 (West). See generally Comment, "The Wetlands Statutes: Regulation or Taking," 5 Conn. L. Rev. 64 (1972).

155. Me. Rev. Stat. tit. 38, § 472 (1977 Supp.).

156. A state wetlands inventory in New Jersey cost over $2 million. 1 Institute for Environmental Studies, supra note 114, at 87.

157. Thurow, Toner, and Erley, supra note 37, at 46.

158. Conn. Gen. Stat. Ann. § 22a-29(3) (West).

159. Id. § 22a-33.

160. Thurow, Toner, and Erley, supra note 37, at 47.

161. See Comment, "Recent State Wetland Cases: The Continuing Battle over the Proper Scope of Regulation," 6 ELR 10125 (1976).

162. See note 168 infra.

163. Model Land Development Code, supra note 112, art. 6.

164. See "Land Banking Can Ease Some Growing Pains," Conservation Foundation Letter (Conservation Foundation, Washington, D.C.), Dec. 1975.

165. J. Wagenlander, "The Urban Open Space Game," 6 Urb. Law. 950, 959 (1974).

166. See Regional Science Research Institute, Untaxing Open Space (Washington, D.C.: Government Printing Office, 041-011-00031-9, 1976).

167. See Model Land Development Code, supra note 112, § 6-501(1) and note following.

168. Planning, Feb. 1975, at 5.

169. 4 United Nations, Urban Land Policies and Land-Use Control Measures 60-69 (New York, 1973).

170. See J. Costonis and R. DeVoy, The Puerto Rican Plan: Environmental Protection through Development Rights Transfer (Washington, D.C.: Urban Land Institute, 1975).

171. R. Fishman, "Public Land Banking: Examination of a Management Technique," in 3 Management and Control of Growth, supra note 23, at 67.

172. Thurow, Toner, and Erley, supra note 37, at 44.

173. See Model Land Development Code, supra note 112, § 6-203 and note following.

174. M. Gleeson et al., supra note 22, at 37.

175. Id.

176. Land Use, Open Space, and Government Process: The San Francisco Bay Area Experience 110 (E. Smith and D. Riggs eds. 1976).

177. Wagenlander, supra note 165, at 953.

178. See chapter 2.

179. 16 U.S.C. § 1301 et seq.

180. 42 U.S.C. § 5305(a)(1).

181. See Thurow, Toner, and Erley, supra note 37, at 44.

182. Id. at 44-45.

183. M. Holbein, "Land Banking: Saving for a Rainy Day," Planning, Jan., 1975, at 19.

184. Comment, "American Law Institute Endorses Land Banking," 5 ELR 10152, 10156 (1975).

185. The problem of lost tax revenues is one example.

186. Berman v. Parker, 348 U.S. 26 (1954).

187. 5 N. Williams, supra note 19, § 158.

188. "Land Banking Can Ease Some Growing Pains," supra note 164, at 5-6.

189. Commonwealth of Puerto Rico v. Russo, 95 P.R.R. 488 (1967). See also Fishman, supra note 171.

190. See, e.g., "Landowners Fight Wild River Effort," Washington Post, Oct. 18, 1976, at A1.

191. The bill was struck down by the Massachusetts Supreme Court on other grounds. In re Opinion of the Justices, 313 N.E.2d 561 (1974).

192. Parker v. Commonwealth, 178 Mass. 199, 59 N.E. 634 (1901).

193. See J. Costonis, "Fair Compensation and the Accommodation Power: Antidotes for the Taking Impasse in Land Use Controversies," 75 Colum. L. Rev. 1021, 1078-79 (1975).

194. See generally W. Irwin and R. Liroff, Economic Disincentives for Pollution Control: Legal, Political and Administrative Dimensions (Washington, D.C.: Government Printing Office, EPA 600/5-74-026, 1974); and C. Schultze and A. Kneese, Pollution, Prices, and Public Policy (Washington, D.C.: Resources for the Future, 1975).

195. Associated Homebuilders of Greater East Bay v. City of Walnut Creek, 4 Cal.3d 633, 94 Cal. Rptr. 630, 484 P.2d 606 (1971); Jenad v. Village of Scarsdale, 18 N.Y.2d 78, 218 N.E.2d 673 (1966). See generally D. Hagman, Windfalls for Wipeouts (Monticello, Ill.: Council of Planning Librarians Exchange Bibliography Nos. 618-20, 1975). Illinois is a major exception. Pioneer Trust & Savings Bank v. Village of Mt. Prospect, 22 Ill. 2d 375, 176 N.E.2d 799 (1961).

196. Jordan v. Village of Menomonee Falls, 28 Wis.2d 608, 137 N.W.2d 442 (1965) (earmarking not required); 5 N. Williams, supra note 19, § 156.08-.09 and cases cited therein.

197. See generally Hagman, supra note 18, §§ 198-200.

198. Id. § 200.

199. See Windfalls and Wipeouts, supra note 195, at 94-98 and sources cited therein.

200. Divan Builders v. Planning Bd. of Township of Wayne, 122 N.J. Super. 508, 300 A.2d 883 (1973).

201. City of Buena Park v. Boyar, 186 Cal. App. 2d 61, 8 Cal. Rptr. 674 (1960).

202. See, e.g., Baltimore County v. Security Mortgage Corp., 227 Md. 234, 175 A.2d 755 (1961); 2 U.S. Water Resources Council, supra note 57, at 43.

203. For a summary and critical evaluation of these provisions, see Regional Science Research Institute, supra note 166.

204. Mont. H.B. 672 (1975).

205. Delays in the implementation of the act have been due to questions about the relationship of the law to existing zoning and other potential conflicts. Land Use Planning Reports, Nov. 1, 1976, at 5. The administrative cost of the law was also estimated to be very high, as much as $50,000 to $150,000 for Great Falls alone. Letter from John R. Richards in Planning, June 1976, at 2.

206. A summary of state court attitudes is provided in 1 N. Williams, supra note 19, § 6. See also authorities cited in note 218 infra.

207. 201 N.W.2d 761 (1972).

208. Id. at 771.

209. 265 A.2d 711 (Me. 1970).

210. Dooley v. Town Plan and Zoning Comm'n, 151 Conn. 304, 197 A.2d 770 (1964).

211. Morris County Land Improvement Co. v. Township of Parsippany-Troy Hills, 40 N.J. 539, 193 A.2d 232 (1963).

212. 40 N.J. at 555-56, 193 A.2d at 241-42.

213. AMG Associates v. Township of Springfield, 65 N.J. 101, 112 n.4, 319 A.2d 705, 711 n.4 (1974).

214. 300 A.2d 736 (Me. 1973).

215. Id. at 750. See also "Recent State Wetland Cases: The Continuing Battle over the Proper Scope of the Regulation," supra note 161.

216. See P. Soper, "The Constitutional Framework of Environmental Law," in Federal Environmental Law 20, 66-67 (E. Dolgin and T. Guilbert eds. 1974); 1 U.S. Water Resources Council, supra note 57, pt. 3; Berger, supra note 24, at 819-23; F. Bosselman, D. Callies, and J. Banta, The Taking Issue 217-19 (Washington, D.C.: Council on Environmental Quality, 1973); and R. Babcock, "On Land Use Policy," Planning, June 1975, at 12, 14-15; Note, "Preserving Scenic Areas: The Adirondack Land Use Program," 84 Yale L. J. 1705, 1716-21 (1975).

217. See Bosselman, Callies, and Banta, supra note 216, at 302-09; and Berger, supra note 24.

218. 39 N.Y.2d 587, 350 N.E.2d 381 (1976). See J. Costonis, "Fred F. French Investing Co. v. City of New York: Losing a Battle but Winning a War," 29 Land Use Law & Zoning Dig. 6 (1976).

219. Coastal Southwest Development Corp. v. California Coastal Zone Conservation Comm'n, 127 Cal. Rptr. 775 (Cal. Ct. App. 1976), discussed in 28 Zoning Dig. 334 (1976).

220. Moviematic Industries Corp. v. Board of County Comm'rs of Dade County, (Dade County Cir. Ct. 1976). But see Steel Hill Development, Inc. v. Town of Sanbornton, 469 F.2d 956, 3 ELR 20018 (1st Cir. 1972), where the court upheld a six-acre minimum lot requirement despite being "disturbed" by the lack of evidence to support the limitation.

221. Sturdy Homes, Inc. v. Township of Redford, 30 Mich. App. 53, 186 N.W.2d 43 (1971).

222. See discussion in section 2.4 supra.

223. E.g., Donnelly v. Outdoor Advertising Board, 339 N.E.2d 709 (Mass. 1975).

224. Sierra Club v. Environmental Protection Agency, 6 ELR 20669, 20682 (D.C. Cir. Aug. 2, 1976).

225. Recent Supreme Court equal protection cases include Roe v. Wade, 410 U.S. 113 (1973); and Dunn v. Blumstein, 405 U.S. 330 (1972). See generally M. Gleeson et al., supra note 22, at 68-72.

226. Wambat Realty v. Adirondack Park Agency, 6 ELR 20690, 20695 (Clinton County, N.Y. Super. Ct. 1976).

227. Potomac Sand & Gravel Co. v. Governor of Maryland, 226 Md. 358, 293 A.2d 241 (Md. Ct. App. 1972).

228. Proctor & Gamble Co. v. Chicago, 509 F.2d 69 (7th Cir. 1974), cert. denied, 421 U.S. 978 (1975).

229. 509 F.2d at 81.

CHAPTER THREE

LOCATIONAL CONTROLS FOR WATER QUALITY

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CHAPTER FOUR

MUNICIPAL WASTEWATER TREATMENT FACILITIES:
RESTRICTIONS ON TIMING AND LOCATION OF HOOKUPS AND EXTENSIONS

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CHAPTER FOUR

MUNICIPAL WASTEWATER TREATMENT FACILITIES: RESTRICTIONS ON TIMING AND LOCATION OF HOOKUPS AND EXTENSIONS

1.0 Introduction

1.1 Municipal Wastewater Treatment Facilities and the Section 208 Water Quality Management Planning Process

Municipal wastewater treatment facilities,* like industrial dischargers, are subject to the National Pollutant Discharge Elimination System created by section 402 of the Federal Water Pollution Control Act Amendments of 1972 (FWPCA). Other key requirements of the FWPCA applicable to municipal wastewater facilities are set out in sections 201(g), 301, and 302 of the act. By 1983 municipal waste treatment facilities must meet best practicable waste treatment technology (BPWTT) or whatever higher level of treatment is required to meet applicable water quality standards.1/ Progress towards meeting both technology and water quality based standards will continue to depend on upgrading of old and construction of new treatment facilities and sewers.2/

Upgrading and expanding publicly owned treatment works, however, cannot by itself assure achievement of 1983 standards. The treatment level expected of the costliest and most advanced sewage treatment plant can be undermined in a variety of ways. Among the threats to the sound operation and required effluent quality of a municipal treatment plant are certain industrial discharges to sewers; uncontrolled stormwater runoff (where storm sewers and sanitary sewers are combined); and excessive quantities of domestic sewage (when it results in inadequate treatment or overflows).

In the case of industrial discharges to sewers, the extra dimension of control needed takes the form of pretreatment ordinances requiring industry to remove or neutralize those components of its discharge which will either damage the treatment system of the municipal facility or which will pass through it untreated.3/ Both the technical and the legal and institutional aspects of pretreatment are the subject of a separate handbook published by EPA's Water Planning Division.4/ EPA is also working on a model pretreatment ordinance.5/

Another threat to the proper functioning of municipal treatment facilities is the unpredictably-sized and frequently grit and oil-laden stormwater from storm sewer cross connections and from roof leaders, foundation drains, etc.6/ Regulatory approaches for controlling

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* This term, and variations on it, will be used to describe all publicly owned centralized sewerage collection and treatment works. Decentralized, small-scale and "cluster" systems will be discussed in the next chapter.

urban stormwater runoff are discussed in chapter 6.

The remaining troublesome contributor to substandard municipal discharges is individual domestic discharges which, in total, exceed the design flow of the particular treatment system. With most of the country already experiencing rapid growth, 7/ and with the observed tendency of new sewer and sewage treatment capacity to accelerate that growth, 8/ controls designed to keep the volume of sewage flow in balance with the particular sewage treatment facility's capacity will be an all important part of most water quality management programs.

Unfortunately, in many municipalities and other local jurisdictions around the country, existing sewage loads actually do exceed or are on the brink of exceeding existing sewage treatment capacity. Short-term controls are needed to avoid further overloading or to parcel out severely restricted capacity in an equitable fashion. Such ad hoc control techniques (bans on further sewer connections, generally called sewer "moratoria," and sewer allocation schemes) are the subject of the first two sections of this chapter.

Even when new sewage facilities are being planned or are undergoing construction, moreover, water quality management plans need to include, in the language of EPA's Guidelines for State and Areawide Water Quality Management Program Development, methods for "managing the systems over time in order to prevent growth from exceeding the designed capacity of the system."9/ EPA's guidelines go on to recommend that water quality management plans include schedules for hookups to the wastewater collection and treatment system. Much of this chapter will discuss how to tie the definition of the current service area and future, incremental extensions of sewer lines and of the service area to a locality's plans for location and timing of future growth.10/

As communities have discovered that major capital facility investments and particularly investments in sewers determine the pattern of land use development, 11/ many have sought methods to harness this cause-effect phenomenon. This has been done in several cases by planning new facilities, scheduling hookups, and locating and sizing new sewer extensions to fit development priorities which reflect overall land use plans. These plans will typically include both a desired rate of growth and the desired locations of such growth. Indeed, it has been observed that the population projections necessary for sizing new or expanded sewer facilities will not be realistic unless based on the "carrying capacity" of the land.12/ Critical environmental areas such as flood plains and prime agricultural land will be put off limits to intensive development and, therefore, to sewers. Considerations of energy and transportation efficiency and a desire to conserve open space may dictate giving priority in sewer service to applicants from already developed or partially developed areas.13/

The goal of better water quality is served by the methods tying sewer

services to land use planning described in this chapter--capital improvements programming and adequate public facilities ordinances--in at least the following three ways:

1. With development permission firmly tied to the availability of sewer capacity, the chronic overloads of the past which have spawned the ubiquitous sewer moratorium can be avoided in the future;
2. With sewering and onsite waste disposal (see chapter 5)unavailable in flood plain and wetlands areas, the adverse consequences of development in these areas on water quality may be avoided. Development in such areas reduces flood storage capacity thereby adding to the size and frequency of flooding--flooding which pollutes as well as causing physical damage and loss of life. Development in wetlands may pollute groundwater and surface water and destroys natural water purification systems. Development along streams also increases the rate of stormwater runoff by increasing the amount of impervious surface; accelerated runoff disturbs the natural balance between a stream or river and its banks, causing erosion and sedimentation. (This last point is also true, of course, of development elsewhere.)
3. Under a comprehensive capital facilities programming/land use planning scheme, preference for finite sewer and sewage treatment capacity may be accorded development based on its overall community contribution. Among other factors to be weighed, low discharge volume, a high standard of pretreatment, and water conservation measures might entitle a particular developer to priority.

1.2 Other Federal Requirements for Municipal Wastewater Treatment Facilities

EPA points out in its Guidelines for State and Areawide Water Quality Management Program Development that communities which do not themselves develop a system for balancing sewer demand and sewer capacity may be subject to having one imposed as a condition of the NPDES permit for the municipal discharge:

> In the event that a violation of an NPDES permit permit occurs due to overloading of treatment works, the Regional Administrator (or the State if the NPDES program has been delegated to a State) may, under authority of Section 402(h) of the Act, seek a court order imposing a ban or restrictions upon sewer connections. A series of planning and management actions to prevent overloading of facilities may be included as special con-

> ditions to permits issued to facilities in danger of imminent overloading.14/

The circumstances under which such conditions may be imposed are further spelled out in EPA's Guidance Memorandum No. 10, "Guidance for Conditioning of Municipal Permits in High-Growth Areas," (Jan. 15, 1974). Specifically, the guidance memorandum suggests several conditions to be included in "permits issued to all facilities where rapid growth (annual growth rate of 3 percent or more) is anticipated" and (1) where the population served is greater than 10,000 and overload is imminent ("facility is operating in excess of 85 percent of design flow or BOD loading requirement at time of issuance") or (2) where, regardless of population served, overload is actual ("facility is already exceeding allowable BOD loading or flow rate at time of permit issuance"). The suggested conditions of Guidance Memorandum No. 10 are:

> The permittee, in consultation with the several independent agencies and local governments listed . . . shall develop a schedule of new extensions, connections and hookups of new sources (e.g., dwelling units) to the waste treatment system over the duration of the permit. This schedule should be consistent with existing or emerging land use plans, open space plans, official zoning maps, and/or capital improvement budgets of the various agencies listed. A copy of this schedule or schedules, along with a statement of concurrence (or non-concurrence) from the local governments, should be provided to the State and EPA within 180 days from issuance of this permit. Thereafter, an annual report should be submitted by the permittee to the State, EPA and the various local agencies tracking the rate of actual hookups, connections and extensions against the agreed-upon schedule. As the schedule is periodically revised, copies of the new schedule should be provided along with the annual report.

Location and sizing of the sewage treatment facility itself are beyond the scope of this chapter. Detailed guidance for these decisions is given in the FWPCA and in EPA regulations and guidelines, 15/ while locational controls generally are discussed in chapter 3 of this handbook.

It is important to note, however, the close relationship between future section 201 planning and state and areawide water quality management planning. After the water quality management plan is approved, future grants for section 201 facilities plans must be made to the management agency or agencies designated in the plan and only for facilities in conformance with the plan. Denver, Colorado is an example of a region which has been coordinating section 201 facilities planning

on a regional basis for some time. The Denver Regional Council of Governments, which has been designated as the area's section 208 planning agency, reviews any comments on all construction grant applications and plans for scope of work. Applications must be approved by the council before they will be approved by the state. Construction grant applicants are already using data for population projections, land use, and instream water quality that are consistent with the area-wide water quality planning program under section 208.16/

The process for reconciling any inconsistencies between section 201 facilities plans and section 208 water quality management plans is outlined in EPA's Program Guidance Memorandum No. 66 entitled "Relationship Between Section 201 Facility Planning and Water Quality Management (WQM) Planning." It reads in part:

> Where future 201 planning results in recommended projects not in general conformance with the recommendations of an approved WQM plan, review of the proposed change must be made by the designated agency responsible for operating the continuing WQM planning process. If the proposed change is accepted by the WQM planning agency, the WQM plan is to be revised. (Revisions will then proceed through the normal State certification and EPA approval process.) If the proposed change is unacceptable, the approved WQM plan is controlling.

Much of the information necessary for facilities planning will, of course, be the basis for future controls on the rate and location of sewer hookups and extensions. Estimates of future municipal wastewater flows based on economic and population projections, for example, will be at the center of both section 201 facilities planning and section 208 water quality management planning. These will provide the basis for the timing of hookups and extensions. As for the spatial dimensions--the exact configuration of the service area--the section 201 facility planning process will contribute valuable data useful for section 208 water quality management planning determinations of what areas have soils suitable for onsite wastewater disposal (see the following chapter) and what areas are too environmentally sensitive and valuable to be serviced at all.

Much of this information on what are commonly known as the "secondary effects"* of sewage collection and treatment facility construction must be gathered and evaluated as part of the environmental impact assessment process under the National Environmental Policy Act (NEPA).17/ If the

*EPA defines secondary effects as "(1) indirect or induced changes in population and economic growth and land use, and (2) other environmental effects resulting from these changes in land use, population, and economic growth." (EPA Program Guidance Memo No. 50, "Consideration of Secondary Environmental Effects in the Construction Grants Process," June 1975, at 11.)

construction grant applicant's environmental impact assessment indicates a project will have significant adverse primary or secondary effects (or will be highly controversial), EPA will prepare an environmental impact statement on it under the agency's NEPA regulations.18/ Additional restrictions apply, as a matter of EPA and executive policy, to the construction of wastewater treatment facilities which may interfere with a wetland ecosystem or with the natural functions of a flood plain.19/

When at the end of the environmental impact assessment or statement review process, EPA decides to award the construction grant, its policy is to include in the grant document any conditions necessary to mitigate adverse primary or secondary environmental effects. The EPA Administrator's June 1975 Program Guidance Memo No. 50, entitled "Consideration of Secondary Effects in the Construction Grants Process," lists ways in which secondary effects may be mitigated, ways which include:

- phasing and orderly extension of sewer service
- improving land use planning
- better coordination of planning among communities affected by the project
- sewer use restrictions
- improving land management controls to protect water quality, such as sedimentation and erosion control and floodplain management.20/

Thus both through its power under the NPDES to restrict sewer connections where overload is threatened, and also through denial or conditioning of construction grants, EPA has the leverage to follow through on the requirement that water quality management plans include (1) measures to prevent growth from exceeding the designed capacity of the wastewater treatment system and (2) other measures, including land use controls, to regulate the location of sources of water pollution, both the treatment facility itself and contributors to it. The following discussion suggests (1) certain tools which water quality management agencies and water quality planning agencies should have if they are to be equipped to avoid degradation of water quality through an overloaded sewer system and (2) techniques by which the sewer system can itself be made a tool to avoid degradation of water quality through ill-timed of ill-placed growth.21/ Development of these or similar tools and techniques should enable communities to avoid state or federally imposed restrictions on their wastewater treatment facilities and should smooth the way for obtaining state and federal funding when and if such funding becomes necessary to upgrade or supplement inadequate collection and treatment facilities.

2.0 Interim Restrictions on New Connections

2.1 Sewer Moratoria 22/

In the past few years the sewer moratorium has become a fact of surburban

life and an all too familiar term in the vocabulary of development. The concept of calling a temporary halt to development is not new. For many years municipalities have imposed temporary restrictions on the issuance of building permits or on the processing of subdivision plans or of rezonings, often to give themselves time to draft a new comprehensive plan or a new zoning ordinance.23/ Increasingly, municipalities and counties caught offguard by rapid growth find their sewer systems as inadequate to deal with that growth as their master plans. And they know if they don't act to limit access to overtaxed sewer systems, the state probably will.

A decision to disallow further connections to an overloaded sewage treatment plant may take many forms.24/ The sewer authority itself may impose a ban on all further connections. This may be enough where the municipality or other general purpose unit of government requires a sewer connection permit as a precondition to the issuance of a building permit. Alternatively, the local government may adopt an ordinance suspending the issuance of building permits for construction requiring sewer service or it may call a temporary halt to the processing of rezoning or subdivision requests. Where neither the sewer authority nor the local governing authority takes the initiative, the state may act to ban new connections to the treatment plant.

There is also variation among sewer moratoria in terms of their coverage. Even in situations where the treatment plant is severely overloaded, the authority imposing the moratorium may want to exempt limited preferred uses such as public facilities and low-income housing from the ban.25/ In cases where the public health hazard is less, an exemption for individual (non-tract) single family homes and even for commercial and industrial uses may be justified. Of course, where there is substantial remaining capacity--or where new but limited capacity will be coming on line--a sewer allocation policy rather than a sewer moratorium is the appropriate control technique. Before describing the nature of sewer allocation policies, however, the question of what agencies may impose sewer moratoria under what circumstances will be discussed.

2.1.1 Appropriate Level and Agency of Government--Questions of Administrative Coordination and Legal Authority

The key administrative problem with respect to the imposition of sewer moratoria is coordination. If the sewer authority or the state imposes a moratorium on the issuance of sewer connection permits, then the local government body should predicate the approval of a subdivision plat and the issuance of a building permit on the applicant's having a sewer connection permit or the assurance of one by the time the property is ready to hook up. Only if there are such formal coordinating mechanisms between the sewer authority and other officials and agencies involved in the development approval process can bureaucratic confusion and resulting inequities be avoided.

Which level and agency of government is in the best position to impose a sewer moratorium is not so much a question of administrative workability as it is one of adequate legal authority. It is not unusual, for example, for the enabling legislation empowering a local sewer authority to stipulate that the authority "shall" grant a connection permit to anyone applying to tap into an available sewer line. In construing such a statute, the Massachusetts Supreme Judicial Court cautioned that the word "'shall' . . . is not to be construed as 'may'." Although the decision in that case, Clark v. Board of Water and Sewer Commissioners of Norwood, 26/ went on to say that the statute in question would not be construed to require the sewer commissioners to grant an immediate connection where to do so would endanger the public health, a sewer authority operating under such a statute would have to sustain a heavy burden of proof and would not, of course, enjoy the presumption of validity accorded the legislative action of a general purpose unit of government.

With sewer moratoria imposed by general purpose units of government it is the form in which they are adopted that generally determines their legal validity. The cases make clear, for example, that a town cannot adopt a moratorium by way of a zoning amendment or a subdivision control regulation if the enabling legislation does not comprehend protection of the integrity of the sewer system and its receiving waters within the statutory purposes. Thus in striking down a zoning amendment which prohibited the construction of new multiple dwellings throughout a municipality and which was adopted, allegedly, to protect the municipal treatment system from overload, the New York Court of Appeals noted in Westwood Forest Estates, Inc. v. Village of South Nyack:

> There is a distinction between the proper use of the power to carry out the purposes of the enabling statutes . . . and the improper use of the zoning power to effect the general police powers of a municipality . . . .
>
> . . . .
>
> This is not to say that the village may not, pursuant to its other and general police powers, impose other restrictions or conditions in the granting of a building permit to plaintiff, such as a general assessment for reconstruction of the sewage system, granting of building permits for the planned apartment complex in stages, or perhaps even a moratorium on the issuance of any building permits, reasonably limited as to time.27/

Although state zoning and subdivision control enabling statutes may explicitly include the assurance of adequate public facilities and/or the prevention of pollution among their stated goals, 28/ localities in jurisdictions where such powers have not been construed broadly 29/ may well find that their surest source of authority for enacting sewer moratoria is their local police powers. The standard form for a sewer moratorium

adopted pursuant to the local police power is a limitation on the issuance of building permits. It must be remembered, however, that local units of government have no inherent police power authority; typically they enjoy such authority under their charter or by a "home rule" provision in their state statutes or constitution.30/ Despite the increase in home rule legislation across the country, some local governments are still severely limited in their authority, enjoying, under "Dillon's Rule" "only those powers expressly granted, those necessarily implied therefrom, and those that are essential and indispensable."31/

Where a locality has not been delegated the necessary police power authority to impose a sewer moratorium, the local sewer authority or governing body will have to call upon the state pollution control agency. Often, in addition to being able to call upon the state's reserved police power to protect the public health and safety, that agency will have explicit pollution control legislation empowering it to impose sewer bans on municipal treatment plants. If the state issues sewer connection permits, this power can, of course, be exercised directly. If it does not, and if the permit-issuing authority disregards the state order, section 402(h) of the FWPCA provides that a state may obtain a court order enjoining future connections--either directly, if it administers the NPDES itself, or through the regional administrator, if it does not. (The availability of this remedy assumes that the treatment works is overloaded to the point where it is in violation of its NPDES permit.)32/

2.1.2 Other Legal Questions

Assuming, then, that the level or agency of government deciding to impose a sewer moratorium has the legal authority to do so, what other legal tests must the moratorium satisfy? Briefly stated, the moratorium must (1) be justified by a bona fide lack of treatment capacity and consequent threat to the public health and (2) be limited as to time, generally to the time necessary to alleviate the health hazard. In addition, a moratorium should provide a variance procedure for hardship cases and, in the case of a particularly lengthy ban, should include one or more categories of allowable use so as not to deprive property owners all use of their undeveloped land.

a. Lack of Capacity

The courts are in general agreement that a government authority which has monopolized the provision of sewer service within a defined area not only has a duty to allow connections by all applicants within that area on an equal basis, 33/ but also to provide adequate treatment capacity to carry and treat that flow.34/ Therefore, the municipality wishing to limit future sewer connections must sustain a heavy burden of proof with respect to its claims of inadequate capacity and threatened hazard to the public health. Gone is the presumption of legislative validity, since in monopolizing sewer service the local government takes on the attributes of a public utility and sheds its "legislative" or "governmental"

prerogatives.

Thus while a court will not order a connection permit if it "would at once overload the sewer and risk serious flooding and danger of injury to persons or property," 35/ the cases attest to a judicial unwillingness to take municipalities' cries of inadequate capacity at face value. The Circuit Court of Fairfax County has even involved itself in the numbers game of millions of gallons per day by which sewer capacity is measured. In the most recent of its long series of cases overturning denials of sewer taps by the County Board of Supervisors, Langley Development Corporation v. Board of Supervisors of Fairfax County, 36/ the circuit court found that the board "did not possess any study of the Blue Plains Plant or other evidence or factual basis upon which it determined that a sewer moratorium or allocation policy was necessary to protect the public health, safety or welfare" at the time the resolutions which formed the basis of the moratorium were adopted. Further, the court found that "a minimum of .6682 mgd of unallocated capacity would exist even if there were some validity to the above referenced allocation policy." The Langley case points up the necessity of backing up a sewer moratorium with adequate documentation of the capacity figure on which an allocation system is based and of the pollution hazard if that capacity figure is exceeded.

b. Reasonable Duration

Westwood Forest Estates, Inc. v. Village of South Nyack, 37/ one of the first cases to bless the sewer moratorium, if only indirectly, was also one of the first to suggest that, to be valid, a moratorium should be "reasonably limited as to time." Since the particular form the Westwood moratorium took was declared invalid by the court, the New York court did not elaborate on what it would consider "reasonable." Subsequent cases suggest, however, that whatever time is necessary to construct the required additional capacity or to upgrade the existing treatment process will be considered "reasonable," as long as the municipality is not dilatory about commencing construction. The Circuit Court of Fairfax County allowed the county three years to furnish service in one instance, despite the court's finding that the board of supervisors had been aware of the lack of sewer capacity for almost a decade. In its letter opinion in that case, Chantilly Development Corporation v. Board of Supervisors of Fairfax County, 38/ the court was careful to stipulate, however, that the board "report to the court at six-month intervals their plans for furnishing sewers."

A New York case, Belle Harbor Realty Corp. v. Kerr, contains the following warning to communities which fail to use the breathing spell provided by the moratorium to good purpose:

> [W]e suggest that the city may impose a reasonable moratorium on construction in the area until the sewers can be expanded to accomodate the area's needs. However, if the city does choose to impose a moratorium, but then

> fails to remedy the sewerage problem with dispatch, property owners could, if so advised, sue to compel such remedial action as well as for any damages which might have resulted from the city's failure to perform its duty.39/

A recent U.S. District Court case, Smoke Rise, Inc. v. Washington Suburban Sanitary Commission, 40/ suggests, however, that a municipality with a legitimately delay-causing pollution problem need not be unduly alarmed by the possibility of the kind of liability suggested by the Belle Harbor case. Smoke Rise involved several five-year moratoria imposed on certain drainage basins by the Maryland Department of Health and Mental Hygiene. In holding that the moratoria were not unreasonable as to time and thus did not constitute a deprivation of property without due process, the court said:

> While a police power moratorium must be reasonably limited as to time, it is clear that the reasonableness of the duration of the moratorium must be measured by the scope of the problem which is being addressed.
> . . . .
> The scope of the police power and the permissible duration of its exercise must expand to meet the increasingly complex problems of metropolitan, multi-jurisdictional government.41/

In finding the five-year term of the Maryland moratorium reasonable, the court cited problems of federal funding; regional planning (including the delay in designation of the Metropolitan Council of Governments as the section 208 areawide water quality planning agency); and the "inter-jurisdictional complexity of the problem" in metropolitan Washington, problems which the opinion describes in considerable detail.42/ The fact that the court felt it necessary to describe the peculiar difficulties experienced by metropolitan Washington at such length suggests, however, that a community seeking to justify a moratorium of as much as five years will have to have highly persuasive evidence of inability to solve the overload problem in a shorter time.

c. Exemptions

Typically, local authorities are reluctant to impose across-the-board sewer moratoria for several reasons. One, they do not want to invite allegations that the moratorium constitutes an unconstitutional "taking" because it has the effect of forbidding any use of undeveloped land. (Munciipalities usually address this concern by exempting single-family dwellings.) Two, municipalities may want to lure, or at least not discourage industry and commercial development by exempting it. Third, a municipality may have a public facility planned or under construction or may want to exempt public facilities generally. Finally, a municipality will want to avoid specific inequities by including in the ordinance a carefully drafted variance provision to take care of the inevitable cases

of reliance, extreme hardship, etc. This list of typical exceptions raises inevitable questions, however: do not such exemptions undermine the primary case for the necessity of the moratorium? Does not picking and choosing between applicants raise constitutional questions of equal protection?

The last exemption in the above list, a variance provision governed by adequate standards, far from undermining the reasonableness of a moratorium, adds to it. As for exemptions of whole classes of uses, the cases suggest that these too may enhance the reasonableness of a moratorium by allowing the property owner some use of his land. Since the validity of the moratorium rests on the inadequacy of the community's sewer system, however, the exemption should be justifiable in terms of its lesser sewage volume. Thus, in upholding sewer moratoria which, in combination with sewer allocation policies, effectively singled out subdivisions for single-family homes, the Smoke Rise court observed:

> Montgomery County and [the defendant Washington Suburban Sanitary Commission] have adopted policies which give low priority to the applications of these conventional homebuilders vis-a-vis other commercial or residential application for sewer hook-ups as additional treatment capacity becomes available during the interim period. In the view of this Court, such allocation policies are rationally related to the legitimate purpose of alleviating sewage overflows while simultaneously affording sewer service to the greatest number of persons and land uses. By selecting a different, less profitable use for their land than single-family subdivisions, these plaintiffs can expedite the availability of sewer service to their properties. Under these circumstances, it cannot be said that a taking has occurred.43/

What the courts will not tolerate, of course, is a selectively imposed moratorium clearly designed to prevent the construction of a particular development, like the one struck down in Kennedy Park Homes Association v. City of Lakawanna as racially discriminatory.44/

2.2 Sewer Allocation Policies

2.2.1 Sewer Allocation Policies Within the 208 Process

Sewer moratoria are responses to emergency situations, situations which communities and sewer authorities should, needless to say, seek to avoid in the first place. Until more communities adopt the various measures available to them to slow the rapid growth which precipitates the sewer overload crises (measures which will be discussed in the following section on Controls on the Location and Timing of Sewer Services) and until the results of such measures as capital improvement programming and development timing controls are fully felt, many communities and sewer

authorities will be confronted with an excess of demand over available sewer capacity and will have to resort to allocation policies for that limited capacity if they are to avoid sewer moratoria. The primary goals of a sewer allocation system are (1) to monitor and control the rate at which capacity is exhausted in order to avoid overload and allow for planning of future facilities and (2) to make limited existing and new capacity available to applicants in an orderly, equitable way.

As they seek to avoid sewage overload, communities will also want to avoid a situation in which the real determinant of the type of future development is the availability of a sewer permit, rather than the community's comprehensive plan or zoning ordinance. Most sewer policies will, therefore, attempt to insure a balance between different types of development, or the correcting of a previous imbalance, by allocating a fixed percentage of capacity to each of several categories of use: residential, commercial, industrial, etc. Where the amount of remaining capacity is particularly small or a community's priorities particularly pronounced, the range of categories will be correspondingly narrow, e.g., 50 percent to public facilities (schools, hospitals, etc.) and 50 percent to low-income housing. The variants are limitless. Next comes the question of how to pick and choose between applicants within use categories.

Complicated schemes have been put forward for giving preference in allocation of scarce sewage capacity to uses which promise to minimize adverse effects on environmental quality by, for example, locating away fom environmentally sensitive areas such as flood plains; pretreating wastes; or generating low levels of wastewater to begin with. As the next section of this chapter will make clear, however, such schemes will be redundant once sewer service areas are drawn to reflect a community's preferred growth sequence and to protect critical environmental areas. In other words, once environmental concerns are made part of the sewer location and sewer access decisionmaking process, allocation of sewer capacity within the area eligible for immediate servicing when demand exceeds supply need only reflect the community's desire (1) to preserve or achieve balanced land use and (2) to award permits to those developers who have waited in line the longest and who are readiest to put their allocation to use.

This has been the approach of two of the very few jurisdictions which have experimented with sewer allocation policies: Montgomery County, Maryland 45/ and Fairfax County, Virginia.46/ While such a policy has the deceptively simple name of "first-come, first-serve," the complexity of the development process in most jurisdictions makes the determination of who came first a ticklish business. Montgomery County's regulations run to 23 pages. Fairfax County's "Procedure for Allocating Sewer Taps," which was declared invalid by the Fairfax County Circuit Court,47/ is almost equally complex. Some of the complexity is attributable to variations in policy as between different watersheds within the two counties, but much of it stems from the scrupulous attempts "to prevent the hoarding

of and speculation in sewage treatment capacity which would prevent persons with an intention to build in the reasonable future from doing so" (Fairfax County) and at the same time "to distribute available sources of sewerage service in order to insure balanced and orderly development" (Montgomery County).

Under both policies, balanced development is assured by the allocation of capacity between categories of use. The Maryland categories are:

1. public facilities and other public service buildings;48/ immediate public health problems (as a result of failing septic or other inadequate system)--8 percent of total capacity available;
2. commercial and industrial development--25 percent;
3. residential development--67 percent;

Commercial and industrial development is further broken down into small and large development. Development contributing 2,500 gallons per day ("gpd") or less receives 2 percent of the total capacity available. Larger developments, accounting for 18 percent of total capacity, are limited to 50,000 gpd per project except upon recommendation to the sewer authority by the county executive, with the approval of the county council.

The residential development category is further broken down as follows:

1. individually owned single family dwelling units--2 percent;
2. small volume builders (those who build fewer than ten dwelling units per year)--3 percent;
3. low and moderate income housing--28 percent;
4. conventional housing--22 percent;
5. large tract planned developments (minimum of 2,000 dwelling units within planned unit development zones)--12 percent.

Under the Virginia system, sewage applicants are accorded capacity within the appropriate use category according to the date that they file a complete site plan, preliminary subdivision plat, or application for a special exception or special use permit with the county Department of Environmental Management. The Maryland policy gives developers two months to grapple with the new policy. One month is devoted to advertising the new procedures, and all applications for service received within the first two months are put in an "Initial Group" and considered on an equal footing regardless of date of submittal. Subsequently, any remaining capacity is apportioned within each class according to the date of application for sewer service.

Under a "Standard Priority System" designed to assign priorities where demand exceeds supply even within the Initial Group, priority is given to projects closest to the construction stage and to those experiencing the longest delays. Nothing is left to the Washington Suburban Sanitary Commission's (WSSC) discretion, however; priority subgroups are ranked according to whether a project has an approved preliminary plan and a sewer authorization

or only the former, etc. An additional subgroup system is imposed on the one described, should capacity still be over subscribed. While this rather rigid system applies to most of the categories of uses, variations among the categories are explicitly provided for where dictated by the realities of the development process or by the anticipated shortfall in capacity allocated. In addition, the policy reflects certain variations among treatment plants.

Both the Fairfax and Montgomery County allocation procedures are particularly emphatic in their provisions for recapture of capacity not actually used within a specified period of time. Thus both policies require the subdivision developer to commence construction of a certain percentage of his units in each of a specified number of years to retain his sewer allocation for those units.

2.2.2 Level of Authority

Planning for sewer allocation is inseparable from the other planning requirements of section 208 and is best done on an areawide basis. The kinds of institutional framework within which ongoing planning for sewage systems may be done are discussed at the end of this chapter. Almost all of the hard decisions with respect to sewer allocation, many of which will be susceptible to severe political pressures, can be made in drawing up the policy itself: in deciding, for example, how much capacity to allocate to public uses and how much to residential development and when to impose a commitment recapture system. Once all the priorities have been spelled out in the policy document, the implementation of that policy should be a fairly routine and expeditious process, best implemented by the sewer authority responsible for issuing sewer permits. Whatever enabling authority was adequate to give the agency its permitting power in the first place will probably be adequate to support the ranking of applicants in accordance with areawide or statewide policy when capacity is scarce. States administering the NPDES can always use conditions in municipal NPDES permits to backstop local authority.

2.2.3 Incorporation of Standards and Planning

Both Fairfax and Montgomery Counties have amended their policies several times to deal with unanticipated situations and changing circumstances, and, needless to say, new situations will continue to crop up and circumstances will inevitably change again. Yet Montgomery County's sewer allocation policy forms part of its Ten-Year Water and Sewerage Plan, which must be approved by both the county council and the state Department of Health and Mental Hygiene. While the county Office of Environmental Planning suggested that it be given the power to set and amend the specifics of the program under general guidelines from the county council, the council objected to delegating such authority, fearing the politicization of the county bureaucracy.49/ Should the task of drawing up a detailed sewer allocation policy and amending it where necessary

be delegated to an administrative official or agency, ways of protecting the decisionmaking process from predictable individual pressure must be found. One possibility would be to hold public hearings on all proposed amendments.

As suggested above, if planning for the sequential growth of sewer service areas to accord with the provision of other capital facilities and with broader land use planning has been done, the sewer allocation process can be administered in an evenhanded, expeditious way by the sewer authority itself. The advantages of this system over an ad hoc determination of the environmental desirability of every application for a sewer connection are self-evident.

2.2.4 Enforcement

There are ways of requiring municipal treatment authorities to implement a sewer allocation policy other than through new state legislation. If a sewer allocation policy has already been instituted to comply with a condition in an NPDES permit, then that permit provides the enforcement mechanism for the municipal treatment authority's failure to abide by the terms of its policy. Where such a condition was not felt to be necessary in the past but becomes necessary, for example, because of sudden growth in the service area, the NPDES permit might be amended to include a sewer scheduling requirement. Should the treatment authority violate such a condition by failing to enforce an allocation policy, it would, of course, be subject to the imposition of a ban on all new connections under section 402(h) of the FWPCA.

If state and/or local law provides, as is the case in Maryland, that building permits may not be granted without a valid sewer permit and if the priorities for sewer allocation reflect a development's zoning or subdivision approval status, the involvement of zoning and planning officials will ensure an informed and independent review of the sewer authority's administration of the sewer allocation policy.

2.2.5 Constitutional Questions

Much of what has been said about the constitutionality of sewer moratoria applies with equal force to sewer allocation policies. Certainly a technique designed to avoid an emergency overload situation should have as much validity as a stopgap, last-minute sewer ban, as long as it is reasonably tailored to the danger to be averted. Smoke Rise, it will be recalled, upheld Montgomery County's sewer allocation policy as well as the state's sewer moratoria.50/ It should not matter at what stage the allocation policy is instituted as long as all available capacity is assigned 51/ and diligent efforts are underway to correct the shortage. However, it is legally dangerous as well as bad policy to use sewer allocation as a land use regulatory technique or to appear to be doing so by subjecting a sewage treatment plant to an allocation policy as soon as it is built. (Again, a sewer allocation policy

is simply a tool for assuring equitable and socially and environmentally desirable distribution of oversubscribed sewer capacity among those applicants who have already qualified for servicing by being within a sewer service area. Methods for avoiding excessive numbers of eligible applicants in the first place, i.e., controls on hookups designed to keep new development in phase with existing and projected sewer capacity, are the subject of the next section of this chapter.)

As for the terms of the allocation policy, Smoke Rise suggests that if certain uses are to be actively discouraged by a sewer allocation policy they should be those which create the greatest burden on sewer systems, and vice versa.52/ While some use should be left to the owner of undeveloped land where the allocation policy will be in effect for some time, Smoke Rise makes clear that the use does not have to be as profitable as any of the ones made unavailable by the allocation policy. One category-wide exemption which would minimize hardship could provide, for example, that every property owner in geographic proximity to a sewer line could effect a connection to that line for one single-family house.

One allocation priority which may be suspect is that commonly accorded public facilities. While such a priority creates no problem if the public facility is actually in the advanced planning or construction stages, saving capacity for a project that is nothing more than a gleam in a city councilman's eye will not square with a policy designed to foster immediate use and will probably be found invalid.53/ It may be wise to combine a public facility category with a public health hazard category for failing septic systems to reduce the possibility of idle capacity.

One final legally troublesome point is the rigidity of the systems exemplified by Fairfax and Montgomery Counties. While the very detail of the policies may immunize them from legal attack for being too vague or for delegating too much discretion, it lays them open to other legal problems as well as to practical, administrative difficulties. It is easy to imagine, for example, cases of reliance and substantial investment which, for some reason, would not be recognizable under the explicit terms of the two county allocation policies discussed above. The possibilities for injustice seem particularly strong in connection with the commitment recapture provisions of both the Montgomery and Fairfax policies. Montgomery County's policy provides, for example:

> The Commitment Recapture System (CRS) involves the submittal by each applicant of a five year development schedule. This schedule shall identify the portion of the project to be constructed each year along with clearly identified "checkpoints" in the development program which permit monitoring the progress the applicant is making in meeting the construction schedule and employing the commitment.
>
> . . . .

> . . . Failure to comply with this schedule constitutes failure to comply with the WSSC conditions of service commitment or authorization and the allocation will be cancelled.54/

Any provision that bold with as drastic implications for the developer will inevitably give rise to questions of interpretation of the construction schedule and to exemptions dictated by hardship (construction strikes, acts of God). The Fairfax County policy provides for a special "Sewer Tap Procedures Committee" to review all questions of interpretation before referring them with their recommendations to the Board of Supervisors. Given the intense political pressures that will inevitably be brought to bear on the sewer allocation process, the sewer authority administrator should not have the final say when application of the policy is disputed. Some provision will have to be made for an appeal process.

At this point a community may well wonder if the unavoidable complexities involved in drafting and administering a sewer allocation policy, even one that purports to be based on a principle as simple as "first come, first serve" are worth it. Unfortunately, by the time a community gets to the point of needing a sewer allocation policy, it may have no choice. The next section of this chapter will be devoted to measures a community might take to avoid a shortage of sewer capacity in the first place.

3.0 Controls on the Location and Timing of Sewer Services: Comprehensive Planning for Sewer Systems and Timing and Channeling Growth in Accordance with Capital Improvements Programming

3.1 Introduction

Sewer moratoria and sewer allocation policies are, at best, short-term, stopgap measures justified only by deficiencies in the sewer system which threaten overflows of untreated sewage hazardous to public health. Yet more and more communities have had to resort to these measures, however unwillingly, because of dramatic increases in population which have outstripped the communities' sewer construction programs and their other capital investment programs as well. Thus the problems of inadequate sewer and sewage treatment capacity stem from the reactive nature of the system. In most jurisdictions, sanitary commissions and municipalities are at the mercy of development forces not only beyond their control, but, more to the point, beyond their powers of prediction.

For example, when a developer requests a long sewer extension to an outlying subdivision, the flow from the subdivision can be estimated but the number and timing of demands for connections along the length of the extension cannot. Residential development in excess of the amount for which the sewer line was sized may be drawn to the area and may precipitate a moratorium. In addition, sudden, unpredictable demands are often placed on the

system by subdivisions with failing septic systems or by failing privately-owned sewage treatment plants usually known as "package plants"--demands which are, of course, impossible to refuse. Lacking more comprehensive growth-staging tools, communities have resorted to "holding zones" and to large lot zoning to avoid, among other problems, having their sewer policy dictated by their septic system failures. Not only are such stop-gap zoning techniques susceptible to challenge as exclusionary; 55/ they also promote the very pattern of scattered, sprawling development and consequent costlier public serivices which the community may have set out to avoid.

While many of the "costs of sprawl" are not of particular relevance here, unplanned growth does have adverse consequences for water quality beyond the overload of sewer systems and sewage treatment plants. Under the existing system, in which location of sewer lines is dictated by developers' locational choices, no account is taken of the nonpoint pollutional effects of development and of the varying capability of land to tolerate development. An example of these two factors in combination is increased sediment loading in streams resulting from new development. Since a developer will, in many cases, be reimbursing the sewer authority for the cost of a sewer extension, it is often to his advantage to locate in the low-lying parts of a watershed, along streams, so that his sewerage may be carried by gravity flow. Also carried into the watershed by gravity flow will be the sediment from the development's construction and the accelerated stormwater runoff from its paved surfaces. The increased stormwater runoff may well create continuing pollution of the stream from erosion and sedimentation.*

3.2 Capital Improvements Programming and Development Timing Described

Until quite recently the passive approach to questions of the timing and location of public improvements was considered legally unavoidable, with traditional zoning districts being considered the only legitimate tool for shaping the density and location of growth. Within the past five years or so, however, adventurous jurisdictions around the country have been experimenting with methods of establishing a temporal and locational sequence for the various categories of development shown on the zoning map. Although a few such jurisdictions have focused their concern on the absolute rate or ultimate dimensions of their communities' growth, 56/ more have keyed their timing devices to keep pace with, but not outdistance, long-term plans for the provision of public facilities.

The classic example of the latter approach is, of course, Ramapo, New York. Ramapo is well-known not only because of the novelty and comprehen-

*Measures designed specifically to deal with stormwater runoff are discussed in Chapter 6. We are merely making the point here that controls on the location of sewer extensions may help to avoid the adverse secondary effects of development on water quality.

siveness of its approach but also because of the highest state court's approval of that approach in the landmark case of Golden v. Planning Board of the town of Ramapo.57/ Briefly, Ramapo's innovation lies not in the fact that it drew up a long-range (18-year) program for the provision of public facilities ("capital improvements program") but rather in the fact that it tied development permission to the adequacy of those facilities, as defined by a rather rigid point system. Under that system, out of 15 points necessary to obtain the special permit required for all subdivisions, the developer will be credited with five points if public sewers are available, three if package sewer plants are available, and three if the development is in a rural zoning district and can gain county approval for a septic system. The remaining points are to be acquired from categories which assign values to (1) the percentage of required drainage capacity available; (2) the proximity of a public park, recreation facility, or public school; (3) the proximity of improved (curbed and sidewalked) roads; and (4) the proximity to a fire house.58/ Zoning provisions like Ramapo's are now generally known by the name "adequate public facilities ordinances."

Keying development permission to the adequacy of public facilities puts a new emphasis on the public facility planning process. It is no wonder then that the whole complex of planning and development timing devices being described here is often termed loosely "capital improvements programming." Many jurisdictions have adopted long-range capital investment programs for years, but never before have they had the tools they have now to assure that their plans are not made obsolete or irrelevant by the unanticipated rate or location of private development. Adequate public facilities ordinances also give new life to the comprehensive planning process. That process now must guide the location and timing of public facilities by identifying those areas where the community desires growth to be concentrated and those areas it wishes to preserve as low-density and by indicating the desired locational sequence and rate of growth.

The coordination of private development with capital improvements programming and of capital investments with broader land use planning requires detailed provision for the interaction between public agencies at all levels as well as between the community and the individual. This brings us to the question of the most appropriate institutional level or levels for the exercise of the myriad control techniques which make up a capital improvements programming/development timing process. These and other questions concerning the actual administration of such systems will be explored in the context of three jurisdictions deeply involved in working out such a process: Ramapo, New York; Montgomery County, Maryland; and Minneapolis - St. Paul, Minnesota.

3.3 Level of Government

3.3.1 Drawbacks to a Local Approach

At the same time that the majority opinion in Golden v. Planning

Board of Ramapo was being hailed as a giant leap forward for timed growth control around the country, critics were pointing out the discrepancies between the court's assumptions and reality. While the factual disputes over such things as the amount of low-income housing in the town of Ramapo are not of concern here, the larger question of the drawbacks to a local approach to capital improvements programming, which the critics also point out, is. The most relevant question raised by those critics is the practicality and reasonableness of Ramapo's keying development permission in part to the adequacy of local sewerage when the county, not the town, controls the provision of sewage facilities.59/

The legal difficulties of a municipality attempting to control the activities of a larger than local sewer district are illustrated by a recent Colorado sewer case, Robinson v. The City of Boulder.60/ Robinson involved the city of Boulder's denial of a water and sewer extension to a proposed subdivision in Gunbarrel Hill, an area otuside the city's limits but within its defined water and sewer service area. Boulder's reason for denying the extension was that the planitiff's proposed development was inconsistent with the Boulder Valley Comprehensive Plan and with certain aspects of Boulder's interim growth policy. In holding that the city must grant the requested extension, there being no utility-related reason such as lack of capacity for its denial, the court pointed out that the county, not the city, had land use authority over the unincorporated areas. In view of this fact and the indication in the record that the proposed development complied with county zoning regulations and with the county planning staff's interpretation of the Boulder Valley Comprehensive Plan, the court declined to address the question of whether the Boulder Valley Comprehensive Plan would relieve the City of Boulder of "its duty to the public in its proprietary role as a public utility" in any other circumstances.61/

Robinson provides an excellent example of the kind of interjursidictional problems glossed over in the Ramapo decision and it points up the need for legal mechanisms to ensure that all actors on the development scene are bound by the development timing plan, not just the developer himself. Robinson also suggests the inherent limitations of any local scheme. In cities like Boulder the development pressures are going to be greatest and the existing public facilities poorest in the unincorporated suburbs. Stringent development timing restrictions applicable or enforceable only within the city limits will only increase those pressures and aggravate sprawl on the city's perimeters.

Recent cases which have established a local duty to participate in meeting regional housing needs 62/ add a legal reason to the above-described institutional one for using a geographical area larger than the local as the basis for planning the timed provision of public facilities and for staging private development. If capital improvements programming is done on a regional basis there is far less likelihood that it will reflect the parochial interest in preserving the status quo or in encouraging commercial and industrial development while discouraging

the development of housing for the new work force.

3.3.2 Two Examples of a Regional Approach: Montgomery County, Maryland and Minneapolis - St. Paul, Minnesota

Montgomery County, Maryland and Minneapolis - St. Paul, Minnesota (the "Twin Cities") are two jurisdictions in which capital improvements programming and sequential guiding of development are being carried out on a regional basis. These two jurisdictions have been chosen as exemplary because of the degree to which they emphasize controls on the provision of sewer services. While the wisdom of according sewers such a preeminent role may be questioned, 63/ the relevance of the two systems for state and areawide water quality management planners cannot be doubted. Both jurisdictions are extremely useful examples of methods for controlling the timing and location of sewer lines and treatment plants so as to avoid point and nonpoint pollution. Those aspects of the system which attempt to accomplish more--e.g., to ensure a balance of development types--will be discussed only if they have ramifications for water quality or if they help assure judicial or political acceptability.

What is more, both Montgomery County and the Twin Cities offer excellent models for the kind of interagency coordination which will be necessary between state and areawide water quality planning agencies and designated 208 management agencies. It is to be expected that local and areawide sewer authorities will often be chosen as management agencies under section 208 64/, while planning functions will be vested in state and regional, including county-wide, bodies who can oversee and coordinate the activities of the sewer authorities from a broader subject matter and geographic perspective.65/

a. Allocation of Authority Between State and County: Montgomery County, Maryland

The Role of The County--By statute effective January 1, 1970, the State of Maryland required every county to adopt and submit to the state Department of Health and Mental Hygiene a plan providing, *inter alia*, for the orderly expansion and extension of community water supply and community sewerage systems over a 10-year period.66/ (In Maryland, public sewer and water systems are denominated "community" systems while private systems are designated "individual.") In Montgomery County, the preliminary plan is prepared by the Office of Environmental Planning within the Office of the County Executive with the assistance of the Washington Suburban Sanitary Commission (WSSC) and the bi-county Maryland - National Capital Park and Planning Commission ("Planning Commission"). Before submission to the state department of health, the plan is refined through public hearings and review and approval by the county council. The county Water and Sewerage Plan must be revised annually.

The Role of the Sewer Authority: The Washington Suburban Sanitary Commission--
Detailed support for the county Ten-Year Water Supply and Sewerage Systems Plan ("Ten-Year Water and Sewerage Plan") is provided by a Six-Year Capital Improvements Program (CIP) for sewers prepared by the bi-county sewer authority, the WSSC, and forwarded to the county council with the county executive's recommendations. After public hearings on the CIP are held, the county council modifies it as necessary to accord with the Ten-Year Water and Sewerage Plan and approves it, returning it to the WSSC for adoption. No projects may be undertaken by the WSSC within the county which are not set out in the CIP and, thus, which are not in conformity with the Ten-Year Water and Sewerage Plan. The county must also approve the WSSC's annual operating budget.

The Role of the State: State Department of Health and Mental Hygiene--
Not only must the state Department of Health and Mental Hygiene ("Department of Health") approve the county Ten-Year Water and Sewerage Plan, its delegated local health officers must ascertain that all subdivision plats are in conformity with that plan and that sewer facilities may be used as proposed by the developer without overloading the collection and treatment facilities.

Just as important as its regulation of the private sector's discharges into public sewerage systems is the Department of Health's regulation of the construction of public sewerage systems themselves. In order to obtain a permit to install or extend a sewerage system the WSSC, any municipality, or any other provider of sewer services must obtain the department's approval of its complete plans and specifications.67/ Any inconsistencies between the WSSC's construction plans and the county's Ten-Year Water and Sewerage Plan not revealed by the WSSC's Capital Improvement Program or annual budget ought to be ironed out at this stage.

b. A Regional Authority: Minneapolis - St. Paul

Although Montgomery County covers a large area (ca. 495 square miles), it enjoys municipal powers under its home rule charter over all the towns within that area (with the exception of Rockville, Gaithersburg, and Takoma Park), so it partakes, in some ways, more of the character of a local unit of government that it does of a truly regional one. It is worth comparing Maryland and Montgomery County's system of sewer planning, then, with that of a multijurisdictional region like Minneapolis - St. Paul, which adds another level of governmental involvement to the institutional pot.

The Twin Cities region encompasses 3,000 square miles, seven counties, two corporate cities, Minneapolis and St. Paul, and approximately 300 other units of local government. In 1970 the population of the entire region was 1,865,000 with about 40 percent of the metropolitan residents concentrated in the two central cities. From 1960 to 1970

the population in the central cities fell by 6 percent, while the population of the rest of the metropolitan area rose by 55 percent.

Regional government came to the Twin Cities area largely as a result of the Minnesota legislature's concern for certain areawide problems including contamination of suburban wells by septic tanks and the location of utilities and sewage treatment plants. In 1967 the state legislature passed a bill creating the Metropolitan Council. A policymaking body with decisionmaking powers, the Metropolitan Council consists of 14 members appointed by the governor. Council policy is implemented through regional operating agencies, local units of government, and private institutions. The only regional operating agency with which we are concerned is the Metropolitan Waste Control Commission (the WCC or the "commission"), formerly the Sewer Board, the most fully developed of the regional management agencies. Originally constituted in 1967, the WCC's chairman and seven members are appointed by the Metropolitan Council and represent combinations of Metropolitan Council districts by two's.68/

The Role of the Metropolitan Council in Sewer Planning--What Montgomery County is required by state law to do for sewers, water supply, and solid waste, the Metropolitan Council is required to do for every kind of development. That is, it must adopt a comprehensive development guide to consist of "statements, goals, standards, programs, and maps presenting guides for an orderly and economic development, public and private, of the Metropolitan Area."69/ The Development Guide includes a chapter covering sewers, entitled "Waste Management." Part III of that chapter is a detailed Policy Plan which includes highly specific sections relative to: (1) revised boundaries for sewer service areas; (2) projects which should be included in the Metropolitan Waste Control Commission's 1976 Development Program and for which federal/state grants should be requested; and (3) recommendations for studies of particular system improvements.

The Waste Control Commission now owns or will acquire "those interceptors and treatment works determined by the Metropolitan Council to be necessary to implement metropolitan sewer plans."70/ Included within that category are treatment plants in the "Freestanding Growth Centers," defined as a limited number of rural centers that can potentially absorb urban growth and where metropolitan investments can be concentrated. Local governments will continue to own municipal collection systems. The commission is responsible for preparing a detailed five-year Development Program (the equivalent of the Maryland WSSC's six-year CIP) for expansion and upgrading of the metropolitan facilities. The commission's program must include, among other things, "a review and description of the public need for the improvement, alternatives to the improvement (including alternatives not involving capital expenditures) [and] the environmental and social effects of the improvement . . . ."71/

Like its counterpart the Montgomery County Council, the Metropolitan Council must approve both the sewer commission's capital program and its annual capital improvements budget. Under the Metropolitan Council Act:

> No capital improvements shall be undertaken by the commission unless authorized by the program or specifically approved by the council. The.council shall not approve any improvement not in substantial conformance with the appropriate policy plan.72/

The Role of Local Governments in Sewer Planning--The Metropolitan Waste Control Commission Act requires each local government unit to adopt a policy plan for the collection, treatment, and disposal of the sewage for which it is responsible and to coordinate it with the council's Policy Plan. It is the Waste Control Commission which must review and approve the local plans "as to those features affecting the Commission's responsibilities as determined by the Commission."73/ The Waste Control Commission, in turn, must describe to the council in its Development Program the relationship of each project proposed in that program to the local sewer plan of each affected local government.

Local governments are involved, moreover, in the evolution of the Development Program. Individual projects proposed in the program have first been developed through an individual facility planning process. Copies of the project facilities planning report are sent to officials and local interest groups of the affected community for review and comment and a public hearing is held. Meetings between local government representatives and the commission are held as necessary. In addition, public hearings are held on the final, areawide Development Program. If a local unit of government is dissatisfied with the programmed availability of metropolitan sewer service it may request the council and commission to consider amendment of the Policy Plan or Development Program under special council procedures.74/

3.4 Incorporation of Planning and Standards

It is almost tautological to discuss the extent to which capital improvements programming and development timing techniques of the kind under analysis here take into account long-range planning, since in many ways the techniques are themselves plans--plans with teeth. The teeth are the definitions of service area: areas where sewer and other public services will be provided at specified times in the future. Ideally, the delineation of service areas should follow the broader land use and environmental planning of the community.

3.4.1 Ramapo, New York

Long before adopting its 18-year Capital Improvements Program and its zoning ordinance amendment, Ramapo, New York undertook comprehensive planning for the future growth and development of the town including what land was to be preserved for parks and the protection of streams. Development inconsistent with the emerging plan was prohibited through the use of interim zoning, a policy which survived judicial challenge.75/ Permanent preservation of open space was guaranteed by the adoption of model

subdivision regulations 76/ and average density, cluster zoning, and development easement laws, 77/ as well as by channeling development away from critical areas through the town's capital improvements program and zoning ordinance.

3.4.2 Montgomery County

In Montgomery County the bi-county "1964 General Plan for the Maryland-Washington Regional District - on Wedges and Corridors," prepared by the Maryland - National Capital Park and Planning Commission, provides that development is to be channeled along the major transportation corridors, while the spaces between those corridors (the "wedges") are to be preserved for low density and rural development. "Wedges" are designed to isolate certain towns from unrelieved urban sprawl and to protect river basins from pollution. Nothing in the "Wedges and Corridors" plan indicates, however, a desired sequence for growth, and a proposed county-wide growth policy report has yet to be adopted.

This lack of a comprehensive staged growth plan on which to base their sewer and water planning is a source of frustration to county officials. To fill the gap, the drafters of the Ten-Year Water and Sewerage Plan have taken the principles espoused in the "Wedges and Corridors" land use plan and translated them into guidelines for determining which areas to provide with sewer service in what sequence. As expressed in the comprehensive Ten-Year Water Supply and Sewerage Systems Plan for FYs 1977-86 those guidelines are:

1. Water and sewer service should be gradually extended along the corridors to supply sufficient land to accomodate anticipated growth (i.e., no "skip" development, leaving large portions of vacant land in between and requiring unnecessarily lengthy water and sewer lines.)

2. When a Master Plan is adopted [for a county sub-area] with staging built in, water and sewer categories should be defined in accordance with that staging. Revisions should not be made unless a Master Plan revision so dictates.

3. Water and sewer service category advances should not be made in areas of the County not covered by a Master Plan.

4. Water and sewer service category advances should not be made in Rural Zone areas. [The "Rural Zone" is a zoning district of five-acre minimum lot size and corresponds generally to the wedge areas delineated by the General Plan.]

5. Consideration may be given to requests that do not conform to the above guidelines if there are unique, beneficial features to the proposed development. This may include such things as relief of health problems or the promotion of housing opportunities in accordance with adopted County housing policies.78/

3.4.3 The Twin Cities

The difficulties experienced in Montgomery County as a result of land use planning authority being vested in a different government agency and an agency at a different jurisdictional level than the agency empowered to plan sewer and water systems is avoided in the Twin Cities. There the Metropolitan Council is responsible for both general planning and the planning of sewage facilities. Extensions of sewer service and new sewer construction are planned to coincide with the areas delineated on the council's Development Framework Plan, which shows the 1975 Urban Service Area ("the portion of the Metropolitan Area in which governmental agencies should plan to support urban development and redevelopment") and proposed additions to that area for 1976 through 1980 and 1981 through 1990. One of the criteria the council identified in drawing the urban development boundaries was soil types. Areas with features making them inherently unsuitable for development--wetlands, steep slopes, flood plains, and closely underlying bedrock--were inventoried to aid in the development of local land use plans and in the micro-planning of public facilities.79/

The recently adopted Metropolitan Land Planning Act 80/ is designed to ensure that local planning and development within the Metropolitan Region occurs in conformity with the general development and public facilities planning undertaken by the Metropolitan Council. Under the new act, local units of government (counties and, at their own election, towns with urban powers) must develop land use plans designating the existing and proposed location and intensity of agricultural, residential, commercial, industrial, and public uses of land and water and further designating areas of outstanding historic and environmental value to be protected. A public facilities component of the plan must designate and schedule areas to be sewered and areas not suitable for public and/or private sewage disposal systems.

The local planning process required under Minnesota's Metropolitan Land Planning Act parallels the planning requirements of section 208 of the FWPCA in many ways. Like areawide water quality management plans, the local plans within the Twin Cities area must contain a management element. This management element takes the form in the Twin Cities of a required schedule for the adoption of (1) zoning and subdivision ordinances; (2) controls over private sewage disposal systems; and (3) capital improvements programming--all calculated to put the comprehensive land use plans into effect.

The Metropolitan Council will review the local government comprehensive

plans for their consistency with the Metropolitan Systems Plans, including the metropolitan waste control plan and budget, and with the Metropolitan Development Guide. The council may require the local government to modify any part of the plan substantially impacting on or deviating from the council's plans. A local government wishing to contest the Council's required modification may request a hearing before the state Office of Hearing Examiners; the council will then make a final decision based on the report of the hearing examiner.

3.5 Implementation and Enforcement

3.5.1 Implementation and Enforcement with Respect to Individual Development Decisions

It is to be supposed that the local units of government in the Twin Cities Metropolitan Region will propose as perhaps their central control device for implementing their land planning and capital facilities programs the type of adequate public facilities ordinance already adopted in Ramapo, New York and Montgomery County, Maryland. The latter ordinance provides in pertinent part, as follows:

> No preliminary plan of a subdivision shall be approved unless the Planning Board determines that public facilities are adequate to support and service the area of the proposed subdivision.
>
> . . . .
>
> 1. Public facilities may be determined to be adequate to service a tract of land or an affected area when the following conditions are found to exist:
>
> [material related to adequate roads and mass transportation deleted]
>
> . . . .
>
> (b) The tract or area has adequate sewerage and water service.
>
> (i) for a subdivision dependent upon public sewerage and water systems:
>
> (1) Said area or tract to be subdivided shall be deemed to have adequate sewerage and water service if located within an area in which water and sewer service is presently available, under construction, or designated by the County Council for extension of water and sewer service within the first two years of a current approved Ten Year Water and Sewerage Plan.
>
> (2) If said area or tract to be subdivided is not situated within an area designated for service within the first two years of a current approved Ten Year Water and Sewerage Plan, but is within the last eight years of such plan, it shall be deemed to have adequate

water and sewerage service if the applicant provides community sewerage and/or water systems as set forth in Section 387C of Article 43 of the Annotated Code of Maryland provided the installation of such facilities shall have been approved by the State Department of Health and Mental Hygiene, the Washington Suburban Sanitary Commission, the County Health Department, and the Montgomery County Council.

. . . .

(iii) In its determination of the adequacy of sewerage or water service, the Planning Board shall consider the recommendation of the Washington Suburban Sanitary Commission, the capacity of truck lines and sewage treatment facilities and any other information presented.

. . . .

2. In considering questions of adequacy of public facilities . . . the Planning Board shall consider, but not be limited to, the nature, extent, and size of the proposed subdivision and its impact in terms of the following:
   (a) The estimated increase in population likely to result when said subdivision is developed in context with projected densities, as anticipated by adopted area master plans and currently approved subdivisions, in the surrounding area and immediate vicinity of the proposed subdivision.
   (b) The present or projected state of development likely to result when said subdivision is developed in context with projected densities, as anticipated by adopted area master plans and currently approved subdivisions, in the surrounding area and immediate vicinity of the proposed subdivision.81/

Having considered the factors enumerated above, the Planning Board is authorized to (1) approve the subdivision plan if it is in accordance with "the purpose and other requirements" of the regulations; (2) approve subject to whatever "conditions and/or modifications are necessary to bring the plan and the proposed development into accord" with applicable regulations; or (3) disapprove.

Consistency between the development of individual lots (as opposed to subdivisions) and the Ten-Year Water and Sewerage Plan is ensured by the requirement in the state law, reflected in the county's zoning ordinance, that no building permit be issued where the provision of an individual or community sewerage system would be inconsistent with the Plan or where the development would cause existing sewerage facilities to be overloaded.82/

3.5.2 Implementation and Enforcement of Plans and Programs with Respect to the Construction of New Public Sewer Facilities and Other Governmental Action

The fact that both the Montgomery County Council and the Twin Cities Metropolitan Council must approve the capital improvements programs and annual capital budgets for sewers has already been noted. Prior to 1974 the Metropolitan Council had approval power over the Waste Control Commission's specifications as well, but that authority was cut back to mere "review and comment" by the Metropolitan Reorganization Act of 1974. This change came about at least partly because of a controversial decision by the council in 1973 to recommend that the proposed Lake Ann interceptor be sized to accommodate predicted growth through 1986 rather than for the 40 to 50 year period which the commission had used, following the council's policy set out in the Development Guide. After review of the Commission's objections, the council withdrew its objections, citing immediate pollution problems, local commitments, and the immediate need to accept a proffered grant from EPA.83/

While the council still has the leverage of capital budget approval power to ensure that plans and specifications conform to the commission's approved Development Program, that may not be enough, since a project unsatisfactory in its details may nevertheless "conform" to an approved Development Program. A proposed project may be included in a Development Program and "approved" by the council as much as five years before the detailed plans and specifications are drawn up with the result that the "approval" will be based on very sketchy information indeed. Before the 1974 amendment described above, the council had on one occasion required the commission to revise its plans and specifications for an interceptor sewer to protect trees and their root systems in an adjacent forest in response to local concern.84/ Under the new law this ability to respond flexibly to details of a project not revealed by the Development Program has been lost.

It is perhaps inevitable that certain construction decisions made by the state pollution control agency and the sewer authority in fulfillment of their mandate to protect water quality will be seen as "over-building" by a government entity with a broader focus such as the Montgomery County Council or the Twin Cities Regional Council. Montgomery County has the offsetting power to restrict access to portions of interceptor sewers.85/ The Metropolitan Council has no such power but has felt the need of it.86/

Another possible method for regulating sizing of sewer facilities and number and location of hookups is through a pricing policy. This method has been suggested for both the Twin Cities and for Montgomery County. References to these proposals may be found in the footnotes; 87/ more detailed discussion of those techniques is beyond the scope of this chapter.

In both Maryland and Minnesota the state water pollution control agency must approve all proposals and plans and specifications for sewer extensions

and other new sewer construction. In both jurisdictions the state agencies are supposed to review the applications for consistency with local or regional sewer plans. Where the original governing body makes it a practice to advise the pollution control agency on all such applications, as the Metropolitan Council does, such review and approval power will at least assure a dialogue between those agencies most concerned with pollution control (the state agency and the local sewer authority) and the governing body concerned more with secondary effects of sewer system investments. In addition, state review and approval power over sewer construction has been used to good advantage in the Twin Cities to nudge reluctant localities to come up with their required sewer plans.88/ The Maryland Sewer Planning Act also uses state approval of new construction as a stick to induce preparation of County Ten-Year Plans and annual updates.89/

3.6 Legal Authority

3.6.1 Authority to Limit Extensions to the Sewer System

Whatever a municipality's duty to allow "all alike" to connect to its sewer once it undertakes to be the sole provider of sewer service in the area, "[t]he date of construction, the nature, capacity, location, number and cost of sewers and drains are matters within the municipal discretion with the exercise of which courts will not interfere, unless there appears fraud, oppression or arbitrary action . . . . This discretion extends to the area to be covered by the sewer, and to the location of branch or lateral sewers."90/ Such discretion is, in many cases, written directly into the state enabling legislation. It has been said in support of leaving municipal discretion unfettered in this matter that decisions respecting allocation of scarce financial resources are peculiarly legislative matters and that even if courts were competent to make such decisions, they would not be able to supervise their execution, as would be necessary.91/ Regulation of sewer extensions may further many legitimate governmental purposes: among them, assurance of a reasonable economic return to the municipality; 92/ prevention of the dislocations and diseconomies of urban sprawl; and the protection of critical natural areas.

It is tempting to try to distinguish between the cases establishing a "proprietary duty" to furnish sewer services and those leaving it up to "governmental discretion" by dividing them into two groups: (1) those in which the developer merely wanted to hook up to the existing sewer line and (2) those in which he was, in effect, asking the municipality to build a new trunk line to serve him. Unfortunately for the hookup versus extension theory, perhaps the most detailed discussion of the proprietary duty is to be found in a case in which the court ordered the municipality to extend sewer and water services to the planintiffs even though such extension would involve building a new section of a sanitary sewer trunk line. That case, Robinson v. The City of Boulder 93/, suggests that the true factor which determines whether a municipality or sanitary district has discretion over the extension of its services to new

applicants is whether the applicant's property falls within the municipal or district service area. Once having defined, monopolized, and served a sewer service area, as the city of Boulder did through agreements with other suppliers and by opposing other methods and sources of supply in the area, a municipality or district takes on the attributes of a private utility and must make its facilities within that area "available to all alike."94/

In Maryland it is clear that a municipality is under no obligation to furnish sewer service to a consumer outside the city unless that consumer is in an area to which the extraterritorial service has already been extended. In Mayor and Council of Rockville v. Goldberg, 95/ the Maryland Court of Appeals held that the city of Rockville could deny the appellant sewer service even though there was an existing city sewer line 800 feet away from his property and even though there was adequate capacity in that line and in the city's sewage treatment plant to service the proposed development. The court's holding in that case reflects in great measure its desire not to undermine the city's annexation policy. The decision, however, when read in the light of later cases dealing with Maryland's overall sewer policy and law, leaves little doubt that a governmental unit in Maryland has full authority to draw boundaries for a sewer service area and to grant or deny service accordingly, whether or not that area coincides with the boundaries of any governmental entity.

3.6.2 Authority to Undertake Comprehensive Sewer Planning and to Time Development Accordingly

No judicial language could be more heartening to the cause of sewer planning and to state and areawide water quality management planning in general than that to be found in the section of Smoke Rise, Inc. v. Washington Suburban Sanitary Commission approving Maryland's Department of Health and Mental Hygiene regulations (Regulation 10.03.26) limiting the use of private sewage disposal systems in areas planned for future sewering under a county's Ten-Year Water and Sewerage Plan. It is worth quoting at considerable length from the federal district court's language in that case:

> Regarding the legitimacy of the purpose of Regulation 10.03.26, the Regulation itself clearly sets forth in the preamble the objectives and policy considerations which underlie the restrictions which the State of Maryland has imposed on the use of private septic systems:
>
> . . . .
>
> . . . The objective of the county plan is to guide the development of the ultimate water supply-sewerage system consistent with population growth and economic development so that . . . wastewater may be collected and delivered to points where conditions are best suited for waste discharge, and treated and disposed

> of to minimize adverse effects on legitimate water uses. [emphasis added by the court]
> Like the commonplace zoning ordinance, Regulation 10.03.26 was designed as a tool to guide growth to the end that neither environmental quality nor economic efficiency would be compromised as water and sewer services expanded throughout the county. The use of water and sewer regulations as tools to plan for and achieve orderly, rational development has received approval from the Maryland courts. In an explicit reference to the statute at issue in the instant case, Md. Ann. Code art. 43, §387C, the Court of Special Appeals of Maryland recently noted with approval that "[t]he State, acting through the Department [of Health and Mental Hygiene], has elected to control growth, at least to the extent that such growth adversely affects water and sewage disposal.96/
> . . . .
> In the view of this court, policy considerations similar to those outlined [in Norbeck v. Montgomery 97/] serve to uphold Regulation 10.03.26 from constitutional attack under the due process clause of the fifth and fourteenth amendments. Additionally, it must be noted that if plaintiffs were to prevail in their attack on the constitutional validity of Regulation 10.03.26 it would be a pyrrhic victory.
> . . . .
> One of the major impediments to the resolution of the sewer crisis in metropolitan Washington has been the random geographic location of those watershed basins receiving the greatest development pressures.
> . . . .
> If this Court were to hold that Regulation 10.03.26 restricts too greatly the kind of land area within which private septic systems may be utilized, the private development would be permitted to build new communities at random throughout the county, irrespective of the engineering, environmental, and economic inefficiencies occasioned by haphazard, unplanned growth . . . . In effect, the planning component of Regulation 10.03.26 is the safeguard against the reappearance of new sewage overflows and further sewer-service moratoria in years to come.98/

But what of a state without the comprehensive sewer planning legislation and enthusiastic court backing found in Maryland? What can it do to restrict development to keep pace with the orderly provision of public facilities under a comprehensive plan? What can a locality do, for example, under traditional zoning powers? The New York and Virginia courts illustrate the extremes of the range of opinion on this subject.

In New York, the majority in Golden v. Planning Board of The Town of Ramapo conceded that the relevant provision of the state zoning enabling law provided no specific authorization for the "sequential" and "timing"

controls at issue. The court went on to say, however, that those controls were the necessary accompaniments to those more familiar zoning powers expressly set out in the enabling legislation:

> The power to restrict and regulate . . . includes within its grant, by way of necessary implication, the authority to direct the growth of population for the purposes indicated, within the confines of the township. It is the matrix of land use restrictions, common to each of the enumerated powers and sanctioned goals, a necessary concomitant to the muncipalities' recognized authority to determine the lines along which local development shall proceed, though it may divert it from its natural course.99/

Having found the general theory of timing growth to be within the statutory mandate, the court proceeded to test the constitutional validity of Ramapo's system by examining its underlying purpose and its impact on both landowners within the community and the general public interest. Central to the court's approval of the system was its finding that Ramapo was not seeking to shirk its obligation to provide for future population growth but only to assure that the town's future population would be served by adequate public facilities.

In a recent Virginia case, Board of Supervisors of Fairfax County v. Williams, 100/ the state Supreme Court gave a much less generous reading to the state's zoning enabling legislation. Interestingly enough, Virginia's law is, if anything, broader than New York's, stating, as it does, that one of the purposes of zoning is to ensure "that the growth of the community be consonant with the efficient and economical use of public funds" and that zoning ordinances should be designed to include protection against "overcrowding of land, [and] undue density of population in relation to the community facilities existing or available . . . . "101/

In Williams the court upheld a lower court finding that a denial of two applications for rezoning to a higher density was "unreasonable, arbitrary and capricious" for several reasons. These included the facts that public facilities were or soon would be available to serve the land in question; that nearby similarly situated land had already been rezoned for higher density use; and that the existing one-acre zoning of the subject property was unreasonable in light of these circumstances and of the shortage of small, buildable lots in the area. The majority gave no real consideration in its opinion to the timing element of the policy which underlay the board's rezoning denial. Under that policy, adopted as a resolution by the board and set forth in accompanying policy statements, the county was to discourage urban density in the subject Middle Run subwatershed until public facilities were available, and public facilities were to be programmed for the area for the 1975 through 1980 period.

One of the earlier Fairfax County cases on which the majority relied in reaching its conclusion that "[t]he effect of the application of the Board's Middle Run policy was to discriminate between similarly situated property," 102/ was distinguished in the dissent. The portion of the dissent distinguishing the case, Fairfax County v. Allman, 103/ points up the importance of tying any implementation scheme firmly to a comprehensive planning effort:

> [In Allman there were] . . . no guidelines for determining when the ultimate density should be attained. There was no provision for phased development within specified periods of time. In the present case there was such provision which, though not binding, evidences the best judgment of the Board as to availability of public facilities and its good faith intention to permit higher density development within the time limits contemplated in the Plan. [emphasis added]
>
> . . . .
>
> In Allman we affirmed the rule that unequal treatment of similarly situated landowners is "arbitrary and capricious" when it lacks a rational basis and bears no substantial relation to the public health, safety, morals, or general welfare . . . .
>
> . . . .
>
> The classifications established here by the Board were based on a rational plan for orderly development of a subwatershed. The Board was justified in pursuing its policies of encouraging greater density in areas already zoned for such development by locating public facilities there before rezoning other lands and incurring the financial burden of installing additional public facilities.
>
> The Board could reasonably determine that the "efficient and economical use of public funds" required deferral, for a reasonable time, of the rezoning of applicants' lands in order to postpone the cost of improving secondary highways that higher density development of applicants' land would require . . . .
>
> The public facilities which the chancellor found would be available within the reasonably foreseeable future depend upon the appropriation of public funds by the Board. The construction of all public facilities, including schools, in the Pohick Watershed has been programmed in stages in conformity with the schedule of urban development projected in the Plan.
>
> In using its zoning authority to regulate phased development of the county, the Board was following the legislative intent expressed in Code §15.1-427 that community growth

> be "consonant with the efficient and economical use of public funds." The Board adduced sufficient evidence of the reasonableness of its actions in denying the applicants' request for higher density zoning to make the matter at least fairly debatable. Reasonable men could disagree as to the advisability of approving the applications at the time they were considered by the Board.104/

Had Fairfax County's policy for future extension of services been more firmly tied to a capital improvements program, like the plans of Ramapo, New York and Montgomery County, Maryland, and had the planned extensions been less a question of the county's "good faith," perhaps the majority would have taken the policy more seriously and upheld the county's action.105/

3.7 Constitutional Questions

3.7.1 Reasonableness

Assuming that a locality has the authority under special enabling authority like Maryland's 106/ or under a court's liberal construction of existing authority, as in New York, to stage public investments and development permissions in accordance with a broad public facilities and land use plan, that power must be implemented in a reasonable way affording landowners and developers their due process rights under the Fifth and Fourteenth Amendments.107/ One of the reasons the Ramapo scheme survived court challenge, doubtless, is that its drafters were careful to safeguard property owners' rights to the maximum extent possible.

Thus the Ramapo zoning ordinance provides for the vesting of a present right to proceed with residential development in such year as the proposed development will have 15 points as indicated by the scheduled completion dates of the capital budget and capital plan regardless of the actual progress made by that date. As a fully vested property right, the special permit may be freely assigned or sold. In addition developers may make up the number of points by which they fall short by agreeing to provide the needed improvements themselves. If, on the other hand, the developer chooses to await provision of public facilities under the capital plan, he is authorized to apply for a reduction in assessed valuation in the meantime. As a final safeguard against irrational inflexibility, the ordinance provides for variances from or modifications in the special permit requirement where the Town Board determines pursuant to its legislative discretion "that such variance or modification is consistent with comprehensive planning for proper land use including the master plan, official map, capital budget, and capital plan upon which this ordinance is based and with the health, safety, and general welfare of the Town and its inhabitants."

In holding that the system's restrictions on private interests were neither unreasonable nor an uncompensated taking, the Ramapo

majority emphasized the temporariness of the restrictions, the town's commitment to its capital improvement program, the ability of developers to advance the time of approval by providing their own facilities, and the mitigating factor of interim reductions in assessed value. The majority opinion then concluded:

> In sum, where it is clear that the existing physical and financial resources of the community are inadequate to furnish the essential services and facilities which a substantial increase in population requires, there is a rational basis for "phased growth" and hence, the challenged ordinance is not violative of the Federal and State constitutions.108/

3.7.2 Exemptions and Variances

In Ramapo and in Montgomery County the construction of single-family homes by individuals is effectively exempt from the staging limitations. This leaves every landowner with a beneficial use to which he can put his property immediately. Montgomery County, like Ramapo, also provides a type of variance procedure from the service area classification scheme . Under the county Ten-Year Water and Sewerage Plan it is a landowner's sewer service classification which determines whether he has a present right to develop or whether he must wait three to six or seven to ten years to do so.

Most amendments to the county Ten-Year Water and Sewerage Plan take the form of changes in service areas. Such changes may be initiated by the county government in order to bring a large area's designation into conformity with a planning objective, or they may be initiated by individuals trying to expedite development of their particular parcel. Amendments of the following types may be considered by the county council at any time: amendments seeking (1) to modify service areas to conform to Master Plan staging; (2) to reclassify a "split parcel" uniformly; (3) to obtain a single-household connection in areas not presently approved for community service but where water or sewer lines abut the lot; and (4) to obtain recognition for extraordinary circumstances as defined by the county executive. All other applications are accepted annually to coincide with the annual update of the plan. The county council adopts amendments after consideration of the county executive's recommendations and comments by the planning commission and the WSSC. The state Department of Health and Mental Hygiene must approve all amendments.

In many ways the service area system is not that dissimilar to zoning, and the question inevitably arises whether the sewer plan will be undermined by endless exceptions and amendments, as has often been the case with zoning.109/ Of course, there must be enough flexibility written into any system to allow the administrator, in his sound discretion, to smooth out anomalies and to recognize cases of extreme hardship. The four sets of circumstances justifying applications for amendments.

at any time fall into this category and are sufficiently well-defined to avoid abuses of discretion. Changes in service area not falling within these categories are governed by the county's "Guidelines for Changing Service Areas" included in the county plan. These "guidelines" are simply a more detailed version of the policies enumerated in the plan and described in section 3.4.2 above. For the present, commitment to those policies is strong enough on the part of the county executive, the county council and, most important, the public--which makes its presence felt at hearings on amendments--that the plan is in no immediate danger of subversion through the amendment process. Should the tide of popular approval turn, however, the state Department of Health, which must approve all amendments, is expected to be an adequate check against the politicization of the system.

CHAPTER FOUR

MUNICIPAL WASTEWATER TREATMENT FACILITIES:

RESTRICTIONS ON TIMING AND LOCATION OF HOOKUPS AND EXTENSIONS

FOOTNOTES*

1. Federal Water Pollution Control Act Amendments of 1972, Pub. L. No. 92-500, § § 201(g)(2)(A), 301(b)(2)(B), and 302 [hereinafter cited as FWPCA].

2. As the title of this chapter indicates, the focus here is on municipally owned treatment plants and collection systems. It should be noted here, however, that some treatment plants are privately owned. Such plants are usually small, so-called "package" plants, and they are a major pollution problem since they are usually constructed without adequate public supervision and often fail. When package plants fail, moreover, the local public authority will usually be obliged to step in and provide service, thereby throwing off all the careful plans for time-phased distribution of capacity in accordance with land use plans advocated in this chapter. Everything that is said in this chapter, therefore, about planning for and regulation of municipal wastewater treatment facilities applies with equal force to privately-owned package plants, unless the context clearly indicates otherwise.

3. Section 208(b)(2)(C)(iii) of the FWPCA requires that a section 208 regulatory program "assure that any industrial or commercial wastes discharged into any treatment works in such area meet applicable pre-treatment requirements."

4. U.S. EPA, Draft Pretreatment Guidance Manual for State and Areawide (208) Water Quality Management Planning Agencies (April 1976).

5. This ordinance is being developed by a special EPA "Pretreatment Task Force," which is currently reviewing (1) the manner in which federal pretreatment standards should be set; (2) enforcement of federal pre-treatment standards; (3) federal view of intergovernmental relations regarding pretreatment; and (4) revision of the general pretreatment regulation, 40 C.F.R. § 128, to reflect EPA's new position when it is developed. The Pretreatment Guidance Manual, supra note 4, will be revised and issued in final form after the pretreatment task force has completed its work. Information on the task force may be obtained from Swep Davis in EPA's Office of Water Planning and Standards, (202) 755-0402. (Since the above was written EPA has published proposed Pretreatment Standards for Existing Sources and New Sources of Pollution, 42 Fed. Reg. 6476, Feb. 2, 1977.)

*In order to conserve space, publication information pertaining to works included in the suggested readings for this chapter has been omitted from the footnotes.

6. "Inflow" is defined at 40 C.F.R. § 35.905-11 as:

> the water discharged into a sewer system, including service connections from such sources as, but not limited to, roof leaders, cellar, yard, and area drains, foundation drains, cooling water discharges, drains from springs and swampy areas, manhole covers, cross connections from storm sewers and combined sewers, catch basins, storm waters, surface run-off, street wash waters, or drainage. Inflow does not include, and is distinguished from, infiltration [defined at 40 C.F.R. § 35.905-9].

7. Council on Environmental Quality, Environmental Quality--The Seventh Annual Report of the Council on Environmental Quality 256 et seq. and figure II-39 (1976).

8. This tendency is summarized in an excellent publication of the New Jersey Department of Community Affairs entitled Secondary Impact of Regional Sewerage Systems (1975):

> Today, outside of the general economy, sewers are the critical ingredient and the guiding force for growth in New Jersey. As the cost of land and construction rises, more townhouses and multi-family units will be built in proportion to single family homes. Sewers are essential for this higher density construction. As a result, the role of sewers as a growth determinant will become even stronger in the future. Id. at 6.

See also Urban Systems Research & Engineering, Inc., The Growth Shapers--The Land Use Impacts of Infrastructure Investments (1976); Binkley et al., Interceptor Sewers and Urban Sprawl (1975).

9. Water Planning Division, U.S. EPA, Guidelines for State and Areawide Water Quality Management Program Development 8-8 (Nov. 1976).

10. Id. at 8-7 and 8-8.

11. Descriptions of actual cases appear in the studies referenced at note 8, supra.

12. See New Jersey Dep't of Community Affairs, supra note 8, at 36:

> Rational planning on the part of municipalities which includes, for example, an analysis of natural resources and a plan for preserving them, a capacity population figure based on these resources and a timing of development scheme, would make the job of protecting population and thus pipe sizing easier.

13. See the discussion in this chapter of Montgomery County, Maryland's sewer planning program, infra section 3.0.

14. Guidelines, supra note 9, at 8-8.

15. FWPCA, § § 201-207; 40 C.F.R. § 35.800 et seq.; and U.S. EPA, Municipal Wastewater Treatment Works Construction Grant Program, Guidance for Preparing a Facility Plan (revised May 1975).

16. R. Farley, "The 208 Agency and the Management Agencies," at 13 and 17.

17. 42 U.S.C. § 4321 et seq., made applicable to grants for the construction of publicly owned treatment works by § 511(c)(1) of FWPCA.

18. Guidelines for Compliance with NEPA in the Title II Wastewater Treatment Works Construction Grants Program and the Areawide Waste Treatment Management Planning Program, 40 C.F.R. § 6.500 et seq. 40 C.F.R. § 6.510 enumerates the circumstances under which an environmental impact statement will be prepared on a treatment works facilities plan, 208 plan, or other appropriate water quality management plan. The list of such triggering circumstances includes the following situations:

> (a) The treatment works or plan will induce significant changes (either absolute changes or increases in the rate of change) in industrial, commercial, agricultural, or residental land use concentrations or distrubutions. Factors that should be considered in determining if these changes are significant include but are not limited to: the vacant land subject to increased development pressure as a result of the treatment works; the increases in population which may be induced; the faster rate of change of population; changes in population density; the potential for overloading sewage treatment works; the extent to which landowners may benefit from the areas subject to increased development; the nature of land use regulations in the affected area and their potential effects on development; and deleterious changes in the availability or demand for energy.
>
> (b) A major part of the treatment works will be located on productive wetlands or will have significant adverse effects on wetlands, including secondary effects.
>
> . . . .
>
> (f) The works or plan may directly or through induced development have a significant adverse effect upon local ambient air quality, local ambient noise levels, surface or groundwater quantity or quality, fish, wildlife, and their natural habitats. (emphasis added)

See also Office of Federal Activities, U.S. EPA, Manual for Preparation of Environmental Impact Statements for Wastewater Treatment Works, Facilities Plans, and 208 Areawide Waste Treatment Management Plans (1974); and New Jersey Dep't of Community Affairs, supra note 8, at appendix I, "Guidelines for Evaluating Secondary Impacts of Regional Sewerage Systems." The New Jersey study notes at p. 7 that the state's priority system for ranking applications for construction grants gives preference to projects in high quality watersheds, with the result that secondary effects are most likely to take place where they pose the greatest threat to environmental quality.

For sample descriptions of adverse primary and secondary environmental effects as identified through the environmental impact statement process, see Interceptor Sewers and Suburban Sprawl, supra note 8, at 32 and 38 (threatened damage to scenic river corridor and storm-water runoff problems). See also Fremont County, Idaho, Final Environmental Impact Statement, North Fremont County, Island Park Area Wastewater Facilities (Jan. 1976, project no. C-160186 01) (land use issues: pressures for increased recreational development and protection of environmentally sensitive areas for fishing and wildlife management); and Chesterfield County, Virginia, Final Environmental Impact Statement, Falling Creek Wastewater Treatment Facility (March 1976, project no. C-510484-01) (land use issues: the impact of induced secondary effects on the Swift Creek Reservoir).

19. See EPA Policy Statement, "Protection of Nation's Wetlands," 38 Fed. Reg. 10834-35 (May 2, 1975), which reads in part as follows:

> In compliance with the National Environmental Policy Act of 1969, it shall be the policy of this Agency not to grant Federal funds for the construction of municipal waste water treatment facilities or other waste-treatment-associated appurtenances which may interfere with the existing wetland ecosystem, except where no other alternative of lesser environmental damage is found to be feasible. In the application for such Federal funds where there is reason to believe that wetlands will be damaged, an assessment will be requested from the applicant that delineates the various alternatives that have been investigated for the control or treatment of the waste water, including the reasons for rejecting those alternatives not used. A cost-benefit appraisal should be included where appropriate.

See also Exec. Order no. 11296, "Evaluation of Flood Hazard in Locating Federally Owned or Financed Buildings, Roads, and Other Facilities, and in Disposing of Federal Lands and Properties," reprinted in 33 U.S.C. § 701, note.

20. A survey of the Regions undertaken in the fall of 1975 by Thomas H. Pierce of EPA's Office of Land Use Coordination turned up seven cases of title II grants with land use controls written in as conditions. Mr. Pierce's cover note of Dec. 1, 1975 to Robert J. Golten, counsel to the National Wildlife Federation, notes:

> It appears that there were relatively few grants conditioned on the adoption of land use controls, since the imposition of controls was considered to be a last resort measure. EPA generally mitigates secondary land use impacts early in the review process through negotiations with the applicant prior to any approvals.

The Natural Resources Defense Council, Inc., for one, has requested that EPA Washington formalize its guidance on land use conditions in construction grants. See Letter from Khristine L. Hall and Diane L. Donley, NRDC, to John Rhett, Deputy Assistant Administrator for Water Programs Operations, EPA (Nov. 17, 1976).

21. In focusing on protection of water quality, this discussion of wastewater collection and treatment systems will necessarily present only part of the picture. It is more common to find the techniques discussed here--sewer moratoria, sewer allocation policies, and controls on the location and timing of sewer services--treated in a more general framework of land use and growth regulation. An excellent treatment of that more general kind can be found, along with valuable discussions of the physical and economic aspects of sewers, in R. Tabors, M. Shapiro, and P. Rogers, Land Use and the Pipe (1976).

22. The literature on sewer moratoria is extensive. In addition to the references included in the footnotes to this section, the reader is referred to the following recent works: Tabors et al., Land Use and the Pipe, supra note 21; Rivkin/Carson, Inc., The Sewer Moratorium as a Technique of Growth Control and Environmental Protection (1973); Urban Systems Research & Engineering, Inc., The Relationship Between Housing and Water Resources Planning and Management (1972); and SCS Engineers, Wastewater Management for New Housing Developments (forthcoming).

23. In his article "Interim Development Controls--for Flexible Planning Zoning," 49 J. Urb. L. 65 (1971) (reproduced in part in 2 R. Scott, ed., Management and Control of Growth 397 [1975]), Professor Freilich discusses the past and future of such controls and suggests a model enabling statute to facilitate their adoption.

24. A nationwide survey of local governments undertaken in 1973 to determine, inter alia, the environmental management techniques they use provides an interesting breakdown of municipalities and counties which have imposed moratoria. Unfortunately, the tables do not indicate the purpose behind moratoria imposed on the issuance of building permits and on requests for rezoning, so it is impossible to tell how many of the moratoria reflect inadequate sewers. Of the 1,070 cities responding, 203 indicated that they had imposed moratoria within the previous 2 years: 125 or 62 percent had imposed moratoria on the issuance of building permits; 73 or 36 percent on requests for rezoning; 84 or 41 percent on water or sewer connections. Of the 159 counties reporting 33 had imposed moratoria: 17 or 52 percent on building permits; 11 or 33 percent on requests for rezoning; and 15 or 45 percent on water or sewer connections. (The remaining numbers in both cases fall into an undifferentiated "other" category.) See S. Carter et al., Environmental Management and Local Government 48 and tables 55-58 (1974).

25. This was done, for example, in moratoria imposed by Maryland's State Department of Health and Hygiene, as described in Montgomery County's FYS 1977-86 Comprehensive Water Supply and Sewerage System Plan 4-14. All state moratoria orders provided exceptions to allow the connection of "public service buildings." In Montgomery County, the term "public service buildings" has been defined to mean:

    (a) publicly owned or operated buildings;
    (b) buildings constructed for operation by a public utility regulated by the State of Maryland;
    (c) buildings constucted for an organization which is qualified for an exemption under the provisions of Section 501 of Title 26 of the United States Code (Internal Revenue Code);
    (d) housing receiving subsidies from Federal, State and local governments; and
    (e) hospitals and nursing homes regulated by the State of Maryland and other buildings used exclusively for medical and dental clinics.

    The Maryland moratoria orders were upheld in Smoke Rise, Inc. v. Washington Suburban Sanitary Commission, 400 F. Supp. 1369 (D. Md. 1975); see infra note 40 and accompanying text.

26. 353 Mass. 708, 234 N.E.2d 893, 895 (1968).

27. 23 N.Y.2d 424, 244 N.E.2d 700, 701-03 (1969).

28. For an example of a state which expressly includes pollution control within the legitimate purposes of zoning, see Md. Code Ann. art. 66B, § 4.03 ("Purposes"): "Such regulations shall be made in accordance with the plan and designed [inter alia] . . . to promote the conservation of natural resources; to prevent environmental pollution, [and] to avoid undue concentration of population . . . ."

29. For the classic example of a very liberal interpretation of the municipal power to tie zoning and subdivision approval to the adequacy of public facilities, see Golden v. Planning Board of Ramapo, 285 N.E.2d 291, appeal dismissed, 409 U.S. 1003 (1972), discussed infra note 99 and accompanying text. A recent decision by the Supreme Court of Virginia, Board of Supervisors of Fairfax County v. Horne, 215 S.E.2d 453 (1975), stands at the opposite end of the interpretive spectrum. Indeed, sewer or water moratoria imposed via refusals to process applications for sub-division approval--or by disapprovals of individual subdivision plans--seem to fare worst at the hands of the courts, and in this regard Horne seems more typical than Ramapo in interpreting the subdivision control power very strictly. Daley Construction Co. v. Planning Board of Randolph, 163 N.E.2d 27, 30 (1959), is illustrative.

In that case, the Massachusetts Supreme Judicial Court held that the Massachusetts subdivision control law did not authorize a planning board to deny approval of a subdivision plan solely "on the ground that its execution may accentuate an existing town water shortage." The section of the law upon which the Randolph planning board relied (Mass. Gen. Laws Ann. ch. 41, § 81M (West)) provided, in pertinent part, that the "powers of a planning board . . . shall be exercised with due regard . . . [and] adequate provision for water, sewerage, drainage and other requirements where necessary in a subdivision . . . ." In concluding that the words "securing adequate provision of water" meant "installation of an adequate system of water pipes rather than an adequate supply of water," however, the court was obviously influenced by a report of a special legislative commission. That report indicated that the new statutory language of which the above-quoted language formed a part "was designed to clarify . . . language . . . especially . . . where overzealous city planners have attempted to extend their authority beyond the past legislative intention."

30. See chapter 2 section 2.2.3 for a general discussion of home rule.

31. Board of Supervisors of Fairfax County v. Horne, 215 S.E.2d 453 (1975).

32. See Irwin et al., Enforcement of Federal and State Water Pollution Controls (Washington, D.C.: Environmental Law Institute, July 1975; available from NTIS, PB 246320).

33. Robinson v. City of Boulder, No. 26720 (Sup. Ct. Colo. March 15, 1976); Delmarva Enterprises, Inc. v. Mayor and Council of the City of Dover, 282 A.2d 601 (1971).

34. Travaini v. Maricopa County, 450 P.2d 1021 (Ariz. Ct. App. 1969); E. T. Barwick Mills, Inc. v. O. B. Stevens, 136 S.E.2d 28 (Ga. Ct. App. 1964).

35. Clark v. Board of Water and Sewer Commissioners of Norwood, 234 N.E.2d 893, 895.

36. Chancery No. 46273 (Cir. Ct. Fairfax Co. Jan 2, 1976). For a list of these cases, see Hazel, infra note 105, at 14, n. 5.

37. 23 N.Y.2d 424,244 N.E.2d 700 (1969). See supra note 27 and accompanying text.

38. Chancery No. 43235 (Cir. Ct. Fairfax Co., letter opinion July 2, 1975).

39. 43 N.Y. App. Div. 2d 727, 728 (1973). Compare Lerner, et al. v. Board of Supervisors, in which the Circuit Court of Fairfax County awarded a $175,000 tax rebate primarily because of the county's failure to provide adequate sanitary sewer facilities (Law No. 30429, 1974).

40. 400 F. Supp. 1369 (D. Md. 1975).

41. Id. at 1386.

42. Id. at 1386-90.

43. Id. at 1383.

44. 436 F.2d 108 (2d Cir. 1970), cert. denied, 91 S. Ct. 1256 (1971). In that case, the City of Lackawanna first attempted to block a proposed low-income housing project by adopting a moratorium on subdivisions and by zoning the project site as open space. When the zoning ordinances were repealed, the mayor refused to approve the project's sewer application. Faced with a record which showed that the city had ignored suggestions as to how it might improve its sewer system, had not attempted to procure any assistance for its upgrading and, indeed, had "deliberately permitted the problems to worsen," the court held that "[t]he City must provide sewerage facilities to the plaintiffs in conformity with the Equal Protection Clause of the Fourteenth Amendment and provide it as soon as it does for any other applicant." Id. at 114. For citations to other utility cases raising equal protection questions and for a general discussion of the subject, see American Society of Planning Officials, "Legal Considerations in Growth Management," in Urban Growth Management Systems 70 and nn.244-48 (1975).

45. Montgomery County Council, Amendment to FY's 1977-86 Comprehensive Ten-Year Water Supply and Sewerage Systems Plan, section C, "Montgomery County Interim Sewer Service Policy and Procedures') (Resolution No. 8-1082, 1976).

46. "Procedure for Allocating Sewer Taps, County Wide, As Revised from the Original Policy Adopted by Board of Supervisors May 14, 1973, and Amended September 10, 1973, October 1, 1973 and Recodified and Amended November 18, 1974."

47. Langley Development Corporation v. Board of Supervisors of Fairfax County, supra note 36 and accompanying text.

48. For the definition of "public facilities," see supra note 25, except for subsection (d), which is treated separately under the allocation system.

49. Interview with Steve Poteat, Environmental Planner, Office of Environmental Planning, in Rockville, Maryland (May 19, 1976), and subsequent telephone interview (Dec. 9, 1976).

50. 400 F. Supp. 1369, 1383 (1975). See supra notes 40-43 and accompanying text.

51. This may not be as easy to do as it sounds, since methods of determining expected flow rates and estimates of infiltration and inflow are so variable. While it is not entirely clear from its opinion in Langley Development Corporation v. Fairfax County Board of Supervisors why the Circuit Court of Fairfax County struck down the county's sewer allocation policy as well as its moratorium, it appears that it found that some capacity had not been allocated, "that a minimum of .6682 mgd of unallocated capacity would exist even if there were some validity to the above referenced allocation policy." Chancery No. 46273 (Cir. Ct. Fairfax Co. Jan. 2, 1976).

52. See supra note 43 and accompanying quote in text.

53. In Clark v. Board of Water and Sewer Commissioners of Norwood, 353 Mass. 708, 234 N.E.2d 893 (1968), the defendant Board had argued that the connection of an apartment complex to the town's sewer system would, in conjunction with other building contemplated such as a junior high school, create an under-capacity in a certain area of town. The court responded: "The sewer commissioners are not empowered to postpone presently sought connections to give precedence to connections contemplated for the future. There was no finding that the board or the town is legally or equitably committed to other connections." Id. at 895.

54. Supra note 45, at 11.

55. See Appeal of Kit-Mar Builders, 439 Pa. 466, 268 A.2d 765, 767 (1970); National Land and Investment Co. v. Kohn, 419 Pa. 504, 215 A.2d 597 (1965); Board of Supervisors of Fairfax County v. Williams, 216 Va. 49, 216 S.E.2d 33 (1975); and Board of Supervisors of Fairfax County v. Carper, 200 Va. 653, 107 S.E.2d 390 (1959). See also 2 N. Williams, American Land Planning Law §§ 38.16, 38.19 (1974).

56. The most famous example of a community which has set an absolute limit on its rate of growth is Petaluma, California, whose city ordinance restricting the number of building permits issued in any one year to subdivisions of more than four lots was upheld in Construction Industry Ass'n of Sonoma County v. City of Petaluma, 522 F.2d 897 (9th Cir. 1975), cert. denied, 424 U.S. 934 (Feb. 23, 1976). For a discussion of the history and administration of Petaluma's scheme, see 2 Management and Control of Growth ch. 9, supra note 23; Urban Growth Management Systems, supra note 43, at 18-19. The so-called "housing cap" approach to growth control is illustrated by Boca Raton, Florida, which in 1972 adopted a charter amendment setting a limit on total housing units of 40,000 (see Urban Growth Management Systems, supra note 44, at 7, 10). The Nov. 8, 1976 issue of Land Use Planning Reports reports that Florida's 15th Judicial Circuit Court recently found that Boca Raton's "cap"

and implementing ordinance violated the due process clauses of the federal and state constitutions. Judge Sholts is reported to have said in his decision that "if a fixed limit on housing substantially and rationally promotes welfare, it may well pass constitutional muster," but that in Boca Raton "the evidence concerning the cap's emotional and arbitrary birth, its unreasonable effects and lack of material, factual and substantial relationship to the public welfare is so compelling that fair debate should not really be expected." Apparently, Judge Sholts suggested that his decision might have gone the other way had the "cap" figure been within the 47,000 to 61,000 range recommended by the city's own consultants. The cases decided were Boca Villas Corp. v. Pence, and Keating-Meredith Properties, Inc. v. City of Boca Raton, (consolidated C.A. No. 73-106/540, Palm Beach County Cir. Ct., Sept. 30, 1976).

57. 334 N.Y.S.2d 138, 30 N.Y.2d 359, 385 N.E.2d 291 (1972), appeal dismissed, 409 U.S. 1003 (1973).

58. The 1969 amendment to the Ramapo Zoning Ordinance is reproduced, in proposed form, in 2 Management and Control of Growth, supra note 23, at 7. Articles discussing the Ramapo system from many different perspectives and all shades of enthusiasm are collected in chapter 8 of that volume.

59. See Silverman, "A Return to the Walled Cities: Ramapo as an Imperium in Imperio," id. at 52.

60. No. 26720 (Sup. Ct. Colo., en banc March 15, 1976). The trial court opinion is reproduced in 2 Management and Control of Growth, supra note 23, at 237 et seq.

61. Id. For a discussion of the proprietary duty to provide sewer service as set out in Robinson, see section 3.6.1 infra.

62. See Southern Burlington County NAACP v. Township of Mount Laurel, 67 N.J. 151, 336 A.2d 713, appeal dismissed, 423 U.S. 808 (1975), and Berenson v. Town of New Castle, 38 N.Y.2d 102, 378 N.Y.S.2d 672 (1975). The former case has been exhaustively dissected in 23 Environmental Comment (Urban Land Institute, July 1975) and in 3 American Land Planning Law, addendum to § 66.13, supra note 55. Berenson involved the town of New Castle's exclusion of all multifamily dwellings under its zoning ordinance. In framing the issues to be considered on rehearing, the Court of Appeals cautioned that the trial court, in examining the zoning ordinance in question, "should take into consideration not only the general welfare of the residents of the zoning township, but should also consider the effect of the ordinance on the neighboring communities." The court went on to say:

> [W]hether New Castle should be permitted to exclude high density residential development depends upon the facts and circumstances present in the town and community at large. Until the day comes when regional, rather than local, governmental units can make such determinations, the courts must assess the reasonableness of what the locality has done. That is what remains to be considered upon the trial in this case. 378 N.Y.S.2d 672, 682.*

63. For three articles suggesting that controlling growth by timing the provision of sewer and water utilities is unwise, see 2 Management and Control of Growth, supra note 23, at 458 et seq.

64. See R. Howe and N. White, Problems and Approaches to Areawide Water Quality Management (EPA 1973).

65. Separation of planning and implementation in sewer services has been recommended by many commentators. One of the best cases is made by the New Jersey Department of Community Affairs in its study referenced note 8 supra, at 4, 22, 43-44, and 59.

66. Md. Ann. Code art. 43, § 387C. Maryland's act was modeled on legislation developed by the U.S. Public Health Service with the assistance of a special advisory committee which included representatives of the Advisory Commission on Intergovernmental Relations, the Housing and Home Finance Agency, the National League of Cities, the American Society of Planning Officials, the National Association of Counties, the National Association of Home Builders, the Water Systems Council, the Conference of State Sanitary Engineers, and the septic tank industry. U.S. Public Health Service, Recommended State Legislation and Regulation: Urban Water Supply and Sewage Systems, Water Well Construction and Pump Installation, and Individual Sewage Disposal Systems (July 1965). All three model statutes have been reproduced in Advisory Commission on Intergovernmental Relations, "Environment, Land Use and Growth Policy," 5 State Legislative Program (1975).

67. Md. Ann. Code art. 43, § 394.

68. The Metropolitan Council Act is codified at Minn. Stat. § 473B. There is a wealth of literature on the Twin Cities Metropolitan Council. The newest and most exhaustive in the area of regional environmental management is R. Einsweiler, I. Ball, and M. Gleeson, Case Study of Metropolitan Council as an Environmental Management Organization (Jan. 1976). Earlier studies include: C. Hein et al., Regional Governmental Arrangements in Metropolitan Areas: Nine Case Studies sec. IV (1974); Advisory Commission on Intergovernmental Relations, Regional Governance: Promise and Performance ch. IV, Substate Regionalism and the Federal System, vol. 2 (1974); R. Freilich and J. Ragsdale, A Legal Study of the Control of Urban Sprawl in the Minneapolis-St. Paul Region (1974).

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*See note 99 infra for a citation to a recent California case dealing with the obligation of a locality to consider the regional welfare when it sets out to limit its growth.

69. Minn. Stat. Ann. § 473.145 (West Supp. 1977).

70. Metropolitan Council of the Twin Cities Area, "Waste Management," Metropolitan Development Guide 5 (Dec. 1975).

71. Id. at 61.

72. Minn. Stat. Ann. § 473.161 (West).

73. Id. § 473.501 et seq.

74. Guide, supra note 70, at 67.

75. Rubin v. McAlevey, 282 N.Y.S.2d 564 (1967), aff'd, 288 N.Y.D.2d 519 (1968).

76. These subdivision regulations have been published by the American Society of Planning Officials. R. Freilich and P. Levi, Model Subdivision Regulations, Text and Commentary (Chicago: ASPO, 1975).

77. These laws are reproduced in C. Little, The Challenge of the Land (New York: Open Space Action Institute, 1969).

78. See supra note 25, at 2-47.

79. Metropolitan Council of the Twin Cities Area, "Development Framework," Metropolitan Development Guide 19, 21 (Sept. 1975).

80. Minn. Stat. Ann. § 473.851 et seq. (West Supp. 1977).

81. Montgomery County, Md., Adequate Public Facilities Ordinance No. 7-41 (June 26, 1973), Montgomery County, Md., Code § 50-35(j) (Michie Supp.).

82. Md. Ann. Code art. 43, § 387C(d)3(i).

83. Einsweiler and Ball, supra note 68.

84. Id.

85. Montgomery County Code ch. 86, art. 1, § 7, and art. 7.

86. Early in its history the council found itself in disagreement with the then Sewer Board and the state Pollution Control Agency over what to do with the sewage of Forest Lake which was being discharged with only primary treatment into a chain of lakes forming part of the St. Paul water supply system. The council recommended a tertiary treatment plant on a small creek, but environmentalists opposed the location, fearing adverse effects on fishing in the creek. Finally, the state Pollution Control

Agency required the Sewer Board to run an interceptor line from Forest Lake to connect with the St. Paul system. The new interceptor encouraged development in an area which the council felt was not yet ready for development. Regional Governmental Arrangements in Metropolitan Areas: Nine Case Studies, supra note 68, at 39.

87. Both the pricing policies considered and the one finally adopted in the Twin Cities are discussed in Robert C. Einsweiller's issue paper for the 208 Areawide Water Quality Workshops sponsored by the National Association of Regional Councils (Washington, D.C.: 1976), "What Is Needed to Implement the Management Plan?" According to that paper, the initial pricing proposal would have charged undeveloped land for the amount of sewer capacity reserved for that land. The history of this proposal and the alternative methods actually used is described by Einsweiller as follows (at 23-24):

> Referring to tax theory, this extra tax placed on the undeveloped land would prevent its being held for speculative purposes and diminish the occurrence of leap-frog development. The concept was never tested. As part of the final package it was determined to make the allocations to the local governments and let them decide how to raise the money. When this was done none of them chose to put it on undeveloped land. They charged it to current users either as a hook-up fee, as a user charge or as a property tax.
>
> The latest amendment has removed the reserve charge from current users. This came about through the service availability charge (SAC) which takes the annual increment of cost for reserve capacity, divides it by the estimated annual number of building permits and then allocates the charge to the communities in which building permits were granted. By so doing the charge achieves one original purpose in that it goes only on new development. But it does not act as any restraint on the request for capacity. If, for example, a community asked for twice as much capacity as it needed, that capacity would be paid for by development occurring in other parts of the region. Therefore, although the SAC charge provides a painless way of paying it has removed the last vestige of restraint on over sizing, sprawl and the other aspects of development that the pricing was initially set up to do. Sprawl in the Twin Cities is now being handled administratively rather than through pricing. Pricing is working in one direction, administrative regulations another. But the new mandatory planning act [see note 80, supra, and accompanying text] does provide enough authority to overcome the lack of pricing as a restraint.

Suggestions for ways in which Montgomery County might restructure its sewer funding and pricing system to further its growth policy

are made in a paper entitled "Pricing and Investment Policy as a Growth Policy Tool" presented at the 1974 American Institute of Planners Conference in Denver by Donald A. Downing, Coordinator, Environmental Planning Division, The Maryland-National Capital Park and Planning Commission, Silver Spring, Maryland. Mr. Downing's concluding summary lists the following recommended policy changes for Montgomery County and refers to jurisdictions where they are in use:

1. Benefit assessments should have uniform rates for land, including agricultural, which has access to sewer service. Were development to occur on some land, which now has access to sewers, further sewer extensions could possibly be postponed and other public facilities provided in a more efficient manner.

2. User charges should be higher in low priority areas and lower in high priority areas, as determined by County Growth Policy. Home buyers would be encouraged to locate in areas where public services could be provided at the least cost.

3. The contribution system for sewer extensions should be replaced by a system of private payment and reimbursement for major extensions. This could provide an incentive for developers to build in areas where service is already provided, and other public facilities are available to the residents. Id. at 15.

See also Downing, "The Role of Water and Sewer Extension Financing in Guiding Urban Residential Growth," Water Resources Research Center Report No. 19 (June 1972), and Downing, "Sewer and Water Pricing and Investment Policies to Implement Urban Growth Policy," Water Resources Bulletin 11, at 345-355 (April 1975). And see R. Tabors et al., supra note 21, at 126-129.

It has been noted by others that charging future users for their pro rata share of excess capacity, while making equitable sense, puts great pressure on the community to in fact grow to the population size for which the sewer system was projected. Urban System's Interceptor Sewers and Surburban Sprawl, supra note 8 and 61, uses as an illustration of this problem the Haikey Creek Interceptor System in Tulsa, Oklahoma. Tulsa financed that system by selling debentures to developers which could not be converted into cash but could only be applied against connection fees. Clearly, such a system puts tremendous pressure on developers to begin selling losts as soon as possible.

It has also been charged, in the above cited work by Urban Systems and elsewhere, that EPA's funding policies stimulate rapid growth

by encouraging the building of excessive capacity. In January 1976 the EPA Administrator submitted a proposal to Congress which would have put new limitations on the eligibility for and the amount of federal funding for new treatment works construction, including a provision "that the amount of reserve capacity for treatment works eligible for Federal assistance is to be limited to that future capacity required to serve the users of such treatment works expected to exist within the service area of the project at the time it becomes operational." Cover letter from Russell E. Train to Speaker Carl Albert (Jan. 29, 1976), forwarding a draft bill "to amend the Federal Water Pollution Control Act." No final congressional action was taken on this bill in the 1976 legislative session.

The New Jersey Department of Community Development has suggested that the typical 15 percent contribution of the state to sewer construction costs be dropped altogether; that way, the department maintains, localities would be paying 25 percent of the costs rather than 10 percent and would take a much closer look at the question of sizing. New Jersey Dep't of Community Affairs, supra note 8, at 51. Still another way to eliminate the "free-ride" aspects of the present funding and pricing systems which may contribute to sewer oversizing and consequent environmental degradation would be to recapture the unearned increment attributable to sewering. The New Jersey Report reports that in one township acreage in a part of town where sewers were available sold for twice the amount of comparable unsewered acreage. Id. at 24. See the forthcoming study for the U.S. Dep't of Housing and Urban Development on ways of equalizing "windfalls for wipeouts" through benefit and "worsenment" recapture system. This study is being undertaken by Professor Donald Hagman, University of California at Los Angeles.*

The existing system of sewer financing and pricing is summarized in R. Tabors et al., supra note 21, at ch. 3 and 127-29. Tabors et al. report that the data they used show that 70 percent of the localities charging connection fees used flat charges for all single-family homes, while less than 20 percent based their fees on actual costs or frontage. The authors also reproduce data compiled by the International City Manager's Association and included in their Municipal Yearbook 1961, at 325 (Chicago: International City Managers' Ass'n, 1961) which shows that developers generally already do pay for lateral sewers in new subdivisions. Of 673 cities studied, developers paid the full costs in 79 percent of the cases, and shared the cost with the city in 13 percent.

88. Einsweiler and Ball, supra note 68.

89. Md. Ann. Code art. 43, § 387C(d)5.

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*See D. Hagman, Windfalls for Wipeouts (Monticello, Ill.: Council of Planning Librarian Exchange Bibliography Nos. 618-20, 1975).

90. McQuillan, Municipal Corporations § 31.17.

91. Ramsay, "Utility Extensions: Timing or Location Control," 28 Stan. L. Rev. 945 (1974), reproduced in its entirety in 2 Management and Control of Growth, supra note 23, at 442. This note cites, inter alia, the seminal case in this area, Moore v. City Council, 23 Ky. L. Rptr. 384, 105 S.W. 926 (1907), and Barney's Furn. Warehouse, Inc. v. City of Newark, 62 N.J. 456, 469, 303 A.2d 76, 83 (1973).

92. In what is perhaps the most famous utility extension case, Reid Development Corp. v. Parsippany-Troy Hills Township, the court held that the township's refusal to extend water mains to the developer's subdivision was not an "arbitrary, unreasonable or abusive exercise of discretion" in view of the fact that the municipal water company was operating at a deficit and that there "was no assurance of a likely customer return in the reasonably proximate future." 31 N.J. Super. 459, 107 A.2d 20, 23 (App. Div. 1954). The court distinguished the holding in an earlier case brought by the same developer against the same township (Reid Development Corp. v. Parsippany-Troy Hills Township, 10 N.J. 224, 89 A.2d 667 (1952)), in which the developer prevailed, because it "turned upon the municipality's withholding of the grant of extension as a means of coercing the landowner into accepting a suggested change in the minimum lot size." Id. at 23. While the Reid cases concerned the provision of public water, not sewer, the cases have made no distinction between the two kinds of utility. Note that Robinson v. City of Boulder, No. 26720 (Sup. Ct. Colo.. en banc March 15, 1976), dealt with both sewer and water without differentiating between them in any way.

93. See supra note 60. The factual details of the case are best gleaned from the lower court opinion which is reproduced in 2 Management and Control of Growth, supra note 23, at 237.

94. Delmarva Enterprises, Inc. v. Mayor and Council of the City of Dover, 282 A.2d 601, 602.

95. 264 A.2d 113 (1970). See also the other Maryland cases cited therein.

96. Citing Commissioners of Poolesville v. County Council of Montgomery County and the Department of Health and Mental Hygiene, 330 A.2d 711 (Md. App. 1975) and, later, Norbeck Village Joint Venture v. Montgomery County Council, 254 A.2d 700 (1969). In Norbeck the Maryland Court of Appeals (the state's highest court) upheld the zoning plan for the Olney Community which was predicated on the "wedges and corridors" idea and was designed to implement the joint purposes of the Master Plan: the preservation of open space and the protection of the watershed. The court had noted then that "[t]he plan sought to encourage earlier growth along the interstate 70S corridor than on the Patuxent River Watershed, thereby protecting

the basin from pollution." Id. at 704. In ruling that the appellants had failed to overcome the strong presumption in favor of the validity of legislative action, the court noted that the presumption was buttressed in this case "by reason of the fact that the plan implemented the General Plan and the Master Plan."

97. 254 A.2d 700 (1960), see supra note 96.

98. 400 F. Supp. 1369, 1391-92 (1975).

99. 334 N.Y.S.2d 138, 30 N.Y.2d 359, 285 N.E.2d 291 (1972), appeal dismissed, 409 U.S. 1003 (1973).
See also a recent decision of the California Supreme Court upholding an adequate public facilities ordinance against a challenge that it was unconstitutional on its face. The court remanded the case for determination by the trial court whether the ordinance bore a reasonable relation to the regional welfare. Associated Home Builders of the Greater Eastbay, Inc. v. City of Livermore (S.F. 23222, Dec. 17, 1976). See note 62, supra for other cases concerning a locality's obligation to consider the general welfare of its region. The Eastbay decision is reproduced in its entirety at 7 ELR 20155.

100. 216 Va. 49, 216 S.E.2d 33 (1975).

101. Va. Code §§ 15.1-427 and 15.1-489. The Virginia state legislature had, however, rejected a bill designed to give express authority for the timing approach. (S. 95, 1972). The bill would have amended Va. Code § 15.1-486 to allow zoning ordinances to "time" "the development of uses otherwise permitted, when public facilities, including utilities, transportation, education, protective and recreational facilities, are not deemed by the governing body to be adequate to support development otherwise permitted in the district."

102. 216 S.E.2d 33, 41.

103. 215 Va. 434, 211 S.E.2d 48 (1975).

104. 216 S.E.2d 33, 46-47 (Cochran, J., dissenting; T'Anson, C.J., joining).

105. According to a Fairfax County lawyer and former county judge, the timing scheme, under which the Middle Run area was not to be developed after 1975, "was to be reviewed annually to determine the progress in the provision of facilities. Despite this provision for annual review . . . review was never implemented, and most zoning applications in the Middle Run and adjacent areas were refused a hearing." J. Hazel, Jr., "Growth Management Through Litigation--A Case Study of Fairfax County, Virginia," Urban Land, November 1976, at 6 and 10. This article gives an excellent history of Fairfax County's experience with mechanisms to control growth, as do Tabors et al., supra note 21, ch. 5; G. Dawson, No Little Plan: Fairfax County's PLUS Program for Managing Growth (1976); and J. Stansbury, "Surburban Growth--A Case Study," 28 Population Bulletin (February 1972).

107. For a general discussion of the constitutional issues raised by the regulation of land and other property, see chapter 2.

108. 285 N.E.2d 291, 304-305 (1972).

109. This concern has also been expressed by the courts. In Smoke Rise v. Washington Suburban Sanitary Commission, 400 F. Supp. 1369 (D. Md. 1975), the court ruled that the plaintiff could not be required to exhaust its administrative remedies by petitioning the state Department of Health to reclassify its land, saying:

> The ingenuity of this argument is matched only by its myopia. The comprehensive plan is the tool whereby design and rationality can replace the chaotic sprawl which has too often characterized metropolitan development. If plaintiffs, and others similarly situated, were allowed to petition administratively for a reclassification of their land, the Montgomery County comprehensive plan would soon be riddled with the same types of exceptions and variances which have crippled the efficacy of local zoning ordinances as salutary tools for the guidance of development. Id. at 1379.

CHAPTER FOUR

MUNICIPAL WASTEWATER TREATMENT FACILITIES:
RESTRICTIONS ON TIMING AND LOCATION OF HOOKUPS AND EXTENSIONS

SUGGESTED READINGS

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CHAPTER FIVE

ONSITE WASTEWATER DISPOSAL SYSTEMS

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CHAPTER FIVE

ONSITE WASTEWATER DISPOSAL SYSTEMS

1.0 Introduction: The New Interest in Onsite Wastewater Disposal Systems 1/

With Congress seemingly promising a sewer hookup for every home in the first half of this decade, the lowly septic tank came to be regarded as something to be replaced at the earliest possible moment by modern, centralized sewage collection, treatment, and disposal systems. The breakdown of many onsite waste disposal systems installed in the subdivision boom years of the fifties and sixties only confirmed the desire to have done with such "primitive" systems as soon as possible.

Recently, however, two research efforts have combined to raise doubts about the practicality and advisability of sewering America and to give onsite wastewater disposal systems a new future. The first research effort has been into the true costs and secondary effects of centralized sewage collection and treatment systems. The findings of this research have been summarized in the introduction to the previous chapter.2/ The second research effort has been into the cause of subsurface disposal system failure and into the expected longevity of such systems in the absence of failure-causing conditions.3/ Recent research has given cause for qualified optimism--the qualifications having to do mostly with the major regulatory effort needed to ensure that subsurface disposal systems are properly designed, installed, and maintained.4/ This chapter is devoted to an analysis of the control techniques and legal and institutional framework designed to accomplish the required regulation.

Even if there were no long-term future for onsite wastewater disposal, government officials at all levels and water quality management planners would have to grapple with the subject of its regulation since it is the only system available now to approximately 30 percent of the population (the number is much higher in the Northeast)5/and will continue to be for the forseeable future since sewering of widely dispersed populations is simply not economic.6/ Even if the economic costs were the same, moreover, the social and environmental costs of sewering would still make onsite wastewater disposal the more attractive alternative in many cases. While the kind of comprehensive planning at the state, regional, and local levels advocated in chapter 4 may go a long way towards mitigating adverse primary and secondary effects of sewer development, total avoidance will often not be possible. For example, there will always be some growth with some increase in stormwater runoff. In some states, rural areas with high quality waters but scattered, severe pollution problems from failing septic tanks or many direct discharges to streams may rank high on state priority lists for construction

grants, yet it is in these areas where sudden growth is hardest to plan for and where that growth can have the most devastating effects on water quality and environmental amenities generally. Community septic systems and other small-scale wastewater disposal systems to be discussed may well be the most environmentally sound as well as the most economical way to abate pollution from sewage in such areas.

There are, moreover, positive environmental benefits attributable to the subsurface method of wastewater disposal. One of these is fertilization of plant growth 7/ and another is replenishment of groundwater. Even more important is the fact that proper subsurface disposal generally keeps pollutants out of surface waters and thus may, in some instances, be superior to tertiary treatment in a sewage treatment plant. And while septic systems, like sewage treatment plants, do generate residual wastes, the material pumped from septic tanks ("septage") is more amenable to land disposal since it contains significantly lower concentrations of heavy metals.8/ The city of Englewood, Florida offers an example of a community attempting to continue the use of septic tanks rather than polluting its prime recreational waters and depleting its groundwater resources by installing a central sewer system.9/ Clearly, the use of septic tanks has enormous economic and environmental advantages over the alternatives resorted to by some cities: piping their effluent to distant discharge points or recycling their wastewater for a water supply.

For all the reasons outlined above, states, regions, and localities may want to take another look at onsite and other small-scale waste disposal systems, traditional and innovative. Many states and localities have already realized that the environmental and public health problems often associated with such systems in the past may be minimized by the adoption of standards and permit requirements for testing, location, construction, maintenance, and by proper training of implementing personnel. The following analysis of the necessary regulatory components of any onsite wastewater disposal program draws on examples from several states and localities which have particularly comprehensive regulation.

2.0 Planning

2.1 General Locational Requirements: Identification of Areas Unsuitable for Subsurface Disposal

Onsite waste disposal's new respectability will be short-lived indeed if it leads to the cavalier assumption that there are innovative technological methods for avoiding every problem-site characteristic. There are many sites which are totally unsuited to onsite waste disposal. The U.S. Department of Agriculture's Soil Conservation Service (SCS) estimates that about 32 percent of the land area of the United States

has soils suitable for septic systems. Many such areas can be ruled out by soil type as identified by soils maps and interpreted by SCS or other trained soil scientists. Because of the invaluable assistance they provide for many environmental control purposes, detailed soil surveys and interpretation are an important part of every water quality management planning program.10/ Another key determinant of the suitability of land for onsite wastewater disposal is the height of the seasonal water table. Groundwater analysis is a required part of water quality management planning in areas with existing or potential groundwater pollution problems and it too is useful for many pollution abatement purposes.11/

Once the soils conditions of the state or community which will not permit successful subsurface wastewater disposal have been identified (flood plain soils and other poorly drained soils, soils with inadequate permeability ["tight" soils], soils with excessive permeability, shallow soils and soils with a high seasonal water-table), these limiting conditions should be clearly spelled out in state regulations or the local ordinance governing subsurface disposal. Pennsylvania's regulations, for example, list groups of soils which are unsuitable for subsurface disposal systems. Such locational restrictions will take their place alongside restrictions on installing septic systems within certain distances from water supplies and surface waters which may be found in most states' regulations.12/ While it may take an individual site inspection to confirm that a specific site partakes of the limiting characteristic shown on the generalized soil survey,13/ the limitations themselves should generally not be subject to variance. And although it is possible to overcome certain problems posed by marginal sites with new technology, certain firm limitations will remain. Thus Maine and Pennsylvania, states which encourage carefully designed innovative systems, have charts showing which soils may be suitable for what systems and which are unsuitable for any subsurface disposal systems at all.14/ The Maine chart includes suggested minimum lot sizes although the state leaves the final decision as to lot size up to local discretion in view of "the unique situations which most communities have." The Maine Code says that the suggested minima were prepared "to provide assistance to planners, planning boards, and others involved in land use."

Local land use planning is an important component of onsite waste disposal planning not least because it is at the local level, through zoning, at which density decisions are usually made. Important as the soils characteristics of an individual site are to the likely success of an onsite system, density is another key factor in assessing the possibility of groundwater pollution. In some situations, each individual system may be working properly but the cumulative effect of many systems may nevertheless result in significant pollution.

2.2 Sewer Planning and Limitations on Onsite Wastewater Disposal Systems

Certainly, locational restrictions on subsurface wastewater disposal systems will have broad ramifications for water quality management planning generally and particularly for sewer planning. Having mapped and identified geologic, hydrologic, and topographic limitations on the use of onsite wastewater disposal systems, communities which are planning or already have central sewer systems will know where they will have to build or extend those facilities if residential development is to take place. Of course, some areas which are unsuitable for subsurface disposal systems may be unsuitable for sewering as well because of their general inappropriateness for development of any kind. Flood plains and steep slopes are just two examples of such areas. While it is important that decisions on future sewer locations reflect limitations on septic systems, it is even more important that the converse be true. For the comprehensive sewer planning of the type outlined in the previous chapter to be maximally effective--especially if it is, as it should be, part of a broader land use planning program--all development decisions must take the sewer plan into account, including decisions for development which will not rely on the public sewers for waste disposal. As noted in the previous chapter, many sewer extensions of the past have been dictated not by sound planning considerations but by septic system and package plant failures.

Two states which mandate local sewer planning, Maryland and Pennsylvania, stipulate that no permits for onsite disposal systems shall be issued unless such issuance is consistent with the applicable local sewer plan.15/ (Pennsylvania used a ban on septic tank construction for new recreational subdivisions to prod counties into developing comprehensive plans for sewer and water systems in the first place.)16/ Although consistency is not defined by the regulations of either state, it is clear that to be consistent with the plan, the onsite disposal system must not be within an area shown on the plan as unsuitable for onsite wastewater disposal because of soil or other limiting factors 17/ or within an area destined by the plan for sewering within a certain time.18/ Unfortunately, practical attempts to mesh restrictions on septic systems with long-term sewer planning have turned up unplanned-for side effects calling for unorthodox remedies, as illustrated by Montgomery County, Maryland.

Laboring under a state-imposed sewer moratorium which has substantially delayed its planned expansion of sewer facilities, Montgomery County modified its restrictions on septic systems in areas planned for sewering both to allow landowners some use of their land in the face of indefinite delays and to avoid the complete subversion of a land use policy that calls for combating sprawl by channeling development in or near those areas already served by adequate public facilities. As things were, development was being pushed to rural areas of the county where limitations on onsite wastewater

disposal were less stringent. The interim "solution" the county hit upon was to allow temporary onsite wastewater disposal pending provision of public sewers. Generally, such temporary systems are to be so located and constructed "as to permit connection to the [future] public facilities in a most economical and convenient manner."19/

3.0 Permits and Standards for Location, Design and Construction of Onsite Wastewater Disposal Systems

3.1 Failure of Past Approaches

Requiring permits and setting standards for the installation of onsite wastewater disposal systems is far from being a new concept. Many states have sanitary codes or plumbing codes which set standards for septic systems and require a permit from a state agency (typically the state health department) or its delegee (often a local health board) prior to the installation of any such system.20/ The publication by the U.S. Department of Health, Education and Welfare (HEW) in 1957 of a Manual of Septic-Tank Practice 21/ (including a suggested local ordinance governing individual sewage disposal systems) and in 1965 of a model Individual Sewerage System Act and Regulations 22/ represents attempts to create a degree of uniformity among state and local standards, but little uniformity exists.

Despite the widespread adoption of minimum design standards and the general enforcement of permit requirements, moreover, governmental regulation of onsite wastewater disposal systems has been judged a failure by many authorities. These authorities quarrel not so much with the substance of the HEW guidance and state and local regulations as with the way they have been applied. All too often what were meant as criteria and minima to guide the permit-issuers in their case-by-case review of applications have become looked on as hard and fast design standards which, once shown to have been met, justify a rubberstamp permit issuance. The rare "problem lot" is dealt with by requiring a licensed engineer to affix his stamp to the subsurface disposal system plans.

The above-described approach is founded on two major fallacies. The first is the erroneous assumption that most sites are alike and are suitable for standardized testing and system design--the so-called "code" approach.23/ This assumption, aggravated by lack of bureaucratic manpower and expertise, has led to the rigid adherence to standards originally meant as "guidelines." Contractors were discouraged from designing systems to meet individual site characteristics, since any departure from the rigidly interpreted standards might entail the time-consuming pursuit of a variance. As a consequence, many systems were "designed by the book" and failed because the "book" necessarily

did not reflect the infinite variability of individual sites.

The second erroneous assumption of most traditional regulatory approaches has been that where a "problem" site is singled out for individualized system design, that design should reflect traditional engineering know-how. In their 1971 paper "Failure of the 'Engineering Approach' in Design of Septic-Tank Systems," 24/ Winneberger and Anderman reported that a survey of 76 "engineered" systems (systems designed individually by licensed civil engineers) in California revealed that about one-third of them had failed within approximately three years.25/

This and other research led the authors to conclude that most civil engineers do not have the training to design septic systems properly and that under the present legal and manpower constraints local permit-issuing authorities are not able to discriminate between competent and incompetent designs.26/ Winneberger and Anderman's recommended solution to the problem they identified is complete public responsibility for onsite waste disposal design. Since the pros and cons of this approach are largely institutional, they will be analyzed from that perspective later in this chapter. This section will continue to focus on regulatory approaches for achieving necessary flexibility and professionalism of design.

3.2 A New Emphasis on Soils and Individualized Testing

The most glaring deficiency in the by-the-book or "code" approach to regulation of onsite wastewater disposal systems which has prevailed is the past in its insensitivity to the geologic and hydrologic limitations of individual sites. Indisputably, the most important determinant of site suitability is the soil.27/ The traditional method for determining soil suitability is the percolation or "perc." test, a test which was enshrined in state and local health codes before its inadequacies were known.28/ Among the criticisms percolation tests are subject to are that (1) their validity depends on soil moisture being at or near field capacity when the test is made, hence tests made in dry periods, especially those made without adequate pre-moistening, are unreliable and (2) they lead to undersized absorption systems because they tell you only about the initial infiltration capacity of a particular soil and nothing about "the permeability of a zone of clogging which may overlay that soil in the future."29/

Dissatisfaction with the perc. test has led to the development of alternative approaches to site and design selection which, while not replacing the perc. test in most cases, provide the necessary supplemental, detailed information with respect to soils and water table. The basis of these new approaches is soil type analysis. Soil surveys carried out by the U.S. Soil Conservation Service are first interpreted by soil scientists

experienced in the performance of soils in the area and their limitations for wastewater disposal. This general information is then combined with particularized site analysis (percolation tests, observation pits, and sometimes permeability tests) to yield a system design responsive to the limitations of a specific disposal site. While this approach is still being refined, 30/ its superiority to the old health code approach is undoubted, 31/ and a number of states have amended their regulations to provide for soil suitability tests by soil scientists. Such regulations must, of course, stipulate that all of the design standards (minima) may be varied to afford greater protection against failure in accordance with any information revealed by the soil test and site evaluation. The following excerpts from the regulations of progressive states and localities illustrate this regulatory approach.

The successful experience of Fairfax County with septic tanks installed under strict siting and design controls has already been noted.32/ Fairfax County public health officials are governed by state regulations which allow for:

> . . . consideration of physiographic province, position of landscape, degree of slope and soil profile (thickness of horizon, color, texture). Such evaluations shall indicate whether or not the soil has problems relative to the position in the landscape, seasonal water table, shallow depths, rate of absorption, or a combination of any of the above. If absorption rate problems are suspected and there is no indication of a water table, percolation tests should be made but their results shall not be presumptive, prima facie or conclusive evidence as to the suitability for effluent absorption. Such percolation tests may be considered and analyzed as one of many criteria in determining soil suitability for absorption of effluent.33/ (emphasis added)

Under article V, section 22-38(b) of the Fairfax County Code all applicants for septic tank permits are required to include in their application: results of percolation tests (performed according to prescribed procedures), a soil profile description to a depth of five feet, and information on the drainage pattern with respect to reservoirs, springs and wells. While minimum absorption field sizes are correlated to percolation rates in a table (section 22-41), the total minimum seepage area of the disposal field may be varied by the county health department "based upon experience data or percolation test" (section 22-46). The county employs a full-time soil scientist whose jobs include advising the county health department in those problem cases where the county's soil maps and correlations of percolation tests with different soil types provide insufficient data upon which to base a decision to grant or deny a permit.

In Maine the state assumes a stronger role in establishing guidelines for the issuance of permits at the local level and shifts more of the expertise burden to the developer. Thus the state Plumbing Code requires a special site report to be filed by either a state-certified soil scientist or geologist, a registered professional engineer experienced in the field of soils engineering, or other expert recognized by the department. The soils and site information to be provided on a special state form is to comply with the following provision:

> The site investigator's report, signed and sealed by him, shall indicate assessment of the suitability of the site and site's soils for sewage disposal and select the type and size of private sewage disposal system and any special design or construction details needed to assure that the proposed installations will meet the criteria of this Code. . . .
>
> The findings shall be supported with:
> 1. a location plan
> 2. log of all soil exploration
> 3. a description of the various soils by strata
> 4. slopes shown by arrows which indicate the downslope direction and accompanied by percentage
> 5. depth to bedrock
> 6. depth to any dense firm sublayer (fragipan, hardpan, iron pan, etc.)
> 7. groundwater conditions (including indication of seasonal groundwater fluctuations, mottling, gley)
> 8. the maximum depth and type of fill if required
> 9. type and size of system selected or designed
> 10. specification for any special equipment which might be required
> 11. distances to all surface waters, wells, springs, swamps, marshes, bogs, etc. as required by [a table].
>
> Soil Scientists shall also describe the site soils in accordance with the standards of the National Cooperative Soil Survey.34/

The Maine Plumbing Code further provides that nothing in it shall be construed to prevent the Department of Health and Welfare from requiring compliance with higher requirements than those set out where deemed essential to maintain a safe and sanitary condition.35/

Needless to say, some sites will require more testing than others, just as some systems (large institutional ones, for example) will justify more elaborate design than others. One approach to such variations is to give the administrative officer broad discretion. This is the approach taken in Pennsylvania where state-licensed sewage enforcement officers decide to a large extent what tests will be required and may well perform them themselves at the applicant's

expense.36/

In Connecticut, where a state certification program is just getting underway, the state Department of Environmental Protection has proposed much more elaborate guidelines for testing and data submission. The degree of information required is made to vary both with the size and character of the proposed discharge, with the problems attributable to the site, and with the type of system proposed. Connecticut's proposed system of categorization is almost a regulatory scheme in itself, since the information required for some categories amounts almost to a mini-environmental impact statement. Thus systems proposed for sites which fall within a high-risk category, which includes soils with very high percolation rates, high groundwater, shallow bedrock, and steep slopes, as well as proposed systems which do not meet the minimum design requirements, would have to meet the following informational, design, and maintenance requirements (among others):

1. A detailed engineering report describing the volume, nature and characteristics of all wastewater including recommendations for any necessary treatment or pretreatment shall be submitted.

2. Separating distances
   The minimum separating distances [specified elsewhere] shall not be assumed adequate for the flow volumes in this category in excess of 1,000 gallons per day. Separating distances used in design shall be increased where practicable and a report shall be submitted describing the effect of the discharge on adjacent watercourses and wells.

3. If the design flow is greater than 1,000 gallons per day, provisions for equalization of peak flow occurrences, pretreatment of wastes, and grease and scum removal shall be considered in the design. A maintenance and cleaning schedule of any pretreatment facilities and the septic tank shall be provided.

4. If the design flow is greater than 1,000 gallons per day, the use of a dosing system shall be considered. The means of dosing used shall provide for uniform distribution throughout the leaching system.

5. If the percolation rate is less than one half minutes per inch a report shall be submitted providing an evaluation of the effect of the rapid movement of the effluent through the soils upon adjacent groundwater and surface water.

6. If percolation rate is greater than twenty minutes per

inch, or if the bottom of the leaching system will be below the upper surface of a compact layer, permeability tests shall be performed in each leaching area to check system sizing and a seepage analysis shall be submitted.

7. If the groundwater table or seasonal groundwater table is less than seven feet below the natural ground surface or final grade if less, a plan shall be submitted showing the slope and elevation of the groundwater together with permeability measurements and a seepage analysis of the site.

8. If the surface disposal system design does not conform to the minimum design requirements [specified elsewhere], detailed engineering plans together with an engineering report shall be submitted to demonstrate the equivalence or superiority of the system design as compared to the minimum design requirements.37/

3.3 The System Design Itself: Provisions for and Limitations on Innovative Individual Systems.

It is not enough, of course, to write regulations which provide for detailed case-by-case site testing and evaluation and for locational controls, such as setbacks from wetlands and watercourses, which may be made more stringent where individual site characteristics warrant. The design of the system itself must be fitted to the site and soil limitations. The standard way this is accomplished is to tie the size of the subsurface absorption field to the percolation rate of the soil as revealed by a percolation test.38/ For some soils and site conditions, however, varying the size of the traditionally designed absorption field will not suffice.

In the past, the attitude was widespread that sites which were not suitable for traditional septic tanks and traditional absorption fields should be ruled out altogether for onsite wastewater disposal. Recently, however, research on so-called "alternative" or "innovative" systems has demonstrated that several such systems may be environmentally sound when carefully designed and maintained.39/ This fact, along with the realization that without reliance on alternative systems a great deal of rural land will be totally precluded from development, has led a number of states to amend their regulations to allow and set standards for alternative systems. It must be realized, however, that even with such systems a good portion of the land area of every state will not be suitable for onsite disposal of waste--in Pennsylvania for example, the amount is estimated to be 50 percent of the total land area.40/

The specifics and relative merits of different alternative systems are, of course, highly technical matters and beyond the scope of a legal and institutional study. There are many excellent descriptions and evaluations of the innovative systems to be found in the technical literature. Descriptions from that literature of the more common alternative systems are excerpted briefly in the footnotes simply to give background for the next section dealing with regulatory approaches to innovative systems.41/ Innovative systems have begun to be looked on with more interest and more favor since 1971 when a survey undertaken for the University of Wisconsin turned up few examples of state regulations which made explicit provision for innovative systems (one state, Mississippi, prohibited them altogether);42/ Even those states which gave innovative systems a certain legitimacy in their regulations may encourage their use only where conventional systems have failed. This is the approach, for example, of New York State, which suggests mounds, evapo-transpiration systems, and aerobic digestion systems for cases where "adverse soil and site conditions exist . . . [but] . . . a house has already been constructed, sewage is overflowing onto the ground surface and the owner cannot afford to abandon his home." 43/

In Pennsylvania, the Sewage Facilities Act provides that in adopting rules and regulations the Environmental Quality Board shall adopt standards which " . . . take cognizance of latest technological developments in the field of individual sewage systems, including adoption of standards providing for use of alternate individual sewage systems . . ."44/ Pennsylvania's regulations do provide such standards, including ones for: aerobic treatment units;45/ elevated sand mounds; oversized absorption areas (for slowly permeable soils); and shallow placement of disposal lines with additonal soil fill covering.46/ Which alternate subsurface absorption area system may be used in what soils groups is indicated in a "Matrix for Adoption of Alternate Subsurface Absorption Areas."47/ Use of alternative subsurface absorption areas must also be consistent with the municipal Offical Plan (the comprehensive plan for the provision of adequate sewage systems).48/ Any system for which standards are not set is denominated an "experimental" system under the Pennsylvania regulations. Such systems are allowed only under very limited conditions--a more formalized version of the conditions imposed by New York for all inovative systems. Thus, the Pennsylvania regulations provide that "experimental individual or community disposal systems . . . shall not be restricted by [the] regulations provided that:

> (1) The experimental system proposed is attempting to resolve an existing pollution or environmental health problem, or when the experimental system proposal is for new construction where it has been predetermined that an individual or community sewage disposal system meeting the requirements of this Chapter or sewerage services meeting the requirements of Chapter 91 of this Title, may be installed in event of the failure of the experiment.

(2) The application for an experimental system must be in the name of and bear the signature of the person who will utilize the system.

(3) The person proposing to utilize an experimental system must be informed by the Department of the nature of the experiment and his responsibility to maintain, correct, or replace the system in event of failure of the experiment.49/

Maine, a state which depends on onsite wastewater disposal systems to a larger extent than most but which has a large proportion of land which is poorly suited to conventional systems, has a correspondingly high stake in alternative onsite wastewater systems--a stake reflected in its regulations. Thus Maine does not require that a conventional system have failed--or for new lots that a conventional replacement be possible--before it will approve an "experimental" system. Indeed, the regulations do not even segregate certain systems as "alternate" or "experimental"; aerobic tanks, dosing facilities, nondischarge systems, mounds, and compost toilet units, along with numerous other nonconventional systems, are simply listed as "approved private sewage disposal systems." A matrix like that developed in Pennsylvania indicates what type and size of systems are permitted for what soil conditions (and, as in Pennsylvania, certain soils are listed as off-limits for any onsite wastewater disposal system). The systems themselves are described by diagrams and written standards.50/ The Maine regulations also include a catchall provision for "other sewage treatment and disposal systems, devices and techniques." Approval of such systems (the equivalent of Pennsylvania's "experimental" systems) is not limited to any particular set of conditions but it must be based on complete plans and specifications and it must come from the state Department of Health and Welfare (permits for most other systems come from the local plumbing inspectors).51/

The evidence on the likely success of alternative individual subsurface wastewater disposal systems of the types discussed above is not all in yet and may not be for some time. Accordingly, states would be wise to take a cautious approach in sanctioning them. The burden of proof and of data production on the applicant must be greater than for other systems and the involvement of experts in governmental review even more substantial than usual. Regulations should be written as flexibly as possible to so provide.

3.4 The System Design Itself II: Provisions for and Limitations on Alternative Community Wastewater Disposal Systems.

While alternative individual wastewater disposal systems are of primary importance to the water cleanup effort because of the hope they may offer for isolated existing homes with malfunctioning, and hence polluting, conventional systems, the development of alternative community systems is of more importance because of their greater promise

for the future as an environmentally sound wastewater disposal method. By alternative community wastewater disposal systems we mean essentially any system that does not comprise a centralized gravity sewer collection system and traditional treatment works. Alternative community systems would include numerous possible combinations of individual septic tank systems, pressure sewer connection systems, community absorption fields, and alternative surface disposal systems such as sand filters. The emphasis here will be on community subsurface disposal systems.

Innovative individual disposal systems are limited--usually severely, if a conventional system was not possible in the first place--by the soils, water table, and geology of the particular site. Also, individual onsite disposal systems--conventional or innovative--are often precluded in small towns which now discharge their untreated wastes directly to surface waters. These towns typically have lot sizes too small for onsite absorption fields.

Community disposal systems have the advantage of being able to pick the best disposal site among many. This may be a particularly significant advantage in lakeshore and riverfront areas where the immediate shorelands typically slope steeply and have high water tables. Commonly owned soil absorption fields could be set back as much as 300-500 feet from the water. Not only would this allow choice of optimum soil conditions in the area; the land would be cheaper and the setback would minimize pollution threats to wells and surface waters should the system fail. The commonly owned parcels could serve a second function as recreational open space. Despite the greater distances of collection and distribution pipe involved, the typical community system should cost less than individual septic systems, lagoons,52/ or package plants, not to mention traditional centralized gravity sewer collection and biological treatment systems.53/

Many of the other advantages of the community septic system are really more accurately described as disadvantages of centralized sewer systems, the main one being their high cost. One authority has estimated that in hilly or rocky terrain, gravity sewers can cost as much as $10,000 per house.54/ The capital costs of centralized sewers are often prohibitive for smaller communities. In most states, moreover, priority lists for state and federal construction grants favor larger communities with larger discharges. Even if a small community can afford a central sewer system with the aid of state and federal financing, the costs of serving dispersed, outlying households may still be too high, since there are few people in the center to offset the high cost of long extensions. Thus the positive advantages of a noncentral community subsurface disposal system are summarized by the Wisconsin Small Scale Waste

Management Project (SSWMP) to include:

1. Existing functional septic tank-soil absorption systems can be utilized rather than providing new service.

2. Isolated homes and clusters of homes can be served individually instead of extending costly sewer lines out to them.

3. Less costly treatment facilities can usually be constructed.

4. A more cost-effective facility may encourage smaller communities to proceed with construction rather than waiting for federal construction grants.

5. More rational planning of community growth is possible since strip growth encouraged by long sewer extensions is avoided.

6. Non-central facilities are more ecologically sound since the disperse systems dispose of the wastes over wider areas.55/

If technical advances make package plants more reliable and tertiary treatment cheaper, the collection systems built for community subsurface disposal systems could always be adapted to feed into such a treatment plant.

Since September 1974, the Wisconsin Small Scale Waste Management Project has been involved in the development of a noncentral sewage disposal system for Westboro, Wisconsin, a small community of 69 occupied buildings. In 1971, 80 percent of the occupied structures were discharging raw or poorly treated wastewater to a creek via storm drains and open ditches, and the town is currently under a state Department of Natural Resources (DNR) order to provide proper wastewater facilities. A centralized, gravity sewer system proposed by a consultant would have cost $384,850, or more than $5,500 per unit served. At the time of that estimate the Westboro sanitary district's priority for federal funding was 372 out of 395.

In an effort to enable the town to comply with the DNR order at a feasible cost, the Wisconsin SSWMP surveyed the soils for their suitability for onsite disposal. The soils in the center of town were found unsuitable and a sand bench on the edge of town was selected for a community disposal field. There will actually be two disposal fields to be used on an alternate basis, allowing one bed to rest at all times. To reduce the cost of the collection

system--the costliest portion of this system as well as of conventional centralized sewer systems--septic tanks will be used to settle out the bulk of the solids so that pressure and small diameter, curved gravity sewers can be used. Pressure sewer pumps are much cheaper to buy and maintain than grinder pumps, although the latter would eliminate the need for septic tanks by grinding up the waste directly. The remaining homes will have individual septic systems owned and operated by the sanitary district.

The total cost of the proposed noncentral system for Westboro is estimated to be $266,420 or less than $3,900 per household. This represents nearly a 30 percent savings over the conventional alternative. Operation and maintenance is expected to cost $3,350 per year, which includes pump-out of all septic tanks.56/

Another demonstration project which combines alternative waste treatment technology (aerobic treatment systems 57/ and some recycling systems) with an alternative management system has been sponsored by the Appalachian Regional Commission in Boyd County, Kentucky.58/ Aerobic systems were used because the project serves existing structures, many of which had too little land or land unsuitable for a subsurface absorption field. The superior quality of the effluent from the aerobic system allows discharge to streams in some cases. The oft-noted drawback to aerobic systems, the maintenance required for aeration equipment, was overcome by organizing a sanitary district to undertake maintenance. The per unit cost of operating the district is estimated at between five and seven dollars for a 100-unit system (a fee which compares favorably with sewer fees). While the units installed so far have cost $4,200 per house, some of that cost reflects the innovative nature of the project, and future costs per house are estimated at between $2,500 and $3,000. Engineering studies of the area put the cost of centralized sewer facilities at $9,000 per house.

Needless to say, such cost-effective alternatives to conventional central sewer systems are of great interest to the U.S. Environmental Protection Agency. The agency requires that alternative treatment systems including decentralized, "cluster" systems of the type used in Westboro, Wisconsin and Boyd County, Kentucky be considered in determining the most cost-effective approach to treatment.59/ Moreover, the agency has made the general determination that such noncentral systems will be eligible for 75 percent construction grant assistance under Title II of Pub. L. No. 92-500 (FWPCA) where they: (1) are determined to be more cost-effective; (2) serve two or more homes; and (3) are municipally-owned, operated, and maintained. The agency is currently working out the details of this policy.60/ Federal sources of funding for wastewater treatment other than EPA and state sources of funding are enumerated in a 1974 publication of the Commission on Rural Water entitled Guide to State and Federal Policies and Practices in Rural Water-Sewer Development.61/

EPA has already funded a number of alternative community wastewater disposal systems. Two, those in Albany, New York and Phoenixville, Pennsylvania, have involved grinder pumps (effluent is collected in a storage tank and gradually ground and pumped out under pressure through small diameter sewer lines).62/ An EPA report on these and two subsequent demonstration projects--Bend, Oregon (septic tank and vacuum pump) and Grandview Lake, Indiana (mixed system)--is forthcoming. The author of that report has concluded that based on the information to date (there is still very little data on long-term operation and maintenance):

> . . . pressure systems are viable alternatives in smaller communities. Their capital costs are generally significantly less than gravity systems for the following reasons:
> 1. The depth of cut required is determined by frost penetration alone.
>
> 2. Small diameter plastic pipe is used.
>
> 3. The sewers are independant of grade.63/

Although at present the primary obstacle to widespread acceptance of alternative community systems is the need for management structures to assure the maintenance and continuity a community system requires, states and localities create an additional obstacle by not providing legal sanctions for community systems in their regulations and standards. Worse, some statutes, regulations, and design standards, as now written, actively discourage community alternatives. Thus regulations which provide, as some do, that all subdividisons above a certain size must be served by central sewer systems, are obviously too inflexible because they fail to take into account the availability of sewers, soil conditions, cost-effectiveness, and the possible environmental advantages of onsite wastewater disposal systems.64/ If, on the other hand, community systems are allowed but are deemed to be public sewage systems--as they are, for example, under Connecticut's proposed regulations 65/--innovative, cost-effective systems such as those using pressure sewers, small diameter pipes, and community absorption fields may not meet what are often outmoded standards or standards written with only large urban sewer systems in mind. Thus the so-called "10-State Standards," followed by many states for sewer construction, base minimum pipe sizing on urban per capita flow, which one authority has estimated as being approximately two and a half times greater than that in rural areas.66/ Other states may require expensive cast iron, ductile iron, and concrete pipes rather than plastic pipe, which is significantly cheaper and has performed successfully in the EPA demonstration projects noted above.67/

Some states--including, surprisingly enough, Maine, a leader in the encouragement of individual innovative systems--appear to preclude or at least discourage the possibility of alternative community

systems altogether by requiring that the drainage systems of every new building be independent from that of any other building and/or that every lot be served by a subsurface disposal system on the same lot.68/ Maine's regulations also provide that "[w]herever practicable all plumbing fixtures shall be drained to the public sewer or private sewage disposal system by gravity" (emphasis added).69/ Such regulatory restrictions are misguided, in view of what are often substantial advantages of alternative community systems over both individual onsite disposal systems, and central sewer systems, as discussed above.

That is not to say, however, that alternate community systems can be treated simply as larger versions of conventional onsite wastewater disposal systems. Certainly the plans for such a system must be given especially careful scrutiny, preferably at the state level, by both the state's department of health and its water pollution control agency. Furthermore, provision must be made for continuous, responsible ownership and management. These two issues, agency review of plans and institutional management, are more fruitfully discussed as part of a broader analysis of administrative and institutional questions, an analysis to be undertaken later in this chapter.

3.5 Anticipating and Coping with Failures: Replacement Areas and Diversion Valves

So far nothing has been said about one of the most familiar standards for onsite wastewater systems, the minimum lot size requirement. The silence is intentional: large lot sizes by themselves are a poor guarantee of successful onsite waste disposal. It may be that only a small part of a large lot has soils and other conditions suitable for an absorption field; the trick is finding that part and properly designing and installing the system for it. Lot size does become a factor, however, when a system fails, whether (1) because of poor location, design, or installation; (2) because of failure to pump out the residue which accumulates in all septic tanks (see sections 4.2 and 4.3, infra); or (3) because of old age. There must be adequate, suitable area for a replacement subsurface disposal system since a failed system will generally clog the soil and render it useless for future disposal purposes.

Accordingly, a number of jurisdictions require that developers set aside adequate land area suitable for a replacement subsurface disposal area. Thus Maryland's draft regulations require "at least two recovery areas" to be set aside and provide that "[t]hese areas shall be exclusive of buildings, easements, rights-of-way, grades exceeding 15 percent, areas covered by mean high tides, areas in the one-hundred year flood plain and other permanent or physical objects."70/ The minimum size for the reserved areas varies with percolation rate within a range of 10,000 to 20,000 square feet. In Santa Cruz County, California, where a public maintenance district has responsibility for inspection and main-

tenance of onsite disposal systems, (see discussion in section 6.4 infra), subdivision developers are required to dedicate easements to each lot for inspection, maintenance, and expansion of the septic tank systems. (The regulations require reservation of an area for 100 percent expansion of the leaching system.)71/ Moreover, joined to the county's requirement of reserved area for a replacement system, is a requirement which may help prevent failures as well as helping in the event of failure. This is a requirement that new septic systems be provided with a diversion valve to allow directing the effluent flow to one-half of the leaching system at a time. This dual-bed system is described at footnote 41.

Fairfax County instituted such a requirement that every new septic tank be provided with an alternative soil absorption system and a diversion valve allowing the homeowner to alternate the system himself in 1973.72/ Cards are sent out annually reminding the homeowner to turn his valve, and asking him to check the card and return it when he has. Initially, county officials made an effort to follow up on the large numbers of cards that were not returned. They finally decided that the administrative burden outweighed the benefits to be gained. If the system failed, they reasoned, the homeowner would contact the county health department and a health threat could almost always be avoided, at least in the short term, by putting the system on the alternate absorption bed. The county expects, moreover, that properly maintained, the alternating beds would double the expected life of an onsite wastewater disposal system.73/ Other jurisdictions which require alternating systems include the state of Ohio 74/ and Georgetown, California.75/

3.6 Necessary Flexibility in Standards

It is beyond the scope of this chapter to deal in any greater depth with design standards for onsite wastewater disposal systems. A number of general points about such standards, however, remain to be made. On the question of whether such standards should be part of the law itself or whether they should be incorporated in regulations, certainly enough has been said about the fluid state of research in this area to suggest that what minimum standards are necessary should be put in regulations where they can be more easily updated. The volume of ongoing technological research and the infinite variability of site conditions further suggest that standards be written as flexibly as possible to allow not only for greater stringency when desired at the local level and/or when the responsible state agency deems it necessary to safeguard health and waste quality, but also for variances from minima where such a variance would in fact result in an improved system.76/ Such variances, however, should come from the responsible state agency (see section 6.3 on variances, infra).

Some states' regulations are, in places, little more than guidelines,

generating some confusion in the mind of the reader as to what is mandatory and what is suggestive. (Such confusion is, of course, to be avoided by explicit characterization in the document itself.) As state and local regulations become "looser" to provide for individualized and thus arguably superior design, the greater the need, of course to ensure: (1) that the ad hoc decisionmakers are qualified to make the decisions; (2) that they do it with adequate site information; and (3) that they are responsible should the decision prove wrong. Methods to insure such reliability are the subject of the next section.

4.0 Administration

4.1 Administering Standards and Permit Requirements: Certified Inspectors and Licensed Installers

Obviously, even the best, most detailed requirements for soil survey information, testing, and design standards will not of themselves assure the proper location and installation of subsurface disposal systems. There must be some method of assuring that the tests are performed properly and the standards adhered to in the actual installation. Administrators trained in soil science must be involved in the testing process.77/ The state of Vermont provides what may be an all too typical example of the gap between regulation on the books and adequate control in practice.

As described in a preliminary report for an EPA-funded onsite wastewater disposal research project, Vermont's current program for regulating onsite wastewater disposal systems for subdivisions and for individual lots does not assure that the systems will be installed in accordance with approved plans.78/ Thus for multi-lot subdivisions the developer need only provide "conceptual assurance" that each lot can support an onsite wastewater disposal system. As long as every lot is shown to have one area with soils suitable for a single lot disposal system and as long as suitable plans for a "typical" disposal system are submitted, a permit will be issued. There is no assurance either that the system will be installed in the suitable part of the lot, that the individual systems will be designed to meet the particular topographic, hydrologic and soil conditions of each site, or that the system will be properly constructed. The subdivision developer is under a legal obligation to construct a community system according to approved plans, but, again, there is no formal method of insuring that the system is actually so constructed. Subsurface wastewater disposal systems for individual lots which are not regulated as subdivisions may be regulated by local ordinance or they may not be regulated at all. The Vermont study reports that only 70 out of 247 towns regulated onsite waste disposal and that none of these required an approval of the system as installed.79/

Not suprisingly, many of the systems installed in Vermont have failed. In recognition of the regulatory failure behind these system failures, a regional agency in Vermont, the White River Natural Resources

Conservation District 80/ (which is similar to the soil conservation districts in other states) developed a procedure for ensuring proper installation of onsite wastewater disposal systems. That system draws on the expertise of a specialist in soils and onsite wastewater disposal systems design working for the district, and has been summarized in the above referenced report as follows:

1. Town officials adopt by resolution or public vote, ordinances or health regulation requiring town approval of sewage system installation.

2. Towns must request onsite sewage program service from the district and then sign working agreements with it.

3. Home owner files application and pays fee to town officials for onsite program services.

4. Town requests specialist to evaluate proposed sewage system site.

5. Specialist evaluates and reports on site conditions and design recommendations to town officials.

6. Town officials: approve, approve with modification, or reject home owners or builders permit for onsite sewage installation.

7. Property owner or contractor installs sewage system.

8. Specialists inspect and report completion of sewage system installation to town officials.

9. Town officials approve or take action to correct any deficiencies that may have taken place during installation.

Soil data and site evaluation are used as a technical base rather than the "perk test". As is commonly known the "perk test" procedure does not recognize many of the soil and site conditions that affect system functioning. Variability in testing procedure and seasonal fluctuations make the "perk test" an unsatisfactory technical base.81/

As of January 1976, 19 of the 23 towns within the White River Natural Resources Conservation District had adopted health regulations to regulate onsite wastewater disposal systems. (The district had developed a model ordinance to assist them.) Specialists work on an open schedule so that they can service as many requests as possible during the installation season and so that they can provide timely service (within 48 hours of a request). The specialist's annual workload is approximately 200 to 250 jobs, and, at a fee of $50 per inspection, the program is expected to almost pay for itself. Specialists are expected to monitor installed systems during the noninstallation season as time permits.

In addition, the district specialist has been authorized by the state to perform site evaluations for one-lot subdivisions. This procedure is cheaper and faster than the preexisting requirement of a report by a licensed engineer, and the evaluations are likely to be better, since the specialist is, unlike most engineers, trained in soils science. The program has been such a success that it is expanding into other natural resources conservation districts throughout the state.82/

Pennsylvania has already done what Vermont hopes to do: involve specially trained soils and sewage disposal experts in local approval of onsite wastewater disposal systems statewide. Under an act passed in 1974, Pennsylvania delegated permit issuing authority to municipalities which employ state-certified Sewage Enforcement Officers ("SEO").83/ The SEOs are involved in supervising the location and design of onsite wastewater disposal systems from start to finish. Thus the SEO may meet with the applicant to go over the application form to ensure adequacy of all information. Then the applicant, or the local agency at the applicant's expense, is responsible for preparing test pits and percolation holes, but the SEO must observe or himself conduct the actual tests and slope measurements and complete the appropriate parts of the application form. The SEO and the applicant also jointly decide on the most appropriate system design for the site. Copies of the application form are forwarded to the state Department of Natural Resources, but it is the local SEO himself who grants or denies the permit. The SEO inspects the installation and may revoke the permit if it is unsatisfactory.84/ The state pays half of the cost of the SEO program including the following:

(1) Expenses for each permit application processed, issued, or denied, including wages and salaries.

(2) Costs for legal services actually incurred in prosecuting or restraining violations and defending against appeals.

(3) Costs for legal services in the preparation of local ordinances and regulations consistent, and needed for the enforcement of the provision of this Act and Chapters 71 and 73 of this Title.

(4) Fees for special consultants retained by the local agency for technical consultation on specific permits.

(5) Mileage expenses incurred by the local agency in processing, issuing or denying applications for permits.

(6) Mileage and expenses for sewage enforcement officers employed by local agencies to and from training courses manadated by the Department in accordance with §71.7.(b)(2) of this Chapter.85/

Clearly such a program will be costly even with healthy permit fees and even if municipalities team up to run the program jointly and share administrative costs and the services of an SEO, as they are encouraged to do. (A joint local agency may be a council of governments or a specialized agency governed by a committee of elected officials of the participating municipalities.)86/ One way to cut costs, of course, is to put more of the expertise burden on the applicant. It will be recalled that in Maine, for example, the state Department of Health and Welfare requires a complete site analysis to be reported on a special form completed, signed, and sealed by a state-certified soil scientist or geologist, by a registered professional engineer experienced in the field of soils engineering, or by others recognized by the department.87/ While the local plumbing inspector must still verify the information and inspect the system before it is covered, 88/ he is relieved of the testing burden imposed in Pennsylvania. At the same time, the state certification requirement is presumably some assurance of the dependability of the third party tests.

Any state or locality which depends on third parties to perform testing should, however, be careful to provide that no tests be performed by a person with a financial interest in the outcome. In other words, care should be taken that the onsite system installers are not performing the soil tests. Licensing of installers in another approach to regulation which states might take.

Vermont is one state which, before it developed its Natural Resource Conservation District program, considered closing the expertise/ inspection gap discussed above by licensing septic tank installers. One reason given for this approach was that employing state personnel to inspect all installations would be too costly if there were enough inspectors and would cause too much delay, inconvenience, and expense if there were not. It was argued that existing state pollution control officers could spot check the installers to ensure that their practice lived up to their qualifications. The proponents of the installers' licensing bill further reasoned that a higher quality product might result because homeowners would be less likely to be able to save money by opting for shoddy systems. (Although endorsed by the Agency of Environmental Conservation, the bill failed of passage.)89/ Experts in states which already have installer certification programs, such as Wisconsin, point out that such programs are only effective if there are the means

and the will to decertify or fine installers who do shoddy work.90/

4.2 Administering Maintenance Requirements

The introduction to this chapter noted that what some consider to be septic systems' poor past performance record is generally conceded to reflect inadequate maintenance as well as careless or uninformed siting and design. Maintenance of a conventional septic system involves periodic pumping out of the septic tank itself. Many homeowners simply do not realize that this is necessary and that if it is not done the whole absorption field system may be ruined, necessitating its complete reconstruction on a new area of the lot. Indeed, many owners, particularly buyers of "used" homes, do not know where their septic tanks are. This problem can be avoided in the future by requiring, as certain states and localities do, that applicants for onsite waste disposal system permits submit a plot plan showing the location of the system with distances to buildings, roads, lot lines, and other markers.91/ Wisconsin and Ohio are examples of states which have set up filing and retrieval systems for such plans at the county level.92/

Design standards might also be written to require that the cleanouts for septic tanks be marked with permanent aboveground markers such as metal plates flush with the ground.93/ States and localities would also do well to develop, as Maine has done, 94/ a simple booklet showing how to measure sludge levels. Such booklets should be distributed to every successful permit applicant.95/

Few states and localities actually require homeowners to determine, at prescribed intervals, whether their systems need to be pumped, although there is little reason not to include a requirement to that effect in individual permits, with the period reflecting expected use and the size of the septic tank. (Since family use habits and septic tanks sizes vary, it would not be sensible to prescribe actual cleanout intervals.) David Stewart, one of the participants in the Wisconsin project, has suggested that maintenance permit forms be mailed to homeowners every one, two, or three years requiring a licensed septage pumper to inspect the septic tank and pump it if necessary. The completed form, signed by the pumper, would have to be returned within a given time period. The state statute or local ordinance would make it unlawful for any owner to use a septic tank system without a valid permit.96/

The difficulty with such a requirement is, of course, policing it, and communities might want to consider another alternative: that of requiring owners of onsite disposal systems to enter into contracts with maintenance companies, as has been done in Ohio for aerobic systems.97/ Still another possible solution, the assumption of maintenance tasks by organized maintenance districts, is discussed in the section of this chapter devoted to analysis of specialized substate management entities, section 6.4 infra.

4.3 The Pumping and Disposal of Septage

The other side of the maintenance coin has to do with regulating the pumping and disposal of septage. A comprehensive regulatory program would include licensing and setting standards for haulers, limiting disposal to approved sites, and regulating the method of disposal at those sites. While the last topic, standards for disposal, is beyond the scope of this chapter, it will be touched on first to give the reader an idea of the complexity of the problem.

Most states and localities have not yet really come to terms with the problem of septage disposal, yet it is a problem of sizeable proportions. One authority has estimated that if every septic tank were pumped every four years (most authorities consider this a minimum), the pumping would yield an annual volume of four billion gallons of septage.98/ Other authorities have estimated that septic tanks potentially generate twice as much sludge as all domestic secondary treatment plants.99/ These same authorities have pointed out some of the problems involved in simply dumping septage directly into the nearest sewage treatment plant, a frequent practice now. Most treatment plants are not designed to handle such highly concentrated loads in addition to their normal loads. The addition of septage, particularly in rural areas where septic tanks are most abundant, might well cause treatment plants to exceed their effluent limitations and threaten serious degradation of receiving waters.100/ The alternative to disposal at municipal treatment plants, land disposal, also has serious implications for water quality if not properly undertaken. High in liquid content, raw septage poses a threat of surface and groundwater contamination when disposed of directly to a sanitary landfill. Special septage disposal facilities designed to treat and stabilize septage so that it can be safely disposed of in a landfill are eligible for EPA construction grant funding, as are the septage hauling trucks or "honey wagons."101/

Disposal of septage directly at sites other than specially designated landfills is also a fairly common practice equally threatening to ground and surface water quality if not properly carried out. Land application must be preceded by a thorough evaluation of soil characteristics, groundwater levels, surrounding land uses, and septage loading rates. The septage may first require a de-watering; it must be de-watered if it is to be buried. Vermont has developed a method which provides for de-watering in shallow drying beds, removal, and burial. Design criteria for this system are set out in the preliminary report for the EPA-funded Vermont project discussed above. The Vermont project plans to explore in detail septage treatment and disposal methods which are economically and practically feasible for a rural environment, including lagooning, rapid burial, regional treatment facilities, and disposal at existing treatment facilities.102/

Still another method of land disposal is, of course, disposal on cropland. Surface spreading requires still different restrictions and precautions. Thus spreading should be prohibited during those seasons when the ground is frozen, snow-covered, or saturated. Maine has developed "Guidelines for Septic Tank Sludge Disposal on the Land" incorporating these and other restrictions.103/ Portions of the Maine regulations--along with Connecticut's standards for septage lagoons, Rhode Island's standards for septage disposal in sanitary landfills and in trenches, and model standards for holding lagoons, spray irrigation, and disposal in sewage treatment plants--are reproduced in The New England River Basin Commission's "Draft Guidelines for Septage Handling and disposal."104/

While a detailed discussion of standards for sludge disposal at particular sites is beyond the scope of this chapter, regulation of the disposers themselves (the septage pumpers or so-called "honey-dippers") will be discussed briefly as the final stage in the maintenance cycle.

Because of the high standards with respect to equipment and actual pumpout and disposal which must be maintained if environmental degradation from septage is to be avoided, septage pumpers should be licensed. Connecticut, Maryland, and Fairfax County, Virginia are examples of jurisdictions which require pumpers to have permits. Fairfax County provides the necessary assurance that septage hauling trucks are leak-proof and in a sanitary condition by requiring that they be inspected before the septage hauler receives his initial license and before every annual renewal thereafter.105/ More detailed equipment requirements are included in The New England River Basin Commission's Draft Guidelines for Septage Handling and Disposal.106/

Many state and local regulations then provide, as Maryland's do, that septage only be disposed of at sites which the governing agency has approved in writing.107/ Rather than simply restricting dumping to approved sites and/or prohibiting dumping in certain areas such as wetlands and watercourses, as many jurisdictions do, states and localities might want to consider spelling out in the septage hauler's permit exactly which sites he is authorized to use. The regulations should also make the septage hauler subject, to the extent applicable, to the standards contained in the regulation and briefly outlined above for different disposal methods and different disposal sites. The relevant statute or ordinance should give the license-issuing agency the authority to revoke any septage hauler's license for dumping in unapproved sites or in an unapproved manner.

Under Connecticut's new draft regulations, any person or municipality holding a permit to dispose of septage must file a monthly written report with the director of Water Compliance and Hazardous Substances "detailing such information concerning the permittee's operations as the Commissioner [of Environmental Protection] may reasonably require."108/ That report may be required to include the address of each system serviced and the location at which the septage was discharged.109/ In addition to providing a control on where septage is dumped, such reports could serve as a planning tool to help the state agency estimate the dimensions of the overall septage disposal problem and where the problem is most acute. The reports might also be useful indicators of the number of people who are not having their tanks pumped regularly.

Perhaps the most intractable problem in this area of septage disposal is

finding enough safe sites. Government officials in Vermont feel, for example, that "the problem of septage disposal is largely due to noncooperation from local governments with haulers wishing to establish environmentally sound septage disposal operations."110/ The EPA-funded onsite wastewater disposal project in Vermont plans to develop model legislation which will require all municipalities to provide for an acceptable means of disposing of the septage generated within their boundaries.111/ EPA has also let a contract for the consolidation of the literature and data on septage treatment and disposal into a reportfor use by local officials affected by the septage problem.

5.0 Enforcement

As noted earlier, perhaps the principal obstacle to the implementation of the standards and other control techniques described so far is the difficulty and cost of enforcing them. The administrative burden experienced by Fairfax County in trying to follow up on its alternative absorption bed system has already been detailed. One way around this difficulty is to tie septic tank approval, inspection, and maintenance requirements closely to the whole development and property transfer process so that developers and homeowners are clearly apprised of and cannot afford to circumvent regulations concerning onsite wastewater disposal. Linking septage system approvals to the earliest plan approvals will work to the developer's advantage as well, since hardship and delay can be avoided if the developer plans his subdivision or building around the location of the onsite wastewater disposal system rather than the reverse.

The most straightfoward and effective way of forging the link between onsite wastewater disposal approval and the greater development process is, of course, to condition the final approval of subdivision plans and/or building permits on the issuance of septic tank permits. This is already done in a number of states. Thus a Montana statute stipulates:

> (1) A person may not file a subdivision plat with a county clerk and recorder, make disposition of any lot within a subdivision, erect any building or shelter in a subdivision which requires facilities for the supply of water or disposal of sewage or solid waste, or occupy any permanent building in a subdivision until the department [of health and environmental sciences] has indicated that the subdivision is subject to no sanitary restriction.
> (2) A county clerk and recorder may not accept a subdivision plat for filing until:
> (a) the person wishing to file the plat has obtained approval of the local health officer having jurisdiction and has filed the approval with the department; and
> (b) the department has indicated by stamp or certificate, that it has approved the plat and plans and specifications and that the subdivision is subject to no sanitary restriction.112/

As an additional precaution and for those houses which are not part of subdivisions, localities should be careful to condition the issuance of building permits on the applicant's having a valid subsurface wastewater disposal permit. Finally, it would be useful to provide, as Maine does, that after the local plumbing inspector inspects the

installation of the wastewater disposal system, he issue a certificate of compliance if the system is in fact properly installed.113/ Such a requirement would enlist the enforcment aid of realtors and real estate attorneys, who would require the production of the certificate at the closing of new homes.

Similarly, the cause of septic tank maintenance would be furthered and incipient failing systems would be detected if a septic system inspection requirement were piggy-backed onto whatever other inspections or certifications a locality requires for the purchase and sale of existing (as opposed to new) homes. Here, as with new homes, enforcement assistance can be obtained through the mortgage process. Thus Minnesota is an example of a state which has persuaded the Federal Housing Administration and the Veterans Administration not to approve mortgages for existing homes without the local sanitarian having first certified the onsite disposal system.114/ Of course, anyone who has had his septic system inspected and pumped recently (say, within two years) should be able to present evidence of the fact and have the inspection waived. Where the required inspection reveals a violation (septage needing pumping or a failing system), an order to correct the violation would be issued and put on record, thus encumbering the title and making it difficult to sell the house. If the owner refused to correct the violation and the state or locality undertook the work for him (as all states and localities should have the power to do), statutory provision could be made that the amount owed the agency would become a lien on the property. Alternatively, the statute could provide, as one authority has suggested 115/ and as Santa Cruz County, California has provided, 116/ that the cost of the work be added first as a tax on the property. As additional insurance, the permitting agency might want to follow the example of Fairfax County in requiring all installers and repairers of individual disposal systems to be bonded to hold the county and all other persons harmless "from all expenses and damages that may be caused by any neglect, defective or inadequate work" as deemed by the county health department.117/

It may be argued that maintenance inspectors for homes about to be sold and corrective work for failing systems will require manpower that the states and localities do not have. There is no reason, however, why the inspections should not be done by licensed septage pumpers and why the legislation providing for corrective work should not provide that the state or local agency may contract out for the work. It may even be that volunteer labor can be enlisted in the cause of detecting incipient septic system failure. Techniques developed in Wisconsin for organizing a lake property survey staffed with students supervised by trained sanitarians are the subject of a special report funded and published the The Upper Great Lakes Regional Commission.118/

The effectiveness of whatever enforcement personnel are available to the state or local agency can be increased by simplifying the enforcement process and by providing detailed guidance on how to go about enforcing onsite wastewater disposal standards and maintenance requirements. One writer on the subject has suggested that states and localities adopt the citation

system for penalizing sanitary ordinance and code violations. Under this system, used in Maryland, the violator of the regulation in question, be he the homeowner or the installer, signs the citation and agrees to appear in court and enter his plea.119/ In the absence of such a simplified legal process, states and localities would do well to follow the example of Maine and Pennsylvania in writing detailed instruction manuals for their sewage enforcement officers.120/ Such manuals, with their detailed descriptions of step-by-step procedures and their sample warning letters, complaints, summonses, etc., should increase the efficiency of the enforcers and should also make enforcement more uniform and fair.

6.0 Appropriate Level and Agency of Government

6.1 State-Local Relationship

While some states have retained all regulatory authority over onsite wastewater disposal and others have delegated it all, 121/ more and more states and localities are sharing the standard-setting, administration, and enforcement responsibilities. In these states, public health laws or other general enabling authority generally provide that state standards are minima and that localities are free to adopt more restrictive regulations not otherwise inconsistent with the state's.122/ Since "consistency" is an ambiguous term, it would be adivsable for the state enabling statute to either define the term or, preferably, provide for state certification of "consistent" local regulations or ordinances. Under this shared jurisdictional arrangement the state typically delegates permitting authority for individual systems and retains permitting authority over innovative systems and large systems (institutional size systems, industrial and community systems).123/ Some states reserve the right to approve subsurface wastewater disposal systems for subdivisions.124/

Those who argue for vesting as much approval power as possible at the state level point to the difficulties local health authorities have ensuring. strict code enforcement. A survey in Wisconsin of county zoning administrators and county sanitarians revealed that 77 percent of the respondents felt that they needed greater job security to hold out against local political pressure. Respondents commented that innovative systems with their greater failure rate and need for increased maintenance will make the enforcement task that much more difficult.125/ With these problems in mind, one authority has recommended that if states cannot see their way clear to assuming all permitting authority they at least should review plans of all onsite systems approved at the local level and retain authority to override local approval when necessary.126/

While such a system might work well for a slow-growing state, there is no question but that it would impose an enormous burden on a rapidly growing one. Furthermore, where regulatory authority over onsite wastewater disposal systems has traditionally been exercised at the local level it might be exceedingly difficult and, in many cases, unnecessary, for the state to reassert its authority across the board. The states of Pennsylvania and Connecticut illustrate an alternative approach, that of selective delegation or reassertion of state authority, which might be the most promising intergovernmental approach of all. In Pennsylvania, it

will be remembered, the state has delegated approval power over all but innovative, experimental, and large systems to local agencies (counties, county and joint county departments of health, municipalities and municipal delegees). At the same time the state retains the authority to:

(1) Set standards for the installation and maintenance of individual sewage systems;

(2) Require satisfactory local "official plans" which must delineate
   a) four categories of soils:
      i. soils that are suitable for on-lot disposal of sewage;
      ii. soils that may be suitable providing the subsoil is permeable;
      iii. soils which are not satisfactory for use due to the presence of impervious water restricting layers, high water tables, periodic flooding, or other limiting characteristics;
      iv. soils which are not satisfactory for use due to contamination;
   b) areas experiencing problems with sewage disposal including a description of those problems;
   c) all areas where sewers are planned to be available within a ten year period;
   d) all subdivisions existing and approved;

(3) Require satisfactory supplements and revisions to official plans for new subdivisions which must include soil conditions and limitations for on-lot sewage disposal if applicable;

(4) Review the performance of local agencies in administering their permitting functions and to order a local agency to undertake actions deemed necessary to administer those functions effectively in conformance with state rules and regulations;

(5) Enter upon lands and make inspections; and

(6) Certify sewage enforcement officers (State Certification Board) and to revoke or suspend the certification of same for cause (Department of Natural Resources).127/

Pennsylvania's faith in localities' ability to administer the permitting program has been bolstered by the state certification program for sewage enforcement officers. States with less faith in the readiness of their political subdivisions to undertake the job of inspecting and permitting onsite wastewater disposal systems might want to reserve the authority to reassume that function when an order to a locality to bring its program up to standard is not enough. (It must be remembered that in Pennsylvania the state shares one-half of the cost of local administration, a source of leverage in itself.)

Still another approach to the same problem--the appropriate sharing of responsibility between state and local regulatory agencies--is currently under consideration in Connecticut. Regulations recently drafted in that state would allow the Department of Environmental Protection (DEP) to delegate authority over onsite wastewater disposal on an almost case-by-case basis, depending on the expertise of the individual locality. The DEP has developed this system because it found that the state Public Health Code, administered at the local level, is not effective in preventing installation of septic systems in unsuitable soils. The newly asserted initial jurisdiction over subsurface disposal systems is premised on the fact that, under the state's water pollution control law, the Department of Environmental Protection has jurisdiction over discharges to all waters of the state, including groundwater.

The four categories of subsurface wastewater disposal systems provided for in Connecticut's current draft regulations make distinctions in terms of sensitivity of site as well as size of system. Thus the fourth category includes poor site conditions as well as innovative systems, and the state will only delegate complete approval authority over that category to town engineers it knows to be particularly qualified. Under the Connecticut regulations potential delegees include other state agencies, municipal sewer authorities, municipal building officials, municipal or district directors of health, and municipal or district sanitarians and sanitary inspectors.128/ As noted above, Connecticut is just embarking on a state ceritfication program for sanitarians.129/

6.2 A Note on Appropriate Agency: Health Departments, Water Pollution Control Agencies, and Wetlands Authorities

Onsite wastewater disposal has traditionally been the exclusive province of public health authorities, state and/or local. In most cases, the agency with the most experience in the field and the best technical resources is the best choice for continued or expanded regulatory authority. The interests and expertise of other agencies should not be overlooked, however. Where a proposed system is particularly large, for example (such as a system designed for an institution), or where an industry or a business is proposing to dispose of process wastes in addition to sanitary wastes through a subsurface disposal system, the experience of the state water pollution control agency with more sophisticated treatment systems and with monitoring and reporting requirements will usually make it the better qualified agency to regulate the system. Thus, as noted above, in Connecticut the Department of Environmental Protection, through its division of Water Compliance and Hazardous Substances, regulates all subsurface systems handling 5,000 gallons or more per day or any industrial wastes.130/ The Connecticut Department of Environmental Protection (DEP) and analogous agencies in other states have regulatory authority over all subsurface disposal systems under water pollution control statutes which give them permitting jurisdiction over all "waters of the state," when those

waters are defined to include groundwater.131/

Whether or not states opt for a system of shared jurisdiction like Connecticut's, however, all states with statutes which give more than one agency technical jurisdiction over an area should clarify the potential overlap by regulation. Another area where possibly troublesome overlap might be turned into effective cooperation is that of wetlands and shoreline areas. Many of the most difficult subsurface disposal problems will occur in these areas, particularly in recreational communities built around lakes without adequate attention to the potential waste disposal problems. The targeting of such areas through wetland and shoreland protection programs may give subsurface disposal regulation a valuable boost. In Minnesota, for example, a major effort to require all homeowners within 1,000 feet of a lake or 300 feet of a river to upgrade their existing onsite disposal systems has been launched under the mandate of the state's Shoreland Management Act.132/

The present fragmented development approval systems in most states and localities pose the risk to landowners of surviving lengthy wetlands review processes only to find out later that they cannot install subsurface disposal systems. Conversely, because of the same fragmentation of authority, wetlands agencies may find themselves powerless to put their detailed knowledge of a site and of groundwater patterns to effective use in restricting or conditioning subsurface sewage disposal when permission for such disposal comes from another agency. Any new laws or regulations governing onsite wastewater disposal should take such interagency questions into account and, to the extent possible, eliminate conflicting jurisdiction or provide for joint data gathering, review, hearings and other sharing of interest and expertise.133/

6.3 Variances

One final word with respect to appropriate agencies and levels of government is needed. Many localities which have exercised authority over subsurface wastewater disposal for a long time provide in their regulations that the local governing body can vote to allow variances from the applicable standards, where, in common boilerplate parlance, "owing to special conditions a literal enforcement will result in practical difficulty and unnecessary hardship." Variances are necessary safety valves for zoning ordinances (although there, too, they are subject to abuse), but variances awarded by general governmental authorities are not appropriate in an area calling for highly specialized technical knowledge if possible severe health hazards are to be avoided. It is more appropriate to hold local permitting authorities to minimum state-imposed standards (standards which should, for that reason, not be too rigid) and to provide that any exception to those standards should be made by the appropriate state agency.

6.4 Specialized Substate Management Entities

While reliance on state-certified specialists to implement rigorous inspection requirements and design standards may be enough to ensure the longevity of onsite disposal systems in rural areas, there are those who question whether it will be enough in densely populated areas where the demands on a sanitarian's time will be much greater and the consequences of system failure from poor design or inadequate maintenance much more dire. Rapidly growing counties like Fairfax County, Virginia and El Dorado County, California (which includes southern Lake Tahoe within its boundaries) have already found themselves unable to keep up with all the demands for inspection and monitoring.134/

Interest in assuring better design and maintenance of individual onsite systems and the new interest in nontraditional individual and community systems, systems which require more supervision and maintenance, have combined to create substantial support for the idea of special management entities for onsite sewage disposal. Such entities could be private--for example, a property owners association--or they could be publicly regulated utilities or rural electric cooperatives. The most common nominees, however, are local special districts, usually pre-existing or at least pre-authorized sanitary districts.135/ Once such an entity exists to ensure continuity of maintenance and, where necessary, ownership, the community can choose the combination of individual and centralized systems best suited to it. Other options are simplified too: a slowly growing community can start with individual onsite wastewater disposal and graduate to a centralized system when that becomes necessary. One of the historical reasons for preferring central sewer systems has been their institutional solidity; if decentralized wastewater disposal can be put on an institutional par with central sewering, communities will be free to make the choice on cost and environmental grounds alone.

Taking the work of two early advocates of the central management concept, J.T. Winneberger and W.H. Anderman, with respect to the necessary responsibilities of the management entity 136/ and combining it with the work of two participants in the Wisconsin Small Scale Waste Management Project, Richard J. Otis and David E. Stewart, with respect to the authority necessary for a central management entity, 137/ we come up with the following list of a management entity's functions and requirements:

1. the legal entity should provide services including:
   a) design of each individual system;
   b) inspection of installations;
   c) maintenance of individual systems;
   d) environmental monitoring services (e.g., groundwater pollution checks); and
   e) problem correction services.

2. the legal entity should maintain adequate records to provide proper guidance to the program;
3. the legal entity should provide professional skills needed to improve practices, such as:
   a) a full-time environmentalist to perform needed work; and
   b) services of consultants for initial construction and unusual workloads, special problems and occasional review. (During slow development, a consultant might serve until the workload justifies employment of a full-time sanitarian.)
4. the legal entity should have the authority and power to provide community collection systems whenever and wherever needed. This authority includes:
   a) the power to purchase, lease, rent, and own real and personal property;
   b) the authority to plan, design, construct, inspect, operate and maintain all components of the sewerage system within its jurisdiction including typical single-family septic systems;
   c) ideally, the capacity to receive loans and grants in aid from the state and federal government (i.e., the ideal entity would be a public one);
   d) the ability (1) to enter into contracts and to undertake debt obligations either by borrowing and/ or by issuing stock or bonds; and (2) to sue and be sued;
   e) the ability to fix and collect benefit assessments and user fees for its services. If the entity has taxing power it should be able to use that power to raise funds to administer the noncentral system;
   f) the power to "plan and control how and at what time sewage service will be extended to those within its jurisdiction or. . .general land use or zoning authority." (The key needs here are the power to compel participation in the system and the ability to refuse service. These powers are necessary to assure the most cost-effective, environmentally sound system);
   g) the power "to make rules and regulations regarding the use of the system and to issue orders against violators of these rules or regulations";
   h) the power "to require the abatement of malfunctioning systems and to require the replacement of all such systems, all according to the plans of the entity." (Otis and Stewart caution that "[t]his power may only be available to governmental or quasi-governmental entities.")
5. the legal entity should carry on a comprehensive

watershed protection program (where appropriate) in conjunction with the local health entity, the state pollution control entities and other pertinent public entities.

Generally an entity with a broader jurisdictional base than a single town is to be preferred because of the economies of scale and ability to achieve more expert operation and maintenance at a tolerable cost. The National Commission on Rural Water has been involved for many years in the development of management entities for provision of sewer and water services to rural communities, and it advocates the use of regional management entities to support locally owned utilities. Under such an arrangement, basic policy would be formulated at the local level, but administration and maintenance of all the systems within the region (whether owned by municipalities, public service districts, or nonprofit corporations) would be performed, under contract, by a regional, perhaps county-wide, support group. User control would be maintained by a board of directors made up of representatives of the contracting entities. Because of the danger of exploitation, the National Commission on Rural Water's National Demonstration Water Project also recommends continuing state oversight of the support groups, including state participation in and approval of the service contracts, state management training for directors of the regional group, and state monitoring of the management operations.138/

It is in California that the concept of special management districts for noncentral waste disposal systems has been put into practice most often and with a considerable degree of success. The idea has been particularly attractive for "transitional" communities (once rural communities undergoing rapid urbanization) and recreational communities which want to plan for and even help finance eventual central sewer systems by allowing controlled, interim use of onsite wastewater facilities. The institutional arrangements pioneered by these communities are also useful models, however, for localities which plan to rely on noncentral sewer systems indefinitely. In some cases the involvement of expert management entities may mean that onsite systems which were expected to be only stopgap solutions will turn out to work well enough to make later replacement with central sewering unnecessary.

To take one of the earliest and best-known California examples, the Improvement District of the Georgetown Divide Public Utility District of El Dorado County was formed to provide for:

1. The aquisition of lands and easements for improvements and works necessary to provide sanitary sewerage and sewage disposal service to said improvement district area;

2. To provide for the planning and designing of such improvements and works;

3. To operate and maintain such improvements after they have been provided; and

4. To pay all costs and expenses incidental thereto.139/

Properties within the Georgetown Divide Improvement District for which central sewers are not available are required to comply with all the rules, regulations, and ordinances of the district. This means that the district will conduct all necessary soil tests and will design the individual disposal system most appropriate for the lots. The district is also empowered to inspect and maintain the individual systems. District standards call for "breezers" (devices providing air to distribution lines and allowing inspectors to observe the liquid level in disposal trenches) and for alternating beds and diversion valves. The district is also required to undertake a watershed monitoring program in conjunction with the County Health Department, the Regional Water Quality Control Board, and the Bureau of Reclamation.

The district's functions are supported by a network of agreements. Every application for an individual waste disposal facility must include a grant to the district of a right to maintain, operate, and repair the waste disposal facility, to abide by all district rules, and to pay all district charges. Upon issuance of the permit, the grant is recorded. Operating charges ($12 per residential lot per year) and any costs of extraordinary maintenance or repair by the district may be billed separately, may be added to other utility charges by agreement with that utility, or may be added to the district tax roll and may thence become liens. The county has adopted a resolution that no building permit shall be granted within the improvement district until the district has issued a permit for a sewage disposal facility.

The district maintains special agreements with individual subdivisions. Thus the district has a legal arrangement with the 1,800 unit Auburn Lake Trails subdivision to provide central sewerage if needed in the future. In the meantime, the subdivision has agreed to be bound by the district's regulations respecting design and installation of individual systems. Developers within the district are required to dedicate easements for future sewer systems, and on-lot disposal systems are designed so that as much of the system as possible can be used if and when a central system is installed.

An order from the California Regional Water Quality Control Board indicates that the soils in the Auburn Lake Trails subdivision are "fragile and extremely susceptible to erosion" and that "geological examination of the area has indicated that a number of lots are presently unacceptable for subsurface waste disposal due to lack of soil, excessively steep slope, or high ground water conditions."140/ Nevertheless, because of the involvement of the improvement district, the Water Quality Control Board issued an order allowing discharges on most lots provided that adequate drainage facilities be furnished to avoid high groundwater problems on some lots. In addition, the order stipulated that the developer, the property owners association,

and the Georgetown Divide Public Utility District must:

1. assume responsibility for the proper design, installation, and maintenance of wastewater treatment and disposal systems;
2. assume responsibility for the immediate correction of any wastewater treatment and disposal system which fails to meet the specified waste discharge specifications;
3. monitor the waste discharges from such systems in accordance with the monitoring and reporting program specified; and
4. supply the purchaser of any lot with a copy of the order.

A less ambitious special district established recently in California is the "Septic Tank Maintenance District" attached to a County Service Area in Santa Cruz County. The section of the county code providing for such district includes a finding that the "use of septic tank systems on an interim basis should be carefully controlled to preclude system failure prior to the availability of sanitary sewer services" and that "[t]he establishment of a septic tank system maintenance district will provide for septic tank system inspection and maintenance procedures to better assure proper functioning of such systems."141/ Under regulations adopted by the Santa Cruz County Health Services Agency, subdivision developers must dedicate easements to each lot for inspection, maintenance, and expansion (a 100 percent expansion area must be set aside) of the septic tank system. The regulations require that the contents of septic tanks be pumped out at least once every three years.142/ This is done by a septic tank company registered by the Environmental Health Service and under contract to the county Board of Supervisors. In the period 1975 through 1976, monthly charges for inspection, pump-out and administration totalled $3.40. This charge can be added to the county property tax.

To date, the experience with special management districts in California has been more or less experimental in nature and the state's role has been limited. An advisory council to Governor Jerry Brown, working out of the Office of the State Architect, is studying the whole area of alternate systems for sewage disposal. 143/

Washington State, on the other hand, is directly involved in encouraging what it calls "on-site waste management systems" since it requires them for subdivisions dependent on onsite systems and designed to have gross densities that exceed 3.5 housing units or 12 people/acre or waste flows of 1,200 gallons/acre/day. 144/ If such a subdivision is located within the boundaries of "an operating public sewer utility," that utility must approve it and must assume responsibility for maintenance of the onsite systems. If the subdivision is outside the jurisdiction of an existing utility district it must have an approved onsite waste management system consistent with state "Guidelines for the Formation and Operation of On-site Waste Management Systems."145/ While the proposed guidelines favor management systems formed by metropolitan or municipal sewer agencies, county governments or their appropriate

departments, sewer districts or utilities operating sewer districts, they do provide that where "no municipal agency is able or willing to operate such a management corporation, a special management corporation may be organized to serve as a management system. . . ." The draft guidelines set out detailed requirements which such special management corporations must meet.

The California experience suggests that any enabling legislation and regulations governing special management districts should clarify any possible conflicts of authority between the districts and other agencies and levels of government. In California, counties have traditionally inspected and permitted onsite disposal systems and they are reluctant to give up these revenue-generating activities. The whole idea of special management entities is to fill a regulatory gap, preferably by the creative use of existing institutions. To avoid waste of precious inspection time and expertise in interjurisdictional squabbles, relationships between agencies should be ironed out at the outset, either in enabling legislation or through interagency agreements. A new management district may even want to contract for expertise from an existing agency, although it will usually be the case, as the Georgetown Divide Public Utility District found when it relied on the El Dorado County Health Department for technical assistance, that there is not enough expertise to go around.

One final word with respect to the usefulness of management entities for onsite wastewater disposal. It has been observed that however strict testing, design, and inspection requirements for new onsite wastewaster disposal systems may become, much of the threat to public health and water quality is from existing malfunctioning systems. Even if they are armed with the necessary authority to enter onto private land, repair or replace a failing system, and impose a lien against the property for the cost of the work performed, 146/ state or local officials may be reluctant to do so where the landowner simply does not have the $1,500 to $3,500 which it costs to replace a failing system. It is therefore necessary that along with the power to borrow and receive grants and thereby accumulate a capital fund, the management entity have authority to charge for work on an installment basis.147/

7.0 Legal Issues

While it has been held that regulation of sewage disposal, being a matter of health and sanitation, is an issue of state concern as to which the state may decide to preempt local regulation,148/ some states have given their political subdivisions the power to enact ordinances regulating onsite waste disposal consistent with state regulation.149/ In most states the matter of state versus

local authority will be clearly decided by the statutory law. As has been noted before, more and more states have been taking an active role in onsite sewage disposal regulation with the result that the local role is being confined increasingly to enforcement, supplementary procedures,150/ and indirect regulations via the municipal zoning power.

Historically, however, the best-known method of regulating onsite waste disposal has been for localities to tailor minimum lot size requirements to what they considered to be the sewage "carrying capacity" of the land. As discussed earlier in section 3.5 we have ignored this traditional control technique because it is so obviously inadequate to the task of proper septic system regulation; it little matters whether the minimum lot size is two acres or three if the homeowner is free to install his system on the most unsuitable part of his acreage and to install it without regard to any technical standards. Nevertheless, the litigation over minimum lot size is of interest since it reveals the courts' attitude towards regulation of onsite sewage disposal systems in general.

Traditionally, courts have looked favorably on lot size restrictions which reflect a genuine concern for the potential health hazards of onsite sewage disposal. The richest vein of decisional law is to be found in Connecticut, where the state Supreme Court has upheld rezonings on the basis of sewage disposal considerations. Thus in De Mars v. Zoning Commission, 151/ the court upheld a zoning amendment which enlarged minimum lot areas in a substantial part of the town of Bolton, finding an adequate rationale in the fact that residential growth was expected and that "larger lot sizes would provide greater area for the disposal of sewage and would increase the distances between sewage disposal areas and the residential water supply."152/ In a subsequent case, Zygmont v. Planning and Zoning Commission of Greenwich, 153/ the Connecticut court upheld the denial of an application for a rezoning from a four acre zone to a 20,000 square foot zone. The court found that the zoning commission was properly concerned about the "water supply prospects and the sewage disposal qualities of the plantiff's land" where "one-third of the lots would be lying in land, presently swamp, which could be rendered usable only by an extensive filling operation" and where there would be only one possible site for a well on each lot which met the requirement of the Greenwich Sanitary Code that no well be within 75 feet of a sewage drainage field.154/ Zygmont and similar cases from other jurisdictions, including Ohio, New Jersey, Iowa, and New York,155/ suggest that more particularized regulations relating to size of absorption fields (including requirements that adequate area for a replacement field be set aside), minimum distances from wells, and restrictions on using unsuitable soils for subsurface disposal should have little difficulty attaining court sanction.

The few cases dealing directly with standards for subsurface wastewater disposal bear this out. One of these is a Pennsylvania case, Appeals of Palumbo, 156/ which upheld the reasonableness of a local ordinance containing subsurface disposal standards relating to minimum septic tank and absorption field size, among other things, as those standards were applied to a trailer camp. The owner of the camp was concededly unable to comply with the standards because of the size of his lot and the nature of his soil. He claimed, however, that he should not be bound by the standards in the ordinance because he had devised a method of sewage disposal (a holding tank pumped out by a scavenger twice a day) which was equally effective. The court responded:

> It is clear that the ordinances cannot be evaded for these reasons. Specific sewage disposal ordinances enacted under qualifying legislation are not to be set aside and held inoperative as to one who under exceptional circumstances is able by other means to dispose of the sewage discharged on his property.157/

In a recent Massachusetts case, the Commonwealth's Supreme Judicial Court was as respectful of limitations on onsite wastewater disposal based on soils tests as the Pennsylvania Supreme Court was of the more general standards challenged in Appeals of Palumbo. At issue in Glen Avenue v. Director 158/ was the refusal of the Massachusetts Department of Public Health, through a local public health director, to issue permits for subsurface disposal systems on two lots which percolation and deep pit tests had revealed to be unsuitable for subsurface wastewater disposal under the general standards set forth in the state Sanitary Code. The court upheld the trial court's judgement that the public health officials did not act unreasonably in denying the application, despite the plaintiff's contention that some of the tests showed a satisfactory percolation rate and that the high groundwater condition could be met by excavation and placement of fill.

What case law exists is clear, then, that locational and design standards rationally related to public health objectives will be upheld as reasonable, even though in some cases uniform application of the standards will result in hardship to the point of precluding development if a central sewer is not accessible. Indeed, the paucity of case law dealing with actual soils limitations and design standards itself suggests the unassailability of such restrictions, provided they are based on sound technical data.

Turning to the subject of maintenance requirements, the scarcity of case law is even more striking--reflecting, of course, the fact that such requirements have been, until lately, a rarity. This has not always been the case, however, and the substantial body of early twentieth century case law upholding requirements for privy and cesspool

cleaning and inspection is surely good authority now for septic system inspection, pumping, and alternating requirements. Before the advent of central sewering, it was common for cities to enact ordinances requiring that privies and cesspools be cleaned and inspected. Faced with challenges to the validity of such ordinances, courts were quick to find them reasonable exercises of delegated powers to protect the public health and safety. The following language is typical:

> We entertain no doubt that a city has the power to provide by proper ordinance, regulations requiring the removal at suitable intervals of the deposits from unsewered privies, and to grant the exclusive right to one or any limited number of persons to do the work for a rate of compensation to be fixed by the city and to be paid by the owner or occupant of the premises. The statutes of the state confer upon municipal corporations the power thus to provide for the safety, health, and welfare of the inhabitants thereof.159/

Furthermore, as the above quote illustrates, the early cases make it clear that when the public health is involved, the government may choose to ensure sanitary practices by taking maintenance out of the untrustworthy hands of the individual and assuming the function itself or contracting out for its performance. Ordinances which provided for employees of the local government to do the work and for unpaid charges to become a lien upon the property were upheld, 160/ as were ordinances providing for the work to be done by an outside contractor at a fixed rate.161/ While an uncleaned septic tank may not present quite the health threat of an uncleaned cesspool in a center city, the two requirements stem from the same need to protect the public health, and maintenance districts and charges can certainly be justified on the same grounds which persuaded an earlier generation of courts. Maintenance requirements for onsite disposal systems derive additional support from the fact that they protect the public fisc, since once a number of septic systems on small lots fail, the community may have no choice but to invest in a central sewer system.

A final legal question has to do with the authority of the state or localities to compel the formation of management entities for individual or community onsite sewage disposal systems and to further compel private participation in those entities to the point of requiring hookup to, say, a community absorption field. Here again, reference must be had to an analogous line of case law, since the concept of community onsite disposal systems and management districts is a relatively new and untried one. Unfortunately, reliance must be placed on a line of cases which uphold requirements that properties within X number of feet of a sewer or subdivisions

of more than Y number of lots connect to or provide centralized sewer facilities. Government agencies should, we repeat, retain discretion to determine what the best available wastewater disposal alternative is in view of all data with respect to growth projections over time, soils, cost-effectiveness, receiving water quality, etc.

When that decision is made, however, in favor of a community system--whether a conventional centralized system or an innovative system of the type described earlier in this chapter--the governmental agency will need to have the statutory authority to compel connection to that community system and participation in its management organization. In some cases, for reasons of fiscal integrity, property owners with existing, functioning onsite systems may be required to modify or abandon those systems.

Such requirements have been upheld in the past with respect to required connections to central sewer systems, 162/ and there is no persuasive reason why the courts should reach a different result when community subsurface disposal systems are at issue, as long as the requirement relates to the health and welfare of the larger community and does not impose an unreasonable hardship.163/ Although the preservation of flexibility is to be desired, a requirement such as the State of Washington's that all subdivisions above a certain size have septic tank management districts 164/ would probably be upheld against challenge that it was arbitrary or unreasonable, just as similar requirements that subdivisions above a certain size be serviced by central sewers and sanitary districts have been upheld.165/

8.0 Conclusion: Secondary Effects

The introduction to the previous chapter dealing with municipal wastewater treatment facilities referred to the concept of "secondary effects." As was noted at the beginning of this chapter, one of the reasons for the renewed interest in onsite wastewater disposal is the growing realization of the growth-inducing effects of centralized sewage treatment facilities and of the general environmental degradation which accompanies unplanned growth. Such adverse secondary environmental effects may include degradation or destruction of wetlands and other environmentally sensitive areas, accelerated stormwater runoff, and erosion and sedimentation.

It should be emphasized, therefore, that the development and promotion of alternative forms of wastewater disposal pose many of the same environmental dangers. Widespread use of the innovative individual systems and community systems described in this chapter will open large areas of rural land previously protected from development because of its unsuitability to conventional subsurface disposal systems.

Fear of such sudden, unplanned growth and its accompanying adverse

environmental impacts was part of the justification behind the Wisconsin Center for Public Representation's recent suit against the Wisconsin Department of Health and Social Services.166/ The center argued that the department violated the Wisconsin Environmental Policy Act when it failed to prepare an environmental impact statement before it adopted a policy permitting installation and use of onsite wastewater treatment and disposal systems other than conventional septic systems.

While beyond the scope of this chapter to discuss, it is important to note that alternative wastewaster disposal systems have the potential for significant secondary environmental impact, that that potential should be evaluated through the environmental impact statement or other available process, and that measures to mitigate adverse secondary effects should be taken. Those measures might include protection of critical areas such as wetlands, discussed in chapter 3, and integrated water, sewer, and onsite disposal system planning as discussed in chapter 4. Potential adverse secondary environmental effects from rapid unplanned growth include accelerated stormwater runoff and erosion and sedimentation. Control techniques for these nonpoint sources of water pollution are the subject of the next chapter.

CHAPTER FIVE

ONSITE WASTEWATER DISPOSAL SYSTEMS

FOOTNOTES*

1. Hereinafter the terms "onsite wastewater (or waste) disposal system" and "subsurface wastewater (or waste) disposal system" will be used interchangeably with the more familiar term "septic system" even though some of the systems discussed in this chapter (loosely termed "innovative systems") are not in fact "septic" in their operation. "Septic" describes a process of bacterial action within a tank which takes place in the absence of oxygen. One of the more common "innovative" systems, the aerobic system, depends on oxidation for decomposition of sewage. The term "septic system" is used in preference to "septic tank" since the latter term describes only half of the system, the tank which settles out most of the solids and the scum. The other half of the system normally consists of a subsurface absorption field through which perforated pipes leading from the tank discharge the liquid effluent released from the tank.

2. See supra chapter 4 , note 8 and accompanying text.

3. Usually septic system "failure" is signaled by sewage backing up in plumbing fixtures or contaminated effluent rising to the surface of the ground over the soil absorption system. Other times, pollution of well water reveals a malfunctioning system. Often these conditions result from the accumulation of so much sludge or scum in the septic tank that solids escape through the outlet device and clog the absorption field. Absorption fields may fail independently when they have been constructed in poorly drained soils or in overly compact (or "tight") soils with either very slow or too rapid absorption rates, or when the slope of the land is too steep, its seasonal water table too high, or its layer of soil over bedrock too shallow. A malfunctioning subsurface absorption system may lead to the pollution of both underground and surface water. For excellent descriptions of all subsurface disposal systems, see S. Goldstein and W. Moberg, Jr., Wastewater Treatment Systems for Rural Communities (1973) [hereinafter cited as Goldstein and Moberg]; W. Jewell and R. Swan, eds., Water Pollution Control in Low Density Areas (1975) [hereinafter cited as Jewell and Swan]; and J. Harkin et al., "Causes and Remedy of Failure of Septic Tank Seepage Systems," in Second National Conference on Individual Onsite Wastewater Systems 119 (1975).

4. A recent statistical study in Fairfax County, Virginia has demonstrated that the expected lifespan of sewage treatment plants and that of

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*In order to conserve space, publication information pertaining to works included in the suggested readings for this chapter has been omitted from the footnotes.

properly designed, installed, and maintained septic systems may be very close. In the early 1950's, Fairfax County experienced many septic tank failures; at that time the only testing performed was the standard percolation test, now acknowledged to be an inadequate test if relied on alone. In an attempt to avoid future failures, the county had its soils mapped in 1954-55, correlated percolation rates with certain soils, and identified those areas with high water tables which should be eliminated from future consideration for individual subsurface disposal systems. Surveying their records over 30 years of application for permits to rebuild septic systems in 1972, Fairfax County officials found that septic tanks were surviving 20 to 30 years. (For those systems which failed, the average life was 10 to 15 years.) The County Director of Environmental Health who wrote up the data expects that with the county's new requirement for alternating absorption fields and "with continued control and care over the installation of new systems, including regular cleanings and alteration of diversion valves, systems should function for 30-50 years or even indefinitely." J. Clayton, "An Analysis of Septic Tank Survival Data from 1952 to 1972 in Fairfax County, Virginia," 1975 J. Envt'l Health 562, 566. For a detailed discussion of Fairfax County's system of alternating absorption fields and diversion valves, see section 3.5 infra.

5. One authority reports that the proportion of people served by onsite systems in New England is estimated at close to 50 percent, with Long Island perhaps as great as 96 percent. J. Kreissl, "Rural Wastewater Research," in Second National Conference on Individual Onsite Wastewater Systems 145 (1975). Another authority wrote in 1973 that despite the conversion to sewers of some 10 million homes in the U.S. and Canada over the previous two decades, "the number of on-site disposal systems rose from about 15 million in 1950 to 19 million in 1960 and 22 million in 1970. In 1967 an estimated 25% of the 1.2 million new homes built in that year had on-site wastewater disposal systems installed." This same writer says that predictions for 1970 to 1990 also estimate the percentage of onsite systems for new homes at around 25 percent. 1 A. Bernhart, Treatment and Disposal of Waste Water from Homes by Soil Infiltration and Evapo-transpiration 10 (2d ed. (1973)) [hereinafter cited as Bernhart].

6. It is difficult to generalize about the comparative dollar costs of onsite versus centralized wastewater disposal systems and any detailed presentation of the results of economic analyses performed in this area would be outside the scope of this study. The limitations on generalized comparisons include topographic and soil conditions which greatly affect the costs of digging for sewers as well as the cost of individual absorption fields. The cost of sewer collection systems is also, of course, a direct function of density and distance. Putting the two alternatives on as close to an equal footing as possible, however, (and this means ignoring the availability of governmental subsidy),

the studies leave little question that in sparsely populated and new, slowly developing communities such as recreational communities, the costs of installing centralized facilities may be prohibitive. Pertinent cost-comparison studies are referenced and analyzed in S. Goldstein, "Community Sewerage Systems vs. On-Site Sewage Treatment Systems," in 1 On-Site Waste Management (Hancor, Inc. 1973) [hereinafter cited as Hancor]. It has been found that in rural and second-home subdivisions in California the build-out rate is typically too slow--often as little as 3 percent a year--to allow for sewering at the outset. W. Anderman, "Economic Feasibility of Rural Sewage Management," at 3 (1975). See also the discussion of "community" wastewater disposal systems infra, and material on the Boyd County, Kentucky demonstration project (aerobic systems) reproduced in the Congressional Record of October 26, 1976 at S 18160 and discussed infra note 58.

7. See Bernhart, supra note 5, at 10.

8. Memorandum from James F. Kreissl, National Environmental Research Center, U.S. EPA, Cincinnati, Ohio to John M. Smith (Feb. 2, 1976).

9. T. Martin, "Septic Tank Systems--The Need for Research," at 14-15, in Hancor, supra note 6.

10. Sources of technical information in addition to the Soil Conservation Service are the U.S. Geological Survey and the Water Resources Council, two federal agencies which perform research on soil conditions and hydrology. The U.S. Forest Service does soil analyses.

11. See chapters 8 and 11 on saltwater intrusion and well disposal.

12. Compare the general prohibitions contained in the Maine State Plumbing Code (part II, June 1, 1975) with those from the Rules and Regulations of the Pa. Dep't of Environmental Resources (ch. 73, effective Sept. 16, 1974). For a comparison of minimum requirements nationally, see G. Plews, "The Adequacy and Uniformity of Regulations for Onsite Waste-Water Disposal--A State Viewpoint," in Second National Conference on Individual Onsite Wastewater Systems 139 ff. (1975). Plews presents in tabular form: (1) minimum setbacks from (a) wells, (b) surface water; (2) minima for absorption field design; (3) minimum tank sizes by number of bedrooms; and (4) minimum depth to groundwater.

13. Individual site inspections and soil tests are treated in section 3.2 infra.

14. Innovative systems are discussed in section 3.3 infra.

15. Md. State Dep't of Health and Mental Hygiene Regulation No. 10.03.26 and Regulation No. 10.03.27 ("Regulations Governing Water Supply and Sewage Disposal Systems for Homes and Other Establishments in the

Counties of Maryland Where On-Site Systems are Utilized"), § .03.E and Regulation No. 10.03.28 ("Regulations Governing Water Supply and Sewerage Systems in the Subdivision of Land of Maryland"), § .04.A.1. Pa. Dep't of Environmental Resources Regulations ch. 71, § 71.32(a). (At the time of this writing, both sets of Maryland regulations were being revised; the drafts referred to in this chapter are dated March 12, 1976.)

16. W. Reilly, ed., The Use of Land: A Citizen's Policy Guide to Urban Growth 282 (1973).

17. Official plans (for the provision of adequate sewage facilities) are mandated for all municipalities in Pennsylvania under the 1965 Pennsylvania Sewage Facilities Act. The information relevant to onsite wastewater disposal systems which is required to be a part of those plans is summarized infra, note 127 and accompanying text. Pa. Stat. Ann tit. 35, § 750.1 et seq. (Purdon).

18. Md. State Dep't of Health and Mental Hygiene Draft Regulation No. 10.03.26 ("Planning Water Supply and Sewerage Systems"), supra note 15.

19. Montgomery County, Md., "Comprehensive Ten-Year Water Supply and Sewerage Systems Plan, FYS 1977-1986," at 5-3 (adopted July 16, 1976).

20. Information on the standards and requirements of the 50 states is collected in J. Patterson, R. Minear, and T. Nedved Septic Tanks and the Environment (June 1971).

21. Developed in cooperation with the Joint Committee on Rural Sanitation and revised in 1967. Public Health Service Pub. No. 526, now available through the U.S. EPA.

22. U.S. Dep't of Health, Education and Welfare, "Recommended State Legislation and Regulations" (1) Urban Water Supply and Sewerage Systems Act and Regulations; (2) Water Well Construction and Pump Installation Act and Regulations; and (3) Individual Sewage Disposal Systems Act and Regulations (1965). See also P. McGauhey and J. Winneberger, A Study of Methods of Preventing Failure of Septic-Tank Percolation Systems (1967).

23. See P. Page, "Adequacy and Uniformity of Regulations for Onsite Wastewater Disposal--'Local Concern'," in Second National Conference on Individual Onsite Wastewater Systems 135 (1975).

24. J. Winneberger and W. Anderman, Jr., "Failure of the 'Engineering Approach' in Design of Septic-Tank Systems and the Development of Septic-Tank Districts" (1971) (unpublished paper).

25. Id. at 7-8.

26. Id. at 4-5.

27. See supra notes 10-14 and accompanying text.

28. The standard method for performing a perc. test has been described and diagrammed in Goldstein and Moberg, supra note 3, at 16-18. An improved method recommended by J. Winneberger is included in 3 Hancor, supra note 6 (1974).

29. P. McGauhey, "Septic Tanks and Their Effects on the Environment," in Jewell and Swan, supra note 3, at 49. For a technical description of clogging, see infra note 41, section B(2). See also Goldstein and Moberg, supra note 3, at 16 ff. J. Winneberger suggests that a good portion of the unreliability of perc. tests is attributable to the often sloppy and uninformed way in which they are performed; see "Correlation of Three Techniques for Determining Soil Permeability," in 3 Hancor, supra note 6 (1974). See also J. Bouma, "Improved Field Techniques for Measurement of Hydraulic Properties of Soils," in Jewell and Swan, supra note 3, at 181; and J. Bouma, "Evaluation of the Field Percolation Test and an Alternative Procedure to Test Soil Potential for Disposal of Septic Tank Effluent," 35 Soil Society of America Proceedings 871-75 (1971).

30. The Small Scale Waste Management Project at the University of Wisconsin is particularly active in this research. See J. Bouma, "Unsaturated Flow Phenomena During Subsurface Disposal of Septic Tank Effluent," 101 J. Am. Soc'y Civ. Engineers (Env'tl Engineering Division) 967-83 (Dec. 1975). For more information on the study of soils' suitability by the Wisconsin Project, see Small Scale Waste Management Project, "On-Site Disposal of Small Wastewater Flows" (Small Scale Waste Management Project, 1 Agriculture Hall, University of Wisconsin, Madison Wisconsin 53706); and J. Quigley, R. Otis, and E. Tyler, "On-Site Wastewater Disposal for Low Density Housing," Envt'l Com., April 1976, at 9.

31. See Goldstein and Moberg, supra note 3, at 19; McGauhey, supra note 9, at 52-53; and J. Kreissl, supra note 5, at 145.

32. See note 4 supra.

33. Va. State Board of Health, "Regulations Governing the Disposal of Sewage" (effective July 1, 1971).

34. Maine State Dep't of Health and Welfare, State Plumbing Code part II, § 4.1 (June 1, 1975) [hereinafter cited as Maine Regulations].

35. Id. § 3.10. One might think that all regulations would contain such a clause, but some leave it up to inference by phrasing standards as "minima." Other regulations provide for stricter requirements only

in certain cases, as, for example, Pennsylvania's, which set out minimum isolation distances (minimum distances between septic systems and wells, water supplies, watercourses, etc.) with the caveat, "Where conditions warrant, greater isolation distances may be required." Pa. Dep't of Environmental Resources, "Standards for Sewage Disposal Facilities," ch. 73, § 73.12 [hereinafter cited as Pennsylvania Regulations].

36. Id. § 73.61.

37. Conn. Dep't of Environmental Protection, Proposed Rules and Regulations Concerning Water Pollution Control §§ 25-54i-1.0 through 25-54i-6.0 [hereinafter cited as Connecticut Draft Regulations].

38. See note 28 supra for references to descriptions of procedures for performing percolation tests. The Pennsylvania Regulations, supra note 35, ch. 73, offer a good example of this tying of absorption area requirements to percolation rates. Id. §§ 73.62-73.64.

39. Perhaps the most extensive research into alternate systems and new methods of testing (as well as community systems--see section 3.4 infra) is being carried out at the University of Wisconsin under a program called the Small Scale Waste Management Project which began in 1969 and which is supported by funds from the U.S. Environmental Protection Agency, the Upper Great Lakes Regional Commission, the state of Wisconsin, and the Wisconsin Department of Natural Resources. The following description of the SSWMP's research into alternative systems is from an article in Environmental Comment (Urban Land Institute, April 1976) by project members J. Quigley, R. Otis, and E. Tyler.

> The objectives of the project are (1) to determine and understand the causes of septic tank system failure, (2) to improve methods of site characterization, system design, and system construction, (3) to develop more effective management techniques, and (4) to assess the implications of new wastewater disposal technologies for land use planning. Substantial progress has been made toward each of these objectives; already the results of the Small Scale Waste Management Project have had significant impact on on-site wastewater disposal practices throughout the country.

An excellent overview of recent research into alternate systems, including the SSWMP research and EPA-sponsored research, is provided by J. Kreissl, supra note 5. Mr. Kreissl is a sanitary engineer with EPA's Municipal Treatment and Reuse Section, Systems and Engineering Branch, Wastewater Research Division, Cincinnati, Ohio.

40. Bureau of Community Environmental Control, Pa. Dep't of Environmental Resources, "Helpful Hints on On-Site Sewage Disposal System Construction, Operation and Maintenance."

41. A. An Alternative to the Septic Tank--The Aerobic Tank

> A typical household aerobic treatment unit . . . consists of two chambers. Raw or septic tank effluent enters the first chamber and is quickly mixed with the aerobic micro-organisms by the air flow from the blower. The mixing brings the microbes into contact with both the dissolved and undissolved waste matter. The nutrient material is rapidly absorbed by the organisms which utilize it for energy and cell growth converting the majority of the organics in the waste to carbon dioxide, water and settleable sludge solids . . . . In the second chamber, the sludge which contains the microorganisms settles out and is returned to the aeration chamber to continue the treatment process. The clarified effluent leaves the unit low in organic matter, suspended solids, and considerably reduced in indicator organisms.
>
> While these units can produce a much higher quality of effluent without odors, they require regular maintenance and servicing. The treatment process is easily upset causing discharge of solids to the disposal field. Household aerobic treatment units are considerably more expensive to install and operate than the septic tank. Excerpted from Small Scale Waste Management Project, "On Site Waste Water Disposal for Homes in Unsewered Areas" (Sept. 1973).

For other descriptions and evaluations of aerobic units, see Goldstein and Moberg, supra note 5, at 150; R. Otis and W. Boyle, "Performance of Single Household Treatment Units," 102 J. Am. Soc'y Civ. Engineers (Envt'l Engineering Division) 175-89 (Feb. 1976); R. Otis, "The Performance of Septic Tanks and Aerobic Treatment Units Under Field Conditions," in 4 Hancor, supra note 6; J. Bailey et al., A Study of Flow Reduction and Treatment of Waste Water From Households 37-38, 48, 99 (1969); and National Research Council, National Academy of Sciences, Report on Individual Household Aerobic Sewage Treatment Systems (Pub. No. 386, Feb. 1958).

A nonconventional, community wastewater disposal demonstration project involving aerobic systems in Boyd County, Kentucky is discussed infra note 58 and accompanying text.

B. Alternative Soil Absorption Systems

1. Dual Bed System

The dual bed system is composed of two seepage beds, each one large

enough to accept the effluent produced. This will mean, of course, that twice as much of the house lot as usual will have to be set aside for the onsite disposal system. This may require an increase in minimum lot size.

Loading is periodically shifted from one seepage bed to the other to allow decomposition by oxidation of clogging compounds that accumulated in the "resting" seepage bed during the previous loading cycle. See J. Bouma, "Use of Soil for Disposal and Treatment of Septic Tank Effluent," in Jewell and Swan, supra note 3.

2. Dosing Systems

Conventional seepage beds receiving septic tank effluent usually have a crusted or clogged layer where infiltration occurs at the bottom and sidewalls. The traditional mechanism of intermittent gravity flow by which effluent is applied to the seepage bed enhances progressive crust formation starting near the point of inlet and proceeding until the total bottom area of the bed and some of the sidewalls are crusted. The 4-inch pipe with many perforations distributes effluent poorly, by depositing the effluent through the first holes in the pipe. The soil underlying the bed at that point receives a high load of effluent. Crust formation occurs because of bacterial action in the soil and an accumulation of solids on top of the infiltrative surface. As the clogging develops, the whole bed is crusted as the septic tank effluent must move farther and farther into the seepage bed to reach uncrusted soil . . . . Crusting can be controlled by applying the effluent intermittently and evenly over the seepage bed area. This procedure uses the soil more effectively than the traditional system. The effluent can be evenly distributed by pumping through small diameter pipes with relatively small holes . . . .
Excerpted from Small Scale Waste Management Project, On Site Waste Water Disposal for Homes in Unsewered Areas 11, 13 (Sept. 1973).

3. Above Ground Mounds for the Disposal of Effluent

Alternative systems have been developed which will overcome some site limitations of the conventional septic tank systems. They are mounds or fills which provide satisfactory disposal of wastewater in some slowly permeable soils, some shallow permeable soils

> over creviced or porous bedrock, or some soils with high groundwater.
>
> The alternate systems overcome these limitations by raising the absorption system of the conventional system above the natural soil. Clean, medium sand is mounded over the original topsoil and the seepage trench or bed is constructed within . . . . The mounded design improves infiltration of the septic tank waste into the natural soil and the sand fill insures purification is achieved before the waste reaches the groundwater. The pumping chamber is an additional component of the mound or fill system which most conventional systems don't need. The septic tank is the same for both. Costs of construction range from $3000 to $6000 as compared to $1500 for a conventional septic tank system.
>
> Excerpted from J. Converse and R. Otis, The Mound or Fill System for On-Site Wastewater Disposal for Rural Homes in Wisconsin (available from the SSWMP, supra note 30).

See also Goldstein and Moberg, supra note 3, at 57-58. Goldstein reproduces the design standards for mound systems established by the Monroe County, New York Department of Health.

C. Left out of the above list because of their rare use are the following systems:

1. Evapotranspiration Systems

These systems, of which the major champion is A. P. Bernhart of the University of Toronto, depend on combining the process of evaporation with that of transpiration--the movement of water from the soil through plants and thence into the air. Bernhart recommends them for areas in which infiltration of wastewater is limited because of tight soils or where infiltration should be discouraged, as where the percolation rate is very fast or where there is a high groundwater table. In the latter two cases, infiltration is to be prevented by a plastic sheet covering the bottom and sides of an evapotranspiration bed. The bed is shallow and transpiration is accomplished by planting it with shrubs and other plants. See A. Bernhart, Treatment and Disposal of Waste Water from Homes by Soil Infiltration and Evapo-transpiration (1973). Kreissl is of the opinion that evapotranspiration beds are of "questionable applicability . . . to the majority of the rural population of the U.S." (presumably because of climatic and growing season limitations) and suggests that EPA-sponsored research now underway at the University of Colorado looking into the use of mechanical evaporation devices offers "potential for

much wider applicability." "Rural Wastewater Research," supra note 5, at 154.

2. Composting Systems

These systems, of which the best known is the Swedish Clivus-Multrum, have been developed on the premise that "the logical and most effective way to decrease water pollution from households is to develop and use technologies that elimate water transports . . . ." Clivus-Multrum accomplishes this by keeping the heavy pollutants--the toilet and food wastes--out of the household wastewater. The solid wastes are turned into soil through a gradual composting process, and the bathwater, laundry water, etc. is disposed of through a subsurface infiltration system. C. Lindstrom, "The Clivus-Multrum System: Composting of Toilet Waste, Food Waste, and Sludge Within the Household," in Jewell and Swan, supra note 3, at 429.

3. Decreasing Volume of Water Transport

Another alternative, of course, is to decrease the volume of water transport as with water-saving faucets, showerheads, and toilets; recycle toilets; and reuse of waste washwaters. The pros and cons of these and other water-saving devices are discussed in J. Bailey et al., A Study of Flow Reduction and Treatment of Waste Water from Households, supra this note, discussion of aerobic systems, part A.

42. J. Kusler, Regulations for Disposal of Rural Domestic Liquid Wastes in Wisconsin, A Review (Nov. 1971). Kusler sent out a questionnaire to all 50 states and received replies from 34. Of those only a few had special standards for innovative systems, as follows: Alaska (special guidelines for waste disposal in cold areas); Delaware (requires aerobic treatment units plus chlorination in areas of high groundwater); Indiana (special provisions for reservoir areas and aeration-type sewage treatment systems); Pennsylvania (special standards for aerobic systems--see infra for update); Missouri (substitution of aerobic sewage treatment plants for septic tanks permitted, but effluent must not be discharged into lakes or streams).

43. New York State Dep't of Health, "Waste Treatment Handbook--Individual Household Systems," which the New York State Code of Rules and Regulations, 10 NYCRR 75.5, identifies as the basis for individual sewage disposal systems standards, at 27.

44. Pennsylvania Sewage Facilities Act, supra note 17, § 750.09.

45. Pennsylvania Regulations, supra note 35, ch. 73, §§ 73.41-73.47. In common with other states (Maine, for example), Pennsylvania only allows aerobic sewage treatment tanks which have been tested and approved by the National Sanitation Foundation and therefore bear its seal.

46. Id. §§ 73.101-73.141. These regulatory standards are fleshed out and illustrated in a booklet prepared for the Department of Environmental Resources by the Pennsylvania State University College of Agriculture, Cooperative Extension Service, entitled "Alternative Methods of Effluent Disposal for On-Lot Home Sewage Systems."

47. Id. at appendix A.

48. See infra note 127 and accompanying text.

49. Pennsylvania Regulations, supra note 35, ch. 73, § 73.3.

50. Maine Regulations, supra note 34, ch. 9 and appendix I.

51. Id. § 10.3.

52. Still another community sewage disposal system is the sewage lagoon--"a shallow lake used to hold sewage for the time required for bacterial decomposition." Goldstein and Moberg, supra note 3, at 26 ff. The lagoon may be mechanically aerated to hasten decomposition. Sometimes, the residual waste is applied to the land through spray irrigation. See the first section of Jewell and Swan, supra note 3, on "Land Treatment of Wastewaters," and references cited therein; and S. Zimmerman and M. Morgan, Toward a Model State Program for Rural Water-Sewer Development 50 (1975). Maine is an example of a state whose regulations provide for sewage lagoons and spray irrigation--see Maine Regulations, supra note 34, § 10.1.

53. Kusler, supra note 42, at 6-11. R. Otis and D. Stewart, "Alternate Wastewater Facilities for Small Unsewered Communities in Rural America" (July 1976) (available from SSWMP, supra note 30).

54. Kreissl, private communication, supra note 39.

55. Otis and Stewart, supra note 53, at 8-9.

56. Id. at 29-48.

57. For a description of aerobic treatment systems, see supra note 41, section A.

58. An extensive description of the Boyd County, Kentucky demonstration project was inserted by Senator Jennings Randolph into the Congressional Record of October 26, 1976 beginning at S 18160. In addition, a paper by Larry Waldorf of the Appalachian Regional Commission, the sponsoring organization, will appear in the soon-to-be-published proceedings of the Third Annual Conference of the National Sanitation Foundation, Ann Arbor, Michigan.

59. See letter from John Rhett, Deputy Assistant Administrator for Water Programs, U.S. EPA to regional administrators (Aug. 18, 1976).

60. As of this writing, the policy was in draft form, awaiting final approval. A preliminary policy statement is contained in Russell E. Train's letter to Senator Jennings Randolph dated April 9, 1976, reprinted in the October 26, 1976 Congressional Record, supra note 58.

61. See suggested readings.

62. Two reports done for the U.S. EPA, Office of Research and Monitoring: see I. Carcich et al., A Pressure Sewer System Demonstration (Nov. 1972); and G. Mekosh and D. Ramos, Pressure Sewer Demonstration at the Borough of Phoenixville, Pennsylvania (July 1973).

63. Kreissl, supra note 5; and Kreissl, Status of Pressure Sewer Technology (in press).

64. Kusler, supra note 42, at 31.

65. Connecticut Draft Regulations, supra note 37, at § 25.54i-5.0(e)(1)(B): "Each residential building shall be served by a separate sub-surface sewage disposal system and each such system shall be located on the same lot as the building served unless approved as a public sewerage system by the Commissioner [of the Department of Environmental Protection]."

66. Zimmerman and Morgan, supra note 52, at 47-51. The authors also note that many states prohibit the use of waste stabilization ponds through their standards.

67. Id. at 50.

68. Maine Regulations, supra note 34, at § 313. See also Missouri Clean Water Commission, Regulation for the Disposal of Wastewater in Subdivisions § 3.01(c) (June 27, 1975), which allows systems in subdivisions other than "centralized sewage collection and treatment systems" under certain conditions, including one "that the effluent shall be contained on the [individual] lot."

69. Maine Regulations, supra note 34.

70. Maryland Regulations, supra note 15, § 10.03.28.04(B)(1).

71. Santa Cruz County Code part 11, "Septic Tank Maintenance District," infra note 142.

72. The theory behind such systems is explained supra note 41, in the discussion of innovative systems. See Fairfax County Code §§ 22-42, 22-44.1, 22-46, and 22-48 as amended. See also Goldstein and Moberg, supra note 3, at 51; and J. Winneberger, "The Principle of Alternation of Subsurface Wastewater Disposal Fields," in 5 Hancor, supra note 6 (Jan. 1976).

73. Telephone interview with Fairfax County Sanitarian (Aug. 5, 1976).

74. R. Martin, "Subsurface Disposal Methods," in Second National Conference on Individual Onsite Wastewater Systems 50 (1975).

75. See note 139 infra.

76. See P. Pate, "Adequacy and Uniformity of Regulations for Onsite Wastewater Disposal--'Local Concern'," in Second National Conference on Individual Onsite Wastewater Systems 135 (1975). Mr. Pate points out the pitfalls of prescribing hard and fast standards at the state level of generality.

77. See supra notes 27-37 and accompanying text.

78. Pilot Control Program, Vermont Agency of Environmental Conservation, Phase I and Analytic Report 7-12, 26-30 (1976) (EPA Contract No. 68-01-3183; W. Siok, Division of Environmental Engineering, project director; B. Hague, EPA Region I [Boston], contract officer).

79. Id. at 33.

80. In Vermont, 14 Natural Resources Conservation Districts are the successors to the original Soil Conservation Districts.

81. B. Stryker and W. Steele, "Community Management of Individual Home Sewage Disposal Systems Through District Specialist Program" (Jan. 1976). This paper forms appendix H to the Vermont study referenced supra note 78.

82. Id.

83. Pennsylvania Sewage Facilities Act, supra note 17, § 750.8 as amended. Sewage Enforcement Officers must pass a written exam before being certified by the Pennsylvania Environmental Quality Board. The Department of Natural Resources conducts training courses for SEO's. Most of the information about the Pennsylvania program imparted here is derived from an excellent handbook entitled "Technical Manual for Sewage Enforcement Officers: prepared by the Division of Community Environmental Services, Bureau of Community Environmental Control, Pennsylvania Department of Environmental Resources (P.O. Box 2063, Harrisburg, Pa. 17120).

84. Pa. Dep't of Environmental Resources, "Administration of Sewage Facilities Program," ch. 71, § 71.41 et seq. [hereinafter cited as Pennsylvania Regulations]. Section 71.48 provides:

> When the inspection reveals that the installation of the system, water supply location or the underlying soil or geologic conditions differ from those stated in the application, the permit shall be revoked and no further construction of either the system or the building for which it is intended may take place until the permit has been reinstated.

85. Id. § 71.63.

86. Pennsylvania Sewage Facilities Act, supra note 17, § 750.8.

87. Maine Regulations, supra note 34, § 4.1.

88. Id. §§ 2.4, 2.7.

89. Vermont, EPA report, supra note 67, at 52. A new bill now being proposed for Licensing of Septic Tank Installers and Servicers is reproduced in Appendix L to that report.

90. Wisconsin certifies master plumbers and requires that onsite systems be installed by or under the supervision of a master plumber. Wis. Stat. Ann. § 145.06 (West). Since over half of the states already license plumbers, this might be one easily accessible approach to regulation of onsite disposal system installation. Telephone interview with David E. Stewart, Dane County Regional Planning Commission and Wisconsin Small Scale Waste Management Program (supra note 30) (Dec. 11, 1976).

91. See, for example, Fairfax County, Virginia, County Code § 22-39.

92. Telephone interview with David E. Stewart, supra note 90. See Wis. Admin. Code § H62-20 (effective July 1976).

93. The septic system regulations of Santa Cruz County, referenced infra note 142, include such a requirement.

94. Division of Health Engineering, Maine Dep't of Health and Welfare (State House, Augusta, Maine 04330), "Septic Tank Maintenance."

95. Fairfax County, Virginia is an example of a locality that does this. County officials there distribute the booklets to the contractors and have no way of knowing whether they are passed on to the individual homeowners, however. One would think that the assistance of licensed septage pumpers might be procured in an attempt to reach homeowners served by onsite wastewater systems directly.

96. D. Stewart, "Legal and Economic Considerations of On-Site Sewerage Systems" (available through SSWMP, supra note 30). See also D. Stewart, "Regulatory Methods to Assure the Maintenance of On-Site Sewerage Disposal Systems" (1976) (available through SSWMP, supra note 30).

97. Telephone interview with David E. Stewart, supra note 90. Apparently one means Ohio has used to check up on whether required maintenance contracts are being renewed is to have the maintenance companies send the county notice of nonrenewals.

98. Kreissl, supra note 5, at 145.

99. W. Jewell, J. Howley, and D. Perrin, "Treatability of Septic Tank Sludge," in Jewell and Swan, supra note 3, at 445.

100. Id. at 474. See also Kreissl, supra note 5, at 154.

101. Rhett letter to regional administrators, supra note 59. See also New England Interstate Water Pollution Control Commission, Draft Guidelines for Septage Handling and Disposal (Dec. 1975). For a description of one method which has been used successfully to treat septage alone, see W. Feige, E. Oppalt, and J. Kreissl, An Alternative Septage Treatment Method: Lime Stabilization/Sand Bed Dewatering (Sept. 1975) (U.S. EPA Environmental Protection Technology Series Report No. EPA 600/2-75-036).

102. Vermont Report, supra note 78, at 59-64 and part II, 14.

103. Life Sciences and Agriculture Experiment Station, Cooperative Extension Service of the University of Maine and the Maine Soil and Water Conservation Comm. , Misc. Report 155 (April 1974).

104. See note 101 supra.

105. Fairfax County Code § 22-52.

106. See note 101 supra.

107. Md. State Dep't of Health and Mental Hygiene Draft Regulation No. 10.03.27 ("Regulations Governing Water Supply and Sewage Disposal Systems for Homes and Other Establishments in the Counties of Maryland Where On-Site Systems are Utilized"), § .07(A)(7), supra note 15.

108. Connecticut Draft Regulations, supra note 37, § 25-54i-6.0a(3).

109. Id.

110. Vermont Report, supra note 78, at 53.

111. Id. at part II, 14.

112. Mont. Rev. Codes Ann. § 69-5003.

113. Maine Regulations, supra note 33, § 2.7.

114. Statement of Michael Hansel, Minnesota Pollution Control Agency, in Second National Conference on Individual Onsite Wastewater Systems 37 (1975) (National Sanitation Foundation, Ann Arbor, Michigan).

115. Stewart, supra note 96, at 12.

116. See regulations cited infra note 142.

117. Fairfax County Code §§ 22-39.

118. J. Kusler and R. Owen, Lake Property Sanitation Surveys (1972).

119. Stewart, supra note 96, at 10; and Md. Nat. Res. Code Ann. § 1-205.

120. Maine: Division of Health Engineering, Dep't of Health and Welfare, "Enforcement Packet: Procedures for Correcting Plumbing Violations" (final review draft prepared by Alan S. Polackwich). Pennsylvania: Dep't of Environmental Resources, "Technical Manual for Sewage Enforcement Officers"; and supra note 83.

121. See J. Patterson, R. Minear and T. Nedved, Septic Tanks and the Environment (1971) for a breakdown as of 1971.

122. Id.

123. Thus Maine, for example, requires written approval from the state Department of Health and Welfare before the local plumbing inspector may issue a permit for a system designed to treat 2,000 or more GPD (State Plumbing Code part II, § 2.3(b)(8)). In Pennsylvania, state approval is required for alternative and experimental systems (Dep't of Environmental Resources, Rules and Regulations ch. 71) and for systems serving institutions, mobile home parks, restaurants, motels, other facilities for public use, etc. (See "Technical Manual for Sewage Enforcement Officers," supra note 83, at IV-3.)

124. See, e.g., Wis. Admin. Code ch. 865.

125. J. Zilber, "Survey of Attitudes of County Sanitarians," Appendix J to SSWMP Progress Report, Oct. 1 - Dec. 31, 1972 (available through SSWMP, supra note 30).

126. Stewart, supra note 96, at 9.

127. Pennsylvania Sewage Facilities Act, supra note 17, §§ 750.08(a), 750.09, and 750.10; and Dep't of Environmental Resources, Rules and Regulations ch. 71 ("Administration of Sewage Facilities Program").

128. Connecticut Draft Regulations, supra note 37.

129. Under the proposed Connecticut system, the state would certify sanitarians to assure their competence in onsite wastewater disposal. State-certified sanitarians will be employed by towns, by multi-town health districts, and by the state. The construction industry supports this program because the inspectors will have expertise they have often lacked in the past and because availability of local inspectors will reduce delays. See W. Jakubowski, R. May et al., "Field Experiences With On-Site Sewage Disposal Systems," at 8-9 (June 1976).

130. Id.

131. See Conn. Gen. Stat. Ann. § 25-54b (West) and, for an example of another law giving a water pollution control agency permitting authority over groundwater, Mass. Gen. Laws Ann. ch. 21, § 26A (West).

132. Minn. Stat. Ann. § 105.485 et seq. (West); and see statement of Michael Hansel, supra note 114, at 37.

133. See F. Bosselman, D. Feurer and C. Siemon, The Permit Explosion: Coordination of the Proliferation (1977).

134. See reference to Fairfax County in section 3.5 supra; and see Winneberger and Anderman, supra note 24, at 13.

135. See Commission on Rural Water, Guide to State and Federal Policies and Practices in Rural Water-Sewer Development 16-29 (1974) for an evaluation of the relative merits of these different institutional approaches.

136. Everything in the outline in the text except for 1(d) and (e) and 4(a)-(h) is taken directly from Winneberger and Anderman, supra note 24, at 11. The responsibilities listed in 1(d) and (e) were suggested by Wade Rose, infra note 143.

137. The enumeration of necessary powers reproduced in the outline in the text as subsections 4(a)-(h) is taken directly from R. Otis and D. Stewart, supra note 53, at 11-13. The authors list six powers; the list in the text subdivides those same six powers into eight.

138. S. Zimmerman and M. Morgan, Toward a Model State Program for Rural Water-Sewer Development ch. 4, at 61 ff. (1975).

139. The information on the Georgetown Divide Public Utility District was derived principally from a compilation of materials entitled "Septic Tank Maintenance District Implementation" developed by the El Dorado County Health Department, the El Dorado Irrigation District, and the Georgetown Divide Public Utility District (Jan. 3, 1972). These materials contain sample resolutions, ordinances, regulations, agreements, monitoring programs, etc. needed to form and administer such a district. For this and other general information, contact the Georgetown Divide Public Utility District, P.O. Box 338, Georgetown, California. See also Winneberger and Anderman, supra note 24, at 12-17.

140. Id., included in "Septic Tank Maintenance District Implementation."

141. Santa Cruz County Code § 11.74.200 (recodified 1975).

142. Id. part 11 ("Regulations for Septic Tank Maintenance Districts"). (All the information referred to in the text can be obtained from the Santa Cruz County Health Services Agency, 701 Ocean Street, Room 400, Santa Cruz, California 95060).

143. For information on this study, contact Wade Rose, California State Department of Health, 2151 Berkeley Way, Room 800, Berkeley, California 94704.

144. State of Washington, Health Services Division, Office of Environmental Health Programs, Dep't of Social and Health Services (Mail Stop 4-1, Olympia, Washington 98504), "Rules and Regulations of the State Board of Health on On-Site Sewage Disposal Systems." WAC 248-96-070, subsec. (1).

145. These guidelines were still in draft form at the time of this writing. They are obtainable from the address in note 144 supra.

146. An example of enabling authority giving such powers to a locality may be found in the proposed legislation for Stinson Beach, California noted infra note 147.

147. Such a provision may be found in proposed enabling legislation for the Stinson Beach, California, County Water District, legislation which would give that locality a broad range of management and pollution control and water conservation powers. Cal. Senate Bill 1902, Stinson County Water District (Sen. Peter H. Behr, California Legislature, State Capitol, Sacramento, California 95814).

148. See 56 Am. Jur.2d Municipal Corporations § 134 and cases cited, especially State ex rel. Southard v. Van Wert, 126 Ohio St. 78, 184 N.E. 12 (1932). See also chapter 2, section 2.5.

149. See note 121 supra.

150. E.g., requirements that a site be approved for sewage disposal before subdivision approval or a building permit is granted.

151. 142 Conn. 580, 115 A.2d 653 (1955).

152. Id. at 654.

153. 152 Conn. 550, 210 A.2d 172 (1965).

154. Id. at 173.

155. State ex rel. Mar-Well, Inc. v. Dodge, 113 Ohio App. 118, 177 N.E.2d 515, 518 (1960) (43,500 sq. ft. minimum lot size justified where area "due to type of soil conditions, has poor leaching ability to absorb the water being discharged from septic tanks"); Bogert v. Washington Twp., 25 N.J. 57, 135 A.2d 1 (1957) (one-acre zoning justified, in part, because of steep slope and probable sewage dissemination and runoff problems); State v. Iowa Falls, 247 Iowa 558, 74 N.W.2d 594 (1956) (municipal septic tank ordinance [not zoning ordinance] allowing septic systems only on lots 17,404 sq. ft. or larger and only when further than 300 feet from sanitary sewers held reasonable regulation); Salamar Builders Corp. v. Tuttle, 29 N.Y.2d 221, 325 N.Y.S.2d 933, 938 (1971) (rezoning of area from 40,000 sq. ft. minimum lot size zone to 60,000 sq. ft. zone, increasing lot cost approximately $3,650 per lot, upheld in view of uncontradicted testimony concerning "the prospect of water pollution from the inadequate spacing of septic tanks in such rocky and hilly terrain . . .").

See also 2 N. Williams, Jr., American Land Planning Law § 38.16 (1974). and 1 U.S. Water Resources Council, Regulation of Flood Hazard Areas to Reduce Flood Losses 426-30 (1972). But compare National Land Investment Co. v. Kohn, 419 Pa. 504, 215 A.2d 597 (1965) and Appeal of Kit-Mar Builders, Inc., 439 Pa. 466, 268 A.2d 765 (1970), two Pennsylvania cases which held that sewerage problems could not excuse exclusionary zoning (zoning tending to discriminate on economic grounds) where there were alternative methods for dealing with those problems. At issue in National Land was a four-acre minimum lot size; the alternate methods for dealing with the sewage problem included local sanitary regulations, requiring a larger lot than the permissible area if percolation tests showed more land was needed, and public sewering. The testimony as to the pollution hazard of lots smaller than four acres was "vague and unconvincing" at best. In Kit-Mar, which involved two and three-acre minima, the court relied on its earlier reasoning in National Land, saying that the same "alternative methods" were still available. These cases suggest, as we have, that the way to avoid pollution problems from subsurface wastewater disposal is to attack them directly through health regulations and not indirectly through zoning restrictions. For more on the Pennsylvania cases and on exclusionary zoning, see 2 N. Williams § 38.16 and ch. 65, supra this note, and 3 N. Williams ch. 66, id.

156. Appeals of Palumbo, 72 A.2d 789 (1950).

157. Id. at 793.

158. 2 Envir. Rep. Cases 1110 (Dec. 2, 1970).

159. Dreyfus v. Boone, 114 S.W. 718, 721 (Ark. 1908). See also McQuillin, Municipal Corporations § 24.263 and citations therein. And see note 162 infra.

160. Ratchford v. City of Gastonia, 99 S.E. 21 (N.C. 1919).

161. City of Gulfport v. Shepperd, 77 So. 193 (Miss. 1918); see also Dreyfus v. Boone, supra note 159, which struck down such an ordinance not because of the monopoly created but because the contract was awarded to the highest bidder,in order, the court inferred, to raise revenue for the city.

162. See People v. Butcher, 209 N.Y.S.2d 723 (1960) (New York City Board of Health had power to require defendant to connect his home to an existing municipal sewer even though defendant's septic tank had not yet become a nuisance because Board had power "to anticipate that possible evil [and] legislate to prevent it." [id. at 726]); Peoples Water Service v. Adkinson, 184 So.2d 707 (Fla. App. 1966) (city had power to require all homeowners to connect to available municipal sewerage system and to pay all sewerage fees, even owners, like defendant, of cesspools "in good working order." "A city sewerage system cannot effectively function upon a 'tic tac toe'

system, that is connect one dwelling, skip a dwelling, and connect the next one. Where one septic tank might not be injurious to a neighbor, two septic tanks could well be injurious to the health of the community." [id. at 709]); Nourse v. City of Russelville, 257 Ky. 525, 78 S.W.2d 761 (1935) ("The courts pretty generally hold that a legislative body may declare privy vaults . . . in thickly settled communities to be nuisances and require their abatement without challenging each one or giving the owner notice and an opportunity to show that it is not in fact a nuisance." [id. at 765]); Spear v. Ward, 199 Ala. 105, 74 So. 27, 29 (1917); Fenton v. Atlantic City, 90 N.J.L. 403, 103 A. 695 (1917). See also McQuillin, Municipal Corporations § 24.264 and cases cited therein. All the afore-cited cases are also good authority, arguably, for general maintenance and inspection requirements and charges being valid exercises of governmental power to anticipate future nuisances as well as abate existing ones.

163. A requirement to abandon an existing functioning individual septic system and tie into an abutting sewer has been found not to be an unreasonable hardship. People v. Butcher, supra note 162 (first case), at 727-28. One might anticipate a different result if the homeowner were required, in addition, to pay for a sewer extension.

164. See note 144 supra.

165. See Cypress Estates, Inc. v. Moore, 273 N.Y.S.2d 509 (Sp. Ct. Suff. County 1966).

166. See Beck v. Wisconsin Dep't of Health and Social Services (Dane County, Wis. Cir. Ct., filed Feb. 12, 1976), digested in 6 ELR 65332 (June 1976).

CHAPTER FIVE

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CHAPTER SIX

MANAGEMENT OF STORMWATER AS A NONPOINT SOURCE IN URBAN AND URBANIZING AREAS

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CHAPTER SIX

MANAGEMENT OF STORMWATER AS A NONPOINT SOURCE IN URBAN AND URBANIZING AREAS

1.0 Introduction

One major purpose of the 1972 amendments to the FWPCA is to impose systematic controls on nonpoint sources of pollution within the framework of water quality management programs. Stormwater runoff is a major nonpoint source. In urbanizing areas, where land-disturbing activities are numerous, stormwater washes soil and sediment into surface waters, causing increased levels of turbidity and eutrophication, threatening fish and wildlife, and blocking drainage.[1/] In developed areas, runoff carries with it the pollutants from surfaces over which it runs, including oil, litter, chemicals, nutrients and biological wastes,[2/] together with soils eroded from the downstream channels of the flow. Where both sanitary wastes and stormwater are carried in combined sewers, their overflow grossly pollutes receiving water.

Water quality control need not always be the primary motivation for controlling stormwater runoff. Regulations specifically addressing runoff and erosion may well be developed in pursuit of other major objectives, especially flood control and water conservation. Indeed, state and local governments will frequently find that existing runoff management plans yield unforeseen water quality benefits. Effective flood prevention policies, for example, will also deter combined sewer overflows in combined sewer areas, control erosion, and inhibit seepage from septic tanks into receiving waterways. At the same time, the local or regional planner must recognize that nonpoint source pollution is an independent problem with its own defining characteristics. So, for example, rainfalls of relatively short duration and low intensity may result in highly polluted urban runoff without causing any appreciable danger of flooding.[3/] A flood control program will clearly fail to reduce the pollution from rainfall events of this type.

Conventional, capital-intensive methods for dealing with stormwater have been primarily concerned with collection and centralized treatment, often in combination with systems for the treatment of sanitary wastes. In that context, stormwater is a point source of pollution to be treated (if at all) just before it enters a receiving waterway. Recently, however, instead of sewering and treatment, measures integrated with a community's system for land use management have been used effectively in some places to control pollution from stormwater runoff.

In fact, agencies seeking to establish stormwater management programs may now select from four distinct approaches to runoff control:

1. Direct regulation is most frequently employed, especially for

control of erosion and sedimentation. Under this approach, developers or subdividers are typically required to submit plans for minimizing runoff from their sites through acceptable control practices, which may be specified in regulations or in engineering guidelines. Or the developer may have to present a plan that meets certain environmental performance standards, limiting, e.g., the rate of runoff or erosion from the developed site. In either case, the control plans must be approved and a permit must be issued by a zoning or subdivision review agency before development can proceed.

2. A second technique, often used in conjunction with direct regulation, is public management of nonpoint source controls. A municipal street-sweeping program, for example, will serve to reduce the pollution level on surfaces over which stormwaters run. Or a local government may construct and maintain stormwater retention facilities for some part of a community.

3. A third alternative, also designed to check stormwater pollution at an early, nonpoint phase, is to hold forth incentives of altered costs or benefits for including retention and controlled release of stormwater in development plans. For example, a developer might be permitted to exceed normal zoning densities on some parts of his site if he dedicates other parts as open space for stormwater retention. Or effluent charges might be imposed on developments in proportion to the rates of runoff from their sites.

4. Lastly, stormwater management agencies can fall back on the technique of government subsidy for construction of public facilities to collect and treat the polluted runoff. This fourth approach, of course, looks on stormwater as just another point source, and hence lies largely beyond the scope of the present chapter.

For the first three approaches identified above, state and local governments are increasingly recognizing that they can employ their traditional police powers, especially over land use, to manage nonpoint sources of water pollution. With respect to stormwater runoff, the most relevant of these powers are the ones typically expressed in local ordinances on the subjects of zoning and subdivision of property, construction, plumbing, sewerage, drainage, and flood control.

Section 208 of the FWPCA places the responsibility for stormwater management on states and on suitably designated substate agencies. Consistently with its overall water quality objectives, the section 208 agency should develop a comprehensive plan for nonpoint source control, a plan that represents a cost-effective mix of direct regulation, governmental activity of a preventive nature, economic incentives to the private sector, and outright government subsidy. This chapter will set out in detail some critical factors that should influence an agency's thinking in its choice of strategies and programs for controlling stormwater runoff. It will be most instructive to focus on controlling runoff, erosion, and sedimentation not primarily through major works of capital improvement, but through preventive approaches that rely to a greater degree

on land use planning and regulation. These may include, for example, facilities for detaining rainwater in ponds, on roofs, or in parking lots; permanent retention in reservoirs; debris and sedimentation basins to reduce runoff velocities; contour or ridge diversions; grade stabilization structures, permeable surfaces, and vegetative recovering. Legal issues and institutional options in stormwater control will be studied with the aid of specific examples which may also aid in evaluating the relative strengths and weaknesses of various approaches.

2.0 Overall Planning: Defining the Problem and Selecting Solutions

Programs to prevent and control stormwater runoff should be based on sound planning, which supplies the justification for regulating land use at later stages. Stormwater management planning is the process by which information on hydrology, soils, geology, and land use is collected and analyzed, and conclusions are drawn about how best to inhibit runoff and erosion damage from existing and future development. The scope of such planning may be comprehensive or limited to a single function, local or areawide.

Functional planning addresses a single category of resources (e.g., land, water, air) or a single social objective such as flood control, water quality control, or regulation of water supply. This restricted type of planning permits a clear statement of objectives and a focused approach to information gathering and regulatory control, but often misses significant interrelationships with other environmental, economic, and social considerations. Comprehensive or multifunctional planning, on the other hand, integrates the protection of water quality with other values and objectives and reconciles development with environmental goals. Once prepared, the comprehensive plan (within which single-purpose interests are reconciled) indicates what development patterns will minimize stormwater runoff and serves as a framework for specific site or project planning.

Wherever possible, stormwater management should be approached on an areawide basis, so that the drainage and pollution problems of an entire watershed can be addressed at once. Runoff control on a site-by-site basis leads to proliferation of small detention facilities which may be dangerous in a heavy storm, inasmuch as stormwater is likely to be released from them in greater total volume over a short space of time than from a well-planned larger facility. To the extent this is true, it would follow that watershed detention facilities are more desirable, except perhaps in the case of large-scale commercial or industrial developments.

2.1 The BMP Concept

To assist the section 208 agency in carrying out its planning function with respect to nonpoint sources, EPA has developed the concept of Best

Management Practice (BMP), as detailed in Supplement No. 1 to the Guidelines for State and Areawide Water Quality Management Program Development.[4] EPA's regulations and guidelines call upon states and designated agencies to establish appropriate BMPs for controlling water quality problems within their jurisdictions. Section 208 agencies should find the BMP approach helpful in developing their stormwater management programs.

A Best Management Practice is defined as follows:

> The term Best Management Practice (BMP) means a practice, or combination of practices, that is determined by a State (or designated areawide planning agency) after problem assessment, examination of alternative practices, and appropriate public participation, to be the most effective, practicable (including technological, economic, and institutional considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals.

In choosing the most suitable BMP, the agency should keep four key criteria in mind:

1. a BMP should manage "pollution generated by nonpoint sources";
2. a BMP should achieve water quality "compatible with water quality goals";
3. a BMP should be "most effective in preventing or reducing the amount of pollution generated"; and
4. a BMP should be "practicable."

Very early in the planning stage, therefore, planning agencies should define their overall water quality goals (which cannot be less stringent than those prescribed in the state's federally approved water quality standards), and determine which control devices will most effectively reduce pollution from runoff and erosion to the desired level. In the course of this exercise, the planning agency may well conclude that controls over the generation of runoff at the source are the best way of avoiding consequent erosion, sedimentation, transport of surface pollutants, or overload of storm drainage systems. For example, in site planning for subdivisions, BMPs may call for limiting the gradient of driveways and for using porous materials as driveway surfaces.

2.2 Data Collection and Analysis

Essentially, the planning process for stormwater management attempts to accommodate development consistently with protection of the water resource. To accomplish this objective and to furnish guidance for future development, it is necessary to gather data on both natural and manmade environments. For example, if a particular development is to occur on a site which has erodable soils, project plans should call for appropriate preventive measures, such as sediment basins, grading, seeding, and

minimizing the duration of soil exposure. Access to an accurately compiled data base gives a control program the confidence to require and the capability of assessing preventive measures at the stage of site-planning review in the zoning or subdivision process.

One widely accepted method of organizing the data needed for effective stormwater management is to construct an environmental inventory; the local or regional authority analyzes the key elements of its ecological system and compiles comprehensive data on each element. At the core of any such study are data concerning the area's physiography, climate, geology, soils, hydrology, population, and expected land use.

A classic example of the environmental inventory approach to data collection was the Ecological Planning Study commissioned by Medford Township, New Jersey. Located east of Camden and Philadelphia, Medford was threatened by the usual suburban sprawl that accompanies the growth of a metropolitan area. In 1971 the township commissioned a comprehensive study of the area's ecological system from the Center for Ecological Research in Planning and Design of the University of Pennsylvania. Proceeding from these data, Medford Township expected to develop a system of rational land use regulations, providing for both ecological and fiscal consequences of future land use.

In its report,[5] the center mapped the geology, topography, physiography, hydrology, soils, and vegetation of the township, identifying areas of poor drainage, highly permeable soils, or susceptibility to flooding. Water quality studies were conducted, and information on water tables and groundwater availability was assembled. The report traced a number of ecological interrelationships. It included wildlife observations and climatological data, and identified areas of historic significance.

Once the initial inventory phase was completed, the center undertook to characterize particular natural areas or resources in terms of community values. It identified, for example, areas "inherently hazardous to human life and property" or made hazardous by specific human action; areas containing "irreplaceably unique and scarce resources" or "vulnerable resources" whose unwise use will "result in social costs"; areas of "high productivity for extraction, agriculture or forestry"; areas where "onsite costs for foundation, maintenance and water supply" would be minimal; and areas of "maximum desirability" for location of various kinds of activity.[6] Standards for development were then established with reference to flood and fire hazards; surface and groundwaters; absorptive capacities of soils; historic, wildlife, and scenic resources; physical contours; and runoff management. The study went on to identify suitable areas for forest and farm production, recreation, and urbanization.

The township is preparing an environmental master plan which will integrate

the environmental inventory with data on transportation, population, community facilities, commerce, and housing, and which will assist in fashioning policies on location of future development. From the standpoint of water quality, the significance of these planning exercises is that they should serve, at the earliest possible stage, to prevent adverse impacts on water resources by channeling development to minimize runoff, erosion, sedimentation, and excessive demands on water supplies. At the same time, they should protect the absorptive, purifying, and retentive functions of critical water-related lands (aquifers, wetlands, steep slopes, riparian, and wooded properties).

Completed at a cost of $150,000, the Medford Ecological Planning Study may well be too expensive and sophisticated for most communities to emulate in every detail, but the environmental inventory approach can easily be tailored to fit more modest objectives as well. The number of factors that can be studied and mapped in a natural resources inventory may be virtually unlimited in theory, but only a few are indispensable for identifying areas subject to major environmental disturbance. Thus, maps of soil types may provide an adequate basis for determining where surface runoff is most likely to cause erosion and sedimentation. In this connection, it should be noted that a community can obtain substantial assistance in mapping and analyzing its soils, topography, geological and water resources from the U.S. Soil Conservation Service (SCS) and the U.S. Geological Survey (USGS).[7]

A fundamentally different way of using data in stormwater management planning is exemplified by the computer simulation models developed for Pennsylvania's Wissahickon Watershed[8] and for the Echo Branch Sub-basin Study in DeKalb County, Georgia. In the Echo project, the Georgia Institute of Technology developed an urban runoff simulation model (UROS-4) specifically for DeKalb County as part of a pilot sub-basin drainage program. Computer simulation planning was used in this case to evaluate alternative methods of controlling runoff from design storms of two, five, ten, and twenty-year frequencies. Echo project planners concluded on the basis of this study that the sub-basin's drainage problems could be solved best by means of increased storage in large, publicly owned and managed detention facilities, rather than through smaller scale, site-by-site detention.[9]

Computer simulation has clear advantages as a planning tool for stormwater management. The technique is now widely used to evaluate different approaches to runoff control for an entire watershed. It also offers a way of identifying the capital requirements and costs of a comprehensive drainage plan. Estimates for correcting the drainage problems of DeKalb County, for example, had ranged from $10 million to $500 million before the county initiated its Pilot Basin Program.[10]

No matter what techniques are ultimately selected for gathering and analyzing data on nonpoint sources, this phase of the planning process

is of critical importance because it permits the formulation of rational regulatory schemes to control runoff and erosion. A related benefit of developing a body of facts in support of future land use regulations is that the general public and the courts will more readily accept regulations based on adequate supporting data. Although experts now recognize stormwater as a major source of pollution, the public at large remains unaware of the variety and level of pollutants carried in urban and rural runoff. Most builders and developers do not at present perceive a clear connection between runoff and damage to public health, property, or welfare. As a result, an ordinance imposing requirements for onsite detention is more likely to be challenged than a regulation that controls the construction and placement of septic tanks. But if the requirements imposed by law follow reasonably from data documenting the nature and magnitude of the problem, legal challenges will be less likely, or, if they are posed, the ordinance will have a much better chance of being sustained as a valid exercise of the police power consistent with due process of law.[11/]

This last point deserves special emphasis. A stormwater management program may come under attack on constitutional grounds either because the regulatory scheme is seen as an unreasonable one, or because the extra financial burden placed on the developer, who must at his own expense install detention facilities for runoff from his development, is seen as a taking without compensation. The case law on the legitimacy of runoff control regulations is not yet highly developed, but there is ample evidence from other domains of land use controls to suggest that the courts will view runoff controls as legitimate regulations when they are backed by a factually rich and complete record.[12/] From a purely practical viewpoint, therefore, a section 208 agency would do well to incorporate into its stormwater management ordinance "a full set of legislative purposes describing the nature of the hazards to be controlled and the purposes in view in controlling them. In other words, it should be the function of performance standards ordinances to contain, as it were, their own legislative history."[13/]

Even outside the context of litigation, the benefits to be gained from careful data-gathering may be sizeable. Planning exercises such as DeKalb County's UROS-4 analysis enable officials to estimate with some accuracy the financial costs of a projected stormwater management program. A figure backed up by a study will often be acceptable to the public where a raw estimate would not.[14/] In a number of cases, widely disseminated information might have helped to overcome private resistance to new ideas, such as the plan to acquire public conservation easements over private property in the Brandywine Project[15/] undertaken by Chester County, Pennsylvania. The acquisition plan failed in that case, partly because insufficient effort was made to educate private landowners to the benefits that would accrue to them under the project. An awareness of the communitywide benefits of a large, permanent retention basin could spur interest in creating a voluntary homeowners'

association to maintain such a facility as a multipurpose resource. Some of these possibilities will receive fuller discussion below. They are touched on here to show the wide implications of the data-collection phase in planning for stormwater management.

2.3 Technical Approaches to Stormwater Management

In order to evaluate technical solutions to the runoff problem, it is useful to break stormwater management into two phases: source management and collection system management.[16] Under the former heading may be included such early preventive techniques as improved site planning, antispill and antilitter ordinances, and more effective street-sweeping practices. Management of collection systems, on the other hand, encompasses such techniques as onsite detention of stormwater (rooftop detention, ponding on paved surfaces, detention reservoirs) and special solutions to combined sewer problems, from drainpipe disconnection to upgrading centralized collection and treatment facilities.

To make an intelligent selection from these varied control techniques, a section 208 agency must take into account a number of unrelated factors. One early, and often decisive, consideration is the state of development of the area for which runoff controls are to be designed. Opportunities for ecologically sound site-planning, for example, are virtually nonexistent in a highly urbanized environment. Such areas also offer little space for the planned construction of large detention reservoirs. A newly developing area, on the other hand, permits a more flexible approach to runoff control. It is in such settings that innovative techniques such as rooftop detention are commonly encountered today.

The problem of erosion and sedimentation occurs most acutely, but can also be most effectively controlled, during the development stage. In the process of urbanization, erosion is increased as a result of runoff. Since most urban development projects, construction sites, and highway projects involve disturbance of soils and their exposure to the elements for varying lengths of time during construction, there is greater likelihood at such time of increased erosion and sedimentation.[17] These damaging effects can also occur, of course, from completed developments that were not planned with sufficient sensitivity to the natural features of the site and that do not incorporate continuing functional controls on runoff.

In addition to appraising a runoff management technique in light of local development patterns, the section 208 agency must assess the costs, benefits, and feasibility of a proposed set of controls. "Cost" includes the financial burden both of construction or land acquisition, and of an effective ongoing enforcement and maintenance program. On the benefit side, the value of a proposed runoff control technique may be enhanced by

the possibility of using the same set of regulations to achieve other objectives as well. Thus, street sweeping has an aesthetic function in addition to its impact on water quality, and a permanent detention basin may be adapted to recreational uses. Climatic and topographical features will often influence the selection of one retention technique over another. The foregoing factors will all enter into the agency's judgment whether a proposed regulatory scheme is--or can be sold to the concerned public as being--a politically feasible one.

The principal preventive and corrective approaches to runoff and erosion control are described and evaluated in some detail below. To give some structure to this survey, the approaches are presented in two groupings: (1) techniques designed primarily for newly developing jurisdictions; and (2) techniques whose principal utility is in highly developed urban areas.

2.3.1 Solutions for Developing Areas

One extreme of the preventive approach to stormwater management is represented by regulations designed to keep the land in as undeveloped a condition as possible. Obviously, there would be no increase in runoff from an undeveloped site if there were no man-made interference with the natural permeability of the soil. Any attempt to prohibit development, short of purchasing open space for public use, would give rise to serious constitutional questions.[18] Quite apart from these, strict growth controls are simply not a realistic alternative for most jurisdictions. The need to balance benefits conferred by development against possibly harmful consequences to the environment has been explicitly or implicitly recognized by many communities. The stated purpose of North Carolina's Sediment Pollution Control Act, for example, is to "permit development . . . to continue with the least detrimental effects from pollution by sedimentation."[19]

A practical alternative to extreme restrictions on future development is site planning based on ecological considerations. The essence of this approach is not to prohibit development completely, but to direct it so that the strains it imposes on the entire ecological system are minimized. Examples of this class of regulation are the flood plain zoning ordinances adopted in many communities under impetus of the National Flood Insurance Act of 1968.[20] While such regulations are primarily designed to avoid direct flood damage to life and property, they yield clear benefits in the context of water quality maintenance as well. Overflows from septic tanks and combined sewers, for example, may be closely linked with improperly designed sewerage and drainage systems within the flood plain. By preventing excessive encroachment of developments upon the flood plain, these special zoning laws also serve to retard rates of runoff and consequent water pollution from streambank erosion and adjacent land surfaces. Other examples of development controls on critical water-related

lands are North Carolina's requirements that riparian buffer zones be provided between natural water bodies and proximate land developments, and that "[t]he angle for graded slopes and fills shall be no greater than the angle which can be retained by vegetative cover or other adequate erosion control devices or structures."21/

A recent and more comprehensive approach to ecologically inspired site planning is exemplified by the set of land use ordinances adopted by Medford Township in conjunction with its Ecological Planning Study (EPS). Medford's subdivision control ordinance (No. 1974-11) incorporates by reference a number of regulations, developed by the EPS, that are designed "to minimize loss of unique, scarce and valuable resources" such as vegetation, wildlife, and water recharge areas, and "to minimize social costs by proper management of" aquifers, soil loss, vegetation, wildlife habitats, and land use in general. The developer has the initial responsibility for determining which of these regulations are applicable to his site and what actions will be taken or avoided in order "to minimize any adverse effect on environment or ecology, or to benefit the environment or ecology." (This will be discussed further in section 4.1 of this chapter.) Such an approach entails the significant public cost of constructing a comprehensive environmental inventory to guide and assist developers in preparing their plans. It should be emphasized, however, that this initial outlay may reduce or eliminate the potentially far greater expense of corrective measures, to compensate for inadequate planning, in the site-development phase.

Whether or not a comprehensive planning approach is adopted, there are also more direct, narrowly focused ways of preventing pollution at its source. One of these is simply to clear away the debris from surfaces over which stormwater travels.22/ Polluted surfaces are not limited to urban areas; contamination of runoff in rural and semirural areas also results from entrainment of organic wastes, fertilizers, pesticides, insecticides, and chemicals. The setting for this chapter, however, is the urban and rapidly urbanizing environment, in which regulatory approaches may be needed for preventing contamination of stormwater runoff by street-surface pollutants. It is appropriate to consider such regulation for both developing and developed areas.

Many localities have adopted ordinances that prohibit littering. While it may be easier in many cases to clean up after litterers than to prevent litter in the first place, it would be unwise to neglect this phase of controls in dealing with stormwater pollution and related nuisances. The objects of such regulation may be quite specifically defined: common street litter, debris in vacant lots or produce markets, weeds and overgrowth, domestic animals (curb and leash laws), storage of loose bulk material used in construction, garbage collection practices, incineration, and abandoned vehicles. Typically, ordinances of this sort proscribe private behavior (e.g., "no person shall throw or deposit litter in any place . . .") and regulate the manner in which litter

receptacles are used (e.g., "persons placing litter in receptacles shall do so in a manner to prevent it from being carried by the elements upon any street . . .").

Antispill ordinances customarily make it unlawful to operate vehicles in such a manner as to allow the spilling or dropping of any liquids or solids on public ways.[23] The construction and loading of vehicles that carry such materials can also be regulated to prevent their contents from dropping.[24] Specifically, spillage of oil and petrochemical products should be expressly prohibited[25] on pain of stiff penalties and reimbursement of cleanup costs. Responsibility for rubbish or litter removal can be placed on the landowners. In San Francisco, for example, a local ordinance[26] requires owners of vacant lots to remove rubbish and debris within a fixed period of time after notice to remove the same is given by the police or posted on the property. Newport News, Virginia[27] charges the owner for the cost of cleaning up if the city is forced to do so by the owner's failure.

Moving further along the hydrological cycle in an effort to contain the polluting effects of runoff, section 208 agencies in urbanizing areas should consider the merits of *stormwater detention*. The principal function of detaining stormwater is to reduce the rate of runoff from impervious surfaces. Detention automatically reduces the potential for erosion by decreasing the rate of flow. In site development, as already noted, gentle gradients and porous paving materials that permit infiltrations can serve to detain stormwater where it falls. Detention facilities for confinement and storage of stormwater also contribute to improved water quality by allowing onsite precipitation and oxidation of pollutants.

Among the more common facilities of this type, perhaps the most controversial are those for rooftop detention. Architects and builders in some areas of the country are unwilling to design roofs that will permit storage of stormwater. The technique has been adopted with success, however, in areas with a relatively dry climate, where the danger of roof deterioration from stormwater ponding is comparatively slight. The Denver Urban Renewal Authority (DURA), which directs the ambitious Skyline Renewal Project in downtown Denver, requires private developers to employ rooftop detention on new structures. This requirement is incorporated in a set of building criteria developed by DURA's staff of engineers. Since the Skyline Project involves the almost complete restoration of a 115-acre area, this requirement means that almost all structures in the completed project will have built-in rooftop detention facilities. In principle, DURA's building criteria apply only to new construction,[28] and generally, it is only in areas undergoing extensive new construction that this technique can be seriously considered. It would be politically unrealistic as well as financially impractical, in most cases, to press for modification of existing structures in order to provide rooftop storage.

Ponding on plazas, parking lots, and other open, paved surfaces is another technique that achieves results similar to rooftop storage. Regulations to implement ponding have been adopted by DURA in the Skyline Project, as well as by many other jurisdictions, among them the Metropolitan Sanitary District (MSD) of Greater Chicago.[29] Detention on paved surfaces presents fewer maintenance problems than detention on rooftops, where inadequate maintenance can result in serious structural damage. For these reasons, ponding in plazas and parking lots is less controversial than rooftop storage, so long as it causes no inconvenience to pedestrian and vehicular traffic.

Although there are few (if any) structural constraints against requiring the owner of an existing parking lot to drain or to regrade his property so as to achieve a desired release rate for runoff, few if any jurisdictions have adopted this type of measure. At least where there is a potential danger to public health or safety, local authorities can require a landowner to modify his property at his own expense so as to eliminate the risk. Thus, a 1944 amendment to a multiple dwelling law requiring installation of automatic sprinklers in lodging houses of nonfireproof construction was held applicable to a lodging house constructed in 1940 in conformity with the law in force at that time, even though compliance with the amendment entailed an expenditure of $7,500 on a property worth only $25,000.[30]

In the field of runoff management, however, requiring structural changes in existing developments appears to be a technique whose time has not yet come. It remains to be seen whether the public interest in runoff control can be shown to be of sufficient magnitude to justify imposition of significant private expenditures for "retrofit" of existing developments. It is a task for water quality planners and their consultants to spell out the necessary justification in terms not merely of added public benefit, but also of avoiding injury to public welfare from soil loss, degradation of water resources, and other adverse effects that will surely follow from absence of runoff controls.

In a limited attempt to enforce its erosion control standards retroactively, North Carolina's Sedimentation Control Commission (SCC) holds developers responsible for faulty maintenance of construction sites, even though construction was initiated before the commission's rules and regulations went into effect. The requirement reads as follows:

> All uncovered areas existing on the effective date of these Rules and Regulations which resulted from land-disturbing activities . . . and are subject to continued accelerated erosion, and are causing off-site damage from sedimentation shall be provided with . . . protective measures . . . sufficient to restrain accelerated erosion and control off-site sedimentation.[31]

In determining the proper corrective measures, the relevant authority must consider "the economic feasibility, technology, and quantity of work required" and must set "reasonable and attainable time limits for compliance." This language clearly invites bargaining by the party against whom the measure is sought to be enforced, but also makes it more probable that any expense ultimately imposed on him will be upheld as a reasonable exercise of regulatory power. The commission's success or failure in implementing the regulation will provide valuable guidance to other agencies charged with controlling pollution from nonpoint sources.

Detention of stormwater in temporary or permanent basins is another approach that has received wide acceptance. Small, dry basins are best suited to dry climates where the nuisance of soggy bottoms is least likely to arise. Such temporary basins have been constructed in the Skyline Project. In fact, the program of building stormwater detention facilities on individual developments has been supplemented there by construction of a depressed park, three blocks long and one-half block wide, which is designed to serve as a temporary storage basin for stormwater.

Permanent reservoirs are one of the most promising solutions to the runoff problem where sufficient land for a reservoir can be obtained.[32/] The land might be bought outright by a regional or local authority that will construct the facility, but this is a costly alternative. Stormwater management agencies have attempted to get around the considerable expense of land acquisition in a variety of ways. Where no public land is available for constructing a reservoir, the most desirable route is to require the developer to dedicate land for this purpose, provided that the tract required is relatively small and places no unreasonable financial burden on the developer. But even where compulsory dedication is otherwise feasible, it may be barred on constitutional grounds as a taking for public use without compensation.[33/]

Consequently, water quality management agencies should be alert to the possibility of working out agreements short of purchase with prospective developers. The village of Mt. Prospect, Illinois, for example, enters into agreements stipulating that lands used for stormwater storage will be released back to developers for their own use when storage is no longer required. The agreements rest on the assumption that some of these onsite detention facilities will be rendered obsolete when the Chicago Metropolitan Sanitary District constructs a multijurisdictional reservoir to accept drainage from Mt. Prospect and Arlington Heights. The Mt. Prospect experience, then, cannot readily be generalized to other settings.

In addition to the cost of land, detention reservoirs require considerable expenditures for construction and for maintenance over time,[34/] and where a reservoir serves the needs of several jurisdictions, complicated cost

allocation problems may arise.[35] Financial resources must be adequate not only to provide labor and cleaning equipment, but also to assure, through periodic inspection and enforcement, that private owners of permanent basins are performing their maintenance responsibilities properly. Unless properly maintained, detention basins will cease to serve their purpose and may become a source of dnager to small children.

Among the varied techniques for controlling runoff, permanent detention basins offer the greatest potential for adaptation to secondary uses. A large storage facility may serve to control floods as well as to reduce stormwater pollution. Properly maintained, the basin can become a valuable community resource because it is aesthetically pleasing and can be used for recreational purposes such as swimming or fishing. Finally, building a reservoir to receive runoff from all or part of a drainage basin may prove to be the only practicable technique for managing runoff on an areawide basis.

It has already been noted that permanent reservoirs perform a useful function in sediment control by permitting soil particles to settle out instead of being washed into receiving waters. Erosion can also be reduced by temporary measures which limit the removal of existing vegetation and minimize the extent and duration of soil loss. Vegetative cover can be installed as an aesthetically pleasing control device to hold soil in place, slow the velocity of runoff and maintain the soil's capacity to absorb water. The use of vegetation can be supplemented by structural improvements, such as check dams, sediment basins, and temporary diversions, which also serve to contain and prevent sedimentation. These measures are all relatively inexpensive and easy to incorporate into the overall project design. They are best applied, for the most part, during construction, and can be required under state or local regulations.

2.3.2 Solutions for Developed Areas

Antilitter and antispill ordinances can effectively reduce surface pollution in highly urbanized settings, as well as in areas undergoing the pressures of urbanization. In metropolitan areas, however, it will frequently be necessary to supplement regulation of private behavior with direct municipal activity, such as street cleaning, garbage removal, street maintenance, snow and ice removal, and sewer and catch basin cleaning.[36]

Current street-sweeping practices in most cities are designed primarily to achieve aesthetic appeal. As a result, conventional street sweepers, which are quite effective in removing litter and large particulate matter, leave behind up to 85 percent of the finer solids in which is found the greatest concentration of water pollutants.[37] In designing street-cleaning

programs from the standpoint of water quality control, greater thought must be devoted to new techniques such as flushing or use of vacuum sweepers. Local authorities should also consider that street cleaning is only one approach, however important, to reducing the contaminant level of urban street surfaces. A street-sweeping ordinance can achieve the greatest impact if it is part of a comprehensive regulatory scheme that also includes such measures as fines for littering and proper regulation of construction sites and onstreet parking.

Stormwater presents special problems in jurisdictions served by combined sanitary and storm sewers. Overflows from combined sewers obviously degrade water quality, but this problem can be approached in only a limited number of ways. Most commonly accepted techniques of stormwater detention cannot be applied in the older, densely built-up urban districts where combined sewers are typically found. Such highly urbanized areas will often lack space for large, permanent detention basins, or even for temporary storage facilities of adequate capacity (like the sunken park in DURA's Skyline Project). It would likewise be infeasible in most combined sewer districts to require that existing structures be modified in order to supply stormwater storage. Replacing combined sewer systems with separate sewers is one possible solution, but this approach can be prohibitively expensive.[38] Separation of storm and sanitary sewers, moreover, only partially corrects the detrimental effect of stormwater runoff on water quality. While inhibiting the overflow of sanitary sewage into local waterways, separate sewers in no way reduce the pollutant level of stormwater itself.

Searching for a more economical alternative to alleviate the problem of combined sewer overflows, several communities have successfully turned to a program of downspout disconnection in order to remove existing attachments joining roof drains directly to the sewer system. The function of such a program is to allow stormwater from rooftops to run out onto residential property and adjacent street surfaces before it makes its way into the sewer system. Consequent reduction in the rate of flow into the combined sewer decreases the risk of sewer overload during peak rainfalls. One such downspout disconnection program was recently carried out in Springfield, Illinois with the aid of successive rounds of letters to property owners followed by inspections of their properties to learn if they had complied. By the end of the campaign, upwards of 85 percent of the connections had been removed.[39]

It must be recognized, however, that there may be no attractive way to resolve the runoff problems of some older metropolitan areas. Boston, Massachusetts, for example, has about 7,000 acres served by combined sewers, plus another 10,000 acres served by separate sewers that connect to the combined sewer system. In addition, some 6,700 acres in neighboring communities are tributary to the combined sewer system. Conventional stormwater management techniques such as open-space ponding, rooftop storage, and detention in reservoirs are obviously out of the question in

a city like Boston. So is downspout disconnection, which would result in unacceptable flooding in heavily traveled areas that lack porous surfaces to absorb some part of the flow. Replacement of the combined sewer system with separate sewers was found to be more expensive than the deep tunnel storage plan now being considered by Boston and the Commonwealth of Massachusetts, but even the deep tunnel plan was estimated to cost a staggering $496 million based on 1967 prices.[40]

The tables on the following page summarize the preceding discussion. Each major technical approach to runoff or erosion control is shown along with its principal costs and benefits. The tables also indicate the type of setting in which a given control measure can most effectively be implemented.

3.0 Institutional Framework: Government Level and Agency Type

3.1 Federal Government

On non-federal lands the federal government has a small direct role in the management of nonpoint sources, but several federal agencies can aid in project planning and development by providing technical and financial assistance[41] to state and local authorities. Stormwater management agencies may frequently find their programs overlapping with areas of primary federal concern, such as soil and water conservation, flood control, point source control, and resource management information. Some examples of potentially relevant federal programs are included below.[42]

Where stormwater management is closely linked to flood control or drainage problems, the 208 water quality management agency may turn to the U.S. Corps of Engineers for consultation and technical assistance.[43] The Corps provides a number of management services, including development of flood plain data, reports on flood hazards, and technical services aimed at decreasing the potential for flood damage.

Through its Conservation Operations program, the U.S. Department of Agriculture's Soil Conservation Service (SCS) provides technical assistance, soil survey information, and advice on sediment control planning to state and local agencies, including soil conservation districts. Under its Resource Conservation and Development Program, SCS cooperates with other public agencies and nonprofit organizations in preparing plans for land conservation and use. In addition to technical assistance, cost sharing for works designed to reduce sedimentation is available under this program. Finally, SCS directs a cooperative program of watershed protection and flood prevention whose purposes include control of sediment pollution in watersheds.[44]

The U.S. Geological Survey (USGS) of the Department of the Interior also carries out programs that have some relevance to stormwater management

CONTROL OF NONPOINT SOURCE POLLUTION IN DEVELOPING AREAS

Control Measure		Purpose	Principal Benefits	Limitations
Nonstructural Approaches	Complete ban on development	Maintains runoff erosion at natural levels	No increase in nonpoint source pollution	1. Severe constitutional difficulties 2. Practically impossible in most communities.
	Site planning	Development planned so as to reduce adverse impact on environment	Realistic compromise between developmental pressure and protection of environment	Requires construction of environmental inventory and entails significant public expenditure
	Source management: anti-litter, anti-spill ordinances	Clears surfaces over which stormwater flows	1. Prevents pollution at early point in hydrologic cycle 2. Directly controls potential sources of pollution	1. Often difficult to enforce 2. Effective only as one element in comprehensive regulatory scheme
Structural Measures	Installation of separate sewers	Prevents polluting overflows of combined stormwater and sanitary sewage into receiving waterways		1. More expensive to install than combined sewers 2. May entail construction of separate treatment facilities to treat runoff
	Other technical measures (temporary diversions, berms, traps, sandbags, check-dams)	Control runoff, erosion at construction sites	1. Usually inexpensive 2. Costs borne by developers	Greatest utility at site of new construction

Control Measure		Purpose	Principal Benefits	Limitations
Structural Measures (continued)	Stormwater detention in temporary facilities: rooftops, parking lots, pavements, dry basins	Reduces flow into storm sewer during peak rainfall by means of storage and controlled release	1. Installation and maintenance costs borne by private developer 2. Permits construction of smaller storm sewers 3. Permits filtering out of debris at outlets and precipitation or oxidation of some pollutants in storage facility	1. Rooftop storage may cause structural damage, especially in damp climate 2. Storage on paved surfaces may inconvenience pedestrian and vehicular traffic 3. Badly maintained dry basins may become nuisances. 4. Release from numerous small facilities may overload sewers and cause flooding.
	Stormwater detention in permanent reservoirs	Accepts excess runoff from large developed areas	1. Serves multiple functions: A. Permits sedimentation, oxidation of pollutants B. Controls flooding C. Provides recreational facility D. Possesses aesthetic value 2. Capable of serving whole community or several jurisdictions	1. Land acquisition entails large public spending where dedication is impracticable 2. Constitutional restrictions may prevent compelled dedication 3. Maintenance by public agency is costly, but maintenance by private parties may be difficult to enforce.
	Vegetative cover	Absorbs runoff Holds soil in place, preventing erosion	1. Relatively low cost 2. Costs borne by developers 3. Aesthetically pleasing	Useful only in conjunction with other control measures

CONTROL OF NONPOINT SOURCE POLLUTION IN DEVELOPED AREAS

Control Measure	Purpose	Principal Benefits	Limitations
Source management: municipal street-sweeping	Clears road surfaces over which stormwater runs	Abates pollution at early point in hydrologic cycle without resort to expensive structural improvements	1. Entails public spending 2. Often not geared to removing small particles which carry heaviest pollutant load 3. Must be incorporated into full program of municipal services (e.g., garbage removal, snow removal, street maintenance, parking restrictions and alternative parking facilities).
Downspout disconnection	Reduces flow into sewers during heavy rainfall	1. Relatively inexpensive 2. Cost borne by private property owner	1. Causes flooding in heavily trafficked areas. 2. Unpopular with most homeowners 3. May require special authorization
Separation of storm and sanitary sewers	Eliminates overflows from combined sewers with inadequate capacity		1. Prohibitively expensive for most communities 2. May entail separate facilities to treat runoff.
Upgrading collection facilities, deep tunnel storage	Increases storage capacity of inadequate combined sewer systems and eliminates overflows		Often prohibitively expensive

practices. These include geological mapping and water resource investigations, which may be undertaken at the request of state or local agencies. The USGS and the cooperating agency share costs. The surveys may then be used for analyzing flood hazards, locating sites for public facilities, and determining land uses consistent with the objective of controlling erosion and sedimentation.

The U.S. Environmental Protection Agency (EPA) plays an important role in stormwater management at the federal level by providing grants under section 208 for areawide waste treatment management planning. EPA has also taken an active role in publishing and distributing information on the nature and causes of nonpoint source pollution and on best management practices for nonpoint source control.[45]

3.2 State Government and State-Local Relationships

At the state level, authority to regulate stormwater may be vested in one or more divisions of a department of natural resources or of environmental protection. In general, however, stormwater is not yet regulated as pervasively at the state level as point source discharge of sanitary or industrial wastes. The principal state involvement in stormwater management to date has been in flood control projects carried out in cooperation with federal agencies. The regulations of a few states go so far as to require storage and controlled release of stormwater for purposes of erosion and sedimentation control.[46]

One major effect of the FWPCA as amended will be to encourage far greater direct participation by the states in stormwater management. Section 208 places primary responsibility on the states to assure planning and implementation of programs for nonpoint source control. As interpreted in NRDC v. Train,[47] the act requires the states to do for areas not specifically designated exactly what the planning agency must do under subsections (a)(2)-(4) for designated substate areas. Where an entire state has been nondesignated,[48] the full responsibility for developing a plan to control point and nonpoint sources will accordingly devolve upon one or another state-level agency.

The states also carry a substantial secondary responsibility for programs developed by designated substate agencies. The thrust of section 208(b)(3), (b)(4) and (c)(1) is that the governors, speaking for their states, are to play key roles in assuring both development and execution of adequate control plans for designated areas with water quality problems.

Apart from obligations incurred under section 208, state agencies can contribute in large measure to successful implementation of stormwater management programs. The possibility of state and local cost-sharing has been alluded to above and should be explored in detail. State

agencies can also provide technical assistance, applying expertise that may not be available in most localities. A good example of this kind of constructive involvement by the state is the Sediment Control Inspectors Handbook published by the Maryland Department of Natural Resources. The handbook prepares inspectors throughout the state to perform their task intelligently.

The section 208 planner would be well advised to search the laws of his state early on, in order to discover whether they authorize state or local agencies to control nonpoint sources of pollution. Such authority may be included by implication in a broadly worded enabling law. In Massachusetts, for example, no person may discharge pollutants or "engage in any other activity that may reasonably be expected to result, directly or indirectly, in discharges of pollutants" without a permit issued by the director of the state's Division of Water Pollution Control (DWPC).[49] He is authorized, moreover, to "[p]rescribe effluent limitations, permit programs and procedures applicable to the management and disposal of pollutants,"[50] and "effluent limitation" is not restricted to point sources but is more broadly defined as "a requirement . . . specifying the maximum permissible quantity or concentration of any pollutant that may be present in discharges, or their maximum permissible hydraulic flow, over designated periods of time . . . ."[51]

Thus, the DWPC may establish performance standards for runoff, erosion, and sedimentation, to be administered either by a permit program at the state level or by permit programs that DWPC "prescribes" for local governments. Under the "Home Rule" Amendment to the Massachusetts Constitution,[52] municipalities also have the power to regulate stormwater runoff upon their own initiative. The amendment provides, in essence, that cities and towns may exercise whatever powers or functions the legislature might have granted to them, whether or not it has done so in fact, so long as the local action is not in conflict with provisions of constitutional or statutory law. Massachusetts, then, is an example of a state whose laws provide, in an indirect and general way, for regulatory control of stormwater pollution. In this as in other cases, however, the conclusion may emerge only from a careful reading of the law by competent counsel. It is another question, of course, whether a state agency will exercise the authority it has on the books. In Massachusetts, the foregoing provisions of law have not been used to regulate stormwater runoff, because the DWPC has neither sufficient administrative resources nor sufficient political backing to take on that responsibility at the present time.

Some states take the more direct approach of enacting legislation designed expressly to deal with runoff, erosion, and sedimentation. The Maryland Sediment Control Law of 1970[53] is a prime example of this approach. It represents the culmination of Maryland's long history of involvement with erosion and sedimentation controls. The act requires the developer to

have an erosion and sediment control plan that meets the approval of the appropriate soil conservation district before he may proceed to clear, grade, transport, or disturb the land. Each county is required, under the law, to adopt grading and building ordinances to carry out the purposes of the act. No grading or building permit can be issued by a county until the sediment control plan has been approved by the soil conservation district and the developer has certified that he will implement the plan.

Under its Sediment Pollution Control Act of 1973, North Carolina has established within its Department of Natural and Economic Resources a separate Sedimentation Control Commission (SCC) which is responsible for developing and administering a statewide program.[54] Members of the commission are appointed by the governor and represent a wide variety of interests: local governments, builders, contractors, utility companies, experts, governmental and nongovernmental conservation groups. Commission members may concurrently hold other elective or appointive offices. Compensation for service on the commission is limited to the customary per diem plus subsistence and travel expenses. The SCC is empowered[55] to adopt rules and regulations applicable to most land-disturbing activities undertaken in the state. Rules and regulations must be based on relevant data, and their adoption or revision must be preceded by one or more public hearings. In conjunction with its own regulatory activities, the commission also assists other state agencies and local governments in developing their own programs for sedimentation control. Each local program is reviewed by the commission and approved if its standards match or exceed those of the model ordinance developed by the commission. An approved program is administered locally, but the commission is required to step in and assume the task of enforcement in case of breakdowns at the local level.

Direct regulation of land use affecting water quality has traditionally been a prerogative of local governments, but such regulation could be supplemented, or even preempted, by the state. Building codes are one type of regulatory device over which the states have often retained some control. Thus, about 40 states have special codes relating to plumbing and fire prevention, while several states--Connecticut and Minnesota, for example--have general building codes that localities are free to adopt if they wish. A handful of states have mandatory building codes.[56] Provisions calling for rooftop storage or other structural solutions to runoff control could be incorporated into a specialized or general building code of statewide application. In this way, new structures throughout the state could be made to conform to a particular set of design criteria.

Recently, a number of states have gone further toward recapturing powers over water-related land uses which had been delegated to local governments. Act 250 of the State of Vermont makes the prospective developer

directly answerable to the state when he wishes to commence construction on a development of more than 10 acres. Before beginning work, he must satisfy the appropriate state agency that the proposed subdivision or development will not result in "undue water or air pollution."[57] A permit will be granted only when the applicant can demonstrate that the development will preserve a series of environmental values, which include the maintenance of water quality.[58]

Involving the state in land use control as the primary permit-issuing authority may not always prove administratively feasible. But the impetus for devising workable and imaginative state-regional or state-local relationships must still come from the state government. One approach to regulating water resources through state and regional agencies is exemplified by the California Coastal Zone Conservation Act.[59] The law creates six regional coastal zone conservation commissions whose principal function is to preserve, protect, and restore California's coastal zone environment.[60] In pursuit of this objective, the regional commissions may deny a permit to any development that would "adversely affect water quality."[61] Denial by a regional commission can be appealed to the California Coastal Zone Conservation Commission, the state-level agency empowered to carry out the provisions of the act.

It is possible for the state to assume a backstop enforcement role in land use control, and especially in water quality maintenance, without creating any regional entities. The Wisconsin Water Resources Act of 1966, for example, requires counties to enact and administer special shoreland zoning ordinances[62] and empowers the state Department of Natural Resources to adopt such an ordinance for any county that fails to do so in compliance with the act.[63] A similar institutional pattern could be employed for regulating any land use that gives rise to storm-water runoff or other nonpoint forms of pollution. Pennsylvania's Department of Environmental Resources, for example, appears to delegate enforcement of earth-moving regulations to local units of government that have department-approved programs for controlling erosion.[64] The department enforces its own regulations in localities that have no independent program.

Whenever regulatory authority is shared by entities at different levels of government, preemption problems may arise. These can be minimized by including within each regulatory scheme a provision like the following:

> Whenever there is a conflict between Federal, State, or local Laws, Ordinances, Rules and Regulations, Orders, and Decrees the more restrictive provision shall apply.[65]

It may be noted in this connection that land-disturbing activities of the United States acting in its proprietary capacity are subject to state and local regulation. The North Carolina Sedimentation Control

Commission's rules and regulations make specific provision for control of such federal activities by the commission.[66]

3.3 Substate Agencies

3.3.1 Areawide Planning Agencies, Special Purpose Districts, and Authorities

Planning for stormwater management is among the major functions to be carried out with section 208 funds by councils of governments (COGs) and regional planning agencies (RPAs) and other agencies that have been designated under section 208 as areawide planning agencies. What part these associations of local governments will play in implementing section 208 plans is not yet clear, but it should at least include coordination of intergovernmental activities in controlling pollution from stormwater runoff and other nonpoint sources. Except for helping to secure federal grants in aid, the planning agencies have so far operated with very limited success because they generally lack the power to implement their plans and recommendations.

Under a section 208 plan, operational and administrative responsibilities for storm drainage and sedimentation control might be vested in a special district with areawide jurisdiction.[67] Enabled under state statute and organized with an emphasis on technical specialization, districts usually are corporate bodies established by an area's residents to perform a particular set of functions. Their jurisdiction may be local, regional, or interstate. Since they have fiscal and administrative independence from general purpose governments, they may be able to provide services more efficiently than the latter. Within its highly specialized area of activity, a district is often in a better position to apply technical expertise and to do so with somewhat greater freedom from political constraints than a general purpose government. For example, the Denver Urban Renewal Authority, a local district with independent administrative powers, has carried out a program of onsite stormwater detention that probably could not have been adopted directly by the city of Denver.

Although special purpose districts are a businesslike vehicle for dealing with regional problems, they may be unsatisfactory in several respects. Special districts with appointed boards tend not to be accountable to the public. They may suffer from tunnel vision growing out of too great a degree of technical specialization. Finally, they represent a further multiplication and fragmentation of administrative authority, and hence occasions for intergovernmental conflict.[68]

In spite of these important drawbacks, the areawide district may be a preferred form of management agency in the field of stormwater management because its jurisdiction can cut across established political

boundaries. Ideally, the special district's boundaries should include an entire watershed. The Minnesota Watershed Act,[69] for example, authorizes creation of watershed districts whose functions include drainage, conservation and pollution control. The Brandywine Plan for Chester County, Pennsylvania called for the establishment of a Water Resources Protection District and a District Water Resources Authority to assist in carrying out the basic purposes of the plan. These were (1) to keep further development out of flood plains; (2) to begin long-range planning for local construction of sewerage and water supply systems; and (3) to enact appropriate land use regulations, in part for protection of water quality within the watershed as a whole.

Soil and water conservation districts (SWCDs) are another form of special district well suited to take an active role in stormwater management. These may vary widely in their authority to regulate water-related land use and to build, acquire, and operate works for controlling surface runoff and sedimentation. Only a minority of SWCDs, for example, are authorized to levy taxes, borrow money, and issue bonds.

Approximately half the states have granted conservation districts the power to participate in regulating land use, but until recently that authority was largely unexercised. Today, a number of states recognize the desirability of having their conservation districts play an active regulatory role. Under 1972 amendments to Iowa's law,[71] districts in that state were required to adopt rules and regulations establishing soil loss limits that must be observed by land developers. Maryland amended its Water Resources Law in 1970[72] to require that development plans involving significant disturbances of land be submitted to and approved by the appropriate soil conservation district. Amendments to the Massachusetts Wetlands Protection Act[73] have greatly increased the power of local conservation commissions in that state to regulate development affecting wetlands. Regulations promulgated by the Massachusetts Department of Environmental Quality Engineering specifically authorize conservation commissions to control activities that cause changes in drainage or sedimentation in areas qualifying for protection under the act.

The special purpose district most commonly exercises its regulatory authority through a permit system. As long as flood control, water pollution control, or drainage are within the scope of the district's enabling legislation, the district can assume a leading role in encouraging stormwater management. By amending its Sewer Permit Ordinance, the MSD of Greater Chicago, a special purpose municipal corporation with jurisdiction over sewerage throughout Cook County, has put into operation a countywide scheme to secure onsite detention of stormwater. The amended ordinance requires all developers in separately sewered areas

controlled by the MSD to provide stormwater detention facilities for their projected developments as a prerequisite to obtaining sewer connection permits. The MSD's ordinance has prompted construction of numerous detention facilities throughout the Greater Chicago area. Detention on private developments has been supplemented by publicly owned, multijurisdictional reservoirs constructed by MSD itself. The main beneficial effect of this detention program has been to reduce flooding during periods of high rainfall, but MSD officials are confident that onsite detention will also reduce rainwater seepage into sanitary sewers and septic tanks, thereby inhibiting overflow of sewage into the district's waterways.[74] It seems reasonable to conclude that detention will also retard erosion and reduce siltation of waterways.

Another possible organizational form for areawide water quality management is the river basin authority or commission, established by state legislature or by interstate compact. The Trinity River Authority in Texas and the Delaware River Basin Commission are examples of this type of institution. It may be empowered to accept grants and loans, issue revenue bonds, charge fees, and acquire land, all in accordance with the terms of its charter. River Basin Commissions created under the Water Resources Planning Act of 1965,[75] such as the New England River Basins Commission, are designed to carry out basinwide water and related land resource planning.

In order to be effective, however, basinwide institutions must have ability to influence development patterns. State and local governments have rarely been willing to yield any part of their authority over that subject, and there is little reason to expect that they will do so in the foreseeable future. Moreover, basin authorities and commissions would have drawbacks similar to those noted above in connection with special-purpose districts, unless political accountability and coordination with other governmental functions were assured through careful institutional craftsmanship.[76]

3.3.2 Local Governments

Local governments (town, city, county) exercise primary authority, through their police powers, to regulate activities causing pollution from stormwater. General-purpose local governments, such as cities and counties, usually have authority to construct and maintain sewers, drainage ways, and treatment facilities. Above all, local governments in many states enjoy a near monopoly over land use control, through their powers to administer zoning, subdivision, drainage, health, grading, and building codes. It is in the exercise of this authority that localities can control stormwater pollution at its source.

The town of Medford, New Jersey implements its program of erosion control primarily through its subdivision ordinance.[77] (Other components of

the land use control system, such as the master plan, official map, and ordinances on zoning, soil erosion control, noise control, and air pollution control, are now being revised to conform to the findings and implications of the Ecological Planning Study discussed earlier in section 2.2.) Adopted in 1974, the operative provisions of the subdivision ordinance specifically refer to the standards for environmental protection contained in the study. They require that, prior to subdividing land, the developer must supply detailed information explaining how he will meet those standards, what impacts his project will have on ecological systems and municipal services, and what measures he will take to avoid adverse impacts.[78] The subdivider is required to install, or to furnish performance guarantees for the installation of, whatever measures may be necessary "to prevent erosion and siltation during and after construction."[79] Permission to subdivide is preconditioned on meeting the foregoing requirements to the satisfaction of the planning board. Developers in Medford must pay application fees into a special fund which is used to defray the costs of reviewing their plans.

Planning boards seeking to impose runoff and erosion controls on subdividers should check the relevant enabling legislation to make sure they have the authority to do so. The stated purposes of subdivision control are frequently included in the enabling law itself--"protecting the health, safety or welfare of the inhabitants," "securing safety in the case of fire, flood, panic and other emergencies", "securing adequate provision for water, sewage and drainage"--and can perhaps be construed broadly enough to permit regulation of runoff. In the context of public welfare, "adequate provision for . . . drainage" may mean facilities not only for promoting runoff, but for controlling its rate so as to ensure minimum erosion and siltation during and after construction. Even so, the utility of subdivision control ordinances will be limited by (1) their failure to cover developments that are too small to qualify as subdivisions but which, in cumulative effect, may cause serious runoff problems; and (2) their failure to cover subsequent individual developments within a previously approved subdivision. A developer's erosion and sedimentation plan may control runoff from the roads he constructs through his subdivision, but not necessarily runoff from later site excavations, gradients, and driveways on lots he has sold for residences. Accordingly, subdivision control ordinances need to be supplemented by building permits that are conditioned in part upon acceptable erosion and sedimentation controls for individual sites, wherever these may be located.

Set in the foothills of the Rocky Mountains, the city of Boulder, Colorado experienced severe flooding and pollution from stormwater runoff because of its hilly terrain and increased urban growth. To manage these problems, the city adopted minimum requirements for onsite stormwater detention to which it added an incentive fee system.

In the first phase of the Boulder program, the city divided its drainage system into two distinct parts: (1) the major drainage system consisting of all natural channels, paths and outfalls; and (2) the secondary or collection system which carries runoff to the major system. Design criteria were then adopted by the city for the flood-handling characteristics of both parts of the system. The major system is designed to handle the 100-year rainfall, while the secondary system's components are designed for rainfall requirements according to land use and property value. The higher the value or the more sensitive the land use, the greater the frequency of the design storm that is selected as the standard. Next, the maximum allowable release rate of stormwater from temporary storage in detention facilities is computed by either the predevelopment runoff rate or the percentage of various types of land use areas planned within the proposed development. Design criteria for detention storage methods are then promulgated, including rooftop storage, detention in depressed areas of parking lots, and collection in wet wells and recharge areas.

These standards are implemented in part through subdivision and building code regulations. Subdivision plat approval in new developments is made contingent upon onsite stormwater detention facilities. Even if only a single building is being constructed, the developer must include such a facility in his plan before he can secure a building permit. Drainage design must be done by a registered engineer and plans are checked with the city engineer. Boulder has also adopted flood plain regulations limiting development in the 100-year flood plain to low-intensity uses.

Where a regional agency, such as the Chicago MSD, implements an areawide stormwater management program, it may still be possible for local governments within the area to supplement or stiffen the regional standards to fit particular local needs. The village of Mt. Prospect, Illinois, for example, has adopted a stormwater detention ordinance which for the most part copies requirements imposed by the MSD, but extends them to residential developments of five to ten acres as well. The Naperville, Illinois ordinance goes even further in requiring storage and controlled release for all developments of more than two and one-half acres.

3.3.3 Private Sector

Regulatory programs to control runoff frequently require private developers to pay for constructing such facilities as detention basins, bypasses, and sediment basins. Compliance with these regulations is secured by a number of methods, including subdivision and building permits, penalties, and court orders.[80/]

Apart from securing compulsory involvement of the private sector in stormwater management, localities might explore, to a greater extent

than many have done so far, the possibility of promoting voluntary cooperation from developers and landowners, especially in connection with the perennially difficult problem of maintaining permanent reservoirs.

A model for developing private institutional arrangements capable of protecting a valuable resource like a multifunctional reservoir may be found in the Wisconsin lake protection and rehabilitation law. 81/ This authorizes riparian landowners to form special districts with powers to gather data and to fund and implement a wide variety of protective and rehabilitative measures. Similar powers could be delegated to organizations like voluntary homeowners' associations entrusted with maintaining detention basins that offer communitywide benefits.

But where no specific resource or tangible benefit is offered to a community, and stormwater runoff is not generally perceived as a problem, it may be unrealistic to hope for substantial private commitment to controlling pollution from this source. The Brandywine Plan in Pennsylvania, for example, included an unworkable component of voluntary participation by private property-owners. To implement the plan, it was proposed that the District Water Resources Authority purchase easements from landowners, thereby restricting future development of their lands. While formal ratification by a number of participating townships would have been necessary to put the Brandywine Plan into operation, municipal consent could have been gained only if a substantial number of landowners in each sub-basin of the watershed had agreed voluntarily to sell easements.

The plan relied primarily on acquisition of easements, rather than on land use regulations, because it was thought that courts might not support curtailment of development rights and that zoning was too changeable and hence unreliable a tool. Also, in point of equity, the plan recognized that owners should be compensated for stringent restrictions placed on the use of their property for watershed or public protection. Outright public ownership, on the other hand, was deemed undesirable because it would lose tax revenues and increase administrative costs.82/ But opposition from landowners in the district ultimately led four of the cooperating townships to reject the plan entirely and two more to seek substantial modifications. The opponents, mainly rural landowners, felt that "the private costs of the land use controls outweighed the public and private benefits . . . [specifically] . . . sharing ownership of the land with government, foregoing the chance to speculate in the land market, and foregoing the chance to seek rezoning of their land for more lucrative uses."83/

It is worth noting, however, that the Pennsylvania law enabling less-than-fee acquisitions, drafted as part of the Brandywine Plan, was

used with some success in Bucks County, Pennsylvania to acquire easements around one of the reservoirs being built under the Small Watershed Protection Programs. Municipal opposition to these acquisitions was stemmed by the county's willingness to pay taxes on all properties it acquired until construction began or the lands were resold to private developers. The success of the Bucks County program must be attributed to the county's enlightened attitude towards environmental protection and to the competence and energy of participating planning agencies.[84]

Cooperation from the private sector also enabled the city of Glen Ullin, North Dakota to complete an ambitious erosion control system, including terraces, diversions, a sediment pond, and extensive grassed areas. Owners of land in the drainage area agreed to donate all necessary easements because they recognized that the system would benefit their cropland as well as the city.[85]

4.0 Formulation of Standards

4.1 Varieties of Standard

Fundamentally, pollution from stormwater runoff is a function of the degree and intensity of human development. To the extent that development itself can be restricted, especially on critical water-related lands--riparian zones, aquifers, wetlands, woodlands, steep slopes--pollution of all kinds can be avoided at the outset. (See chapter 3 on Locational Controls for Water Quality.) More commonly, development affecting critical natural resources is made subject to regulatory guidance and control, not prohibited altogether. For example, under North Carolina law, "[n]o land-disturbing activity shall be permitted in proximity to a lake or natural watercourse unless a buffer zone is provided along the margin of the watercourse of sufficient width to confine visible siltation within the 25% of the buffer zone nearer the land-disturbing activity."[86] This regulation specifies a site-development standard to be implemented through environmentally sensitive engineering, in order to assure that watercourses receive no more sediment than if bordering lands had remained undisturbed. The regulation thus exemplifies the two major types of standard to be explored in this subchapter: (1) specification or engineering standards; and (2) natural or environmental performance standards.

To the extent that ordinances regulating land use are cognizant of the need for stormwater management, they typically specify control techniques to be engineered into development plans. Basins for stormwater detention, surfaces of porous materials, buffer zones, and restoration of vegetative cover are examples of such techniques. These can be required, in more or less detail, without necessarily defining the results their employment is supposed to achieve in terms of environmental

functions or processes. Rather, it is assumed that if the designated techniques are employed, a satisfactory degree of environmental protection will consequently be achieved.

There is a trend in stormwater management away from specifying rigid engineering standards, but these are still encountered in certain settings. DURA, for example, has prescribed limits of one-half and of one inch per hour for drainage from plaza decks and rooftops, respectively. To enable developers to meet these limits, DURA recommends the use of a specially designed detention ring in conjunction with standard design drains and downspouts. Since all development subject to regulation by DURA occurs under essentially uniform conditions within a single downtown area, this type of regulatory approach operates both fairly and efficiently toward the limited objective of avoiding overload of the Skyline storm sewer system. A similar approach has been adopted under somewhat similar conditions in the Atlanta metropolitan area.

As a rule, specific engineering and design standards discourage innovation and may, if rigidly conceived, fail to permit sensible variations from one development to another. From the builder's or developer's viewpoint, however, such standards may present distinct advantages. Conforming to an exact set of standards makes approval by the supervising agency a near certainty. Private developers in the Skyline Project, for example, can easily satisfy DURA's detention criteria by incorporating the recommended detention ring into their rooftop design. Moreover, when all builders or developers must abide by the same design standards, the risk of arbitrary or unfair review by the evaluationg agency is vastly reduced. The administering agency, too, will find such standards easier to implement, with fewer and less-skilled personnel, than where the criteria to be applied call for expert judgment case-by-case. Specification standards are particularly appropriate when the problem to be solved is relatively homogeneous, when the technical solution is clearly indicated, and when the state of the art presents few alternatives.

Absent these special conditions, the governing laws and regulations may attempt to fall back on generalized criteria, such as requirements that "the disturbed area be kept to a minimum" in the process of development or that "sediment in the runoff water be trapped and retained on the project area."87/ Such criteria, however, are too vague to qualify as best management practices, and their vagueness makes them difficult to apply and enforce in particular cases. Usually, criteria of this sort are intended to guide the subdivision control agency in case-by-case review of plans submitted by developers. But to perform the necessary review effectively and evenhandedly across a range of cases calls for degrees of expertise, resources, and procedural due process that may well lie beyond the reach of many agencies. Without definitive standards to apply, an agency is in danger of making serious technical errors or of abusing its discretion, and may accordingly find itself embroiled in

repeated litigation. Vague criteria, then, are not enough. They should be supplemented by natural performance standards--to which we turn next--at least in settings where specification standards are infeasible, inappropriate, or unequal to the task.

In the context of site planning for development, performance standards can be articulated in terms of the natural functions of the land, such as its ability to retain or release runoff or to lose topsoil through erosion. These standards then form the foundation for the regulatory scheme.

> To develop this system of regulation, a community identifies the natural processes that are closely associated with public health, safety and welfare; that provide the community important benefits that are ignored through the private market mechanism. Specifically these are processes such as runoff, erosion and groundwater infiltration which are closely linked to maintaining public water supplies, preventing hazards from floods and droughts, preserving water quality in lakes and rivers and maintaining the natural resource of the soils themselves. The community then establishes a specific (preferably numerical) level at which the natural process should operate, and any development of the land must be done in such a way that the natural process continues to function at this level. In contrast to a specification approach, this kind of regulation does not require designated construction techniques or site planning, but allows the developer to choose his own system of guaranteeing that the natural processes continue to operate.[88]

Incorporation of environmental performance standards into land use regulations can afford considerable freedom to a developer to employ whatever control measures he wishes, so long as his siting and construction practices meet the prescribed standards. At the same time, use of these standards shifts the burden of persuasion from the regulator to the developer who proposes new techniques for maintaining natural functions at an acceptable level.

Regulations based on the natural performance approach have been used with varying degrees of success to control runoff and erosion, two natural processes of crucial import in stormwater management. As we have already noted above in section 1.0, runoff is a significant nonpoint source because it erodes exposed land surfaces and scours other pollutants into waterways unless its flow can be checked by appropriate control measures.

The measurable features of runoff are volume (varying with previous moisture conditions, the hydrologic character of the soil, and local conservation practices) and rate (primarily a function of rainfall intensity).[89] Nearly three decades of research have yielded quite

reliable formulae for estimating both rate and runoff. Six or seven different methods have been developed for determining the rate of runoff, ranging from the basic "Rational Formula" to newer methods, such as Beasely's,[90] which are more successfully applied to small geographic units.

The most satisfactory formula for estimating soil loss through erosion is the Universal Soil Loss Equation[91] developed by the USDA. It is used to predict the average annual soil loss that can be expected from a certain soil over a number of years. The equation has its limitations: for example, it relates erodability and soil loss only to topsoil, though much urban erosion is a function of subsoil.

Performance standards for runoff and erosion should be built upon an adequate data base that describes the natural features of the site, including soils, hydrology, geology, topography, and biota. Once baseline conditions are known, standards can be designed to allow development that preserves the natural functions of the area in which it occurs. The experience of Medford Township again illustrates this procedure in its most complete form.

Proceeding on the basis of conclusions reached in its Ecological Planning Study, Medford Township has incorporated a natural performance standard into its runoff control regulations. The Medford regulations with respect to runoff specify that no alteration is to be permitted of "the amount of surface runoff presently occurring, both under normal precipitation as well as under intense storm conditions, as identified in the Runoff Management Chart . . . excess runoff to be recharged locally into the ground through the use of recharge ponds or injection wells."[92] The Runoff Management Chart correlates vegetative cover type, soil type (in terms of runoff and infiltrative capacity), and relevant land use categories (e.g., one-acre residential, one-quarter-acre residential, intensive urban), with excess runoff in inches produced during the most intense hour of a 10-year recurrent 24-hour storm, and with percentage of site area required for withholding that excess in order to allow its infiltration locally within three hours. The three-hour limit is deemed practicable in terms of the space required for rainwater detention in suburban development. A separate hydrological map shows current and permitted runoff for each area of the town, as well as outcrops of important aquifers to be protected by prescription of low runoff rates.

Medford's Ecological Planning Study involved a costly degree of detail and calibration. But the existence of several reliable methods for calculating runoff rate and volume makes it possible to use the natural performance standard in runoff control without developing as extensive a data base as was compiled for Medford Township. The Chicago MSD, for example, frames its detention requirement in terms of a natural performance standard, even though there exists no districtwide equivalent

of the Medford Runoff Management Chart. MSD's sewer permit ordinance simply requires that:

> Effective January 1, 1972, no permits shall be issued for sewer construction in unsewered or separately sewered areas when construction of the facilities to be served by the proposed sewer would result in runoff [from the site] in excess of that from its natural or undeveloped state.

The Rational Formula is then used to compute the allowable release rate from the proposed development site and the appropriate volume of onsite storage.

The performance standard for runoff may be linked to features other than the predevelopment runoff from a given site. Thus, the Naperville, Illinois ordinance (developed consistently with the MSD ordinance) ties the release rate of runoff to the capacity of the watershed drainage system:

> The controlled release rate of stormwater runoff from . . . developments . . . shall not exceed the existing "safe" storm drainage capacity of the natural downstream outlet channel or storm sewer system. The release rate shall be an average value computed as a direct ratio of the tributary watershed area. This value shall not exceed an average runoff rate of 0.15 inches per hour which is compatible with the "safe" capacity of the West Branch of the DuPage River and the Des Plaines River. The rate at which storm water runoff is delivered to a designated storm water storage area shall be unrestricted.

In the Wissahickon Watershed of Philadelphia, on the other hand, new development is controlled as of 1975 under an ordinance that limits allowable impervious ground cover. The restriction varies in different areas of the watershed depending upon the specified potential impact of site development on nearby streams. If a site is located in a 20 percent allowed coverage zone, and more coverage is called for in a developer's plans, he will not receive permission to develop unless his plan shows that he will install countermeasures to control runoff from the excess impervious area.

Unlike standards for runoff control, allowable rates of soil loss, though exemplifying the concept of natural performance in general, do not usually vary according to the natural features of particular sites. Medford Township, for example, has a regulation uniformly restricting allowable soil loss to three tons per acre per year at all times including all stages of development. This is by reference to indicators of mapped

potential soil loss, which is a function of soil texture, moisture conditions, and steepness and length of slopes. The three-ton limit was recommended by USDA as capable of being met through feasible interceptive devices, such as check-dams, silt trappings, levees, or terracing at or near the site. Actual soil loss, expressed as a percentage of potential soil loss for particular types and degrees of vegetative cover, is calculated in accompanying charts. The standard itself does not vary; the type and degree of control required to meet it does. In contrast, an ordinance of Leon County, Florida[93] requires, in effect, that there will be no greater sediment load in runoff from construction sites and finished developments than would be the case under natural conditions. Here, the permitted level of soil loss may vary from one site to another.

The North Carolina SCC's rules and regulations on erosion and sediment control show exceptional sophistication in the use of performance standards. To begin with, the commission exempts developments from certain technical requirements where the developer can meet the desired performance standard for erosion without the use of technical improvements. Thus, detention storage and controlled release of runoff are not required "in those instances where the person planning to conduct the activity can demonstrate that the storm water release will not cause an increase in accelerated erosion or sedimentation of the receiving stream or other body of water . . . ."[94] On the other hand, the commission is prepared to impose stricter technical standards on individual developments where compliance with general requirements fails to reduce sedimentation to a satisfactory level:

> Whenever the Commission, or a local government having jurisdiction, determines that significant sedimentation is occurring as a result of a land-disturbing activity, despite application and maintenance of protective practices, the person conducting the land-disturbing activity or the person responsible for maintenance will be required to take additional protective action.[95]

These provisions reflect the commission's willingness to depart from fixed technical standards whenever the central objective of meeting the performance standard requires such a site-specific adjustment.

Despite the advantages of a natural performance orientation in runoff and erosion control, this approach carries undeniable costs for the administering agency. Where the developer is free to select technical measures for reducing runoff and preventing erosion, the plan reviewer must exercise a great deal of judgment to make sure that the proposed plan will meet desired standards. Proper implementation will also require close supervision during the construction stage, when most technical improvements are installed. Lack of expertise, money, or manpower can easily undermine an agency's efforts to implement a performance standard.

This was the experience of officials in DeKalb County when strict drainage regulations were adopted in 1972.[96] Without resources to review development plans thoroughly or to inspect construction sites frequently, the county was initially unable to enforce the drainage ordinance effectively. Enforcement was also hampered by the fact that county police permitted no public interference with watercourses on private land to which there was no public right of entry.[97]

Performance standards are frequently incorporated into land use regulation through the vehicle of impact zoning. Impact zoning is

> [a] process of land use analysis that measures the consequences of changes in a community in terms of demands related to the capacities of the natural, physical, market and fiscal systems. [To be] legally defensible, [it] requires definitive performance standards related to public health, safety and welfare, as well as a proper legislative and administrative framework for negotiation between town and public or private developer.[98]

Following this approach, the community adopts an ordinance under which each proposed development--residential, commercial, or industrial--will be evaluated for its impact on environmental quality and on municipal services designed to maintain it. Development will not be permitted unless it meets environmental standards. The particular manner of meeting them need not be prescribed, but can be evaluated case-by-case, depending upon the nature of the development proposed. Such schemes are usually implemented through existing zoning authority and special permit procedures, as under an ordinance adopted in Duxbury, Massachusetts.[99] Assessment of environmental impacts is also required under the Project Impact Evaluation System of Fairfax County, Virginia.[100] A regulatory agency with the expertise and manpower to evaluate proposals competently might consider controlling runoff from proposed developments through such an ordinance. Without adequate resources, however, the agency may encounter severe implementation problems, as noted above in connection with runoff control in DeKalb County.

Ordinances controlling runoff or erosion often require that suitably qualified professionals participate in producing the development plan. The DeKalb County code, for example, specifies that "[g]rading, erosion control, sedimentation control and drainage plans shall be prepared by and implemented under the supervision of a currently state registered professional architect, landscape architect, engineer or combination as may be appropriate for project planning and design." In the same vein, the erosion and sedimentation control ordinance of Washington County, Maryland requires that development plans "shall be prepared and approved or signed by a Professional Engineer, Land Surveyor, Landscape Architect, Architect, or other persons acceptable to the Board."

Plan preparation by qualified experts becomes particularly desirable where the ordinance itself does not rigidly specify what control techniques should be used by developers. Moreover, the regulatory agency's task of plan evaluation may become less burdensome if the agency can rely on expert certification to the effect that necessary control measures have been included in the plan. Requiring that experts be registered, licensed, or otherwise approved by the state assures that minimum professional standards will be maintained in plan preparation. Participation by professionals outside the agency could become even more useful if the agency made its policies and standards for nonpoint source control generally known to private architects and builders through a design manual or other similar publication. Penalties for negligent or fraudulent certification might be helpful under some circumstances.

A natural performance-oriented approach to runoff management need not imply complete abandonment of specification standards. Indeed, it may often be necessary to specify detailed design criteria in order to assure that control facilities will be safe, aesthetically pleasing, and efficient over periods of continued use. A good example of specification standards in support of performance objectives may be seen in Naperville's runoff control ordinance.[101]

4.2 Expression of Standards - The Regulatory Framework

Having arrived at a proper blend of performance and specification standards, the planning body must find a suitable regulatory framework for implementing them. Compliance with standards is most commonly secured by means of an ordinance. In a community where earth-moving or runoff-promoting activities take place under uniform conditions and are susceptible to particular controls, it may be worth specifying the controls in the ordinance itself. In many newly urbanizing areas, however, specificity and resulting ease of administration will have to be sacrificed in order to allow for variations from one site to another. So, for example, the Chicago MSD, which encompasses parts of several watersheds, could not hope to specify a precise set of controls to be used on all new developments in its jurisdiction. Accordingly, the MSD adopted a performance standard which developers may meet with the aid of control measures best suited to their particular development.

One technique frequently encountered in the field of stormwater management is adoption of an ordinance setting forth the program's policies and objectives and supplementing it with guidelines or manuals that specify in detail how developers should proceed.

Guidelines offer a more flexible way of influencing behavior than outright regulation, but unless they are openly advisory in nature, their use may be questionable on due process grounds. If a "guideline" is in fact

a requirement, then it ought to be adopted by whatever formally established procedure the jurisdiction has for rulemaking, especially where a regulatory purpose is sought to be achieved by means of guidelines. If such safeguards are not observed, regulations masquerading as guidelines could create considerable uncertainty and open the way to arbitrary action by the regulatory authority.

New Jersey and Maryland both supplement their erosion and sedimentation laws with manuals of standards developed by agencies of state government. The merit of this approach is that the manuals can be updated as technical improvements occur in the field of erosion control, without a need to amend the ordinance itself. At the same time, developers will receive detailed, technical guidance in carrying out their responsibilities under the statute. Similarly, the Engineering Department of the MSD's Local Sewerage Systems Section has developed a Manual of Procedures and a set of forms to assist municipalities within the district in implementing the sewer permit ordinance.[102] This manual spells out design standards and administrative requirements for issuance of sewer permits and explains procedures for permit application. In addition, the MSD has put together an information pamphlet to be used by engineers and architects in computing for a given development the allowable release rate, the required storage capacity, and the appropriate size of a bypass system to conduct the flow from upstream areas.

Another practice, expecially prevalent in regulatory arrangements to control erosion, is to provide in the ordinance a set of principles or policies by which new developments are evaluated. The erosion and sediment control section of the DeKalb County Code, for example, recites the following:

> It is hereby declared to be public policy to:
> (1) Minimize the removal of vegetation,
> (2) Minimize the exposure of bare earth to precipation by encouraging the scheduling of land development in increments of workable size which can be completed within a single construction season or within a time period compatible with the type and size of the project.
> (3) Provide for the re-establishment of vegetation within a reasonable period following completion of a final grading and utility installation.
> (4) Give priority to the paving of streets, parking lots and other areas within a reasonable time following completion of final grading.

The developer is free to select the combination of measures that will best further these policies. The advantage of this regulatory model is that it allows the development process to be more or less strictly controlled depending on particular site characteristics. Builders on sites with high erosion potential will naturally have to install more stringent control measures to satisfy the objectives of the ordinance.

The model will only operate effectively, however, when agency personnel are capable of evaluating varied development plans, of judging their acceptability with respect to particular topographic conditions, and of administering policies evenhandedly across a range of cases (see discussion in section 4.1).

Under appropriate circumstances, a community may wish to establish only a minimum set of standards by ordinance, leaving room for more specific adjustments where necessary. This approach is especially desirable in an areawide regulatory scheme that has to allow for varied types of development. When the ordinance merely sets minimum standards, various techniques may be used to achieve stricter regulation on particular sites or in particular communities. In the Chicago sanitary district, for example, participating municipalities are encouraged to develop their own stormwater management regulations, tailored specifically to development patterns within their political boundaries.

Several municipalities have extended onsite detention requirements to developments of smaller size than those to which the MSD ordinance applies. Naperville has added fairly precise design requirements to the underlying performance standard. The city of Boulder requires all new developments to provide onsite storage for a five-year rainfall. In addition, a monthly service charge is levied against every lot (single-family residences are excepted) to pay for maintaining the public drainage facilities. This charge is reduced if the developer designs his detention facilities for a 10, 20, or 100-year rainfall, thus creating an economic incentive to adhere to stricter standards. The Iowa sediment control law (mentioned earlier in section 3.3.1) relies on a privately initiated complaint procedure to achieve stricter regulation in certain settings.

A somewhat unusual approach to regulating stormwater runoff is illustrated by the Michigan Environmental Protection Act. This law authorizes courts to grant remedies reasonably designed to protect natural resources upon a plaintiff's showing that the defendant's conduct is reasonably expected to cause pollution. The statute itself spells out no control measures for the courts to adopt in particular situations. In Irish v. Green,[103] a Michigan court acting under this statute ordered a defendant to install appropriate measures, including sodding, surface water dams, and reservoirs, to prevent erosion damage to plaintiff's property. Private litigation may be a useful way to supplement a comprehensive stormwater management plan, but reliance on litigation cannot be recommended in view of the expenses, delays, and uncertainties of adversarial judicial process.

5.0 Implementation and Enforcement

To assure the proper functioning of the selected regulatory scheme, the section 208 agency should carefully consider how compliance will be

secured, both during development and afterwards.

It is possible, of course, to have an ordinance that attempts to regulate runoff from new developments without the aid of any enforcement strategy. The regulatory objectives will not necessarily be accomplished, however, unless an enforcement mechanism (permit, penalty, etc.) is built into the regulation. Standards are not self-executing. For all practical purposes, an ordinance lacking enforcement provisions is no more than a policy statement which developers may ignore with impunity.

5.1 Compliance Monitoring During Development

Implementation of standards for runoff and erosion can and should begin before the start of actual construction. One very effective way of accomplishing this is to combine pure regulation with a permit system under which development plans are individually scrutinized to assure compliance with the requirements of the ordinance. Numerous examples of this technique may be cited from the field of runoff and erosion control, among them the Medford subdivision approval and the MSD sewer connection permit, as well as the two-step building plan approval for the Denver Skyline Project.[104] In implementing a control program for nonpoint source pollution, a regulatory approach that incorporates a permit system offers several specific advantages. To begin with, a permit system makes it impossible for the builder to embark on earth-disturbing or other runoff-prone activities without making himself familiar with the governing ordinance and following its requirements. In a flexible regulatory environment, the permit system also allows for the tailoring of specific control requirements to the peculiarities of the individual site and development plan, and makes the developer accountable at an early stage for any new technical strategies he may want to employ. Finally, the permit system can be combined with other devices (performance bonds, permit revocations, administrative orders) that induce compliance throughout the construction phase.

It is worth noting, however, that no matter how attractive a permit scheme may appear in theory, it will be worth rather little if it breaks down in practice. This may happen when the administering agency lacks a staff of suitably trained personnel, as was apparently the case in DeKalb County between 1970 and 1972. Breakdowns are also to be expected when the load of applications is too great for the supervising agency to review with due attention. The Chicago MSD, for example, issues about 1,000 sewer connection permits per year, and for the vast majority of applications, permit issuance has necessarily been reduced to an administrative formality. If the pressure of development increases in the region, the MSD's procedure could eventually turn into an automatic rubber-stamping routine.

Controls on land-disturbing activities are frequently built into the process of granting subdivision approval. Regulation at this stage may be quite effective in assuring proper grading and paving of streets, but may have no impact upon development on individual sites. The necessity for control at this second stage of development should not be overlooked. Improper site preparation and driveway design can contribute significantly to nonpoint source pollution. Performance standards for runoff and erosion should be imposed on builders by requiring them to plan for controlled release of stormwater and reduction of soil loss as a precondition to obtaining a building permit (see discussion above in section 3.3.2).

The enforcement techniques that can most easily be worked into a permit system are the performance bond and the certificate of completion. Both are highly desirable devices for securing compliance during construction because neither seriously strains the resources of the supervising agency. The performance bond or escrow account[105/] draws on the builder's own financial resources to assure that, in case of default, money will be available to complete the project according to specifications. The amounts involved can be quite substantial, e.g., six to ten percent of the construction cost in the Denver Skyline Project. The certificates of completion, issued after a building has been built and before it can be put to its appointed use, gives the enforcing agency a chance to monitor compliance again at the end of the construction phase. Performance bonds and certificates of completion have been used successfully to promote onsite detention in Boulder and in Denver.

An interesting, and apparently effective, variant on the foregoing approach has been evolved by DURA for developments in the Skyline area. By agreement with DURA, Denver banks will not grant the developer favorable interest rates on his construction loan until DURA signs the certificate of completion, thereby finally deeding the development site to the developer. This strategy, of course, is most effective where the public agency originally owns the land on which private development takes place.

Performance bonds should not be thought of as substitutes for onsite inspections during construction. Indeed, effective regulatory programs often employ both techniques. DURA's project manager and his staff, for example, provide ongoing surveillance and supervision during construction in the Skyline area. Spot inspections are a good solution to the problem of inadequate manpower in compliance-monitoring before development is completed. Under North Carolina law, "the approving authority, either the Commission or a local government, shall provide for periodic inspections of the land-disturbing activity to insure compliance with the approved plan, and to determine whether the measures required in the plan are effective in controlling erosion and sediment . . . . Notice

of such right of inspection shall be included in the certificate of approval for the plan."[106] The corresponding regulations assert, in typical form, the commission's "power . . . to enter at reasonable times upon any property, public or private, for the purpose of investigating and inspecting the sites of land-disturbing activities."[107]

A variety of administrative and judicial proceedings may be brought to bear against developers who violate ordinance provisions during construction. These require substantial expenditures of time and money, and should be used as backstop enforcement devices when performance bonds and spot checks fail to produce satisfactory results. Early administrative action usually takes the form of a notice to comply, setting forth all necessary remedial measures and a time limit for accomplishing them.[108] This may be followed by an administrative order to stop work on the project until compliance has been achieved.[109] Finally, a penalty can be assessed against a continuing violator. For example, the North Carolina Sedimentation Pollution Control Act (SPCA) subjects violators to a civil penalty of not more than $100 for each violation and authorizes the appropriate supervising agency to make a written demand for payment on the alleged violator.[110] The developer must pay or otherwise settle the matter within 60 days in order to escape judicial action.

Permit revocation is another powerful enforcement weapon available to many administrative agencies.[111] The detailed enforcement sections of the Leon County erosion control ordinance, for example, authorize the Board of County Commissioners to revoke a development permit upon a finding that the permittee has proceeded with work on the project while under a valid stop work order.

Criminal penalties and injunctions may be invoked against recalcitrant developers if administrative sanctions prove inadequate. Provisions such as the following from the North Carolina SPCA obviously carry considerable clout:

> Any person who knowingly or willfully violates any provision of this Article or any ordinance, rule, regulation, or order duly adopted or issued by the Commission or a local government, or who knowingly or willfully initiates or continues a land-disturbing activity for which an erosion control plan is required, except in accordance with the terms, conditions, and provisions of an approved plan, shall be guilty of a misdemeanor punishable by imprisonment not to exceed 90 days, or by a fine not to exceed five thousand dollars ($5,000), or both, in the discretion of the court.[112]

Cases brought under this type of provision will in most instances be settled before the matter actually comes to trial, but the threat of criminal prosecution and heavy fines may well induce the developer to

complete work according to the approved plan.

Penalty provisions are frequently supplemented by procedures for injunctive action, as in the sediment control ordinance of Montgomery County, Maryland:

> Any person violating the provisions of this Chapter shall be guilty of a misdemeanor, and upon conviction, shall be subject to a fine of not more than one thousand dollars for each and every violation . . . . In addition thereto, the County may institute injunctive, mandamus or any other appropriate action or proceedings at law or equity for the enforcement of this Chapter or to correct violations of this Chapter, and any court of competent jurisdiction shall have the right to issue restraining orders, temporary or permanent injunctions or mandamus or other appropriate forms of remedy or relief.[113]

Needless to say, the enforcement measures described in this section should not be regarded as mutually exclusive. On the contrary, an effective enforcement strategy would make use of a combination of the remedial measures discussed here to apply pressure on developers before, during, and after construction on a given project.[114]

5.2 Enforcement of Maintenance Obligations

The section 208 management agency may well be hampered by scarce resources when it seeks to assure compliance with ongoing maintenance requirements for completed detention and erosion control facilities.[115] Permanent reservoirs must be protected against sedimentation, algal growth, mosquito breeding, and erosion of banks; other types of detention will carry their own characteristic maintenance burdens. As a rule, storm-water management agencies have failed to find workable solutions to these continuing maintenance problems.

In drafting an ordinance on runoff management, it is extremely important to allocate the maintenance burden exactly. Where the ordinance is not explicit on this matter, courts may hold the private developer and the public agency jointly responsible. In Robert L. Anthony, et al. v. Department of Environmental Resources and Springfield Associates,[116] for example, the Pennsylvania Environmental Hearing Board stated that the department and the developer should develop a joint monitoring program to deal with maintenance problems.

Regulations allocating maintenance responsibility tend to be considerably less detailed than provisions dealing with compliance monitoring during construction. The following language is fairly typical: "Persons carrying

out soil erosion and sediment control measures under this Ordinance, and all subsequent owners of property concerning which such measures have been taken, shall maintain all permanent anti-erosion devices, retaining walls, structures, plantings, and other protective devices."[117] The Chicago MSD approaches the issue from a similar point of view, although the formal assignment of responsibility works a little differently in the district. The MSD's permit authorizing construction of a sewer connection is automatically replaced by an operations and maintenance permit which makes the permittee responsible for maintaining all onsite detention facilities. As long as the development continues to use a sewer system within the MSD's jurisdiction, the MSD has authority to inspect the detention system for compliance with maintenance standards. Since the MSD's sewer construction and operation permit is technically issued to the municipality in which development occurs, the MSD has formal recourse against this primary permittee when a violation occurs. Neither the MSD ordinance nor the Washington County ordinance, however, takes realistic account of changes in ownership and management of facilities and of situations involving multiple owners.

In practice, maintenance responsibility for detention or erosion control facilities can fall on different entities, depending on the type of facility involved. When a detention basin is included in a planned unit development, title to the property usually passes to the homeowners' association, along with the obligation to maintain it. Similarly, permanent detention ponds in commercial or industrial parks are maintained by the owners of establishments in the park or by their lessees. Large, permanent facilities may be maintained by the municipality or by a regional park district, but municipal authorities are often unwilling to assume this role unless the facility offers substantial benefits to the community.[118] More than one municipal government may be responsible for maintaining a multijurisdictional detention basin such as the reservoir now planned to accept drainage from Mt. Prospect and Arlington Heights. No a priori formula exists for allocating such responsibility. In this instance, the two municipalities hope to work out a simple, equitable arrangement, perhaps with one municipality agreeing to cut grass and keep fences and banks in good repair, while the other cleans the water and maintains the pumps. Whether such an agreement would prove effective in the long run remains an unanswered question.

There are, in effect, only two ways of approaching the maintenance problem: either the public agency must do the job itself or else incentives must be offered to encourage the appropriate private entity to perform the task. Public maintenance will frequently be the most acceptable solution because it avoids the tangle of joint ownership and absentee owners. The principal disadvantage of this approach is that the regulatory agency must devise a scheme for funding and staffing the program. It has been noted above that general revenue sources, such as property taxes and bonds, are not especially good funding techniques for this type of expense.

Permit fees are a steady source of income that could theoretically be applied towards financing maintenance oeprations. It is not at all clear, however, that these revenues could ever be adequate to cover the costs of continued maintenance. Montgomery County, for example, cannot finance its annual administrative expenses, including plan review and inspections, entirely out of income from application fees, even without paying for maintenance. Penalties or fines have not in the past been widely used to cover such costs,[119] and penalty proceeds could easily prove too irregular or too insubstantial. User charges or effluent charges, such as Boulder's drainage fee, may be the most reliable source of funds for this purpose, especially where the class of benefited users is clearly defined. User charges may thus have their chief application in maintaining large reservoirs or public drainage systems. Of course, if the benefit conferred is communitywide, it may make sense to fund maintenance costs out of property taxes instead.

For small detention facilities, it has generally been assumed that the private interest in maintaining the value of property will be a sufficient incentive for cleaning and repairing the facility as needed. On the other hand, the experience of MSD officials suggests that some owners or lessees will not bother to keep their facilities in good working order unless they are subjected to periodic official inspection and threats of enforcement action. It may be impractical for a section 208 agency to design an independent, building-to-building inspection program simply to check the condition of small detention facilities. A realistic alternative could well be to piggy-back inspections of this sort upon existing, regularly scheduled inspections of elevators or fire alarm systems.

Another promising technique for pressuring private developers to maintain detention facilities has been tried out in Palatine, Illinois. The village of Palatine enters into written agreements with developers stipulating certain ownership, maintenance, and operation requirements. The agreement provides that the owner will be primarily responsible for maintenance, but that if his work is unsatisfactory, the village (after proper notification to the owner) will perform the needed maintenance operations and place a lien on the property to cover expenses. This agreement remains in force until the facility is completed, at which time the village assumes all maintenance obligations. There is no apparent reason why such an agreement should not remain effective even after the construction is completed.

A close approximation to this technique, with the time limit removed, is found in the emergency maintenance provision of the DeKalb County Code. This section authorizes the roads and drainage director to conduct emergency maintenance operations on private land whenever he finds that emergency conditions exist. These operations, however, are limited to "removal of trees and other debris," and no mechanism is provided for

collecting costs from the private owner. DeKalb County officials were apparently concerned that performing major repairs on private land would create a continuing maintenance obligation on the part of the county.

When the party responsible for maintaining a detention facility is easily identifiable, he can be subjected to enforcement proceedings just as a developer can during construction. If he fails to perform his maintenance obligation adequately, he may have to pay a fine or face a court order. Revocation of an operation and maintenance permit may be an alternative remedy in rare instances. In addition, private property-owners may become liable to neighboring landowners for damage caused by inadequately maintained detention systems. Damages have been awarded to private plaintiffs in the past when their property was harmed by overflow from defendant's negligently maintained drainage ditches.[120] Inadequate maintenance of stormwater detention facilities may also lead to flooding of adjacent properties, thus giving rise to an action for damages. More frequently, faulty maintenance will result in insect breeding, unsightly algal growth, or other offensive consequences, against which injunctive relief may be available in a cause of action for nuisance.

Stormwater management ordinances should spell out in some detail what remedies are available to private plaintiffs. North Carolina's erosion control law, for example, permits any injured party to seek injunctive relief or to sue for damages.[121] Provisions in the same law for double damages where actual damages are less than $500 and for award of litigation costs to either party protect the interests of litigants with relatively minor complaints.

A final point worth noting in this connection is that not only private landowners, but also municipalities may become liable when a detention or drainage system malfunctions. In Calamari v. Town of Glastonbury,[122] a Connecticut court held the town responsible when a drainage system constructed by a private developer according to plans modified and approved by the town's engineer caused a stream on plaintiff's property to fill beyond its usual capacity and to overflow. The town was found liable in this case even though there seems to have been no negligence on the part of the town engineer. This decision, if widely followed, would set an extremely high standard of care for section 208 management agencies at the plan reviewing stage.[123]

6.0 Legal Issues

A comprehensive stormwater management program should be drafted with an awareness of due process considerations if it is to survive challenge in the courts. The issuance, denial, or revocation of a development permit are actions that impinge seriously on the developer's property rights. Accordingly, it is important that these administrative actions

be surrounded by proper procedural safeguards. Most agencies entrusted with stormwater management now recognize this need, and erosion and runoff control ordinances usually include provisions for notice and hearing when an enforcement action is begun[124/] and for rights of appeal from adverse administrative decisions.[125/] Rules and regulations adopted by the North Carolina SCC recognize plan disapproval or modification as especially sensitive types of agency action entitling the plan submitter to a public hearing before the commission.[126/]

Measures for detaining stormwater or preventing erosion must be reasonable if they are to be approved as valid exercises of regulatory power. The reasonableness requirement assumes greatest importance when a particular measure or regulatory objective seems inherently unfair. For example, the Chicago MSD has compensated for poor planning before 1972 with regulations that may seem inequitable from the standpoint of the post-1972 developer. He must provide for drainage from previously developed upstream areas in calculating the storage capacity for his own development. In other words, he must provide storage for runoff attributable, at least in part, to developments that escaped the requirements of the MSD's amended ordinance. Furthermore, any new bypass system he constructs must be large enough to accommodate the flow from fully developed areas upstream, even when no development has actually taken place there. Provisions like these may need special justification, even though they offer the only realistic means of controlling runoff in areas where prior unregulated development has created serious drainage problems.

An agency should be able to demonstrate the reasonableness of its regulations. In the first place, it should be prepared to show, through careful data compilations and planning studies, that its regulatory requirements further the community's overall water quality objectives. Secondly, it would be useful to show that no practicable alternative exists. For example, the MSD could not, in all probability, impose detention requirements on existing developments completed before the 1972 amendment went into effect. Instead, it must rely on new developments to compensate for earlier planning failures. But third, MSD's requirements (or similar ones elsewhere) would not be so questionable on constitutional grounds if the serviced owners of upstream properties had to pay their fair share of downstream control costs.

Regulatory schemes calling for stormwater detention may also raise the potentially vexing issue of taking property without compensation. This question would most commonly arise when a developer is required to set aside land for a detention basin, but it might also be raised when the cost of installing any facility is perceived to be excessive. The taking issue can always be sidestepped if the landowner is compensated for property he dedicates to public use, but systematic compensation will in most cases prove too financially burdensome for the administering agency. The water quality management agency should

therefore become generally familiar with the law of takings and with strategies for avoiding litigation on this issue. Stormwater management is too new a regulatory field to have generated its own case law on takings, but guiding principles can be drawn from other categories of land use regulation.

The basic constitutional test governing the subject of takings was set out in Pennsylvania Coal v. Mahon.[127] Under that decision, a court must weigh the public benefits of regulation against the private loss to determine whether the regulation operates as a taking in the particular case. When the public interest is strong, there may be almost no limit to the loss that can be occasioned to the private property owner. In Turnpike Realty v. Town of Dedham,[128] for example, the Massachusetts Supreme Judicial Court upheld flood plain regulations that allegedly reduced the value of plaintiff's property by 80 percent. Here, the purpose of safeguarding the community against the economic and physical dangers of unrestricted development in the flood plain proved weighty enough to prevail against a very considerable private loss.

However, where the purpose is simply to preserve plaintiff's land in its undeveloped state or to secure the land for a public facility without compensation, courts may treat the regulation less leniently. In Baker v. Planning Board of Framingham,[129] for example, the board's refusal to grant subdivision approval to plaintiff was not sustained when the only reason for the refusal was that the proposed subdivision would have deprived the town of land that had been functioning as a floodwater retention basin. But in Just v. Marinette County,[130] it was held that the state of Wisconsin could exercise its police power to preserve its wetlands in their "natural" state, where development would pose a threat to water quality, navigation, fishing, and scenic beauty.

On the issue of whether a developer may be required, without compensation, to dedicate space for a detention facility, analogies may be drawn from cases concerning land dedication for other public purposes. One thread that runs through these cases is that the dedication is most legitimate where the need for the land is directly and solely attributable to the activities of the particular developer. (See Aunt Hack Ridge Estates, Inc. v. Planning Commission of the City of Danbury.[131] In contrast, compulsory dedication for a public school was disapproved in Pioneer Trust & Savings Bank v. Village of Mt. Prospect,[132] where the need for additional public school facilities was not uniquely attributable to the addition of the new subdivision. In general, this judicial stance fits well with the performance orientation in stormwater management, since the philosophy of this approach is to make the developer correct only the imbalances he himself introduces into the ecological system. The result in Pioneer Trust may, however, raise questions about the desirability of regulations (like the MSD's detention requirements)

that force the developer to compensate with extra storage capacity for the drainage failures of tributary development. Without necessarily being unconstitutional, those regulations may prove unexpectedly costly if the administering agency is called upon to defend them in court.

Even when the water quality management agency is forced to adopt a relatively vulnerable regulatory position, agency officials can pursue certain strategies to save their programs against constitutional challenge.[133] Most valuable is the technique of supporting regulations with careful draftsmanship and thorough compilations of relevant data, which may succeed in defining and strengthening the regulatory purpose to such a degree that it outweighs individual losses under the Pennsylvania Coal balancing test. As a practical matter, the courts have time and again upheld regulations as nonconfiscatory where the agency has convincingly shown a need for the regulation in terms of public health, safety, or welfare.[134] Where the agency has been unable to make this showing, quite similar regulations have been held to be takings.[135]

Water quality management agencies should remain alert to possibilities of resolving potential constitutional disputes outside the courtroom through negotiation. This technique has been successfully employed by agencies with power to control land use. For example, the San Francisco Bay Conservation and Development Commission, whose powers to control development in areas adjacent to the bay were judicially affirmed in Candlestick Properties, Inc. v. San Francisco Bay Conservation and Development Commission,[136] attempts to reach accommodations with developers wherever possible. Recently, the commission worked out an agreement allowing four acres of fill in the northwestern part of the bay in exchange for dedication of 365 acres to the Conservation Foundation. Imaginatively conceived tradeoffs like this may forestall expensive and embarrassing litigation. The role of conversations with developers should also not be underestimated. The MSD has found informal discussions particularly useful as a means of warding off formal challenges to its detention and bypass requirements.[137] The North Carolina legislature considered this technique so important that it provided for regular preconstruction conferences among "affected parties" in the preamble to the state's Sediment Pollution Control Act.

7.0 Effectiveness of Existing Stormwater Management Programs

The preceding sections have concentrated on regulatory approaches designed to control runoff at different points in the hydrological cycle and to achieve and maintain performance standards with respect to runoff and erosion. Many of these programs will achieve success only if they meet with general public acceptance. This final section will survey briefly techniques that have been used in the past to gain public approval of stormwater management regulations.

Public acquiescence in a stormwater management program is critically important during the initial phase in which controls are adopted, but continuing public acceptance is also needed to permit implementation of the policy without serious challenge. Jurisdictions that have employed regulatory procedures for stormwater management have shown considerable awareness of the need for public involvement and have used various methods to publicize their programs. The MSD of Greater Chicago, for example, appointed a special blue ribbon committee, composed of a cross-section of local citizens, government officials, builders, and engineers, to assist in the formulation and adoption of section 3(B) of the sewer permit ordinance. The same committee also helped develop the manual of procedures for administering the ordinance. Occasionally, the composition of the regulatory agency itself may reflect an effort to reconcile various conflicting interests; North Carolina's Sediment Control Commission may serve as a model in this context. DURA's plans for the Skyline Project were approved by both the Denver Planning Office and the City Council as being in the best interests of the city's overall development. Other techniques considered useful by officials at DURA, MSD, and elsewhere have included informal discussions with developers before formal plans are submitted, and information pamphlets designed to acquaint architects, engineers, and home builders with the substance and purpose of stormwater control regulations.

Direct education of the public on the benefits of particular runoff control measures can be extremely effective, especially where participation by many individuals is needed to achieve the regulatory purpose. A good example of a successful direct appeal to the public was the letter campaign by which the Springfield Sanitary District carried out its downspout disconnection program. Although initial resistance to the program was high, eventually a very high percentage of homeowners complied. Many citizens who did not respond to letters threatening legal action reacted favorably to the final letter, which appealed to their public spiritedness without referring to enforcement.

CHAPTER SIX

MANAGEMENT OF STORMWATER AS A NONPOINT SOURCE IN URBAN AND URBANIZING AREAS

FOOTNOTES*

1. In terms of sheer volume, sediment ranks above domestic sewage, industrial wastes, and chemicals as a major cause of water pollution. Annual sediment deposits in the nation's reservoirs amount to approximately 950,000 acre-feet, or nearly five times the total volume excavated in building the Panama Canal. Suspended solids carried by runoff to streams are estimated to be at least 700 times the volume of suspended solids in sewage discharge. See National Association of Counties Research Foundation (NACRF), Urban Soil Erosion and Sediment Control (1970).

2. The earliest reported study of the pollutional level of urban stormwater runoff was based on a sampling of flow from street surfaces in downtown Detroit in 1950. Results supported the conclusion that "stormwater run-off from highly urbanized and highly populated areas is heavily polluted and would be but slightly less objectionable in the receiving waters than the run-off flow from combined sewers." See C. Palmer, "Feasibility of Combined Sewer Systems," 35 Water Pollution Control Fed'n (Feb. 1963). Recent studies of urban runoff also suggest that in many localities the pollution level of the water may be at least as high as that of sanitary sewage. See U.S. Environmental Protection Agency, Water Pollution Aspects of Street Surface Contaminants (1972)

3. Urban Systems Research and Engineering, Inc., Improving Environmental Quality through Local Use Ordinances 294 (April 1976).

4. Draft dated November, 1976.

5. Center for Ecological Research in Planning and Design, University of Pennsylvania, Medford, Performance Requirements for the Maintenance of Social Values Represented by the Natural Environment of Medford Township, N.J. (1974).

6. Id. at 11, 13.

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*In order to conserve space, publication information pertaining to works included in the suggested readings for this chapter has been omitted from the footnotes.

7. As in the context of overall planning, the section 208 agency can achieve an initial lowering of costs by adopting a functional approach to data collection. For purposes of stormwater management, a functionally oriented environmental inventory would include only those factors that most directly affect runoff and erosion. Such short-term cost-cutting, however, must be weighed against the benefits of integrating the community's program for nonpoint source control with its broader developmental objectives.

8. The computer study for the Wissachickon Watershed was done by the Regional Science Research Institute, Philadelphia at a cost of approximately $40,000.

9. See W.L. Jorden and Co., Echo Branch Sub-Basin Study, Pilot Sub-Basin Drainage Program, (Feb. 1976).

10. A. Brandstetter, Computer Analysis of Urban Stormwater Models (Aug. 1974).

11. Restrictive land use regulations have been upheld largely on the strength of carefully marshalled evidence in the following cases: Potomac Sand and Gravel Co. v. Governor of Maryland, 266 Md. 358, 293 A.2d 241, (1972); Spiegle v. Borough of Beach Haven, 46 N.J. 479, 218 A.2d 129 (1966); Golden v. Planning Board of Town of Ramapo, 30 N.Y.2d 359, 334 N.Y.S.2d 138, 285 N.E.2d 291 (1972). Similar restrictions have been struck down when unsupported by facts in the record: Sturdy Homes, Inc. v. Township of Redford, 30 Mich. App. 53, 186 N.W.2d 43 (1971); Lyon Sand and Gravel Co. v. Town of Oakland, 33 Mich. App. 614, 190 N.W.2d 354 (1971); National Land and Investment Co. v. Kohn, 419 Pa. 504, 215 A.2d 597 (1965). In Steel Hill Development, Inc. v. Town of Sanbornton, 469 F.2d 956 (1st Cir. 1972), considerations of public health and welfare led to approval of six-acre zoning as a stop-gap measure, but the Court was "disturbed" by the "crude manner" in which the law was adopted without "any professional or scientific study."

12. Id.

13. Institute for Environmental Studies, University of Pennsylvania, "Delaware Law and Potential Land Use and Performance Controls for the Christina Basin," at 7-8 (discussion Paper 10, Nov. 1972).

14. This is especially important when costs are high. Projected costs for improvements in the Echo sub-basin, for example, were $1.6 million.

15. Institute for Environmental Studies, University of Pennsylvania, Plan and Program for the Brandywine (Oct. 1968).

16. This is the approach taken by EPA in the Guidelines, supra, section 2.1 and note 4. Cf. supplement entitled "Best Management Practices--Urban Runoff Sources of Water Pollution," at 4-5 (draft, Feb. 1976).

17. A. Strong, Regulation of Urban Development to Control Runoff and Erosion IV-3 (1973).

18. For example, in Morris County Land Improvement Company v. Parsippany-Troy Hills Township, 40 N.J. 539, 193 A.2d 232 (1963), the court invalidated a zoning ordinance permitting only public and quasi-public uses of plaintiff's land.

19. N.C. Gen. Stat. § 113A-51 (preamble).

20. In contrast with restrictions on development generally, strict regulations of development in flood plains has been upheld. Turner v. County of Del Norte, 24 Cal. App. 3d 311, 101 Cal. Rptr. 93 (1972); Turnpike Realty v. Town of Dedham, 284 N.E.2d 891 (Mass. 1972).

21. North Carolina, Rules and Regulations for Erosion and Sediment Control, Admin. Code subchap. 4B, § 6 [hereinafter cited as N.C. Rules and Regulations].

22. See Federal Water Pollution Control Administration, U.S. Dep't of Interior, Water Pollution Aspects of Urban Runoff 13 (June 1969).

23. Id. at 217, appendix F, citing New Orleans Code § 28-20(a)

24. Id., citing Ogden, Utah Code § 14-18-26(b)

25. Id., citing Los Angeles Code § 62.19.

26. Id., citing San Francisco Police Code § 79.

27. Id., citing Newport News City Ordinance No. 178, § 19.

28. In practice, several existing structures have been modified to accommodate rooftop storage because their owners could escape condemnation only by rehabilitating their property in accordance with criteria established by DURA. Since the Denver Building Code requires roofs to sustain a snow load equivalent to the weight of about six inches of water, modification for purposes of rooftop detention has normally involved only the installation of the special detention ring. Costs of rehabilitation have been borne by the private landowner.

29. Cf. Manual of Procedures for the Administration of the Sewer Permit Ordinance Art. 6, § 6-4 (adopted Sept. 3, 1970).

30. Queenside Hills Realty Co. v. Saxl, 328 U.S. 80 (1946).

31. N.C. Rules and Regulations, supra note 21, § 15.

32. A stormwater detention basin is not subject to federal or state water quality standards because it is, in effect, an artificial treatment facility. Unless there is a spillover from such a reservoir, it will also fall outside the FWPCA's definition of navigable waters. Of course, multipurpose facilities used for contact sports or water supply will have to meet applicable public health standards. Proper maintenance must assure that these basins function right and do not become nuisances or health hazards.

33. For example, in Pioneer Trust and Savings Bank v. Village of Mount Prospect, 22 Ill. 2d 375, 176 N.E.2d 799 (1961), dedication of land for a school site under a subdivision ordinance was held unconstitutional because the need for the educational facility was not "specifically and uniquely attributable to the addition of the subdivision." The constitutionality of compulsory land dedication is discussed further in section 6.0 infra.

34. Inadequate maintenance of permanent detention basins may lead to excessive sedimentation, algal growth, mosquito breeding and erosion of banks.

35. For example, the Chicago MSD will bear the construction cost for a detention reservoir which will serve Mt. Prospect and Arlington Heights, but the two villages must work out a way of sharing the cost of land and maintenance of the completed facility. If such a project benefited more than two municipalities, equitable cost allocation could become even harder to achieve.

36. Pavement material, motor vehicle discharges, atmospheric pollutants, vegetation, and ice-melting compounds all contribute to pollution on street surfaces. A multi-pronged regulatory scheme is necessary for controlling these varied sources of contaminants.

37. EPA's analysis of material from representative road surfaces indicates that

> the very fine, silt-like material (43 microns) accounts for only 5.9 percent of the total solids but about one-fourth of the oxygen demand and perhaps one-third to one-half of the algal nutrients. It also accounts for over one-half of the heavy metals and nearly three-fourths of the total pesticides. Water Pollution Aspects of Street Surface Contaminants, supra note 2, at 6.

38. Replacement of combined sewers with separate storm and sanitary sewers may be impossible in most cities except in connection with large-scale urban renewal, e.g., Denver's Skyline Project.

39. H. Poertner, Practices in Detention of Urban Stormwater Runoff 132-41 (June 1974).

40. Id. at 187.

41. See Executive Office of the President, Office of Management and Budget, Catalogue of Federal Domestic Assistance.

42. The following examples are not a complete catalogue of federal programs with possible bearing on water quality management.

43. See 33 U.S.C. §§ 426(g), 701(a), 577.

44. Watershed Protection and Flood Prevention Act of 1954, Pub. L. No. 83-566, 16 U.S.C. § 1001 et seq.

45. See generally annoted bibliography included in EPA Guidelines, supra section 2.1 and note 4.

46. See e.g., N.C. Rules and Regulations, supra note 21, § 8a.

47. 7 Envir. Rep. Cas. 2066 (D.D.C. 1975).

48. At the time of the district court decision in NRDC v. Train, more than half the states had been nondesignated in their entirety. Cf. 7 Envir. Rep. Cas. 2068.

49. Mass. Gen. Laws Ann. ch. 21, § 43(2)(West).

50. Id. § 27(6).

51. Id. § 26(A).

52. Mass. Const. art. II, as amended by art. LXXXIX, § 6.

53. Ch. 245 of the Acts of 1970.

54. N.C. Gen. Stat. § 143B-298

55. N.C. Gen. Stat. § 113A-54

56. Cf. 1 U.S. Water Resources Council, Regulation of Flood Hazard to Reduce Flood Losses 118 (1970).

57. Vt. Stat. Ann. tit. 10, § 6086 (issuance of permit; conditions).

58. Id.

59. Cal. Pub. Res. Code div. 18 (West).

60. Id. § 27001.

61. Id. § 27401(e).

62. Wis. Stat. Ann. § 59.971 (West).

63. The relevant provision reads as follows:

> If any county does not adopt an ordinance by January 1, 1968, or if the department of natural resources, after notice and hearing, determines that a county has adopted an ordinance which fails to meet reasonable minimum standards . . . the department [of natural resources] shall adopt such an ordinance. Id. § 59.971(6)

64. Tri-County Conservancy of the Brandywine, Chadds Ford, Pa., Environmental Management Handbook IV-6b, citing Rules and Regulations of the Department of Environmental Resources (Dec. 1975).

65. N.C. Rules and Regulations, supra note 21, § 4c.

66. Id. § 17.

67. Special districts can vary greatly in organizational form and regulatory authority. The discussion here is necessarily simplified.

68. For example, the Springfield Sanitary District initially lacked authority to press its downspout disconnection program in the city of Springfield, which owns and operates its own sewer system. It required an amendment to the Illinois Sanitary Districts Act to extend the District's regulatory authority to city sewers tributary to its own system.

69. Minn. Stat. 112.34, § 112.36.

70. This is the case in Minnesota, for example, where SWCD's have taken a leading role in controlling erosion. Cf. V. Reichert and W. Oemichen, "Erosion: Today's Soil, Tomorrow's Silt," Soil Conservation, Sept. 1976.

71. Soil Conservation Districts Law, Iowa Code Ann. §§ 467A.1 - A.53 (West Cum. Supp. 1976).

72. Sediment Control Act, Md. Nat. Res. Code Ann. § 8-1101 to § 8-1108 (Cum. Supp. 1975).

73. Mass. Gen. Laws Ann. ch. 131, § 40 (West).

74. Telephone interview with Ayoub Talhami, Supervising Engineer of Local Sewer Systems, Metropolitan Sanitary District of Greater Chicago (June 2, 1976).

75. Pub. L. No. 89-80, 42 U.S.C. § 1962 et seq.

76.

> The compact [or other enabling law] could be made to safeguard the interests of basin residents through a requirement that the states [or state] delegate power to basin residents, who then would elect the members of the commission. They would vote on the basis of equal-population districts . . . .
>
> Attempts to provide for basin representation by advisory committees dealing with recreation, land-use planning, and other special interests do not serve as surrogates for representative government in weighing values. E. Haefele, Representative Government and Environmental Management 41-42 (1973).

In a nutshell, Mr. Haefele's thesis is that government agencies empowered to decide fundamental questions of public policy should be headed by elected representatives of the public. If stormwater management, for example, involves only technical implementation of pre-established policy, that task might well be entrusted to appointees with special qualifications. But to the extent it involves the making of fundamental social choices--e.g., location of a multipurpose reservoir, or establishment of substantial restrictions on development--the task is more legislative than administrative in nature, and should accordingly be performed by officials who are directly accountable to the people.

77. Township of Medford, Burlington County, New Jersey, Subdivision Ordinance of 1974 (adopted Aug. 7, 1974).

78. Id. art. VI, § 2.

79. Id. art. VII.

80. Compliance and enforcement are discussed at greater length in section 5.0 infra.

81. Cited in B. Berger et al., "Strengthening Lake-Shoreland Management in Massachusetts" (draft dated Feb. 1976).

82. Institute for Environmental Studies, Brandywine Plan, supra note 15, at I-A-2.

83. A. Strong, Private Property and the Public Interest 206 ff. (1975).

84. These were the Division of Natural Resources of the Bucks County Planning Commission and the Neshamisy Water Resources Authority.

85. H.A. Mittelstedt, "Terraces Protect Glen Ullin," Soil Conservation, February 1976, at 9.

86. N.C. Rules and Regulations, supra, note 21, § 6a.

87. Southeastern N.H. Regional Planning Commission, "Sample Portion of Municipal Subdivision Regulations to Deal with Soil Erosion and Sediment Control".

88. Office of Research and Development, U.S. EPA, Performance Controls for Sensitive Lands: A Practical Guide for Local Administrators 445 (March 1975). (Revised version published as Thurow, C.; Toner, W.; and Erley, D., Performance Controls for Sensitive Lands, Planning Advisory Service, nos. 307, 308. Chicago: American Society of Planning Officials, 1975.

89. Rate is the more important variable because the pollutant content of runoff depends much more on the intensity than on the volume of rainfall.

90. Id. at 453-54.

91. The equation expresses average soil loss as a function of several variables, including runoff, slope, erodability of a particular soil and soil management practices.

92. Center for Ecological Research, Medford Performance Requirements, supra note 5, at 29.

93. Leon County Ordinance No. 73-10, Ordinance No. 73-57 and Ordinance No. 75-5.

94. N.C. Rules and Regulations, supra note 21, § 8.

95. Id. § 14.

96. See W. Jorden and K. Jones, "Building a Drainage Program," Public Works, March 1976.

97. This policy was changed in 1972 when a new election brought in a new Board of County Commissioners.

98. R. Ditmer, "Impact Zoning: An Introduction and Selected Bibliography," Council of Planning Librarians Exchange Bibliography #974, at 3 (Feb. 1976).

99. Duxbury Protective By-Law art. 100, adopted under art. 17 (March 15, 1973).

100. See Ditmer, supra note 98, at 11.

101. Cf., for example, City of Naperville, Ordinance No. 72-74, § 12.902F (Standards for wet bottom storage areas:

> Wet bottom storm water storage areas shall be designed with all of the items required for dry bottom storm water storage areas except that a low flow conduit and a system of drains with a positive gravity outlet shall be eliminated. However, the following additional conditions shall be complied with:
>
> a. Water surface area shall not exceed 1/10 of the tributary drainage area.
>
> b. Shoreline protection shall be provided to prevent erosion from wave action.
>
> c. Minimum normal water depth shall be four (4) feet. If fish are to be used to keep the pond clean, a minimum of 1/4 of the pond area shall be a minimum of 10 feet deep.
>
> d. Facilities shall be available, if possible, to allow the pond level to be lowered by gravity flow for cleaning purposes and shoreline maintenance.
>
> e. Control structures for storm water release shall be designed to operate at full capacity with only a minor increase in the water surface level. Hydraulic calculations shall be submitted to substantiate all design features.
>
> f. Aeration facilities to prevent pond stagnation shall be provided. Design calculations to substantiate the effectiveness of these aeration facilities shall be submitted with final engineering plans. Agreements for the perpetual operation and maintenance of aeration facilities shall be prepared to the satisfaction of the municipality.
>
> g. In the event that the water surface of the pond is to be raised for purposes of

storing water for irrigation or in anticipation of the evapo-transpiration demands of dry weather, the volume remaining for storage of excess storm water runoff shall still be sufficient to contain the 100 year storm runoff.

102. Manual of Procedures, supra note 29.

103. 4 Envir. Rep. Cas. 1402 (Mich. Cir. Ct. 1972).

104. Redevelopment plans for parcels in Denver's Skyline Project area are reviewed once before a temporary award is made. Final review and approval by DURA's Board of Commissioners precedes each actual sale.

105. While either a performance bond or an escrow account can be used by the 208 agency to guarantee completion of projects according to plan, the two devices may not appear equally attractive to developers. A performance bond may require a smaller outlay of capital, but the amount will not be recoverable as in the case of an escrow account. The differences between the two forms of guarantee do not seem to have been exploited in a systematic way to ensure compliance with runoff and erosion control standards. Cf., for example, the interchangeable use of cash, corporate bond, and letter of credit in the Montgomery County, Md. sediment control ordinance, infra note 113.

106. N.C. Gen. Stat. § 113A-61(d).

107. N.C. Rules and Regulations, supra note 21, § 19(a).

108. Cf. N.C. Gen. Stat. § 113A-61; Leon County Ordinance, supra note 93, § 7.1(a).

109. Leon County Crdinance, supra note 93 § 71.(b).

110. N.C. Gen. Stat. § 113A-64.

111. 208 agencies must offer adequate procedural due process before revoking a permit. For further discussion of this point, see section 6.0 infra.

112. N.C. Gen. Stat. § 113A-64(b).

113. Montgomery County Code ch. 19 (Sediment Control), § 19-19.

114. For example, the Leon County ordinance, supra note 93, includes provisions for notice of violation, administrative stop work orders, permit revocation, and injunctive action.

115. Violations during construction may not even be a serious problem in many jurisdictions. For example, while some 150 of the 1,000 permits issued annually by the Chicago MSD give rise to some form of violation proceedings, very few involve non-compliance with detention requirements. Since builders who have incorporated detention facilities into their plans seldom fail to include them in actual construction, violations tend rather to be minor errors in the construction of outlets or installation of detention rings.

116. No. 73-356-W (Pa. Envt'l Hearing Bd., filed June 12, 1975).

117. Washington County, Md., Ordinance for the Control of Erosion and Sedimentation § 12 (adopted March 2, 1971).

118. Cf. Code of DeKalb County, Georgia, ch. 6A, § 6A-8(b)(8)(d).

119. N.C. Gen. Stat. § 113A-64(a)(2) is an exception.

120. See, for example, Birch v. Boston and Maine R.R., 259 Mass. 528, 156 N.E.2d 859 (1926), Land Development v. Louisville Gas, 2 Envir. Rep. Cas. 1001 (Ky. Ct. App. 1970).

121. N.C. Gen. Stat. § 113A-66.

122. No. 106990 (C.P. Hartford County, Conn. Oct. 8, 1973).

123. But cf. Van Buskirk v. State, 3 Envir. Rep. Cas. 1966 (N.Y. Ct. App. 1972) where the state of New York was not held liable for property damages allegedly caused by the negligence of the state Water Resources Commission in granting a permit for construction of a dam by an association of riparian landowners.

124. Cf. Montgomery Co., Md. ordinance, supra note 113, § 19-9.

125. Cf. Naperville, Ill. ordinance, supra note 101, § 12.903D.

126. N.C. Rules and Regulations, supra note 21, § 17(a)(4).

127. 260 U.S. 393 (1922).

128. 284 N.E.2d 891 (Mass. 1972).

129. 353 Mass. 141, 228 N.E.2d 831 (1967).

130. 56 Wis. 2d 7, 201 N.W.2d 761 (1972).

131. 160 Conn. 109, 273 A.2d 880 (1970).

132. 22 Ill. 2d 375, 176 N.E.2d 799 (1961).

133. For detailed discussion of options, see F. Bosselman, D. Callies and J. Banta, The Taking Issue (1973).

134. Cf. Potomac Sand and Gravel Co. v. Governor of Maryland (wetlands regulation), 266 Md. 358, 293 A2d 241 (1972); Spiegle v. Borough of Beach Haven (beach set-back regulation), 46 N.J. 479, 218 A.2d 129 (1966); Golden v. Planning Board of Town of Ramapo (zoning ordinance), 30 N.Y.2d 359, 334 N.Y.S.2d 138, 285 N.E.2d 291 (1972).

135. Cf. Sturdy Homes, Inc. v. Township of Redford (flood plain zoning), 30 Mich. App. 53, 186 N.W.2d 43 (1971); Lyon Sand and Gravel Co. v. Town of Oakland, 33 Mich. App. 614, 190 N.W.2d 354 (1971); National Land and Investment Co. v. Kohn (exclusionary zoning), 419 Pa. 504, 215 A.2d 597 (1965).

136. 11 Cal. App. 3d 557, 89 Cal. Reptr. 897 (1970).

137. While the cost of providing onsite detention is only a small fraction of the total cost of a given project (site improvement, including grading, sewer connections, by-pass and detention facilities, generally amounts to only three to five percent of project costs), the absolute amount of expenditure may be high enough to stand in the way of willing compliance from developers. For example, shortly after the MSD's detention program went into effect, the developer of a projected shopping center proved reluctant to spend an additional $200,000 to install detention facilities in conformity with MSD requirements. Discussions in which MSD officials explained the program's benefits kept this dispute from rising to the level of a formal challenge.

CHAPTER SIX

MANAGEMENT OF STORMWATER AS A NONPOINT SOURCE IN URBAN AND URBANIZING AREAS

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CHAPTER SEVEN

AGRICULTURE AND SILVICULTURE

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CHAPTER SEVEN

AGRICULTURE AND SILVICULTURE

1.0 Introduction

1.1 Scope and Organization

It is necessary to explain at the very outset the reasons for treating two such important areas of study, agriculture and silviculture, 1/ within the confines of a single chapter. This treatment is not meant to suggest that nonpoint pollution from agriculture and silviculture is less important than that from other sources or that the technical practices for controlling pollution from the two different sources are similar. From the legal and institutional perspective, however, the two activities and approaches to regulation of pollution resulting from those activities have much in common.

Since the primary pollutant emanating from agricultural and silvicultural activities is sediment, jurisdictions needing stronger controls over agricultural and silvicultural pollution will want to consider adopting a comprehensive erosion and sediment control program applicable to both. And, while the size of the commercial forestry industry or agribusiness in some states and localities will dictate a much more focused approach, the alternative approaches to regulating nonpoint pollution from agriculture and silviculture are similar. Such approaches include: setting performance standards or best management practices for some farming and forestry activities; requiring owners or operators of farms and forests to have pollution management plans; protecting watercourses and waterbodies from accelerated agricultural and silvicultural runoff through critical area programs; and using technical assistance, cost-sharing, and tax incentives to ease and speed accomplishment of environmental goals.

Even if control of sediment from agricultural and silvicultural activities is undertaken through separate programs, moreover, it is important that those programs be coordinated because of the trade-offs that may exist between them. The state of Iowa, for example, experienced a 40 percent loss in commercial forest acreage between 1954 and 1974 due to clearing, much of it for agricultural use. That conversion from forest use to agriculture meant going from a use which typically yields one ton per acre of sediment to another which may yield as much as five tons per acre annually. 2/

Despite the similarities in kinds of pollution and regulatory approaches to pollution abatement and despite the need for coordination between agricultural and silvicultural management efforts in a total nonpoint source program of the type section 208 of the Federal Water Pollution Control Act seeks to promote, few existing state programs address both activities. Accordingly, in view of the empirical approach of this manual, this chapter is divided into two main sections: the first half deals with

agriculture, the second with silviculture. With the exception of erosion and sediment controls, repetition is avoided by discussing an individual control technique only once, in the context affording the best concrete examples of its use.

The value of critical areas programs to sediment control is discussed at the end with reference to both agricultural and silvicultural activities. Occasional cross-references will be made to suggest the use of a given control technique for both agricultural and silvicultural control, but limitations of space require the reader's willingness to make connections between the two activities and the different management approaches discusssed for each.

1.2 Pollution from Sediment

Sediment sounds to the uninitiated like a relatively minor pollutant, hardly deserving of the name, but in fact it is far from harmless. The title of a U.S. Department of Agriculture (USDA) publication, Sediment--It's Filling Harbors, Lakes and Roadside Ditches,3/ gives a capsule summary of some of the damage sediment does. And while sediment is filling waterways--thereby impeding navigation and, in some extreme cases, totally filling reservoirs--4/ it is simultaneously destroying fish habitat; 5/ marring recreational uses; hampering irrigation by wearing out pump parts and increasing channel maintenance costs; and damaging municipal water treatment facilities.6/

In both agriculture and silviculture, of course, erosion can result in the irretrievable loss of productive soil. The clogging of channels and culverts by sediment and organic debris aggravates and may even cause substantial flood damage. The natural nutrients and fertilizer and pesticide residues which cling to soil particles result in the more traditional forms of water pollution with their well-known side effects.

A certain amount of sediment in streams results not from man's activities but rather from the natural flow of water across soil and rock.7/ Recent figures attribute 26 percent of the total sediment load to streambank erosion. Those same figures put the contribution of agriculture at 40 percent, of pasture and rangeland at 12 percent, of forest lands at 7 percent, of urban uses at 4 percent, and of roads at 3 percent.8/

Of course, these estimates are nationwide figures, and the relative sediment contributions of different land-disturbing activities will vary significantly from state to state and area to area. State and areawide water quality management planning agencies should, of course, determine the extent of the sediment pollution problem within their jurisdiction and pinpoint its source or sources prior to determining the focus and scope of any needed control measures. Thus section 208(b)(2)(F) of the FWPCA requires state and areawide water quality management plans to include:

> a process to (i) identify, if appropriate, agriculturally and silviculturally related nonpoint sources

of pollution, including runoff from manure disposal areas, and from land used for livestock and crop production, and (ii) set forth procedures and methods (including land use requirements) to control to the extent feasible such sources.

The least costly and most effective control measures for agriculturally and silviculturally related pollution will typically involve preventive measures rather than collection and treatment. The U.S. Environmental Protection Agency (EPA) has labeled such preventive measures "Best Management Practices" (BMPs). The agency has developed guidance to assist state and areawide water quality planning and management agencies in identifying and assessing agriculturally and silviculturally related nonpoint source problems and in developing local BMPs tailored to the particular problems so identified. This published guidance includes:

1. Guidelines for State and Areawide Water Quality Management Program Development (including interim final Guideline Supplements for BMPs for Nonpoint Sources);9/

2. Methods for Identifying and Evaluating the Nature and Extent of Nonpoint Sources of Pollutants; 10/

3. Methods and Practices for Controlling Water Pollution from Agricultural Nonpoint Sources; 11/

4. Control of Water Pollution from Cropland; 12/ and

5. Processes, Procedures and Methods to Control Pollution Resulting from Silvicultural Activities.13/

The language of section 208(b)(2)(F) quoted above reflects a recognition on the part of Congress that the extent of nonpoint pollution from agriculture and silviculture will vary from state to state and locality to locality. Meanwhile, the concept of BMPs developed locally takes into account the fact that the measures appropriate to control identified sources of nonpoint pollution will vary with differences in climate, topography, soil, and type of watercourse. The very fact that meaningful generalized guidance has been written, however, suggests that despite the variations in extent and nature of nonpoint source pollution from one political jurisdiction and geographic area to another, 14/ certain primary features of agriculturally and silviculturally related pollution and the measures by which to minimize or prevent it are generalizable.

Reference should be made to the above-mentioned reports and others cited in the course of this chapter for background in technical matters. In addition, brief summaries of agricultural and silvicultural nonpoint pollution problems and of frequently suggested technical control methods will be given at the start of the discussion of each activity and in the footnotes to provide a practical context for the legal and institutional analysis which follows.

2.0 Agriculture

2.1 Erosion and Sediment Control

2.1.1 Technical Methods of Controlling Sediment Pollution from Agriculture

The ways in which erosion and sedimentation result from agricultural activities are familiar to most laymen and need little background discussion here. Traditionally, wind and water erosion of agricultural lands has been of concern to farmers and to all levels of government because of the resulting loss of productive soil. Although during the past six years the literature and the actions of some state legislatures have evidenced a new concern for the effects on water quality and on beneficial water uses of runoff from agricultural lands, some experts still feel that too much emphasis has been put on control of pollution from animal wastes and too little on that from sediment.15/ They point out that the removal of acreage limitations for feed grains will return millions of acres of land to production, much of it marginal land which is highly prone to erosion.16/

The EPA guidance manuals cited above provide extensive discussions of the technical aspects of erosion control on agricultural lands and ample citations to other technical studies. Needless to say, the volume and kind of sediment pollution resulting from agriculture is dictated by a number of variables. These include: volume, intensity, and distribution over the year of precipitation; length, gradient, and configuration of slope; and susceptibility of the particular kind of soil to erosion. This susceptibility is a function of four factors: the soil's texture, organic matter content, structure, and permeability. Once these factors have been identified for a particular location, the effects on soil losses of various combinations of erosion control practices can be predicted with reasonable accuracy. Such practices are many and varied.

Growing vegetation on land is, of course, itself a method of controlling erosion. Its effectiveness will vary with the type and quality of growth and with the amount of protection the crop affords in the months and seasons of greatest wind and rainfall. Moreover, different forms of crop tillage will result in different amounts of erosion. There is a good deal of actual experience, much of it sucessful, with so-called conservation tillage methods: methods which reduce the erosion potential of land below that of conventional tillage. Such methods are based on minimizing soil disturbance and/or increasing water infiltration. They often involve use of plant residues to control erosion, and they may reduce the number of separate plowing and planting operations. Other erosion control methods for agricultural land include: terraces, strip and contour cropping, grassed waterways, rotation of soil depleting crops with soil conserving ones, rotation of cover crops with row crops, and use of drainage structures.17/

2.1.2 Current Regulatory Status and Sources of Authority

The first concerted effort to attack an already serious erosion problem was made by Congress with the passage of the Soil Conservation Act of 1935.18/ That act established the Soil Conservation Service (SCS) within USDA and authorized the secretary to require state enactment of soil erosion control programs before extending aid to private lands. Following the enactment of the 1935 act the federal government furnished the states with a "Standard Soil Conservation Law" on which most soil conservation laws have been modeled. All 50 states, Puerto Rico, and the Virgin Islands have such laws. All the state soil conservation laws provide for the creation (generally pursuant to local referenda) of soil and water conservation districts. These entities' jurisdiction is usually, but not always, coextensive with county lines, and they are governed by boards of supervisors which are appointed in some states, elected in others, or which combine elected and appointed officials in still others.19/

In each state a central soil and water conservation commission (board, council, or committee) coordinates the districts' activities and provides them with financial and technical assistance. Few local soil and water conservation districts have taxing powers. Local soil and water conservation districts now number in excess of 3,000 and comprise over 97 percent of the agricultural land within the United States. Approximately two million individual landowners and over two thousand communities are now receiving conservation assistance through cooperative agreements with the USDA Soil Conservation Service (hereinafter USDA/SCS). While SCS is the only federal agency which receives funds earmarked for direct technical assistance to local conservation districts, the U.S. Forest Service, the Agricultural Stabilization and Conservation Service, the Bureau of Land Management, the Agricultural Research Service, and the Bureau of Sport Fisheries and Wildlife, among others, all provide services to the districts.20/

a. Local Erosion and Sediment Control Programs

While approximately half the states empower soil conservation districts to adopt land use regulations (as provided in the "Standard Law" model),21/ few districts have exercised their authority, preferring instead to rely on voluntary landowner cooperation. In those states where local land use authority exists and where the state is not taking the lead in nonpoint source regulation, however, this existing local authority is a logical source of power for areawide water quality planning agencies to tap. The major obstacle to effective use of this authority in many states is the requirement that land use regulations be adopted by a three-fourths majority in a referendum.22/

New Jersey and Wisconsin are two of the few examples of states in which local conservation districts have exercised the authority given to them by existing law to regulate land use for erosion and sediment control. In New Jersey, however, local regulations like those of the Camden County Soil Conservation District have been preempted by a recent state Soil Erosion and Sediment Control Act.23/ In Wisconsin, after attempts to enact regulations were unsuccessful because of failure

to obtain the required two-thirds favorable referendum vote, the law was amended in 1971 to permit adoption of regulations with a simple majority vote. In 1973 there was developed a Model Ordinance for adoption by soil and water conservation district boards, and several district boards now have proposed regulations pending. Vernon County expects action on its proposal early in 1977.24/

Another Wisconsin county, Washington, is conducting a local sediment control demonstration project and hopes to develop model guidelines and regulations. That project (undertaken in conjunction with the local soil conservation district, the state Board of Soil and Water Conservation Districts, the Wisconsin Department of Natural Resources, the University of Wisconsin, the USDA/SCS and EPA) is scheduled for completion in 1978.25/ In Montana, another EPA demonstration project now underway will include the development of best management practices necessary for the control of erosion problems (see discussion in section 2.1.3 below) and their enforcement through the adoption of local land use regulations under the Soil Conservation Districts Law of 1939.26/

Of course, there are numerous examples of local ordinances dealing with urban erosion and sediment control. Some of these have developed out of the rural soil and water conservation movement and depend heavily on the expertise of local conservation districts. Thus Montgomery County, Maryland's erosion and sediment control program relies on the local soil conservation district for plan review and other technical assistance. The Montgomery County program is discussed in detail in chapter 6, which reviews control programs for sediment resulting from construction and other land-disturbing activities in an urbanizing environment.

The municipal and county ordinances discussed and cited in chapter 6 suggest the kind of regulatory programs which are within the general police power authority of local units of government. Should the appropriate soil conservation district, districts or association of districts 27/ be unable or unwilling to adopt a comprehensive regulatory program for sediment-producing activities including agriculture and silviculture, an areawide water quality planning agency should, of course, explore the possibility of the county or other local unit or units of government adopting such a program.

Meanwhile, in the interest of devoting adequate time to what looks to be, from the practical standpoint, the most likely source of authority for local regulation of agriculture and silviculture, attention will be focused here on statewide erosion and sediment control laws. Many such laws already enacted provide for implementation at the local level through local soil and water conservation districts and other local governmental entities.

b. State Erosion and Sediment Control Programs 28/

The requirements of section 208 of the FWPCA and the increased recognition

of the sizable dimensions of nonpoint pollution which that act has sparked have led to a reevaluation of the need for strong erosion and sediment control programs which include mandatory provisions. Responding to this need, a task force which included representatives of USDA, EPA, the Council of State Governments, and the National Association of Conservation Districts drafted a Model State Act for Soil Erosion and Sediment Control ("Model Act") which was included in the Council of State Governments 1973 Suggested State Legislation.29/

The Model Act takes the form of an amendment to existing conservation district enabling laws. It therefore vests regulatory authority for erosion and sediment control programs in existing soil conservation districts, subject to a requirement that the local programs conform to statewide guidelines and conservation standards.

The impact of the Model Act and of the new concern for erosion and sediment control it reflects has been dramatic. Since 1973, acts regulating erosion and sedimentation have been introduced in approximately half the state legislatures and at least 14 such acts have been passed.30/ Many recent erosion and sediment control enactments draw heavily on the principles of the Model Act, while other recent legislation in the area, such as Montana's Natural Streambed and Land Preservation Act of 1975, 31/ takes an individualistic approach.

Some states, however, have not felt the need to expand their statutory authority at all. Pennsylvania, for example, has based pervasive erosion and sediment control regulations on a grant of authority contained in its broad-reaching 1970 Clean Streams Act. That act authorizes the state to order correction of any "condition which exists on land in the Commonwealth" which is resulting in or threatening pollution.32/

Ohio originally intended to rely on the general authority vested in the state's Environmental Protection Agency to enforce regulations relating to the abatement of agricultural pollution and urban sediment control. Under the proposed regulations, which will be discussed in more detail later, pollution abatement is based on minimum conservation standards (the equivalent of EPA's BMPs) and not on water quality standards. Because of this, Ohio's EPA decided it did not have clear authority to adopt the proposed regulations, and Ohio is now planning to introduce new legislation in January 1977 giving the Division of Soil and Water Districts within the state's Department of Natural Resources power to adopt the proposed regulations and to supervise the local conservation districts in their administration of the program.33/

Each state nonpoint planning agency will need to analyze closely its existing water pollution control authority to ascertain whether it contains authority adequate to sustain an erosion and sediment control program. Other factors to be discussed later, such as choice of appropriate administering agency, will also enter into any decision whether to adopt a wholly new law or whether to rely on an existing law. Should a state or areawide water quality planning agency determine that new

legislation is needed to deal adequately with sediment pollution resulting from agricultural and/or silvicultural activities, it would do well to examine the efforts of states which have recently come to the same conclusion.

2.1.3 Management Approaches: Plans, Soil Loss Limits, and Conservation Standards

Unfortunately, there are not many models to look to for guidance. Many of the "new" erosion and sediment controls laws exempt agricultural and silvicultural activities from their coverage and focus instead on erosion and sedimentation from construction and development.34/ Undoubtedly, in some states problems of political acceptability, not relative size of sediment contributions, account for this selectivity, yet, in the Midwest, where agricultural sediment pollution problems are severe, effective erosion and sediment control programs are being developed. This is an encouraging sign that such programs can be made politically palatable to a rural constituency given a few basic prerequisites.

First, the program must be carefully developed and "sold." Its proponents must have the data to convince the farming and forestry communities that their activities are causing a sediment pollution problem, and they must involve those communities in formulating a practical program to combat that pollution.

Second, government officials in states which have adopted or are considering laws applicable to agriculture and silviculture stress that the program must be focused, flexible, and no more "coercive" or burdensome than absolutely necessary. As shown in the outlines of existing and proposed state programs in appendix A to this chapter,* this has meant, for the most part, that states active in this area have eschewed permits in favor of conservation standards and conservation plans.

The conservation plans are, generally, the same plans which the local conservation districts have been preparing in conjunction with the USDA Soil Conservation Service for decades. Yet of the state programs illustrated, Pennsylvania is the only one which actually requires such plans for normal agricultural operations such as tilling and plowing. Moreover, Pennsylvania softened the blow considerably: (1) by giving the farmers until July 1, 1977, almost 5 years from the effective date of the regulations requiring plans, to have plans prepared; and (2) by stipulating, in those regulations, that plans for low intensity agricultural operations on low erosion hazard sites:

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*The programs outlined in appendix A are (1) Pennsylvania's regulations under its Clean Streams Act; (2) the Model State Act for Soil Erosion and Sediment Control; (3) Iowa's amended Soil and Water Conservation Law; (4) Ohio's proposed amendments to its Soil and Water Conservation Law; and (5) Indiana's Draft Proposal for Soil Erosion and Sediment Control.

> . . . can be in the form of a statement indicating the present land uses and treatments and a declaration of intent to continue present practices where either: (1) risks of erosion are minimal, (2) minor land disturbance now occurs, or (3) the agricultural operation has adequate conservation treatment on the land.35/

If conservation treatment under such a homemade plan is inadequate, Pennsylvania's conservation districts may require a plan "prepared by a person trained and experienced in the field of erosion and sedimentation control." In almost every case this means that the plan will be prepared through a cooperative agreement between the landowner, the conservation district, and the USDA Soil Conservation Service. The last-named agency provides the technical expertise needed to develop the plan; the district approves the plan; and the landowner agrees to abide by it.

In Pennsylvania and New York, another state which requires agricultural operations to have soil conservation plans, the only formal requirement that the landowner actually abide by the conservation practices set out in the plan will be in the terms of the cooperative agreement. Whether the cooperative agreement will become effective enforcement tools in Pennsylvania and New York now that they are, in effect, imposed on most farmers instead of simply being available to the most concerned farmers, remains to be seen, since the requirement does not go into effect in Pennsylvania until July 1, 1977 and in New York until January 1, 1978.36/

In Iowa, Ohio, and Indiana, states with much larger numbers of farms than New York or Pennsylvania and states which are at various stages in their development of erosion and sediment control programs, the sentiment is against using the well-established SCS cooperative program as the focal point of mandatory erosion and sediment controls. These states have opted instead for an approach which is included but not stressed in the Model State Act for Soil Erosion and Sediment Control: the adoption of mandatory performance standards.37/

The term "performance standards," discussed at length in chapter 3, section 4.0, is used here to mean a generally applicable standard which regulated activities are required to meet. The methods or best management practices to be used to meet that standard are either left up to the individual or spelled out in general technical guidance rather than through individualized conditions in a permit. (The Best Management Practice concept is discussed in chapter 6, section 2.1.) For agricultural activities the basic performance standard which has been used in Iowa and which other states are considering adopting is expressed as a tolerable soil loss limit. The idea of soil loss limits is transformed into a practical control technique by the use of the Universal Soil Loss Equation (USLE).38/

The USLE makes it possible to estimate average annual soil loss due to sheet and rill erosion by factoring in values for rainfall, length and

steepness of slope, erodibility of the soil, and cropping, management, and conservation practices. Given a particular soil loss tolerance factor (which is now typically based on soil productivity factors but which in the future will have to be keyed to water quality standards), the equation can be turned around and used to plan the level of conservation required.39/ This "level" will be expressed as the particularized conservation practices (e.g., contour ploughing, terracing, etc.) determined to be the local best management practices.

The previous capsule summary of the use of the USLE to arrive at best management practices glosses over some of the real stumbling blocks to reliance on the USLE alone. As discussed in EPA's Loading Functions for Assessment of Water Pollution from Nonpoint Sources, 40/ estimates based on the USLE are approximations only. That study points out that the equation represents a long-term average on an annual basis and that "[i]t can be used to predict an assumed single storm event or a series of storm events, but fact values for single events or for seasonal events are not as complete and available as 'annual average' factors."41/ Estimates for extreme storm events are virtually impossible to make, according to the same source.

In addition, the methods for use of the USLE in predicting sediment yields from silviculture, construction, and other nonagricultural sources are not well developed. The equation's developer predicts, however, that once the effects of "management variables" (different conservation practices) on soil loss have been determined for these other activities, the soil loss estimates should be as good as those for agriculture.42/

It remains to be seen, moreover, whether the USLE will be ruled precise enough to substitute for monitoring when a violation of a soil loss limit is alleged. Pointing out the difficulties inherent in monitoring anything so intermittent and hard to trace to a particular source as sedimentation, officials in Iowa (the one state which has already adopted mandatory soil loss limits) are confident the the USLE will be judicially approved if it is challenged in that state.43/

Soil loss limits and conservation standards must vary, of course, with different kinds of land. In recognition of this fact, Iowa's law provides for local adoption of standards. In the language of the act, Iowa's soil conservation districts may:

1. Classify land in the district on the basis of topography, soil characteristics, current use, and other factors affecting propensity to soil erosion.
2. Establish different soil loss limits for different classes of land in the district if in their judgement and that of the state soil conservation committee a lower soil loss limit should be applied to other land in the district, it being

> the intent of the general assembly that no land in the state be assigned a soil loss limit that cannot reasonably be applied to such land.44/

As of this writing, Iowa's 100 local soil conservation districts have adopted the maximum soil loss rates set out in state guidelines without any serious objection. For agriculture, the rates are set to coincide with replenishment rates and vary from two to five tons per acre, depending on the soil type. The maximum permissible soil loss rate from construction sites suggested by state guidelines is five tons per acre per year.45/

Ohio's proposed legislation (outlined in appendix A to this chapter) incorporates "T" values: the maximum rate of soil erosion that will allow for a high level of crop production to be sustained economically and indefinitely.46/ Those values have been defined for different soils in the Technical Guides developed by the USDA Soil Conservation Service for individual soil conservation districts. The conservation practices necessary to achieve different T values are set out in the Technical Guides and are expected to form the BMPs for Ohio's program. Under Ohio's proposed regulations, the T values would be achieved in phases: 2 times T would be allowable until 1980; 1.5 times T would have to be achieved by 1980; the T value itself by 1986.

Ohio differs from Iowa in the amount of flexibility it would afford the individual farmer to stay within the maximum allowable soil loss limits by methods of his own devising. Ohio's proposal provides that "[t]he Technical Guide shall be used to determine the acceptability of conservation practices and management measures." Iowa's amended soil conservation law stipulates, on the other hand, that the districts "[m]ay not specify the particular practices to be employed so long as such owners voluntarily comply with the applicable soil loss limits established for the district."47/

More importantly, however, both Iowa's and Ohio's programs, like the one proposed in the Model Act, assure necessary flexibility and an added measure of certainty by providing that anyone following a plan approved by the local soil conservation district shall be considered to be in conformity with the required performance standards. By following Iowa's example of not requiring plans, Ohio hopes to avoid what it considers the wasteful and unnecessary practice of using district and SCS personnel to draw up or at least spend substantial time reviewing conservation plans for agricultural and silvicultural operations which they know to be up to standard.48/ Without such a requirement, preparation and review of conservation plans can be reserved for individual problem cases: cases of a landowner having some difficulty with the established conservation practices and cases involving violations of the soil loss limits in which the landowner is persuaded to avoid further enforcement action by obtaining technical assistance and entering into an SCS cooperative agreement.

What is more, under the performance standard system, planning assistance can continue to be offered in the majority of cases without the psychological obstacle created by requiring that it be accepted. This helps to

preserve the voluntary atmosphere the districts and the SCS prize. Finally, and most importantly from a water quality standpoint, soil conservation districts and the SCS can focus their planning efforts on those geographical areas which need them most.49/ In Pennsylvania, where plans are required, the Department of Environmental Resources does not expect to meet the 1977 deadline set in 1972 because of the backlog on SCS-prepared plans (which take an average of one and a half months each to complete.) The department is considering establishing a ranking system which would give priority to farms located in critical conservation areas as identified from statewide stream maps.50/

2.1.4 Administration and Enforcement

a. The Complaint Process

The erosion and sediment control programs outlined in Appendix A to this chapter illustrate a variety of approaches to ensuring compliance with their provisions. The Model Act provides, for example, that wherever a permit--such as a building or grading permit--is required in order to undertake the earth-disturbing activity in question, that permit provides the implementation mechanism. Such permits are not to be issued until the required erosion and sediment control plan has been approved by the appropriate local soil conservation district. Under this approach (which is said to work well in Michigan), 51/ the local government unit or authority responsible for issuing the grading permit, building permit, etc. is likewise responsible for performing follow-up inspections and for ensuring adherence to the erosion and sediment control plan.

With agricultural activities, however, there will seldom, if ever, be any pre-existing permit requirement involved. The burden of determining whether general conservation standards or standards set out in individual plans are being adhered to will generally fall to the local soil conservation districts. Conservation districts are the logical choice to undertake inspection and follow-up because of their technical expertise and their close familiarity with the people and land involved. Yet many conservation districts are reluctant to assume an enforcement role, arguing that such a role would be inconsistent with, and therefore compromise, their role as teachers and technical assistance resources. Soil conservation district officials insist that farmers woild think twice about asking the district for assistance if they knew that the district official might use the invitation as an excuse to inspect for possible violations of conservation standards.52/

At the same time, soil conservation officials are often the first to admit that the state and federal soil conservation program has not been as effective as it might be. This is because the districts have lacked the enforcement power to fall back on in what is often estimated to be the 10 to 20 percent of cases where education and outreach programs fail.53/ Such cases are generally characterized as nuisance cases, and several states are hopeful that the whole enforcement process can be put

on a nuisance basis. This would allow the conservation districts to take a reactive approach, with enforcement being triggered by third party complaints of sediment damage being suffered.

Iowa is the one state which has actually passed a law instutionalizing the complaint process.54/ The pertinent section of the Iowa soil conservation statute now provides:

> The commissioners of any soil conservation district shall inspect or cause to be inspected any land within the district, upon receipt of a written and signed complaint from an owner or occupant of land being damaged by sediment, that soil erosion is occurring thereon in excess of the limits established by the district's soil erosion control regulations. If they find that sediment damages are occurring to property owned or occupied by the person filing the complaint and that such excess soil erosion is so occurring on the land inspected, they shall issue an administrative order to the landowner or landowners of record, and to the occupant of the land if known to the commissioners, describing said land and stating as nearly as possible the extent to which soil erosion thereon exceeds the limits established by the district's regulations.55/

While Ohio proposes to follow Iowa's example in limiting complaints to persons actually owning or operating property allegedly being damaged by soil sediment in excess of state standards, 56/ Iowa is itself reconsidering whether people can in fact be expected to police their neighbors.

More than mere residential neighbors, farmers depend on adjoining landowners and must work to maintain good relations. (Indeed farmers cite this need for neighborhood responsibility as a very important factor in limiting pollution from agricultural activities.) In the five years Iowa's law has been in operation, only about 100 citizen complaints have been filed. In the words of an Iowa state official, the existing requirements that complainants be persons damaged ". . . has stopped many people from filing a complaint. They just can't bring themselves to coming down on their next-door-neighbor."57/

While Iowa contemplates amending its law to provide for citizen suits and/or government action (see below), Indiana's draft proposal for an erosion and sediment control program 58/ already reflects the perceived need for a more open process by authorizing "any concerned citizen" to file a complaint with a soil conservation district. This provision is just one of the many in Indiana's proposal which is very much under debate. The concern, of course, is to maximize enforcement without inviting frivolous complaints. It is worth noting, however, that there is less likelihood of frivolous or ill-motivated complaints in the context under discussion than in others. This is because the "penalty" involved is a requirement to undertake certain conservation measures rather than any prohibition on continuing or commencing an activity. Yet this very fact militates

against active citizen involvement. No matter how broad the category of private individuals who can bring complaints, therefore, it is critical that government agencies be given the initiative as well.

While adequate governmental access to the complaint process is perhaps more important than broad citizen access, it has not always been afforded. Thus Iowa's law makes no provision for the bringing of complaints by soil conservation districts themselves. This lack is understandable, perhaps, in light of the general expectation, at the time the amendments to Iowa's law were under consideration, that the districts would be extremely unwilling participants.59/ Today, however, Iowa officials feel their program is severely crippled by the lack of enforcement initiative in the districts,60/ and there can be no excuse for any new law to contain such an omission. Indeed, drafters of new laws should consider which state and local agencies should be involved in the enforcement process in addition to local conservation districts.

Clearly the access to the complaint or other enforcement process afforded private parties should also be afforded state and local agencies and political subdivisions which are themselves the owners or custodians of land and water. Often the most obvious and serious sediment damage will be suffered by governmentally owned improvements such as reservoirs and water treatment plants. As of August 1976, 116 of the 216 complaints filed with Iowa soil conservation districts were filed by the State Conservation Commission in connection with sedimentation of state lakes.61/ It should also be noted that Iowa's amended soil conservation law provides that the state's six conservancy districts, which are charged with effecting improvements such as flood control projects and reservoirs, can require the soil conservation districts to take action against an erosion problem which is preventing the conservancy district from constructing an internal improvement.62/

Ohio and Indiana also propose to give agencies at the state level the power to initiate complaints. In Indiana only the state Soil and Water Conservation Committee, the state agency responsible for administering the Soil and Water Conservaton Districts Act, would have that power. In Ohio both the state Division of Soil and Water Conservation and the agency responsible for pollution control generally, the Ohio Environmental Protection Agency, would be vested with the authority to initiate complaints. In view of the likely reluctance of individuals and even of local conservation districts to initiate complaints or other enforcement actions available under an erosion and sediment control program, it would appear advisable to make authority to require such action available to both the state conservation agency and the state water pollution or environmental protection agency, as in the Ohio proposal.

b. Cost-Sharing

Environmentalists may be tempted to dismiss the model Act, Iowa's

amended soil conservation law, and their hoped-for progeny as fundamentally weak because of the caveat attached to their enforcement provisions against farming and silvicultural operations. That caveat is the requirement that cost-sharing funds be made available before compliance can be required, a provision which is to be found in different forms in all of the acts and proposals under discussion except Pennsylvania's. As contained in section 5(e) of the Model Act, the cost sharing caveat in connection with enforcement of conservation standards and practices reads as follows:

> If there is not available to any such owner, operator, or occupier at least 50 percent cost-sharing assistance or adequate technical assistance for the installation of erosion and sediment control measures required in an approved farm or ranch plan, or for measures to conform agricultural and forestry practices to conservation standards established pursuant to this Act, any such owner, occupier, or operator who shall fail to install erosion and sediment control measures required in an approved farm or ranch conservation plan, or to conform his agricultural and forestry practices to such conservation standards, shall not be deemed to be engaged in prohibited land-disturbing activity subject to penalties under the Act.

A simple perusal of such a provision might indeed lead the reader to conclude that it undercuts any pretense to regulatory strength which the act might otherwise boast, but reference must be had, again, to Iowa's experience to evaluate the only example of such a provision in operation.

In Iowa, the amended soil conservation law makes a distinction between "permanent" soil and water conservation practices (e.g., terraces and grassed waterways) and "temporary" conservaton practices (e.g., contour planting and minimum tillage). At least 75 percent of the cost of any permanent conservation practice must be made available to the landowner before he can be required to undertake it. Meanwhile the percentage of cost-sharing needed to back up a required temporary conservation practice is set by the individual districts, subject to state revision upward.63/ Despite the state's having set the required level of cost-sharing as high as it did and despite the impoundment of federal cost-sharing funds in 1972, state officials report that the cost-sharing requirement has not stood in the way of effective enforcement of Iowa's law. The Iowa legislature has appropriated two million dollars for each year of the 1973-1975 biennium. As a result of this high level of appropriations, no enforcement action has ever had to be abandoned for want of necessary cost-sharing funds.64/

Under Iowa's cost-share enforcement system, a supplemental administrative order issues upon commitment of cost-share monies. The landowner is given six months to commence and one year to complete the needed work, as specified in the original administrative order notifying him of the violation.

If the landowner fails to do the work, the district may obtain a court order, violation of which is punishable in contempt proceedings. (Compare the penalties in the state outlines in appendix A to this chapter.) It is interesting to note that in Iowa many complaints have been settled informally by the district and by the two parties involved. Thus only 21 administrative orders have been issued, and of those only four of the landowners involved have failed to apply for cost-sharing funds.65/

Iowa's story makes the whole enforcement question sound very tame indeed, but drafters of state programs must be careful to to be lulled into a sense of false security. Not all legislatures can be counted on to be as generous as Iowa's, although Indiana's has also supported cost-sharing with approximately two million dollars annually.66/ Clearly, new erosion and sediment control programs should channel available cost-sharing monies to the individuals and situations with the greatest need. In this respect, the Indiana and Ohio proposals are more satisfactory than the Model Act or Iowa's law.67/ Where Iowa and the Model Act provide that even so-called "temporary" conservation practices such as contour planting and minimum tillage cannot be required without cost-sharing being made available, both Ohio and Indiana propose to limit their "exemptions" to those permanent erosion and sediment control practices for which the cost is generally conceded to be greater than the return to the individual. Ohio's proposed regulations defines such practices to include erosion control structures, grassed waterways, diversions, and field windbreaks. (Given the probability of new data on the cost-benefit ratio of erosion and sediment control practices, it probably makes sense to identify those "permanent" practices eligible for cost-sharing in state regulations, as Ohio and Indiana propose to do, rather than in the statute itself, as Iowa has done.)

Where a conservation practice will bring eventual economic benefits to the farmer, it might also be worth exploring a loan or part grant, part loan approach. Still another way to stretch cost-sharing funds would be to channel funds available for voluntary applicants to those areas where they can do the most good in preventing erosion and sedimentation. Indiana is already contemplating establishing such priorities, as, for example, by favoring hilly counties over flat ones.68/ States should also be careful to provide that where inprovements are not maintained, any monetary assistance provided for their installation is fully recoverable.

Finally, states should be wary of writing their cost-sharing provisions so broadly that they are hampered in going after the polluter who needs no cost-sharing or technical assistance to bring his discharge under control but can simply stop performing a polluting act. Thus Ohio's proposed regulations include a prohibition on tilling or performing any other earth-disturbing practice in such a manner that soil is placed in a ditch, stream, or lake. Yet if Ohio adopted the Model Act's cost-share provision unchanged, it would not be able to require a farmer to refrain from placing fill in a stream without making 50 percent cost-sharing assistance or adequate technical assistance available to the farmer. Of course, cost-

sharing and "adequate technical assistance" have no meaning in this context, but the enforcement task would certainly be made simpler by providing for a category of prohibited practices, to be established by regulation, for which no cost-sharing or technical assistance will be required.

2.1.5 Appropriate Level and Agency of Government

As is demonstrated by the existing and proposed programs of Iowa, Ohio, and Indiana and as has been voiced by many state officials, 69/ there is a consensus (1) that erosion and sediment control programs for agriculture should be administered at the local level and (2) that the contender for the job who boasts the greatest technical expertise and the largest measure of trust from the farmers necessary to do the job well is the local soil conservation district.

Of the other possible contenders, the urban county is particularly strong, especially in states or counties where agriculture is not the major contributer of sediment and a highly integrated urban and rural erosion control program is sought. Yet experience shows that even where primary responsibility for erosion and sediment control is in the hands of a general purpose unit of government, substantial reliance is placed on the soil conservation districts. This has been true at the state level in Pennsylvania (see the outline of that state's program in appendix A to this chapter) and at the county level in Maryland (see the discussion of Maryland's erosion and sediment control program in chapter 6).

If they intend to entrust a primary role in erosion and sediment control programs to soil conservation districts, state and areawide water quality management agencies may need to convince the districts that it is in their and their "clients" best interests to assume that role. As soil conservation districts in Ohio, for one, have realized, if they do not attempt to control agricultural nonpoint pollution, someone else with less knowledge and experience will.70/ Many district officials may have felt the lack of an enforcement stick in the past and may willingly seize it once they realize that is is possible to resort to it sparingly while continuing to use, in most cases, the traditional persuasive, educational, and service programs, but at an accelerated pace.

It would be asking too much, however, to expect soil conservation districts to shoulder all the new burdens imposed by mandatory erosion and sediment control programs or to actively embrace an enforcement role overnight. It is essential, therefore, that any program which relies for its administration on soil conservation districts make adequate provision for coordinated planning and guidance and for back-up enforcement authority. It is generally agreed that it makes most sense for these functions to be undertaken at the state level, especially since there will have to be close coordination with the state water pollution control agency to assure consistency between agricultural erosion and sediment control standards and state water quality standards.71/

At the same time, thought should be given to entrusting a planning and/or management role to existing regional (interstate or areawide) agencies where that will facilitate coordinating planning and management along watershed lines. As Iowa develops its state water quality management plan, for example, it is considering giving a coordinative role in nonpoint pollution control to the state's six conservancy districts. These districts are organized along broad watershed lines and have a direct concern in controlling erosion and sedimentation since they are concerned with water management problems (insuring an adequate water supply, flood control, etc.).72/

The management functions of a state or regional supervisory agency will be basically twofold. The first role will be guideline and standard-setting. One alternative is to give the local conservation districts or other local administrative body the authority to draw up administrative rules and establish conservation standards, subject to state approval. This is the course Iowa's law took, but Iowa's Department of Soil Conservation ultimately published a very detailed "Guide for Formulation of Soil Loss Limit Regulations by Soil Conservation Districts," which all the state's districts followed closely. Rather than leaving the initiative with the localities only to run the risk of, in effect, having to reassume it later after precious time has been lost, a state might consider the alternative Indiana is now contemplating. Under Indiana's draft proposal the state Soil and Water Conservation Committee would establish minimum conservation standards which would govern in a district until such district adopted more stringent standards or its own standards conforming to state guidelines.

Most states will probably favor entrusting the state standard-setting role to the agency most familiar with erosion and sediment control, that is, whatever agency is responsible for coordinating and supervising local conservation districts. Yet whatever conservation standards are set will have a vital bearing on the state's water quality. Therefore, the state water pollution control agency should have a role in their development. Thus the state water pollution control agency might, for example, be given authority to require revisions in conservation standards necessary to meet water quality standards both before and after their promulgation when it is determined that water quality standards are not being met because of agricultural nonpoint pollution.73/ Pennsylvania illustrates another alternative In that state the state Conservation Commission and the local conservation districts were transferred in 1971 from the Department of Agriculture to the Department of Environmental Resources, the state agency responsible for water pollution control.

The second basic role which must be retained at the state level if primary administrative responsibility is delegated to the local level is back-up enforcement authority. If the complaint process described above is the key enforcement mechanism, then both the state soil conservation agency and the water pollution control agency should be given authority to initiate complaints and to prosecute them in the courts should the local soil conservation district fail to take action. Having this authority to prosecute violations of performance standards and

BMPs may be of more practical value to a water pollution control agency than the power to prosecute nonpoint source violations of water quality standards, given the difficulty of detecting the latter type of violations and their precise sources. It is interesting to note in this inter-agency connection that in Maryland the state Water Resources Board apparently deals with agricultural polluters by ordering them to cooperate with the local conservation district to find a solution.74/

Ensuring an active role in any erosion and sediment control program for the state water pollution control agency may compensate for any passivity of local soil conservation districts when it comes to enforcement. In this connection it will be important to provide the state agency best qualified in terms of manpower, expertise, and interest--the state soil conservation agency, the state department of natural resources, or the state water pollution control agency--with the authority to assume administration of the erosion and sediment control program if the local authority is not doing an acceptable job. One way to write such a provision is to have the program delegated from the top down in the first place, as Pennsylvania does and as Ohio proposes to do. Under Ohio's proposed regulations, supervisors of soil and water conservation districts would enter into agreements or contracts with the Ohio Department of Natural Resources for the "determination, implementation, inspection, and funding of agricultural pollution abatement measures." The Division of Soil and Water Districts within the DNR would be authorized to implement such a program in any district which failed to negotiate a satisfactory agreement or contract.75/

2.2 Pollution from Animal Wastes

As noted earlier in this chapter, water pollution from animal wastes has received more attention in the past than the more pervasive and intractable problems posed by erosion and sedimentation.76/ Heightened concern over pollution from animal wastes derives from the trend in recent years to confine large numbers of livestock and poultry in small areas for feeding. Dairy operations present similar problems of large waste accumulations. According to statistics cited by EPA in 1973, there were then 1,914,945 feedlots in the United States, of which about 180,000 were cattle feedlots.77/ It has been estimated that the volume of animal waste produced in the United States is about 10 times that produced by the human population and that about one-half of this is produced by animals in confined feeding facilities.78/

The primary focus of regulatory attention to date has been on requiring holding systems adequate to contain the accumulation of animal feedlot wastes and stormwater runoff which comes in contact with those wastes. Less attention has been placed on the location of such holding ponds (although some locations may pose a threat to groundwater) or on assuring that the waste disposed of on the land does not run off into the nearest water body with the next rain. In other words, more attention has been paid to animal wastes as a point source of pollution (through direct drainage from feedlots into waterbodies or through overflow from inadequate

holding facilities) than as a nonpoint source (through indirect drainage or pollution of groundwater or through improper ultimate disposal.)

Congress clearly recognized the dual point/nonpoint nature of animal waste disposal by providing for its control both via NPDES permits 79/ and effluent standards 80/ and via section 208 management programs. The "agricultural" provision of section 208 specifically requires water quality management plans to include, where appropriate, a "process to identify" and "procedures and methods (including land use requirements) to control to the extent feasible" "runoff form manure disposal areas."81/ The point source regulatory picture will be sketched first; then the need for water qualtiy management plans to take a more comprehensive approach to animal waste regulation will be discussed.

2.2.1 Animal Wastes and the NPDES

EPA's NPDES regulations for discharges to navigable waters from concentrated animal feeding operation underwent several revisions 82/ and were not finally promulgated until March 18, 1976.83/ The final regulations established categories of regulated operations as follows:

1. NPDES Permits Are Required for All:

   a. feedlots with 1,000 or more animal units 84/ which discharge to navigable waters, as that term has been liberally defined 85/ unless discharge occurs only in the event of a 25-year, 24-hour storm event.

   b. feedlot with less than 1,000 but with 300 or more animal units if feedlot:

      1. discharges pollutants through a man-made conveyance; or
      2. discharges pollutants into waters passing through or coming into direct contact with animals in the confined area;
      3. unless discharge occurs only in the event of a 25-year, 24-hour storm event.

2. NPDES Permits May Be Required by the director of the responsible state or interstate water pollution control agency or the regional administrator for feedlots not falling within the above definitions in the following instances:

   a. for feedlots with 300 or more animal units, where the director or the regional administrator takes into account certain enumerated factors relative to: the size of the feeding operation and its location relative to navigable waters; the amount of wastes reaching navigable waters and the means by which

they do so; and the slope, vegetation, rainfall, and other factors affecting the likelihood or frequency of discharging to navigable waters.

b. for feedlots with less than 300 animal units, where:

i. the factors enumerated in section 2.a above are taken into account; and

ii pollutants are discharged into navigable waters through a man-made conveyance system; or

iii. "pollutants are discharged directly into navigable waters which originate outside of and pass over, across, through, or otherwise come into direct contact with the animals confined in the operation."

c. provided that no permit shall be required under this section until there has been an onsite inspection and unless the owner or operator of the feedlot is notified in writing of the requirement to apply for a permit.

The second category noted above was included in the regulations to give states a certain amount of flexibility in tailoring the NPDES program to their own needs.86/ Many states which have a significant number of feedlots already go beyond the NPDES in terms of categories of facilities covered. For example, several require permits for all feedlots which cause or threaten to cause water pollution exceeding state water quality standards.87/ Moreover, many if not most of the states with large commercial feedlots have comprehensive permit programs developed specifically for those operations. Some of those programs require permits for all new operations regardless of size, 88/ or establish thresholds lower than those of the NPDES.89/ Some state feedlot programs, Indiana's for example, put the burden of coming forward on the feedlot owner.90/ Others take the approach of notifying owners on a case-by-case basis fo the need to apply for a permit.91/ Still others, like Iowa's, compromise by making a distinction between existing and new feedlot operations and put the burden of coming foward only on new operations.92/

Limitations on the NPDES imposed by problems of administrative feasibility (severe limitations on the numbers of feedlot permits which EPA's regional offices can feasibly process) 93/ and of jurisdiction (the confinement of the NPDES to discharges to surface water) 94/ generally apply with less force to the states.95/ State and areawide water quality management planning agencies will need to assess the adequacy and adaptability of the NPDES and of any existing state feedlot regulatory program from the broader perspective of the requirements of section 208 and of the examples of possible point and nonpoint pollution problems described below.

2.2.2 Animal Wastes and Water Quality Management

As illustrated by the EPA's NPDES regulations for point sources and by the complex definitions of covered facilities in Iowa's feedlot regulations, the pollution potential of a feedlot depends on a number of criteria not easily reduced to numbers and thresholds. A small facility for one hundred dairy cows if poorly designed or managed could pose a much more significant pollution problem than a large, well designed, well-run feedlot for 10 times as many beef cattle.96/ A feedlot or animal waste holding pond located far from a watercourse yet on land with a high water table may threaten serious pollution of groundwater feeding a domestic or public water supply. A feedlot and holding pond system may be located well away from high groundwater and from the nearest stream and any surface runoff may be properly diverted, but if there is inadequate land for waste disposal or if the waste is disposed of improperly, a potential point source may simply be converted to a sure nonpoint source of pollution.

Given the importance of the location of feedlots and holding ponds in relation to ground and surface water, there is every reason to require (1) all new, enlarged, or modified and (2), where administratively possible, most if not all existing feedlots to register with the water pollution control agency. Such registration notices should include adequate information and maps with respect to: (1) animal numbers and density, existing or anticipated waste loads, and design of waste disposal and holding systems (including permeability of retention structures); (2) location of dwellings, animal structures, feedlots, holding ponds, surface water,and domestic and animal water supplies; and (3) slopes and direction of surface drainage, groundwater elevation, soil types, location and size of disposal areas, and planned method and frequency of land disposal.97/

With such information the state water pollution control agency (with the aid of the state department of agriculture, the state soil conservation agency, and other expert assistance) will be able to assign priorities for inspections to determine whether facilities not covered automatically by the NPDES nevertheless should be subjected to a plan approval and/or a permit requirement. This is the approach taken by Iowa, except that there the registration requirement does not apply to all facilities, 98/ and Iowa's Department of Environmental Quality must notify those existing facilities sybject to the act of the need to register. Iowa's criteria for determining whether a registered feedlot is polluting or may reasonably pollute waters of the state are reproduced in the footnotes.99/

For states which will need time to gather data and perform inspections on all feedlots and other sources of animal waste pollution, Ohio's proposed inclusion of animal waste storage facilities and management facilities within its proposed erosion and sediment control program suggests a way of strengthening feedlot regulations.100/ Ohio has recently developed good management practices for storage and disposal of animal wastes which it now proposes to adopt as the basic regulatory standards with which all animal waste disposal facilities must comply. Non-complying operators are subject to the same complaint and enforcement process described in the previous section on erosion and sediment control, except that only existing facilities must be given cost-sharing assistance.

Under Ohio's current proposal, the state would pay for any non-federal portion of 75 percent of the cost up to $5,000 of any of the following improvements where such improvements are necessary to up-grade existing facilities to meet state standards: animal waste storage facilities and management facilities; permanently installed equipment; earth grading and filling; and vegetative cover and fencing. Applicants must agree to maintain the facility in good operating condition and otherwise assure continued effective control of sediment and animal waste pollution. Failure to maintain good practices subjects the grant recipient to state action to recover the amount of the grant.

Under Ohio's proposed system, farmers and livestock and other animal producers are effectively encouraged to have a sediment and/or waste management plan developed for their entire operation. Only if they manage their operation in accordance with such a plan, approved by the local soil conservation district, are they necessarily deemed in compliance with applicable management standards and thus immune from complaint.

Ohio's proposed program may offer a promising approach for those states where most concentrated animal feeding facilities not subject to the NPDES are part of larger agricultural operations. In such areas, combining an animal waste management program with an erosion and sediment control program may avoid duplication of adiministrative effort and make most efficient use of technical assistance,usually that provided by local conservation districts, agricultural extension personnel, and USDA/SCS.

States which have large numbers of commercial feedlots and therefore already have or want a more focused feedlot regulatory program may also profitably borrow from Ohio's proposal. Ohio's approach could be used to help ensure that facilities below any state-determined threshold and facilities which have not yet been reached by a registration/permitting process are subject to certain minimum management standards, which can be enforced through citizen, local, and state action. In addition to providing for voluntary plan approval to meet such standardized requirements, the state should, of course, indicate to what extent compliance with the terms of an NPDES permit would satisfy state standards. Construction and management standards relating to groundwater and land disposal of wastes, matters not covered by the NPDES, should also apply to facilities covered by the NPDES as well as those which are not.101/

Many existing state programs provide useful examples of general construction standards relating to protection of groundwater. A discussion of the need for standards to protect groundwater, suggestions for inclusion of pertinent data requirements in a feedlot permitting program, and generalized standards for protection of groundwater from animal waste pollution may be found in a June, 1976 EPA publication entitled A Manual of Laws, Regulations, and Institutions for Control of Ground Water Pollution.102/ State by state descriptions and examples of regulations designed to prevent contamination of groundwater by animal wastes may be found in the U.S. House of Representatives Conservation and Natural

Resources Subcommittee Hearings on Control of Pollution from Animal Feedlots.103/

Existing standards for land disposal of animal wastes likewise abound. Examples include the model standards appended to the Council of State Government's "Model State Confined Animal Feeding Environmental Control Act" of 1973; 104/ Indiana's guidelines on "Irrigation for Land Application of Animal Waste," "Utilization of Animal Waste as Fertilizer," and series on animal waste handling and disposal for different types of animals; 105/ Ohio's "Livestock Waste Management Guide"; 106/ and Maine's "Guidelines for Manure and Manure Sludge Disposal on Land"; 107/ among others.108/ The development and enforcement of such standards through a broad state permit program or through the best management practice standard and/or plan and complaint process suggested by Ohio is a particularly important contribution state and areawide water quality management programs can make to the water quality regulatory picture.

3.0 Silviculture

3.1 Introduction

As used throughout this chapter, the terms "silviculture," "silvicultural activities," "forest practices," and variations on those terms will be used in their loosest and broadest sense to include construction, use, maintenance, and abandonment of logging roads; construction of structures in and over watercourses; harvesting; residue management; reforestation; and the use of chemicals (pesticides, fertilizers, and fire retardants). Like pollution from agriculture, pollution from silviculture is overwhelmingly nonpoint in nature and results chiefly from runoff and from erosion and sedimentation.109/

The runoff and sedimentation from silviculture may carry with it mineral sediment, organic matter (that present in soils, leaves, twigs, and slash), and dissolved and undissolved chemicals.110/ Disturbance of streambeds and banks and of the perimeters of water bodies during silvicultural activities accelerates erosion and, where shade is removed, allows stream temperatures to rise, often to the detriment of valuable fish populations. The focus in this chapter will accordingly be on legal methods to control (1) erosion and sedimentation from forest lands and (2) disturbance of watercourses and waterbodies.

While some states and some areas designated pursuant to section 208 will not include silviculturally related nonpoint sources of water pollution, such sources are indeed common throughout the United States. Commercial forests cover one-fifth of the land area of the United States and three-fourths of the states have 10 percent or more of their land in commercial forests.111/ What is more, states not known for their forest products now may become so as marginal agricultural land is returned to forest use and as new technologies and new demands on old forests make useful products out of formerly unusable trees.112/

Although water pollution from silviculture is overwhelmingly nonpoint in nature, EPA has identified rock crushing and gravel washing facilities and log sorting and log storage facilities which discharge to navigable waters 113/ as subject to the National Pollutant Discharge Elimination System (NPDES)114/ and to effluent limitation guidelines.115/ In its definition of the term "silvicultural point source" EPA included the following "comment" elaborating on which silvicultural activities do and do not constitute point sources:

> This term does not include nonpoint source activities inherent to silviculture such as nursery operations, site preparation, reforestation and subsequent cultural treatment, thinning, prescribed burning, pest and fire control, harvesting operations, surface drainage, and road construction and maintenance from which runoff results from precipitation events. However, some of these activities (such as stream crossings for roads) may

involve point source discharges of dredged or fill material which may require a §404 permit (see 33 C.F.R. 209.120).116/

Those silvicultural activities which result in pollution and which are not covered by the NPDES program or by section 404 of the FWPCA will, of course, have to be covered by statewide and areawide water quality management plans. Under section 208(b)(2)(F) of the FWPCA such plans are required to include "a process to (i) identify, if appropriate, . . . silviculturally related nonpoint sources of pollution . . . and (ii) set forth procedures and methods (including land use requirements) to control to the extent feasible such sources . . . ."

In general, the most effective means for controlling silviculturally related nonpoint sources is through preventive land management practices rather than through treatment. Sediment is transported to the receiving water through runoff and would be difficult and expensive to treat once it has reached the stream. Where nonpoint pollution from silviculture is determined to be a significant problem, the water quality management process must include the development of "best management practices" (BMPs). EPA is currently developing guidance to assist planning agencies in identifying and assessing nonpoint source problems and in developing BMPs for the particular problem.117/ Moreover, many states have already undertaken the task of regulating sediment pollution from silviculture. The following section, and, especially, the accompanying footnotes, outline some existing examples of "best management practices."118/

3.2 Technical Methods of Controlling Sediment Pollution from Silviculture

3.2.1 Logging Roads

It is generally agreed that logging roads are the major sediment source associated with silviculture. This is particularly true in those parts of the West where the timber industry is extending into ever more rugged country; where more miles of road must be built; and where the slopes are steeper, the rainfall heavier, and the soils more fragile and susceptible to slides. At the same time, silviculture experts in both the South and the Northeast also consider that the bulk of their erosion and sedimentation stems from logging roads.119/ Many states on both sides of the continent have already developed recommended or mandatory road construction, maintenance, and abandonment standards. Region X of the EPA has recently developed an excellent guide entitled Logging Roads and Protection of Water Quality,120/ which provides a good summary of erosion control practices for logging roads. Standards from this and other technical guides and, more significantly for the purposes of this report, from existing state statutes and regulations or guidelines are summarized in the footnotes.121/

3.2.2 Logging Practices

Growing trees on land is in itself an excellent method of keeping the soil on the land and out of the water. It is only at the intervals of, typically, 10 to 20 years when trees are thinned or cut that a timber operation becomes a potential polluter. Generally, the amount and duration of soil exposure and the amount, duration, and velocity of runoff will determine the amount of sediment washed into streams. In addition to logging roads, skid trails along which logs are pulled and the landings at which they are collected and from which they are transported may be heavy sediment contributors. Needless to say, skidding logs or trees in or across streams and dumping logging debris in streams causes erosion of the streambanks and bed themselves and adds organic material to the water in addition to sediment.

From the standpoint of water quality, the harvesting method which minimizes (1) road mileage, (2) number and usage of skid trails and landings, and (3) the use of mechanical equipment in and around streams and, indeed, anywhere on the forest floor is the method to be preferred. Thus, the practice of removing relatively large blocks of trees all at once, known as clearcutting, may or may not be preferable from a water quality standpoint, depending on the amount of soil bared in the operation. Since clearcutting generally requires fewer roads and fewer entries into the forest than selection cutting, the soil exposure from the former method may in fact be less in many cases. That is not to say, however, that clearcutting is not a proper subject of environmental regulation for water quality as well as for aesthetic and, sometimes, wildlife protection reasons. Harvesting large areas of trees, regardless of the number of roads and trails used to do it, may pose a potential erosion hazard if regeneration and growth of underbrush is slow. Moreover, except in unusual circumstances where streamside trees have been killed by natural agents such as fire, insect or disease, clearcutting should be prohibited in a buffer zone along streams, rivers, lakes, etc. both to minimize erosion and to preserve shade and, thereby, existing water temperatures.122/ The "waterside protection zone" provisions of a number of western state forest practices acts are outlined in appendix B to this chapter, and the use of a critical areas approach to minimize silvicultural pollution is discussed in section 4.0, below.

Erosion control standards for skid trails, landings, stream crossings, and general harvesting procedures are outlined in the footnotes with references to pertinent state standards and the technical literature.123/

3.3 Forest Practices Acts

3.3.1 Introduction

The regulation of forest practices is far from being a new concept. At several defined periods over the past century, concern over forest devastation through poor cutting practices and forest fires and a desire to ensure future forest productivity and watershed protection have resulted in many proposals for and enactments of state and federal legislation. Congress has passed more than a dozen statutes with respect to forests, most of them designed to foster the use of sustained yield forest management practices in federal forestland (over 183 million acres) and neighboring private forestland.124/ Under the Sustained Yield Forest Management Act of 1944,125/ the Secretaries of the Department of Interior and the Department of Agriculture are empowered to establish so-called "sustained yield units" which may include private lands through cooperative agreements with the landowner. Such cooperative agreements are to include limitations on the time, rate, and method of harvesting timber from the land.126/

Moreover, land and resource management plans127/ developed for units of the National Forest System are soon to be governed, as a result of the newly passed National Forest Management Act, by Department of Agriculture guidelines designed to ensure, among other things, that timber will be harvested from National Forest System lands only where ". . . protection is provided for streambeds, shorelines, lakes, wetlands, and other bodies of water from detrimental changes in water temperatures, blockages of watercourses, and deposits of sediment, where harvests are likely to seriously and adversely affect water conditions or fish habitat."128/

Harvesting by private corporations or individuals on federal and state forest lands is done under timber sales contracts. The contracts are a potentially powerful vehicle for requiring forest management practices which are designed to prevent or reduce nonpoint source pollution. EPA is working closely with the U.S. Forest Service to include language in timber sales contracts which will ensure that best management practices are used in all national forest lands. It should be kept in mind that section 313 of the FWPCA and Executive Order 11752 require federal properties, facilities, and activities to be in compliance with state, interstate, and local substantive requirements respecting control and abatement of pollution.129/

The upsurge in national interest in forest practices which followed the publication of the Joint Congressional Committee Report in 1941 was matched by a corresponding spate of state forest practices legislation, passage of which was undoubtedly motivated in part by a desire to anticipate and forestall federal regulation.130/ Many of the state forest practices laws now on the books date from this period, the 1940's and early 1950's.131/ While usually such laws include among their declared aims

the protection of watersheds, protection of water quality is generally an indirect beneficiary, at best, of measures designed primarily to increase forest productivity. Many of the "old" forest practices statutes are primarily seed tree laws which seek to ensure continued forest productivity through the establishment of cutting standards ("leave three to eight seed trees per acre").132/ There are few encouraging words and fewer useful tools in these old forest practices acts on which to rely in combating pollution from forest mismanagement.133/

Our attention in this chapter will be focused, therefore, on the "new" forest practices acts, legislation passed primarily by the western states in part because the old laws were not sufficiently protective of water quality. Citations to and outlines of the portions of the laws of California, Idaho, Nevada, Oregon, and Washington discussed are included in appendix B to this chapter.

There has been a great deal written and said on both sides of the question of the need for and workability of forest practices laws of the type now in effect in the western states listed above. To the extent such laws and proposals modeled on them impose notification, plan, and permit requirements, their opponents criticize them for threatening to drown the landowner or timber operator in red tape and for diverting the energies of state foresters from technical assistance to desk work.134/ Proponents point out that in Oregon, a state with relatively long experience with such a "new" forest practices act, both the timber industry and state forestry officials appear to be reasonably satisfied with the act.135/

It is not within the mandate of this handbook to take sides in this controversy. Rather, primary features of both the "new" forest practices acts and of a number of alternative management approaches to protection of the water from silviculturally-related nonpoint pollution will be set out. It will be up to state and areawide water quality management planners and, subsequently, state and local legislators to determine the regulatory approach most suitable to the particular dimensions and characteristics of their silvicultural pollution problems.

3.3.2 Management Approaches: Plans, Permits, Notifications, and Standards

The most obvious feature of the new forest practices laws enacted in the West over the past six years is their emphasis on procedural vehicles through which to better enforce substantive requirements. These procedural vehicles include notification and plan submittal requirements as well as the more familiar permit or license. Oregon's 1971 Forest Practices Act 136/ requires timber owners and operators to notify the state forester before commencing "an operation." Oregon's regulations include all significant silvicultural activities within the definition

of "operation": harvesting of forest crops; road construction; site preparation; application of insecticides, herbicides, rodenticides, and fertilizers; clearing forest land for change to non-forest uses; treatment of slashing; and pre-commercial thinning. Exemptions from the notification requirement include routine road maintenance, recreational uses, tree planting, and direct seeding unless the seed is treated with rodenticides. Whether they require prior notification or not, all forestry operations in Oregon must be conducted in accordance with the detailed forest practice standards applicable to the appropriate one of the three forest regions into which the state has been divided.

Idaho's 1974 Forest Practices Act is similar to that of Oregon in simply requiring notification, but its exemptions are broader, including, as they do, clearing forest land for conversion to non-forest uses and activities undertaken pursuant to a woodlot management plan approved by a local soil conservation district. Idaho provides that the state's forest practices regulations govern in all cases except where the Idaho Department of Lands has approved a plan "for an alternate practice or practices which provide for equivalent or better results."137/

Nevada in 1971 and California in the Z'Berg-Nejedly Forest Practice Act of 1973 have gone further than Oregon and Idaho by requiring state approval of applications and plans for timber operations before those operations are commenced. Both state statutes 138/ attempt to allay the fears of commercial foresters about potential costly time delays by setting strict limitations on the time the state forester may take in reviewing an application and plan. In Nevada, the state forester firewarden must issue or deny the permit within 45 days of receiving the application. In California, the state forester has 10 days to do an initial inspection and 15 days after that to review the plan, which must have been prepared by a registered professional forester. If the state forester does not act within that period, or whatever longer period may be agreed upon by the owner or operator, operations may proceed in accordance with the plan. It should be noted that the final version of California's bill is said to have passed with the concurrence of both the state's forestry industry and of most of its conservation organizations.139/

In its 1974 Forest Practices Act,140/ the state of Washington compromised between the notification and the plan and permit requirement approaches by establishing four separate categories of forest practices. The amount of information required and state review involved increases as the practices increase in importance and environmental threat from category to category. The act sets out general guidelines which the state Forest Practices Board must follow in defining which forest practices will be included in which category.

Regardless of the merits of Washington's compromise approach (which seem substantial), it may be that the issue of which regulatory technique to use, a notification or a plan approval and permit, has been over-

emphasized by writers and commentators. Notification requirements can be written to require the owner or operator to submit as much information as he would include in a plan and permit application, while strict time limits mean that, in effect, many plans and permit applications will be treated simply as notifications. Oregon's system appeals to the forestry industry because there is no permit or plan approval delay, yet Oregon's Department of Forestry apparently has an administrative policy of asking timber operators to wait 10 days after notification before commencing operations. Most operators apparently find no problem doing so.141/ As for permit delays, Washington forestry officials, for one, have apparently been able to keep within the short, 14-day period allowed them for review of most plans and permits.142/

Although the psychological impact of labels is not to be discounted,143/ the really important questions to ask about a regulatory program are (1) whether it allows for the formulation of workable standards which are flexible and fair; (2) whether it is administratively workable both for the bureaucrat and the the person subject to regulation while ensuring protection of the values it seeks to foster; and (3) whether it is easily, effectively, and fairly enforceable. (Of course, this is not an exhaustive list of the criteria by which to judge an adequate forest practices program. Additional tests are included, for example, in a list compiled by the Society of American Foresters entitled "Criteria for a Competent State Forest Practices Act.")144/

3.3.3 Regulations and Standards: Formulation and Flexibility

No attempt is made here to evaluate different states' forest practice standards, since such technical matters are beyond the scope of this study. References to the kinds of standards or best management practices which would be included in a program designed to limit erosion and sedimentation from silvicultural activities are made in section 3.2 above. As with the conservation practices for agriculture discussed in section 2.0 of this chapter, however, it is important to review the general characteristics of the standard-setting and standard-application process.

Needless to say, forest practices standards and practices designed to protect water quality should be drawn up by people with adequate expertise. This argues, of course, for the standards being contained primarily in regulations, rather than in statutes. Given the present evolutionary state of the art of determining best management practices for silviculture (evidenced by the fact that the state of Washington apparently revised their regulations five times within two years),145/ it is probably unwise to tie an administrator's hands by providing specific standards of the type to be found, for example, in Nevada's forest practices act.146/

On the other hand, standard-setting should not be left to the unbridled discretion of one state agency likely to represent one point of view.

Instead, the forest practice legislation (or any other legislation discussed in this handbook, for that matter) should provide for expert and citizen guidance in the regulation writing process and should contain guidelines concerning what types of standards must be adopted. Washington and California provide good examples of such legislation.147/

On paper at least, Washington's provision for a broadly representative technical advisory committee for the formulation of regulations to be approved by the State Forest Practices Board is a good model (although perhaps open to potential under-representation of environmental concerns). Need for local variations in standards is accommodated, as it must be, by the establishment of regional forestry districts and of regional committees to assist the statewide advisory committee. The nine-member regional committees are required to have four members regularly engaged in forest practices; other states should consider stipulating representation of conservation and environmental interests, too. Since there are always problems of apathy and absenteeism with any advisory committee, moreover, frequent opportunities for public participation in review of regulations both pre- and post-promulgation should be afforded.

In order to ensure that water quality protection is adequately considered in the regulation promulgation process, Washington's statute further provides that: "Forest practices regulations pertaining to water quality protection shall be promulgated individually by the board and by the department of ecology after they have reached agreement with respect thereto."148/ California's statute specifically requires its state Board of Forestry to develop soil erosion standards, as follows:

> 4562.5. Soil Erosion Studies. It is the purpose of this section to insure that soil erosion associated with timber operations is adequately controlled to protect soil resources, forest productivity, and water quality. The prevention, retardation, and control of accelerated erosion are the principal goals of this section. The board shall conduct such investigations of soil characteristics and erosion rates and of the instruments, techniques, and procedures available for development and application of soil resource conservation standards, and shall, by January 1, 1976, publish reports or otherwise disseminate the information thus obtained, including a determination, if possible, of permissible levels of soil loss. The board shall promulgate regulations for each district to govern timber operations that may cause significant soil disturbance.149/

Of course, any such statutory guidance respecting necessary and proper subjects for regulation runs the risk of being under-inclusive (California's, for example, says nothing about thermal pollution from shade removal). It should, therefore, include a broad catch-all provision to allow for adoption of whatever additional standards may be

necessary to safeguard the water quality values to be protected by the act.

As with any new state law, it is important to provide for reports to the legislature on progress and experience under the act and for frequent reviews of regulations promulgated. Thus California's act provides for an annual report to the legislature detailing actions taken pursuant to the act and including recommendations for legislative action "necessary to more fully carry out the purposes and requirements" of the act.150/ California's law allows for readjustment of district boundaries as well, should land within a district as originally drawn turn out not to share its physical characteristics.151/ Since the State Board of Forestry can create as many districts as it deems necessary, it should always be possible under this system to have regulations tailored to unique local conditions.

That is not to suggest, however, that the regulations themselves should be extremely detailed. As with agriculture, the extreme variability of soils, even within small geographical areas, makes setting absolute best management practice standards difficult. For example, road construction on a given slope gradient may or may not be problematic depending on whether the soils or geological substrata are unstable or not.152/ Hence regulations should be written in such a way that the enforcer can obtain as much information as necessary from the operator and so that standards are general enough to be adapted to unique conditions. Where it is not proposed to require forest cutting plans for all operations, provisions should be made for the operator to have a plan approved voluntarily. This option should, as in the agricultural context discussed above, provide assurance to the person who is doubtful about his conformity to regulatory standards.153/ The plan should be limited in duration, however. In California, for example, plans are effective for not more than three years (except for stocking work).154/

In those few cases where the legislature or the technical advisory board does feel a regulatory standard needs to be specific to best protect forest and water resources, the act or regulations should provide strict substantive procedural safeguards for variances from that standard. Thus Nevada's forest practices statute imposes a very high burden of proof on those who would conduct tractor logging on slopes with a 30 percent or greater incline or who would fell or skid trees or construct roads or landings within 200 feet of the high water mark of a waterbody or watercourse. In the first case, the timber owner or operator must obtain a special variance from the state forester firewarden; in the second case, the variance must be obtained from a committee composed of the state forester firewarden, the director of the Nevada Department of Fish and Game, and the state engineer. In both cases, the variance decision is to be governed by enumerated considerations, all having to do with possible erosion and threats to water quality.155/

Nevada's scheme is, in effect, a critical areas program superimposed on a conventional permit and plan approvál program. Since disturbance of highly erodible soils and of soils near and within streambeds accounts for the greatest share of sediment pollution from silviculture, Nevada's approach of assigning priorities and setting criteria for decision-making in the legislation itself is one to consider.

3.3.4 Administration

a. Inspections

With the number of notifications or plans and permit applications which may be received in a given year and with the short time within which inspections will have to be made, all but the best-staffed state agencies will have to assign priorities for inspections. Oregon officials, who inspected 6,404 operations out of the 9,427 for which they received notification in the past fiscal year,156/ base their informal priorities on soil types, slope, whether the logging will be by cable or tractor, road mileage, and the presence and quality of streams in the area.

Since how the operation is conducted is more important than what the notification or plan and permit application says about how it is proposed to be conducted, inspections should be done during all operations. Washington's law has a good provision which helps take the guesswork out of when an operation is actually going to start. That provision requires the timber operator to give two days notice before the commencement of actual operations "whenever an approved application authorizes a forest practice which, because of soil condition, proximity to a watercourse or other unusual factor, has a potential for causing material damage to a public resource, as determined by the department."157/ Apparently this provision has been applied successfully.158/

The key factor cited by both Oregon and Washington officials 159/ is the familiarity of the state agency's field people with the lay of the land and with the ways of particular operators. However willing the forest products companies may be to go along with new state standards, and most are, getting the word to the "catskinner" on the job is the hard part of administering any program. Local inspectors can focus their attention on those operations which they know may be performed without adequate regard to environmental quality. Of course, this is also where state personnel need to channel their educational programs, a key supplement to any regulatory program, as will be discussed later in this chapter.

b. Interagency and Intergovernmental Coordination

While most forest products companies and timber operators have few problems with the actual regulatory standards promulgated under state

forest practices acts, they have been justifiably concerned with the problems of overlapping jurisdiction which the passage of any new legislation in an environmentally conscious state is likely to pose these days.160/ Specifically, logging activities in or around waterbodies, such as culverting a stream for a logging road, are likely to already involve at least one state agency, perhaps a local one as well, and the Army Corps of Engineers under section 404 of the FWPCA. The solutions to this problem of overlap will be as various as are state wetlands laws, state fish and game laws, state land use laws, and local flood plain ordinances, to name a few of the laws which might be involved. No new law or regulations applicable to silvicultural or any other activities, for that matter, should be formulated without first developing a procedure through which any conflicting standards can be reconciled and any overlapping approval processes can be streamlined. Apparently, the state of Washington had a serious initial problem its Forest Practices Act, its Shoreline Management Act of 1971,161/ and its Hydraulics Project Approval Law.162/ It recently promulgated forest practices rules and regulations163/ which clarify the situation and encourage the kind of interagency cooperation which the forest practice regulatory agency, the Department of Natural Resources (DNR), reports taking place. Thus while a timber operator who wishes to do any work in a streambed must have approval from the Department of Fisheries or Game under the Hydraulics Act referred to previously, DNR apparently arranges for consolidated review of major multi-permit operations, including a joint inspection by representatives of DNR, the Department of Ecology (Water Pollution Control), and the Departments of Fisheries and Game.164/

When overlap threatens to be a problem, new laws or regulations in this area should provide for interagency agreements providing, where feasible, joint inspections, joint application review, and joint hearings--or the assumption of one agency's duties in a certain area by another. Time limits should be imposed on reaching such agreements so that they may go into effect prior to the effective date of new legislation.165/

Potential conflicts between state and local legislation should also be anticipated and dealt with before they arise. Fuzzy language like that found in the provision of Washington's Forest Practice Act dealing with local planning and zoning requirements should be avoided. Washington's act provides that no county, municipality, or any other local or regional entity should regulate forest practices except those with respect to lands to be converted to non-forest use. Such entities may adopt additional or more stringent regulations which are "not inconsistent" with the forest practices regulations and which will not "unreasonably prevent timber harvesting."166/ Such language simply creates confusion and invites litigation. The status of local ordinances or regulations should be made clear, not obscure, by any new statute.

If additional or more restrictive local forest practices regulations are determined to be desirable, they should be expressly authorized without qualification as they are in Calfornia. The relevant provision of the Z'Berg-Nejedly Forest Practice Act reads:

> 4516. County and Regional Regulation. Notwithstanding any provision of this chapter, individual counties and the California Tahoe Regional Planning Agency shall have the right, within the reasonable exercise of their police power, to adopt rules and regulations. Such county or agency rules and regulations may include, but are not limited to, matters relating to soil erosion control, protection of stream character and water forestation methods, mass soil movement, submission of timber harvesting plans, location and grade of roads and skid trails, excavation and fill requirements, slash and debris disposal, haul routes and schedules, hours and dates of logging, and performance bond requirements.167/

The Tahoe Regional Planning Agency has, in fact, adopted such regulations, along with a Tree Conservation Ordinance which applies to tree cutting associated with land use conversions and any other noncommercial cuttings. The Tahoe Forest Practices Ordinance further stipulates that it establishes only minimum standards applicable within the Tahoe Region and that any political subdivision may enforce equal or higher standards within its territory.168/

It should be noted in this connection that a recent case in the Supreme Court of South Carolina held that the tree cutting section of a zoning ordinance was not authorized by the states's zoning enabling statute.169/ Nevertheless, forest practices regulations whose purpose is to prevent degradation of a locality's waters, flooding, and other consequences of erosion detrimental to the health and welfare of that locality should be legitimate expressions of the local police power where that power has not been narrowly construed and where preemption is not an issue.170/ (Note 170 contains references to local tree cutting ordinances.)

An additional or alternative way to encourage participation of local governments in regulation of silvicultural nonpoint pollution is to give them an opportunity to compel enforcement of state regulatory standards. Since it is often the local people who will be primarily affected by the pollution of water supplies, the reduction in reservoir storage capacity, the loss of fishing and other recreational opportunities, and damage to irrigation and water treatment equipment from sediment, there is a strong case for affording them an enforcement role in a statewide regulatory system. Before describing what form that role might take, enforcement provisions will be described generally.

3.3.5 Enforcement

As with erosion and sediment control programs for agriculture, one of the important arguments in favor of forest practices legislation is the need for effective enforcement tools. Such tools are required to achieve with a small, reluctant minority of timber operators the advances in erosion and sediment control and protection of water bodies which the rest of the operators either already have adopted or voluntarily will adopt once education and technical assistance have been made available. Like the erosion and sediment control programs discussed in the Agriculture section of this chapter, forest practices acts should allow for a go-slow, cooperative approach to enforcement where that is considered to be the most promising course. Unlike most of the erosion and sediment control programs applicable to agriculture and silviculture discussed earlier, many state forest practices acts now on the books do provide effective enforcement provisions for cases of hard-core resistance or persistent negligence.

During the first years of a new act many violations will result from unfamiliarity with new requirements. One example might be uncertainty as to whether a certain practice is covered by a notification or a permit requirement when the line has not yet been clarified by regulation. For such cases, forest practices acts should provide for warnings. More than half of Oregon's enforcement actions or citations in its first two years (fiscal 1973 and 1974) took the form of warnings.

Of those 105 cases over the two-year period where court citations were issued in Oregon, the overwhelming majority of defendants pleaded guilty; only five pleaded not guilty. Of the 49 violators who received a fine (the largest fine was $1,000 and most were in the $5 to $50 range), about half were guilty of failure to give the required notification. The director of the Oregon program characterized the half of the violations not involving failure to give notification as primarily involving failure to protect Class I streams (waters which are valuable for domestic uses and for fish spawning, catching, and/or other recreational uses).

In March 1975, Oregon's director reported that only 5 percent of the Deparment of Forestry's time was spent in strict enforcement actions.171/ In fiscal 1976, only 36 of 146 cases of violation involved failure to file notification,172/ weakening the argument that laws like Oregon's waste state foresters' time on non-substantive duties. Idaho's forest practices law suggests one way to spread out the enforcement burden for the procedural requirements of such an act: a provision requiring the initial purchaser of forest tree species to receive and keep on file for inspection by the Idaho Department of Lands a copy of the timber cutter's notification of harvesting with respect to the trees purchased.173/

For substantive violations which threaten harm to resources if not halted, the forest practices regulatory authority must be authorized to issue stop work orders. Such provisions, along with the necessary accompanying opportunity for the forest owner or operator to take an administrative appeal, are to be found in many of the existing forest practices acts.174/ In the period January through June 1976, the state of Washington's Department of Natural Resources issued 12 such stop work orders (77 notices to comply were issued in the same period).175/ By the time such an order is issued, however, damage requiring corrective measures may already have been done. Oregon officials found in fiscal 1973 and 1974 that about 60 percent of violations required remedial work.176/

In most cases, the owner or operator can be brought to correct past deficiencies and avoid future ones by threat of court actions. In those few cases where this is not true, however, it is important that the state be able to undertake corrective action itself, without undue delay. Again, examples of such powers can be found in existing legislation, the specifics of which are outlined in appendix B.

In Oregon and Idaho, state officials must first estimate the cost of the repair and notify the owner of the estimate. If the owner or operator refuses to pay, the state agency may take its request to its administrative board which, after giving the owner or operator an opportunity to appeal, may then authorize the state agency to proceed with the necessary work. Washington allows the state agency to undertake such work without prior authorization (after the owner or operator has had a chance to appeal the final administrative order). In California, the state forester may take such corrective action on his own authority after first providing an opportunity for a public hearing before the State Board of Forestry.

Such provisions go on to stipulate that any unpaid costs become a lien on the land and, sometimes, on personal property as well. Since it is usually the operator, not the landowner, who is responsible for the violation, it makes practical and equitable sense to provide as California does, that costs of remedial action, including administrative costs, may also be recovered from the operator in a civil action for debt.177/ While such corrective action will be resorted to rarely, state officials often see it as a more useful source of leverage than time-consuming court actions.178/ In both the one corrective action case brought to date in Washington and the one such case in Oregon, the costs quoted to the operators by the state agencies were so high that the operators decided to do the work themselves, after all.179/

Other enforcement techniques include bonding requirements, as used in Nevada.180/ A student of the California law reflects:

> A performance bond is a limited enforcement tool because it only corrects obvious effects: a prohibition against yarding

> in streams is virtually unenforceable by a bond procedure. Nevertheless, large abuses are deterred by fear of forfeiture.181/

Perhaps more useful in deterring lesser violations of forest practice standards is California's licensing provision. No person in the state is allowed to engage in timber operations without a license, which is good for only one year. Renewal may be denied

> until any violations by the applicant as exist on the date of submission of the renewal application, of which the applicant has been notified and given reasonable opportunity to correct, are corrected on such reasonable terms and conditions as the [State Board of Forestry] may require.182/

A final concern in any effective enforcement program is access to the enforcement process by those with a direct interest in ensuring adherence to forest practices standards. At the state agency level, this will include all agencies concerned with water quality: the agency responsible for water pollution control, the department of fish and game, or equivalent, and maybe others. Examples of the involvement of such agencies in the programs under discussion were given earlier in this chapter and also appear in the outlines in appendix B.

In the state of Washington, the Department of Ecology (which, as mentioned previously, is jointly responsible for promulgation of forest practices regulations pertaining to water quality protection) is authorized to petition the Forest Practices Appeals Board if it determines that a person has failed to comply with the regulations and that the Department of Natural Resources has failed to take enforcement action. If it finds merit in the contention, the Appeals Board must, within 48 hours, direct DNR to take appropriate enforcement action.183/ In California, where the State Water Quality Board has jurisdiction over nonpoint as well as point sources, its regional boards apparently monitor water quality for forest practices violations and take enforcement action accordingly.184/

As for enforcement action initiated at the local level (where most of the ill effects from violations of forest practices rules will be felt), it might be prudent to give local government entities the same powers as other government agencies. In Washington, for example, a county may appeal DNR approval of any application concerning lands within the county's jurisdiction to the Forest Practices Appeals Board.185/

Penalties available under the state forest practices acts here discussed are detailed in appendix B.

3.4 Alternative Approaches to the Control of Silviculturally Related Nonpoint Sources

3.4.1 Revisions to and/or Regulations under Related Legislation

States whose water quality management planning processes identify silvicultural activities as a significant contributor of nonpoint pollution should certainly consider adopting comprehensive legislation such as that discussed in the previous section; other states with fewer commercial forestry operations may want to consider simply building upon existing, general authority.186/ This authority may take a number of different forms: a water pollution control law which covers nonpoint as well as point source discharges; an erosion and sediment control law which covers all earth-disturbing activities; or a wetland or other critical areas protection program, to name the most generally available. Critical areas programs will be discussed in a separate section later in this chapter. This section briefly addresses the first two options listed above.

a. Water Pollution Control Laws

As noted above, California's Regional Water Quality Control Boards are authorized to regulate pollution from logging operations. The Porter-Cologne Water Quality Control Act authorizes the boards to regulate existing or threatened discharges of "waste" which may adversely affect the water environment, and the term "waste" has been interpreted to include soil, slash, sawdust, and other debris from logging operations.187/ Montana's water quality act defines waste to include decayed wood, sheerings, sawdust, bark, and sediment.188/ As mentioned previously, Pennsylvania's Clean Streams Law gives the state Department of Environmental Resources broad power to order a landowner or occupier to correct any condition existing on land which is resulting in pollution or the danger of pollution.189/ Pollution is defined broadly so as not to be limited simply to point source discharges but to embrace "contamination by alteration of the physical, chemical, or biological properties of [Waters of the Commonwealth], or change in temperature, taste, color or odor therof . . ." when such contamination

> will create or is likely to create a nuisance or to render such waters harmful . . . to public health, safety, or welfare, or to domestic, municipal, agricultural, recreational, or other legitimate beneficial uses, or to livestock, wild animals, birds, fish, or other aquatic life.190/

Pennsylvania's Department of Environmental Resources (DER) has taken this general water pollution control authority and used it to adopt erosion and sediment control regulations which apply to all earthmoving activities including those connected with silviculture. Guidelines for forest products harvesting or removal operations interpret the applicability of the regulations and their plan and permit requirements to silvicultural practices. Permits are only required for earthmoving activities affecting 25 acres or more. Since DER estimates that normally only 10 percent of a forest product harvesting area is directly affected by earthmoving, permits are generally only required for harvesting of 250 acres or more. Operators conducting smaller operations must, however, have an erosion and sedimentation control plan prepared by a person trained and experienced in the area. All operators must implement and maintain the erosion and sedimentation control measures set forth in a plan.

DER's forestry guidelines set forth a suggested outline and provisions for a basic forest practices plan.191/ Inspections to determine whether operations are proceeding without a required permit or plan or whether erosion and sedimentation control measures set out in a plan are being followed are carried out by DER personnel. In states where logging operations are larger and more sophisticated than they are in Pennsylvania, water quality agencies responsible for administering forest practices regulations should utilize the experience of state foresters in joint inspections.

b. Erosion and Sediment Control Legislation

In states where the extent of silvicultural pollution is judged insufficient to warrant comprehensive forest practices legislation, logging roads may nevertheless be a significant source of sediment. Since road construction is more a typical earthmoving practice than a specialized forest practice, it might well be regulated through a state erosion and sediment control program.192/ States which have inadequate authority for such a program in their water pollution control law may have already adopted or may be considering adopting legislation similar to the Model State Act for Soil Erosion and Sediment Control.193/ Such legislation is readily adaptable to the regulation of erosion and sedimentation from road construction and other earth-disturbing activities connected with silviculture.

As presently written or proposed, many of the erosion and sediment control programs outlined in appendix A leave the reader confused about their application to silvicultural activities. Thus Ohio's proposed amendments to its soil conservation law would allow the Board of County Commissioners to adopt rules requiring persons to obtain permits and file sediment control plans

> . . . before clearing, grading, excavating, filling, or otherwise improving or preparing five or more contiguous acres

> of land for the construction of nonfarm buildings, structures, utilities, recreational areas, or other similar nonfarm uses, in order to secure compliance.194/

A later section of the proposed act provides for the establishment of (1) standards to control agricultural pollution and (2) pollution abatement practices for farming and silvicultural operations eligible for cost-sharing.

Since there are no definitions of "clearing" or "nonfarm uses" in the Ohio proposal, it is impossible to tell whether some or all silvicultural operations carried out on five or more acres would require a permit and plan approval, and it must be inferred that silviculture will be subject to the same performance standards as agriculture. Drafters of erosion and sediment control legislation who intend the laws to apply to silviculture, as Ohio apparently does, must be careful to be absolutely clear in the legislation as to what silvicultural activities are covered by such provisions.

Moreover, acreage thresholds for permit requirements like Pennsylvania's 25 acres and Ohio's proposed 5 acres must be considered carefully in reference to silviculture activities. It may well be that a threshold which makes sense for a construction site does not make sense for logging and logging roads. In addition, such thresholds, baldly stated, are difficult to interpret. Does selective logging of a five-acre site constitute "clearing" that site? What about a forestry operation extending over a year's time, consisting of discrete clearcuts, each less than five acres, connected by logging roads?

3.4.2 Fiscal Incentives, Contract Provisions, and Educational Programs

A large category of existing laws applicable to forest practices has yet to be touched on in this chapter, a category which includes enabling legislation for service forestry programs (educational and technical assistance) and for cost-sharing and preferential tax laws for timberland. The concept of tying technical and financial assistance and tax relief to sound forestry practices, including measures to protect water quality, is not new. One example long in existence is the New York Forest Practice Act of 1946, under which management and market services are extended to owners signing cooperative agreements with the New York Department of Environmental Conservation.195/ All such cooperative agreements now include an undertaking to abide by the standards set forth in the "Guidelines for Timber Harvesting in New York" recently prepared by the New York Section of the Society of American Foresters.196/

States which provide direct monetary as well as technical assistance to forest owners contingent on their complying with approved forest practices include Virginia 197/ and Mississippi 198/. While these

states' acts were designed primarily to foster reforestation and forest productivity, it must be remembered that well-managed forests are themselves a preferred land use from the point of view of low water pollution potential. Thus by providing direct cost-sharing assistance to small landowners 199/ for reforesting land, Virginia and Mississippi do promote the creation and preservation of a forest as "a natural reservoir for retention of water," in the language of the purposes section of Virginia's Reforestation of Timberlands Act.200/

The further use of such acts to promote sound logging practices is a little problematic. The requirement in Virginia's law that notice be given when land seeded with help from the state is logged applies only to land for which assistance was given in loan form and is merely a device to ensure repayment.201/ When assistance takes the form of an outright grant of money, material, or technical assistance for reforestation, attempting to retain leverage over the long period it takes the trees to mature could be difficult.

Although Virginia and Mississippi have both recently adopted forest practices guidelines which do address water quality considerations (Virginia's202/ are more detailed than Mississippi's203/), we know of no attempt in either state to enforce logging standards through the state's forest incentives program.204/ Virginia does, however, use its inspection program under its Seed Tree Law as a mechanism for encouraging better harvesting practices.205/

In order to be used, then, to promote good logging practices as well as reforestation, an incentives program like Virginia's or Mississippi's would have to be considerably broadened. Such a broad program would make financial assistance contingent on a management plan or cooperative agreements that would take in the whole forestry operation from cutting to re-seeding to cutting again. It also would provide for follow-up inspections and monitoring to be sure that the agreed-upon practices were being carried out.

An indirect form of financial incentive--tax abatement or special tax rates--offers another possible tool for promoting good forestry practices. The possible advantanges of tax incentives over direct cost-sharing programs are their wider use and applicability (large timber operations are not usually excluded) and the fact that they afford leverage on an annual basis. As more and more states move to 100 percent valuation of real estate, preferential assessments will be sought by increasing numbers of owners of forest and farm land. Two relatively recent publications have listed and summarized state forest tax incentive laws;206/ therefore, only a brief sketch of how such a law might be used to abate or prevent nonpoint source pollution will be offered here.

A good illustration of this kind of legislation is New York's 1974 amendment to its Real Property Tax Law, Chapter 480-a.207/ New York now

provides that any tracts of at least 25 acres devoted to or suitable for forest crop production may be certified by the Department of Environmental Conservation as eligible for tax assessment at their value per acre for forest crop production. Additional tax revenue from such lands is derived through a 6 percent stumpage tax imposed on receipts when the land is logged. The Department of Environmental Conservation notifies the owner when it deems the forest crop ready for harvesting and directs the owner in recommended forestry practices for such harvesting. It is clear that failure to abide by the Department's harvesting and management standards (which are the guidelines developed by the Society of American Foresters referred to earlier) constitutes grounds for de-certification.208/

What is not clear from New York's forestry tax provision is whether its stiff five-year roll-back penalty is available for improper management or, more probably, only for conversions "to a use which precludes management of the land for forest crop production."209/ The roll-back penalty (foregone taxes plus 10 percent interest) in the state of Missouri's preferential tax assessment program has been interpreted to apply to failures to maintain proper forest conditions and practices.210/ Such practices are to be specified in rules and regulations recommended by the State Forester and adopted by the Missouri Conservation Commission.211/

While the application of a harsh roll-back penalty is certainly an excellent deterrent, it would be unfair to use it for failure to abide by many forest practices standards which are unavoidably vague (e.g., "minimize size of landings") and violations of which result in slight or easily corrected damage. Consequently, any new tax law or regulations written with water quality practices clearly in mind might provide for a limited classification of violations (e.g., violations of cutting restrictions along stream and lake sides) for which roll-back penalties as well as de-certification would apply. Landowner certainty should be further assured by inclusion of a provision allowing for formal state assurance that proposed cutting and management practices do conform to prescribed standards. As noted often before, this may be accomplished through state approval of forest management plans.

Still other useful methods for injecting protection of water quality into existing forestry programs suggest themselves. Such options include encouraging better forest practices among small contract loggers. It is often these loggers rather than the large timber companies who are unaware of the need for and technical developments in erosion and sediment control.212/ Possibilities for assuring the use of sound practices by independent loggers include a licensing program such as California's;213/ a state forestry association listing of reliable harvesters, like the one being developed in Mississippi;214/ and development by the state forestry department in conjunction with state forestry associations of a recommended harvesting contract for private landowners.215/ State cost-sharing assistance or tax relief could

perhaps be predicated on the use of an approved harvesting contract by the private forest owner.

Space does not permit further discussion of these more narrowly targeted options, nor does the focus of this handbook on regulatory programs allow treatment of still another potentially exceedingly valuable approach to curbing forest mismanagement: intensive educational programs. It might well be, however, that an agressive educational program (1) tied closely to mandatory standards and to fiscal incentives and penalties and (2) subject to careful monitoring would be adequate to control a particular state's or area's nonpoint pollution problem from silvicultural sources. While we know of no state which has put together such a comprehensive program, Virginia and Mississippi are examples of states which have recently embarked on vigorous educational programs.

4.0 Agriculture and Silviculture and Critical Areas Programs

A recent computer study of Canadarago Lake, New York undertaken at Cornell University found that 40 percent of the surrounding land was contributing 90 percent of the total sediment. This prompted an SCS official to remark, "This knowledge could contribute to development of a 'critical area' strategy, with heaviest investment in the areas with the greatest problem."216/

It will not have escaped the reader's notice, perhaps, that many of the erosion and sediment control programs, the animal waste control programs, and the forest practices laws and regulations discussed in this chapter establish their own internal critical areas provisions. For example: erosion and sediment control programs may reflect the fact that the potential for pollution increases the closer the activity is to water or the greater the slope between the activity and the water (1) by establishing corresponding priorities for erosion and sediment control plans;217/ (2) by providing for local variations in soil loss limits;218/ or (3) by prohibiting certain activities along stream banks or in streambeds.219/

A recognized technique for filtering out the pollutants in runoff from animal waste facilities is the use of a buffer strip between the feedlot and any nearby waterway, specially graded and seeded to retain and "treat" the runoff.220/ Sediment in runoff from cropland may also be removed by grassed terraces.221/ Most striking of all, of course, are the "waterside protection zones" created by many forest practices acts and regulations. On the well-supported theory that much if not most of the sedimentation from silviculture results from road building; from logging near streams or on steep slopes descending directly to streams; and from logging activities undertaken directly in the streams, such protective zone provisions restrict many such activities and may prohibit the most earth-disturbing ones altogether.222/

Restrictions of this sort in laws and regulations applicable to agriculture and silviculture are in part locational restrictions designed to keep the most polluting activities--chemical spraying and mechanical soil disturbance--away from the water itself. In the case of agriculture, such restrictions are also designed to use the natural runoff retarding and filtering qualities of undisturbed grass, brush, and trees as a pollution treatment system for whatever manure and chemical laden runoff reaches the buffer zone from contiguous land. In the case of forests, leaving a strip of trees along a watercourse also maintains cool water temperatures often necessary to native aquatic life.

In appreciation of both the particular sensitivity and the pollution control value of stream and lakeside areas, a number of states have recommended new "critical areas" programs as supplements to or even substitutes for more broadly conceived erosion and sediment control programs. Thus, when Ohio's Agricultural Pollution Technical Advisory Board was helping to develop the state's proposed erosion and sediment control program, it recommended that the erosion from stream and riverbanks and from lake shores, which it considered to be a significant contributor of sediment, be dealt with by a separate program.223/ When considering its state's need for a forest practices act like those recently enacted in the West, Wisconsin's delegation to the American Forestry Association/U.S. Forest Service/U.S. EPA Water Quality Workshop in Chicago counter-proposed reliance instead upon controls focused along rivers and lake shores, supplemented by general educational efforts.224/

Other states, when confronted with the need to regulate pollution from agriculture and silviculture, have suggested that existing state land use or wetlands programs lend themselves well to abatement of pollution from one or both of these new sources of concern. In New England, which has both a number of old forest practices acts 225/ and several relatively recent wetlands and land use laws, one knowledgeable commentator has judged that the broad-purpose acts effect or could effect much more far-reaching regulation of forest practices than the older, single-purpose acts.226/

In some cases, adoption or adaptation of one or a combination of critical areas programs* may indeed be adequate to control erosion and sedimentation from a particular source. This might be true for silviculture in a state with little commercial logging. In other cases, stringent controls on land-disturbing activities in critical areas may

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*The term is used here as a catch-all to describe critical areas protection programs, wetlands laws, streambed laws, wild and scenic rivers programs, hillside protection laws, and open space easement and purchase programs.

allow adoption of a more lenient or gradual approach elsewhere. For states which already have critical areas programs, the idea of using existing legal and administrative machinery will exert a strong appeal. States without such programs may be considering them for reasons including but not limited to water quality. Since Chapter 3 describes the use of critical areas programs to achieve water quality objectives in some detail, the remainder of the discussion here will be brief and confined to a few examples of the ways in which such programs can be used to minimize nonpoint source pollution from agriculture and silviculture.

While the term "critical areas program" is most accurately used to describe a statewide program to preserve and protect natural areas of outstanding significance, such programs are generally least appropriate to the accomplishment of broad nonpoint pollution control objectives because of limitations in scope. Thus, Florida's Environmental Land and Water Management Act of 1972, described in Chapter 3, excludes both agricultural and forest lands from its coverage and is further limited to 5 percent of the state's land.227/ Broader land use programs could be used, however, to protect water quality, particularly public water supplies, by designating protected watersheds and by preserving and regulating forest uses there. This is done, for example, in Hawaii, where the Department of Land and Natural Resources is empowered to regulate tree-cutting in areas it designates as forest and water reserve zones.228/ Another statewide land use planning scheme, Vermont's well-known "Act 250," exempts agriculture and forestry from its coverage but does regulate logging road construction above the 2,500-foot level.229/

Existing or contemplated wetlands*legislation is a much more likely source of authority for the regulation of nonpoint pollution from agriculture and silviculture.230/ Many states and localities have wetlands and/or flood plain legislation, and most such laws and ordinances apply to all watercourses and waterbodies, not just ones of outstanding ecological value. Traditionally, however, such laws and ordinances have exempted agricultural and silvicultural activities altogether either for reasons of political expediency or because agriculture and silviculture were mistakenly assumed not to affect the wetland ecosystem.231/

Another reason for exempting agricultural and silvicultural activities, of course, has been the fear of imposing an onerous administrative burden both on the farmer or forester and on the wetlands protection agency. An answer to such fears may lie, of course, in the examples of

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*In this section, the term "wetlands" is used to encompass streambeds and banks, floodplains, and the watercourses and waterbodies themselves, as well as the inland and coastal marshlands more frequently associated with the term.

the agricultural and silvicultural programs discussed earlier. Where an agricultural activity, like the construction of an animal waste holding pond, or a silvicultural activity, like the construction of a logging road, should be prohibited in a sensitive wetland area, there may be no need to impose a wetlands permit requirement on the action. It can simply be prohibited outright or in the absence of a special permit, as long as there are effective education and enforcement programs to ensure that such prohibitions are observed. More routine activities, carried out on a year-to-year basis on farms or as part of a long-term harvesting program in forests, could be subject to a soil and water conservation plan requirement as an alternative to a traditional wetlands permit. Such a provision might take the form of an exemption from a permit requirement for (1) agricultural uses of land authorized under a farm conservation plan approved by the local soil conservation district and, where wetlands are involved, by the wetlands protection agency, and (2) silvicultural activities authorized under a forest management plan approved by the state forester and/or the local conservation district and, where wetlands are involved, by the wetlands protection agency. In addition to being given the opportunity to review and approve such farm and forest management plans where wetlands are involved (and it is safe to say they will be in many cases), the state wetlands protection agency and, where it is not the same, the state water pollution control agency might be authorized to bring enforcement actions against activities undertaken in or affecting wetlands where such activities are in violation of the conditions of an approved plan or are not sanctioned by it.

Wetlands statutes offer a legal and institutional structure for imposing controls on agriculture and silviculture to protect both against nonpoint pollution and against destruction of valuable ecosystems. A more focused approach to the control of erosion and sedimentation, our main concern here, is offered by laws or ordinances focused on the watercourse itself, its bed, and banks. A recently enacted law of this kind is Montana's Natural Streambed and Land Preservation Act of 1975.232/ The declared policy of that act is to preserve rivers and streams and the lands and property immediately adjacent to them in their natural state ". . . and in so doing to keep soil erosion and sedimentation to a minimum, except as may be necessary and appropriate after due consideration of all factors involved."233/ Statewide guidelines for administration of the act are adopted by the State Board of Natural Resources and Conservation, but the act is actually administered at the local level by local conservation districts (or, where none exists, by a grazing district or board of county commissioners) pursuant to locally adopted rules.

In the model rules developed for adoption at the local level by the Montana Department of Natural Resources, the definition of covered projects for which prior approval is required under the act and under the board guidelines is expanded to go beyond hydrographic modifications, (e.g., culverts, channel changes, diversions, dams, and

reservoirs). Thus "project" is defined to include "farming practices, including: (a) brush removal operations by mechanical, spraying or other means; and (b) grazing and tree cutting on erosive sites as determined by the district."234/ Unfortunately, the coverage of such a regulation is still difficult to guage since what constitutes land "immediately adjacent" to rivers and streams is never defined.

More explicit is a Watercourse Protection Ordinance of Napa County, California which defines "watercourse" to include "an area extending laterally outward 50 feet beyond the top of the banks on either side of the channel."235/ The stated purposes of the Napa County ordinance include the following objectives intended to promote the public health, safety, and general welfare by "preserving riparian cover": the preservation of fish and wildlife habitats; the prevention of stream bank erosion; the maintenance of cool water temperature; and the prevention of stream water siltation. To achieve these among other objectives, the ordinance stipulates that no person may "deposit or remove any material within a watercourse . . . plant or remove any vegetation within a watercourse; or alter any embankment within a watercourse" without first obtaining a permit from the Napa County Conservation, Development, and Planning Commission. No application is to be approved when the commission finds that the proposed work will "destroy a significant amount of riparian cover."236/

Laws such as Montana's Streambed and Land Preservation Act and the Napa County ordinance discussed above might serve as useful supplements to a general erosion and sediment program or to a forest practices act, particularly where such general programs do not include permit requirements. To be really useful components of an overall nonpoint pollution control program, however, such laws and/or regulations promulgated under them would have to include more particularized standards pinpointing their application to agricultural and silvicultural activities. An example of still another type of critical areas program focused on protection of the streambed and banks, a state wild and scenic rivers program, will illustrate.

New York's Wild, Scenic and Recreational Rivers System Act 237/ was enacted in 1973 to "insure that the finest natural rivers throughout the state would remain freeflowing and that their immediate environs would be protected from inappropriate development."238/ Under the terms of the act, the Adirondack Park Agency is responsible for the administration of the river system on private lands within the boundaries of the Park (see section 7.3 of Chapter 3 for a description of the Adirondack Park). The Adirondack Park Agency's "Rules and Regulations Governing the Wild, Scenic, and Recreational System Within the Adirondack Park" are a good example of how broad-purpose regulations can be made specific enough to control particular activities, in this case timber harvesting as well as agricultural, residential, industrial, recreational, and other uses.

The Adirondack regulations are an excellent example of a regulatory system which focuses landowner and bureaucratic time and energy on the most environmentally significant activities while at the same time raising the level of care and environmental sensitivity with which all activities are carried out. In other words, the Adirondack Rules establish a system similar to the one in Washington's Forest Practices Act under which some activities require permits before being undertaken, others are simply subject to certain uniform restrictions and standards, and some may be sanctioned on a broad scope and time frame through submission and approval of a management plan.

While the Adirondack regulations are complex because of the different use area categories within the Park and the three different river classifications (wild, scenic, and recreational), the requirements for wild river areas illustrate the approach taken. In wild river areas,239/ the most restricted river category, a "special rivers system permit" is required for the following activities:

1. Vegetative cutting inside the mean high water mark of the river or within 100 feet of the mean high water mark, except for the removal of dead or diseased vegetation and cutting of up to 5% basal area per acre over a ten-year period for:

   (a) The purpose of clearing the river or its tributaries of fallen trees or trees threatening to erode or undercut the bank; or
   (b) The purpose of undertaking permitted activities [which include forest management other than the activities above-described].

2. Wood roads for motor vehicles as necessary for forest management purposes only.240/

Between the buffer strip 100 feet on each side of the river described above and the outer boundary of the river area, forest management practices are to conform to guidelines published by the New York Section of the Society of American Foresters and to the Adirondack Rules and Regulations on clearcutting and logging near or across rivers.241/

Before granting a special rivers system permit, the Adirondack Park Agency must make explicit, detailed findings which are worded to conform closely to the type of activity proposed (cutting of vegetation, road building, new structures, including docks, boathouses, and single-family homes, subdivisions, bridges, etc.). Thus, vegetative cutting is only to be allowed within 100 feet of the mean high water mark for "compelling purposes as would be consistent with recognized sound forestry practices and would cause no undue adverse environmental impact, particularly in respect to the stability of the river bank and the aesthetic character of the river shoreline."242/

Finally, any person who owns 500 or more acres of contiguous land within a river area may submit a land management plan for approval by the Adirondack Park Agency instead of applying for individual permits. The plan is to be for a period of not less than 10 years; is to address potential adverse environmental impacts of any planned activities in detail; and is to include financial guarantees and other means by which the landowners will be bound to perform the activities as set forth in the plan. Such plans are subject to a public hearing before approval and, once approved, are to be reviewed every five years. Plan approval may be revoked after a hearing.243/

A separate variance procedure is available under the Adirondack Rules and Regulations for hardship cases involving application of particular restrictions or standards.244/ Violations are punishable by penalties of from $100 to $1000 a day, and the Attorney General may act on his own or at the request of the Agency to enforce any regulations or orders and to enjoin, correct, or abate any violation thereof.245/

Detailed as the Adirondack Regulations are, they are not by any means the whole answer to protection of land and water resources from nonpoint pollution. As has been noted previously, New York State is using other means, including required conservation plans for all agricultural and forestry uses over 25 acres, to attack the problem on a broader basis. One shortcoming in the water-focused approaches described above is that they pay little attention to the character of the land along the streams. What may be an adequate buffer zone where the land is flat and the soils stable will not be when the opposite conditions prevail.

Steep slopes and unstable soils are particularly prevalent in the West and the best examples of legal mechanisms for controlling erosion and sedimentation from activities undertaken on steep slopes are to be found there. It will be remembered, perhaps, that under California's Z'Berg-Nejedly Forest Practice Act, the stream or lake protection zone widths vary depending on the area's estimated erosion potential (which is partly a function of slope).246/ California also has a number of local hillside protection ordinances, but most of those emphasize control of residential development, not disturbance or removal of vegetation.247/

Another approach to the problem which California is considering is the withdrawal of highly unstable soils from logging through purchases under a state water conservancy program or through acquisition of open space easements.248/ Acquisition programs for critical areas, which are discussed in some detail in Chapter 3, should be considered an important part of the arsenal for combating nonpoint pollution from agricultural and silvicultural nonpoint sources. In fiscal 1976, the U.S. Department of Agriculture made an additional $16 million available for its water bank program, which has been compensating landowners since 1972 for maintaining wetlands and providing additional habitat for migratory waterfowl.249/ The water bank program, which is administered through the Agricultural Stabilization and Conservation Service, with planning

and technical assistance from the USDA Soil Conservation Service, is just one of a number of federal programs available to facilitate protection of critical areas.

5.0 Legal Issues

For the most part the constitutional issues surrounding regulation of agricultural and silvicultural nonpoint sources are very little different from those raised by the regulation of pollution and of land use in general, which are treated in detail in Chapters 2 and 3. For this reason, and because the regulation of agriculture and silviculture as a nonpoint source of water pollution is so new that there are few useful cases on the subject, this section on legal issues will be brief.

There can be no doubt that in preserving the purity of drinking water supplies for humans and animals and in protecting against harm to fish and against flooding, control of nonpoint pollution from agriculture and silviculture is a legitimate expression of the police power. There have been few challenges to ancient judicial recognition of this fact, which has been expressed frequently with respect to woodland and, less frequently, with respect to agricultural land.

The most complete statement to date of the state's interest in the control of timber harvesting is to be found in a 1949 decision of the Supreme Court of Washington, State v. Dexter.250/ Finding the state's requirements for reforestation of harvested land not converted to another use to be a proper exercise of the state's police power, the court gave explicit recognition to the problems of accelerated runoff and erosion, saying:

> Unfortunately for the respondent's plea for the unrestricted right of the owner of timberland to do as he pleases with his own, the record of such unrestricted use has been one of "cut out and get out". . . Denuded hillsides have made possible the rapid runoff of surface waters, thus increasing the dangers from floods and contributing to costly soil erosion. . .
> . . . .
> . . . Surely, where natural resources can be utilized and at the same time perpetuated for future generations, what has been called "constitutional morality" requires that we do so.
> . . . .
> There is ample and sound authority to sustain our conclusion that the challenged legislation is for the general or public welfare and is a proper exercise of the police power. . . [citing and quoting cases].251/

There is less judicial precedent for regulation of agricultural activities than for regulation of forest practices for the simple reason that there have been, over the years, far fewer mandatory requirements applicable to agriculture. Yet looking at what precedent there is in

the agricultural area and relying on the analogies available from other land-disturbing activities such as earth removal and mining, it is clear that the courts will have little trouble in accepting the purposes of agricultural nonpoint source regulations to be legitimate.

This can be seen from a Colorado wind erosion case whose conclusions are equally applicable to water-borne soil. That case, Oberst v. Mays,252/ involved a statute, Colorado's Soil Erosion-Dust Blowing Act of 1954, under which (1) like certain of the erosion and sediment control programs discussed earlier, enforcement actions were triggered by complaints and (2) like some of the forest practices acts discussed, the enforcing authority could itself provide and charge for corrective action should the landowner fail to undertake such action within the time specified in an order. The plaintiff landowner, Mr. Oberst, alleged that the subject statute deprived him of due process of law because it failed to give him notice and an opportunity for a hearing in connection with the abatement and assessment action. In affirming the trial court's judgment for the defendant county, the court declared:

> We hold that the conditions allegedly existing on plaintiff's lands were such as to warrant summary abatement in the protection of the "health and well-being of the citizens of the state." The dust blowing from the lands into the air and upon adjacent property was injurious to the public health and to adjacent property, and constituted a nuisance per se and hence was subject to summary abatement.253/

Other cases have upheld local regulation of earth removal and requirements for reseeding and other conservation practices as valid exercises of state-delegated police power where they were found necessary to protect the land against wind and water erosion.254/

A more difficult question arises in connection with the form which regulations on agricultural and silvicultural nonpoint pollution may take. As noted in Chapter 2, regulations and standards must be reasonably related to the harm they are designed to avoid. If, for example, a state opts for a uniform performance standard for erosion control--i.e., a maximum rate or rates of soil loss--it should have a rational basis for believing that erosion in excess of that rate will cause pollutants to enter waters causing, in turn, a violation of applicable water quality standards. Such a performance standard should, furthermore, be meaningful to the individual so that he may know whether his conduct is permitted or proscribed. Experts believe that with the use of the Universal Soil Loss Equation, conservation standards or "Best Management Practices" which should meet the soil loss limits can be described. Although the use of the USLE to predict what activities will and will not result in violation of a soil loss limit has not yet been tested in court, attorneys in Iowa, the only state to have legally formalized its use, expect it to withstand any future legal challenge.255/

Inevitably, however, many conservation standards and other erosion and sediment control regulations will defy exact wording. The prevalence in existing forest practice regulations of vague injunctions like "keep construction roads as narrow as possible" has already been noted. It is doubtful that such general vagueness of language would invalidate application of the underlying statute to a flagrant polluter,256/ but the rights of the regulated to know what is expected of them should be safeguarded. This may be done, as noted before, by giving the landowner or operator the option of having a plan approved to determine compliance and by providing for warnings and informal meetings where there is a legitimate question as to a given practice's consistency with regulations and standards.257/

Of course, the owner or operator should also be afforded an administrative hearing both upon any order issued against him and also in the event that the regulatory agency determines to undertake corrective action itself.258/ Examples of statutory provisions affording such procedural due process may be found in the western forest practices acts which are cited and outlined in appendix B.

The remaining constitutional issue is, of course, the by now familiar "taking" issue. Everything that has been said before in connection with this issue applies with equal force to the agriculture and forestry sectors. The fact that a significant fraction of the subjects of agricultural and silvicultural water pollution control regulations may be marginal operators who can ill afford any costs of antipollution equipment and procedures259/ has no bearing on the constitutionality of regulations necessary to protect the public health and welfare.260/ The "taking" issue remains the same regardless of ability to pay.

Many of the types of agricultural and silvicultural nonpoint source regulations discussed earlier in this chapter would simply prohibit, in the language of the landmark "taking" case, Just v. Marinette County, "changing the character of the land at the expense of harm to public rights."261/ Moreover, many of the best management practices discussed will not work a financial hardship on the owner or operator, regardless of the profitability of the particular farming or forestry operation. When a developer who has bought 10 acres of marshland intending to fill it is faced with new legislation prohibiting such filling, his chances of recovering his investment may indeed be small. When a farmer, on the other hand, is required to leave a strip of undisturbed vegetation along a creek, it may well be that he is being asked to do something he does already because of the problems of operating equipment in low-lying, waterlogged areas. Many of the anti-erosion measures for logging roads are cheap, and others are simply questions of better design.262/

For those few cases in which new antipollution requirements will require substantial investment or substantial foregone income by the marginal operator, such options as cost-share programs, preferential taxation schemes, and easement or fee purchase programs can, as

discussed earlier, ease the burden. In those even fewer cases where nonpoint pollution regulations might prohibit the continuance of existing agricultural and silvicultural uses on substantial acreage, ". . . a system of compensable regulations [would be] a means of validating [such] land use restrictions that are so restrictive that the courts would hold them to be a taking in the absence of compensation paid to the landowner."263/ An example of such a severely restrictive regulation might be a prohibition on all future logging in streamside areas and areas with unstable soils as applied to a logging operator most of whose land fell within the proscribed area. Legislatures contemplating passage of nonpoint source control legislation would do well to identify such cases in advance and allay the fears and uncertainties of landowners and regulatory agencies alike by writing in compensation provisions of the type suggested by numerous commentators.264/

APPENDIX A

EROSION AND SEDIMENT CONTROL PROGRAMS

Pennsylvania

I. Statutory and Regulatory Authority

The Clean Streams Law of Pennsylvania, 35 Pa. Stats. §691.1 et seq. (1964, 1975-76 supp.)

Rules and Regs. of Department of Environmental Resources, (DER) Ch. 102 Erosion Control (adopted 9/72)

DER Guidelines: Soil Erosion and Sediment Control Manual (Jan. 1, 1974); Soil Erosion and Sedimentation Control Manual for Agriculture (Jan. 1, 1975); and Soil Erosion and Sedimentation Guidelines for Forestry (no date).

II. Coverage

"Earthmoving activities" -- includes any construction or other activity which disturbs the land including mineral extraction. Agriculture and silviculture included; covered and hard-surfaced feedlots not included.

III. Control Techniques

Permit -- required from DER for all earthmoving activities affecting 25 acres or more except:

1. For agricultural plowing and tilling.

2. Where E & S control plan has been developed for activity by USDA/SCS.

3. Where permit otherwise required under Clean Streams Law, Surface Mining and Reclamation Act, Water Obstruction Act, or water pollution section of same title.

(DER has discretion to reduce the 25 acre threshold statewide, for critical areas, and for any county or municipality.)

Plan -- whether permit required or not all persons engaged in earthmoving must use control measures to prevent accelerated erosion as set forth in Plan. (Agricultural control plans for plowing or tilling required by July 1, 1977.)

IV. Standards

Erosion and sediment control measures set forth in §§102.22, .23 to be incorporated into earthmoving activities except where designer of plan shows that alternate method will work. (Standards quite specific -- manuals elaborate.)

Plans to be by person trained and experienced in erosion and sediment control methods and techniques. (Except Agriculture Manual allows simple statement of present conservation practices where such are now adequate.)

V. Administration and Implementation

DER or designee may require plans to be filed.

Applications for required permits must be accompanied by plan.

Local government body which issues building permits to notify DER or designee of applications involving earthmoving affecting five acres or more and shall not issue building permits requiring earthmoving permits until latter issued.

County Conservation District may review plans for adequacy, require revisions, and inspect to determine if plan is properly implemented.

VI. Enforcement

Wherever danger of pollution exists DER may order landowner to correct condition, except where pollution or danger of pollution is from sediment and results from Act of God on land for which a USDA/SCS conservation plan has been developed and implemented.

Conducting activity without required permit or contrary to regulations or administrative order = nuisance.

Penalties: Violation of act, regulation, or code = summary offense subject to fine of $100 to $1000 or 60 days in jail for first time; repeat offenders are guilty of misdemeanor, $100 to $5000, or 1 year in jail or both; civil penalties may be imposed as well by Environmental Hearing Board, enforced by liens.

VII. Inter-Agency/Inter-Governmental Relationships

Plan review and permit application processing -- performed by Soil and Water Conservation Districts, who receive support from Bureau of Soil and Water Conservation in DER.

Inspection -- districts may apply for delegation of inspection authority, otherwise DER Bureau of Water Quality Management inspects.

Permit issuance -- Regulations provide for delegation of administration and enforcement of whole program to counties or other local units of government upon presentation of acceptable plan showing adequate staffing and approval of county commissioners. For now, DER regional offices issue permits upon recommendation of Districts.

VIII. Cost-Sharing Provisions

Cost-sharing is not a required part of the erosion and sediment control program in Pennsylvania.

Model Act

I. Statutory and Regulatory Authority,

Model State Act for Soil Erosion and Sediment Control -- (developed under the auspices of National Symposium on State Environmental Legislation and published by the Council of State Governments in their 1973 Suggested State Legislation.)

No model regulations.

II. Coverage

All "land-disturbing activity" defined to include tilling, clearing, grading, excavating, transporting, and filling of land.

"Person" defined to include state and political subdivisions.

III. Implementation Techniques

Plans

1. Erosion and sediment control plans must be reviewed and approved by SCD before any land-disturbing activity takes place.

2. Modifications to approved plans may be required where original plan has proved inadequate.

Exemptions

1. Any person implementing and maintaining farm or ranch conservation plan approved by district with respect to normal agricultural and forestry activities;

2. Any person whose normal agricultural and forestry practices are in conformance with the conservation standards established pursuant to the Act; and

3. Any persons in categories (1) or (2) who fail to use measures spelled out in plan or conform to conservation standards if at least 50 percent cost-sharing assistance or adequate technical assistance not available.

IV. Standards

State -- State Soil and Water Conservation Commission to adopt erosion and sedimentation control guidelines which shall contain conservation standards for various types of soils and land uses and which shall include criteria, techniques, and methods for the control of erosion and sediment.

Local -- SCDs to establish conservation standards consistent with state's.

V. Administration and Implementation

Other permits -- no agency authorized under other law to issue permits for activities involving land disturbance is to issue such permit unless application accompanied by SCD approved erosion and sediment control plan, with inspection and enforcement to be done by permit-issuing authority.

Agricultural and forestry operations -- SCDs authorized to inspect to determine compliance with plan or with conservation standards; nonconforming operator to be given notice of measures needed, six months to commence and 12 months to complete.

VI. Enforcement

Appeals from SCD administrative orders taken directly to court.

Penalties -- violations of requirements and orders = misdemeanors punishable by fine not to exceed $500 or [up to?] one year's imprisonment.

VII. Inter-Agency/Inter-Governmental Relationships

Program formulation by SCDs to be done with assistance of an advisory committee (membership stipulated in Act).

In areas where there is no district, state committee to designate local unit of government, such as county, municipality, town, parish, borough, or township to develop and implement program.

VIII. Cost-Sharing Provisions

Fifty percent cost-sharing required to be available before farm or ranch conservation plans and conservation standards can be enforced with respect to normal agricultural and forestry activities.

Iowa

I. Statutory and Regulatory Authority

Statute: An Act Relating to Conservation of Soil and Water Resources of the State, and to Control Water Pollution -- Code of Iowa, Chs. 467A, 467B, 467C, and 467D (1975).

Regulations: Commissioners of individual SCDs shall adopt regulations necessary to establish soil loss limits and to implement the limits, regulations to be approved by state soil conservation committee.

Guidelines: State Department of Soil Conservation has prepared "A Guide for Formulation of Soil Loss Limit Regulations by Soil Conservation Districts" (January 1972).

II. Coverage

All owners of property, including non-farm property, within the district are bound by soil loss limits, except that farmers are exempted from certain structural regulations and public roads within city limits are exempt.

"Landowner" defined to include federal agencies, state and political subdivisions.

III. Implementation Techniques

Soil Loss Limit -- is the maximum amount of soil loss by water or wind erosion, in tons per year, which the SCDs shall determine, after a hearing, is acceptable consistent with meeting the goals of the Act and which the State approves; different limits may be established for different classes of land.

No permit or plan requirement.

IV. Standards

Erosion Control Practices. SCDs may require owners of real property to employ either soil and water conservation practices (e.g., permanent practices such as terraces or grassed waterways or temporary practices such as contour planting and minimum tillage) or erosion control practices (drainage structures for non-farm uses) except that SCDs may not specify the particular practices to be employed so long as the owner voluntarily complies with the applicable soil loss limits.

V. Administration and Implementation

Complaint and Follow-up

1. Complaints may be made by (a) owner or occupier of land being damaged by sediment or (b) regional Conservancy Districts

(there are six in state) created under Iowa Code Ch. 467D, when Conservancy District informs appropriate SCD that it is unable to proceed with a planned "internal improvement" (e.g., a flood control project or a reservoir) because it would not be adequately protected from soil erosion.

Administrative order must state as nearly as possible extent to which soil erosion exceeds limits established and to be issued upon finding that (a) excess soil erosion is occurring and (b) complainant is suffering sediment damages:

(1) for agriculture projects order may allow six months for commencement and one year for completion of work specified as necessary.

(2) for agricultural land, cost-sharing must be available before erosion and sediment control practices can be required.

VI. Enforcement

If work specified in administrative order not done, SCD may petition court for order. Burden on SCD to prove that soil erosion is in fact occurring in excess of limit.

Failure to obey court order = contempt of court.

Nuisance action -- SCDs, Conservancy Districts, and owner of property damaged by soil erosion may bring action to abate nuisance and to have offending landowner comply with SCD regulations.

VII. Inter-Agency/Inter-Governmental Relationships

SCDs adopt standards and rules for implementation after public hearing and with approval of State Soil Conservation Committee.

Districts administer and enforce law, regulations, and standards and set level of cost-sharing necessary to require temporary conservation practices.

VIII. Cost-Sharing Provisions

No landowner to be required to establish any new or temporary soil and water conservation practices [these are the erosion control standards applicable to agriculture] unless cost-sharing has been made available in following amounts:

(1) At least 75 percent of cost of permanent soil and water conservation practice (defined in Act: terraces, grassed waterways, etc.)

(2) Amount set by state soil conservation committee for any temporary practice (defined in Act: contour planting, minimum tillage, etc.)

Ohio

I. Statutory and Regulatory Authority

Proposed Act which would amend Ohio Rev. Code §§1515.01, 1515.30, 6111.04, and 6111.44 and which would enact §§307.79, 1515.31-.33 and 1515.99 relative to agricultural pollution abatement and urban sediment pollution. (This legislation which, as H.B. 1011, was withdrawn from consideration in 1976 is expected to be resubmitted in January, 1977.)

Proposed regulations and standards which are now used on an essentially voluntary basis include "Agricultural Pollution and Abatement Standards and Regulations" (revised 6/21/76) drawn up by an Agricultural Pollution Technical Advisory Board and two publications of the Cooperative Extension Service of the Ohio State University: "Ohio Erosion Control and Sediment Pollution Abatement Guide" and "Ohio Livestock Waste Management Guide."

II. Coverage

Proposed legislation would make mandatory abatement procedures applicable to agricultural and urban sediment pollution (to be defined). Annual waste disposal covered. 6/21/76 regulations say not applicable to "river and shore erosion areas" but are applicable to privately and publicly owned woodland (except areas under jurisdiction of urban or metropolitan government) and to ditches and streams in agriculture areas under public management.

III. Control Techniques

Regulations: Proposed Act empowers the Chief of the Division of Soil and Water Districts, subject to the approval of the Ohio DNR and of the Ohio Soil and Water Conservation Commission, to adopt:

(1) standards for a minimum level of management and conservation practices to control agricultural pollution;
(2) criteria for determination of such management and conservation practices; and
(3) procedures for administration and enforcement of rules.

Plan: Anyone managing land and animal wastes in accordance with plan "currently" approved by SCD considered in compliance with regulations and standards.

IV. Standards

No person owning or operating land in agricultural areas shall permit:

(1) average annual soil loss by sheet or rill erosion in excess of that specified by Technical Guide (a document developed

for each SCD by SCS); T value (soil conservation level for maximum agricultural productivity) to be achieved in three phases by 1986.

(2) accelerated erosion (defined in regulations) "in drainage-ways, grassed waterways, or in ditches and streams required by the Ohio Rev'd. Code to be maintained."

(3) tillage or other earth disturbing practice on land adjacent to ditch, stream, or lake in manner that soil is placed in or is in danger of eroding into same.

V. Administration and Implementation

Local -- SCDs would be able to assume implementation powers for agriculture pollution abatement program via agreement or contract with DNR.

State -- State Division of Soil and Water Conservation (DNR) would implement in a district whose Board of Supervisors failed to negotiate agreement with DNR.

VI. Enforcement

Enforcement Action by District may be triggered by:
(1) "a legitimate complaint from someone receiving damage";
(2) initiative of Division of Soil and Water Conservation or OEPA ;
(3) own surveillance .

Phases of Action

1. Voluntary solution to be attempted by offer of cost-sharing and technical assistance;
2. On-site investigation to include identification of any other erosion or animal waste problems;
3. Person refusing to cooperate to be given opportunity to meet with District Board to review;
4. Where no action after allowed interval, District to file violation report with State Division of SWC.
5. Division to issue administrative order; may be followed up by injunction.
6. Persons aggrieved may appeal to special state Soil and Waters District Board of Review and thence to Court (spelled out in detail in proposed Act);
7. Anyone violating Division order guilty of misdemeanor (fine unspecified).

VII. Inter-Agency/Inter-Governmental Relationships

State - local: see Administration, above.

Inter-agency -- Director of DNR is to use Division of Soil and Water Districts to coordinate efforts of state and local governmental agencies to meet minimum state air and water quality

standards for agricultural pollutants, and Director of Environmental Protection to coordinate those efforts.

OEPA, as well as DNR, may initiate complaints to local districts.

VIII. Cost-Sharing Provisions

Sediment -- State Division of Soil and Water Districts would pay any non-federal portion of 75 percent of the cost of the following eligible practices:

1. critical area stabilization
2. diversions
3. field windbreaks
4. grade stabilization
5. grassed waterways and outlets
6. terraces

Animal waste facilities -- state will pay non-federal portion of 75 percent of the cost of required improvements for existing animal facilities (including storage facilities, earth grading, vegetative cover and fencing) but not for new or expanded facilities.

State may recover funds paid where improvements not maintained.

Indiana

I. Statutory and Regulatory Authority

Draft Proposal for Soil Erosion and Sediment Control (N.B. - This proposal is still undergoing review, comment, and revision; drafts available from State Soil and Water Conservation Committee, DNR, Agricultural Administration Building, Purdue University, West Lafayette, Indiana 47907)

Guidelines (Standards) and Regulations would be established by State Soil and Water Conservation Committee.

II. Coverage

"Land disturbing activities" - any land change which may result in or contribute to soil erosion from water or wind and the movement of sediment into water courses or impoundments or onto other land. Exemptions to be set forth in future Guidelines. "Person" includes state and political subdivisions.

III. Implementation Techniques

Plan - required for all land disturbing activities, to be approved by local District.

Permits - grading, building or other permits involving land disturbance not to issue unless District has approved E & S plan and applicant has certified he will follow it.

Agriculture and Silviculture
No one to be claimed engaged in prohibited land disturbance if
(1) he is following approved plan ;
(2) his normal agricultural and forestry practices conform to prescribed standards ;
(3) cost-sharing or technical assistance as provided for not available (see below).

IV. Standards

State Soil and Water Conservation Committee (DNR) to adopt Guidelines and Standards:

(1) to establish "technical guide" in use in each District containing conservation standards and soil loss limit for various types of soil and land uses;
(2) to list permanent control measures for which cost exceeds personal benefit and to list percentage of cost-sharing assistance to be made available;
(3) to include time schedule (not more than 10 years) for compliance with maximum soil loss to be tolerated.

State standards to govern until local ordinances adopted based on conforming or stricter District standards.

V. Administration and Implementation

Inspections and follow-up (a) to be performed by permit-issuing authority where grading, building or other permit required; (b) with respect to other land-disturbing activities, any concerned citizen, District or Committee may file complaint against one alleged to be violating District standards.

VI. Enforcement

(1) Activities subject to complaint: (a) Complaint triggers District investigation and attempt to bring about solution via cost-sharing, technical assistance, etc.; (b) landowners may meet with District Board to review District investigation. If Board finds violation of standards, it shall give landowner period for voluntary compliance; (c) where no action, District to turn case over for prosecution to county Prosecuting Attorney.
(2) Penalties - violations = misdemeanor, $500.00 maximum per day.
(3) Permit-issuing authority, District, Committee, or any concerned citizen may request legal or equitable relief.

VII. Inter-Agency/Inter-Governmental Relationships

State-local, see standards, above.

VIII. Cost-Sharing Provisions

State guidelines to set amount of cost-share assistance which must be made available before "permanent erosion and sediment control measures for which the cost is greater than the return to the person" can be required.

APPENDIX B

STATE FOREST PRACTICE ACTS AND REGULATIONS

Oregon

I. Oregon Forest Practices Act

ORS 527.610-527.730 and subsec. (1) of ORS 527.990.
Oregon Forest Practice Rules (3rd rev. effec. 8/1/75).
(These comprise rules of general applicability and specific rules for Oregon's three forest regions: excerpts here are from the Eastern Oregon Region).

Forest Practice Committees for each of three regions develop regulations; the State Board of Forestry adopts them; State Forester administers Act and Regulations.

II. Implementation Techniques

(1) Notice to State Forester required prior to: (a) harvesting; (b) road construction or improvement; (c) site preparation; (d) application of insecticides, herbicides, rodenticides, and fertilizers; (e) clearing for conversion to non-forest use; (f) treatment of slashing; (g) pre-commercial thinning.
(2) notice may be for multiple operations and is valid for 1 year.
(3) written approval of State Forester required for stream channel changes.
(4) "landowners" covered include state and political subdivisions.

III. Waterside Protection Zone

(1) "During and after harvesting operations, stream beds and streamside vegetation shall be maintained in as near a natural state as possible in order to maintain water quality and aquatic habitat."
(2) Shading: "Where insufficient non-merchantable tree species exist to provide up to 75% of original shade over the stream, a fringe of undisturbed merchantable trees may be required. This requirement may be waived if an acceptable harvest plan of staggered cuttings or other means is developed which will not result in a significant increase in stream temperatures. . .Neither an optimum nor a minimum width can be set arbitrarily for shading streams. . .the necessary width will vary with steepness of terrain, other topographic features, the nature of the undercover, the kind of soil, and the amount of timber that is to be removed."

(3) Leave stabilization strips of undergrowth vegetation along all class II streams in widths sufficient to prevent washing of sediment into Class I streams below.

IV. Inter-Agency Involvement

(1) State Forester to meet at least annually with other state agencies "concerned with the forest environment" to review sufficiency of rules and to report on suggested amendments, etc. to Board of Forestry.
(2) Every forestry operation to comply with regulations of Department of Environmental Quality.

V. Enforcement Techniques

(1) After determination of violation and service of citation and order to cease violation upon operator with copy to owner, State Forester may issue temporary order directing the operator "to cease any further activity in that portion of the operation that is resulting in [continuing] damage."
(2) At operator's or owner's request, Board must hold hearing on temporary order within 5 work days (defendant can then appeal to circuit court).
(3) Where order directs repair of damage or correction of an unsatisfactory condition and operator fails to comply, State Forester may proceed with repair if: (a) operator or owner agrees to pay cost; or (b) State Board authorizes him to proceed with work after giving operator and owner opportunity to appear. Such expenditures shall constitute a general lien upon real and personal property of operator and owner.

VI. Penalties

Failure to give required notice of violation of regs. is a misdemeanor and each day in violation of an order is a separate offense.

California

I. Z'Berg-Nejedly Forest Practice Act of 1973, Div. 4, Chap. 8, Public Resources Code §§4511-4628 (as amended, to be effective 5/23/76). Amended Forest Practice Rules (adopted by State Board of Forestry, 6/30/75): Subchapter 1, Coast Forest District; Subchapter 2, Northern Forest District; Subchapter 3, Southern Forest District (Rules developed in consultation with the three District Technical Advisory Committees). Administrator: State Forester. [Technical standards cited here are from Regulations for Northern Forest District; the regulations for the three districts are substantially similar for our purposes].

II. Implementation Techniques

(1) Licenses--"No person shall engage in timber operations [includes: cutting or removal of timber; construction and maintenance of roads; stream crossings; landings, skid trails; and fire hazard abatement] until he has obtained a license from the board." and
(2) Plans--no person (defined to include state and local government) may conduct operations unless timber harvesting plan prepared by registered professional forester has been submitted. Plan must outline methods for avoiding "excessive accelerated erosion from timber operations to be conducted within the proximity of a stream."
(3) Conversions--persons intending to convert timberland which is zoned "timberland preserve" to uses other than growing timber must have application approved by State Forestry Board or delegated State Forester. One of the findings which must support approval is that soils, slopes and watershed conditions are suitable for uses proposed.

III. Waterside Protection Zone

(N.D.)* Stream or lake protection zone:
(1) 150 feet on both sides of water in areas with extremely high Estimated Erosion Potential (as measured in accordance with chart which bases categories on soil texture and depth, productivity potential of site, and slope.)
(2) 100 feet in areas of high Estimated Erosion Potential
(3) 50 feet in areas of moderate or low Estimated Erosion Potential
[Registered Professional Forester and State Forester may agree after inspection to increase or decrease distances by not more than 50%]. Within zone, 50% or more of shade-producing canopy to be left unless less is justified by Plan and specific finding re no unreasonable effects on beneficial uses of water and

IV. Inter-Agency Involvement

(1) Copies of timber harvesting plans to be transmitted to Department of Fish and Game, appropriate California regional water quality control board, and county planning agency.
(2) All work within stream beds, lakes, marshes, meadows (except stream crossings) prohibited except as provided through Fish and Game Code (N.D. Regulations).

V. Inter-Governmental Involvement

[Act]". . .individual counties and the California Tahoe Regional Planning Agency shall have the right, within the reasonable exercise of their police power, to adopt rules and regulations by ordinance or resolution which are stricter than those provided under this chapter and its regulations. Such county or agency rules and regulations may include, but are not limited to matters relating to . . ." inter alia: soil erosion control; protection of stream character and water quality; flood control; reforestration methods; mass soil movement; submission of timber harvesting plans; location and grade of roads and skid trails; excavation and fill regulations; slash and debris disposal; hours and dates of logging; performance bond requirements.

VI. Enforcement Techniques

(1) Board may deny license if applicant has failed or refused to comply with regulations within the past 3 years.
(2) Licenses are only good for one year; renewal may be denied until any existing violations are corrected.
(3) State Forester to return plans not in conformance with Act or Regulations; applicant may then request public hearing before Board.
(4) State Forester may request Attorney General to bring action for compliance or may himself ask court for temporary restraining order. Court may authorize State Forester to take emergency corrective action and expenses shall become lien on property.
(5) Court may enjoin any further timber operations where there are outstanding violations. Defendant may enter agreement with State Forester re resumption of operations and correction of violations which agreement may be incorporated in court order and backed up by bond to secure performance.
(6) State Forester may take corrective action secured by lien on land after first giving notice of proposed action and of opportunity for public hearing before State Board.

VII. Penalties

Violations are misdemeanors punishable by maximum fine of $500 or six months imprisonment or both. Each day in violation of order for corrective action is separate offense.

Washington

I. The Washington Forest Practices Act of 1974

Ch. 76.09 RCW
Washington Forest Practice Rules and Regulations promulgated by the Washington Forest Practice Board* (7/16/76)
Administered by the Department of Natural Resources

II. Implementation Techniques

Act provides for 4 classes of activity subject to different regulations:

(1) Class I- practices with no direct potential for damaging a public resource and which require no permit or notice;
(2) Class II- practices which require only notification and may commence 5 days thereafter (Act specifies certain activities excluded from Class II and allows Board to exclude others);
(3) Class III- practices requiring DNR approval (within 14 days);
(4) Class IV- practices on platted or to be converted lands or practices which have a potential for substantial impact on the environment and therefore require an evaluation under the State Environmental Policy Act (Classes I-III specifically exempted from the state EPA) must have DNR approval (varying time limits).

Alternate Plan: exception to required conformity with Act and with Regulations: applicants may propose to be governed by alternate plan which would achieve purposes and policies of the Act as well or better through variance from regulations.

III. Waterside Protection Zone

(1) Streamside Management Zone (SMZ)-streambank integrity within area 50 feet from high-water for Type 1 and 2 waters and 25 feet from high-water for Type 3 water: avoid disturbing brush,stumps, and root systems and leave high stumps where necessary to prevent timber from entering water.
(2) Shade Requirements- within Streamside Management Zone along those type 1,2, and 3 waters designated by DNR as temperature sensitive: (a) leave all nonmerchantable shade vegetation; (b) leave sufficient merchantable timber to retain 50% of the summer mid-day shade (except that DNR may require 75% in some circumstances); (c) waivers possible where applicant: (i) shows high probability of windthrow and agrees to replant in first planting season; (ii) agrees to staggering producing equal or greater temperature control; (iii) provides alternate satisfactory method of temperature control.

*Regulations pertaining to water quality protection are promulgated individually by the Board and the Department of Ecology after they have reached agreement with respect thereto).

IV. Inter-Agency Involvement

(1) Composition of Board: Forest Practices Board is composed of: Commissioner of Public Lands; Director of Department of Commerce and Economic Development; Director of Department of Agriculture; Director of Department of Ecology -- or their designees; and an elected member of a county legislative authority, as well as representatives of the public and industry.

(2) Department of Ecology: Where Department of Ecology (DOE) (responsible for water pollution control) determines that a person has failed to comply with those parts of regulations relating to water quality protection, DOE shall inform DNR in writing. If DNR fails to take authorized enforcement action within 24 hours, DOE may petition chairman of Appeals Board, who shall, within 24 hours, deny petition or direct DNR to take enforcement action.

(3) Departments of Fisheries and Game
- (a) no heavy equipment to be used in Type 1, 2, or 3 water except with approval of Departments of Fisheries and Game.
- (b) any work involving deepening, widening, straightening or relocating channel or stabilizing banks must be done in compliance with Hydraulics Act and, in cases of Type 1 water, Shoreline Management Act.
- (c) where Department requires remedial work in a stream bed, it shall first seek approval from Departments of Fisheries and Game.

(4) Coordination: Board recommends that DNR negotiate inter-agency agreements re assumption by DNR of administrative responsibility for other laws and regulations applicable to forest practices on non-federal lands.

V. Inter-Governmental Involvement

Role of Political Subdivisions:

(1) In course of rule promulgation counties may propose specific regulations pertaining to problems within county and Board and DOE may adopt.

(2) Local and regional governmental entities are prohibited from adopting law, ordinance, or regulation pertaining to forest practices except:
- (a) land use planning and zoning authority with respect to platted or to be converted lands;
- (b) taxing laws
- (c) public health laws
- (d) certain limited regulations with respect to forest practices within shorelines of state under "Shoreline Management Act of 1971"

(3) For applications relating to platted or to be converted lands which county finds inconsistent with any applicable regulations, DNR must either disapprove or appeal to Appeals Board.

(4) County may appeal any DNR approval with respect to lands within jurisdiction to Appeals Board.

VI. Enforcement Techniques

(1) Informal conference - every operator shall be afforded opportunity to discuss proposed enforcement actions at an informal conference with DNR unless there is danger of imminent damage to public resource.

(2) Notice to Comply - operator to undertake specific course ordered by DNR unless he or owner requests Departmental hearing. After hearing DNR to issue final order which may be appealed to Appeals Board.

(3) Stop Work Order - DNR has authority to issue where Act or Regulations are being violated; approved application is being deviated from; or immediate action is necessary to prevent continuation or to avoid material damage to a public resource. This final order is appealable directly to Appeals Board.

(4) Corrective Action - after operator fails to take any action requested by final order of DNR or decision of Appeals Board or court, DNR may determine cost of work and notify operator and owner of it. If operator or owner fails within 30 days to do work, DNR may do it and operator/owner shall become liable for cost. Payment due becomes lien on land.

Emergency Corrective Action - available for failure to obey Stop Work Order.

VII. Penalties and Other Relief

Civil Penalty - $500.00 for each violation of Act or Regulations. Every day's violation of Notice to Comply or Stop Work Order a separate violation. May be mitigated by DNR. Appealable to Appeals Board.

Injunction - DNR may petition A.G. for; county may bring action for injunctive, declaratory or other relief for forest practice activities within its jurisdiction against DNR, owner, or operator to enforce Regulations or final order of DNR or Appeals Board.

Criminal Penalties - also available.

Idaho

I. The Idaho Forest Practices Act (1974)
Idaho Code, Title 38, ch. 13
§§38-1301 -38-1312
Rules and regulations promulgated by the State Board of Land Commissioners (effective 3/17/76).
Administered by the Idaho Department of Lands.

II. Implementation Techniques

Notice required before commencing a forest practice on state and private lands:

(1) notice valid for two years, for practices continuing longer must be renewed annually.

(2) Forest Practices requiring advance notice:
(a) harvesting; (b) road construction including installation or improvement of bridges, culverts, and other stream structures; (c) reforestation; (d) application of insecticides, herbicides, rodenticides and fertilizer.

(3) Exemptions include:
(a) routine road maintenance, grazing, Christmas tree growing;
(b) forest practices under approved woodlot management plan;
(c) clearing for conversion to non-forest use.

Rules govern unless Department approves plan "for an alternate practice or practices which provide for equivalent or better results."

III. Waterside Protection Zone

Requirement to provide shading, soil stabilizing and water filtering effects of vegetation along streams by one or more of the following methods (inter alia):

(a) leave hardwood trees, shrubs, grasses and rocks wherever provide shade and erosion control;
(b) where not enough non-merchantable trees exist to allow for 75 percent of original shade, Department must approve harvest plan providing for scattered cutting which will not result in significant increase in steam temperatures;
(c) buffer strip to be 75 feet wide unless approved by Department.

IV. Inter-Agency Involvement

(1) Forest Practices Advisory Committee mandate includes achieving coordination among state agencies which are concerned with the forest environment.

(2) Director (a) to meet at least annually with other state agencies and with Forest Practices Advisory Committee to review recommendations for amendments to rules and, (b) to consult with personnel of other agencies where their expertise is "desirable or necessary."

V. Inter-Governmental Involvement

Requirements of notice, etc. apply to political subdivisions of the state.

VI. Enforcement Techniques

(1) Department may issue notice of violation when operator has violated rule. Order shall be served along with notices of violation.

(2) If violation does not cease, Department may direct operator to cease the damaging activity. Operator may require hearing before Board of Land Commissioners.

(3) Department may also issue orders requiring repair of damage and if not repaired:
   (a) estimate cost and upon owner, etc. agreeing to pay, repair; <u>or</u>
   (b) request authority from Board to repair. Board must give owner, etc. opportunity to appear. Board approved expenditures, including administrative costs, become a general lien on real and personal property.

(4) Initial purchaser of lumber must, before accepting delivery, obtain and keep on file for Department inspection a copy of the required notice for the harvesting practice from which his trees are acquired.

VII. Penalties

Violations of notice requirement, forest practice rule, temporary cease and desist order, and material misrepresentations are misdemeanors. No fine amount set.

Nevada

I. Nevada Forest Practice Act

Nev. Rev. Stat. §§ 528.010 - 528.090
(enacted 1955, amended 1971 and 1973)

Rules and Regulations Promulgated by the Nevada State Board of Forestry and Fire Control (approved Dec. 10, 1962).

Administered by the State Forester Firewarden and the Division of Forestry, State Department of Conservation and Natural Resources

II. Implementation Techniques

Permit required prior to any logging or cutting. Plan-all applications for logging permits must be accompanied by a plan showing inter alia:

(a) An accurate topographical map showing exterior boundaries of the areas to be logged and the roads, structures and landings, existing and proposed.
(b) The volume of timber to be removed.
(c) The time required for removal of such volume.
(d) The specification as to the percentage of merchantable volume to be removed and the composition of any residual stand.
(e) The revegetation plan, if applicable.
(f) The slash-disposal and cleanup plans.
(g) The road construction specifications and erosion control measures.

Grounds for Permit Refusal include:
1. failure to comply with the forest practice rules or regulations; and
2. that the logging operation as planned will cause significant soil erosion and sedimentation.

Variances
a. required for tractor logging on slopes of 30 percent or more:
   1. request must be accompanied by additional specified information;
   2. state forester firewarden has discretion to prescribe special conditions;
   3. state forester firewarden must take certain factors into account including "the extent to which tractor logging may cause siltation and eroded soils to infiltrate the 200-foot stream buffer."

b. required for work within waterside protection zone, see below.

III. Waterside Protection Zone

a. Zone-Within 200 ft., measured on the slope, of the high water mark of any lake, reservoir, stream or other body of water tree felling or skidding; construction of roads or landings; and operation of vehicles prohibited without variance.

b. Variance-

1. must be obtained from committee composed of State Forester Firewarden; the director of the Nevada Dept. of Fish and Game; and the State Engineer.

2. Before acting on request, committee must consider following factors:

(a) The extent to which such requested activity is consistent with good forestry management for the harvesting of timber;

(b) The extent to which such requested activity significantly impedes or interrupts the natural volume and flow of water;

(c) The extent to which such requested activity significantly affects a continuation of the natural quality of the water pursuant to state and federal water qulaity standards;

(d) The extent to which such requested activity is consistent with the prevention of significant soil erosion; and

(e) The extent to which such requested activity may significantly obstruct fish passage, cause sedimentation in fish spawning areas, infringe on feeding and nursing areas, and cause variations of water temperatures; and

(f) The filtration of sediment-laden water as a consequence of timber harvesting on adjacent slopes.

IV. Inter-Agency Involvement

A committee composed of the State Forester Firewarden, the director of the Nev. Dept. of Fish and Game, and the State Engineer decides on applications for variances from the prohibitions on logging in the waterside protection zone.

V. Enforcement Techniques

Performance Bonds are required for all logging activities, with the amount based upon the price or value of the timber to be cut.

Logging Permit

1. must be renewed after a year;
2. may be suspended for : violation of forest practice rules, conditions of the permit, or terms of the plan; refusal to allow inspection; or inadequate performance bond;
3. may be denied for failure to correct a violation of a previously issued permit within a period of 3 years prior to current application.

VI. Penalties

Violations of any regulation in act or promulgated pursuant to it is a misdemeanor punishable by not more than 6 mo's. imprisonment, by fine of not more than $500, or by both.

CHAPTER SEVEN

AGRICULTURE AND SILVICULTURE

FOOTNOTES*

1. As used throughout this chapter, the terms "silviculture," "silvicultural activities," "forest practices," etc. will be used in their loosest and most general sense to mean the actions involved in and results emanating from forest harvest, production, management, and protection systems which include within them the following activities: construction, use, maintenance, and abandonment of logging roads; construction of structures in and over water; harvesting; residue management; silviculture (the growing of the trees themselves); reforestation; and the use of chemicals.

2. Iowa state report to a Workshop on Forest Practices and Water Quality sponsored by the American Forestry Association, the U.S. EPA, and the U.S. Forest Service (Chicago, Ill., April 13-14, 1976). Seven such workshops were held around the country between July 1975 and April 1976 under a grant from the U.S. EPA as part of the agency's guidance program under § 304 of the FWPCA. Papers presented at the individual conferences may be examined at the offices of the American Forestry Association (1319 18th Street, N.W., Washington, D.C. 20036) or at EPA. Hereinafter these workshops will be cited as AFA/EPA/Forest Service Workshops.

3. Soil Conservation Service, U.S. Dep't of Agriculture, Information Bulletin No. 325.

4. In Eureka, California, a 1,750 acre-foot reservoir built in 1938 was totally filled with sediment by 1955. 2 Cal. State Water Resources Control Board, A Method for Regulating Timber Harvest and Road Construction Activity for Water Quality Protection in Northern California 49 (Pub. No. 50, 1973).

5. In a paper given at the AFA/EPA/Forest Service Workshop, supra note 2 (Portland, Ore., Dec. 9 and 10, 1975), Roger A. Barnhart, head of the California Cooperative Fishery Research Unit at Humboldt State University, attributed prime responsibility for the decline in salmon and trout populations in California to sedimentation of the streams.

6. See California Study, supra note 4, at 49.

7. Not only does water running off land in a "natural" state carry some sediment, but water flowing in stream or river channels is itself erosive and scours sediment from the stream's bed and banks as long as there is sediment there to scour. Since "unnatural" amounts of

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* In order to conserve space, publication information pertaining to works included in the suggested readings for this chapter has been omitted from the footnotes.

sediment have been accumulating in streams for at least a hundred years, experts predict that it will take a long time before improved erosion control practices result in any dramatic improvement in water quality. See Victor H. Barry, Jr., Deputy Administrator for Field Services, SCS, paper presented at the Annual Meeting of the National Association of Conservation Districts (Honolulu, Hawaii, Feb. 1-5, 1976). Given this fact, it is obvious that water quality monitoring may be of limited usefulness for determining the effect of a general erosion control program and for determining an individual's compliance or noncompliance with it.

8. The other contributors, according to this estimate, are "other [non-forest] federal lands" at 6 percent, mining at 1 percent, and "other" at 1 percent. Dow Chemical Company, An Economic Analysis of Erosion and Sediment Control Methods for Watersheds Undergoing Urbanization 15 (1972) (NTIS PB 209 212). These are the latest figures according to USDA/SCS.

9. U.S. EPA, Draft Final Guidelines for State and Areawide Water Quality Management Planning (Nov. 1976).

10. Oct. 1973 (EPA-430/9-73-014).

11. Oct. 1973 (EPA-430/9-73-015).

12. A joint publication of U.S. Dep't of Agriculture and U.S. EPA, Report No. ARS-H-5-1 and Report No. EPA-600/2-75-026a (Nov. 1975).

13. Oct. 1973 (EPA-430/9-73-010).

14. See Soil Conservation Service, U.S. Dep't of Agriculture [hereinafter USDA/SCS], Land Resources and Major Land Reserve Areas of the United States (Agriculture Handbook No. 296, Dec. 1965, revised March 1972).

15. See Control of Pollution from Feedlots: Hearings Before the Subcomm. on Conservation and Natural Resources of the House Comm. on Government Operations, 93d Cong., 1st Sess. 323-24 (Nov. 29 and 30, 1973) [hereinafter cited as Hearings]. In his testimony before the subcommittee, Robert R. Buckmaster, chairman of the Iowa Water Quality Commission, when asked to compare the dimensions of feedlot pollution versus siltation in his state, replied, "I do not think you can even compare them in magnitude. I am much more concerned about erosion," and, later, "when we are talking about agricultural pollution generally . . . feedlots are of minor importance." Id. at 323-24. It should be noted that at the time Mr. Buckmaster was testifying, Iowa claimed to lead the nation in livestock production. Id. at 267.

16. See N. W. Hines, "Farmers, Feedlots and Federalism: The Impact of the 1972 Federal Water Pollution and [sic] Control Act Amendments on Agriculture," 19 S.D. L. Rev. 540, 566 (Summer 1974).

17. See Methods and Practices for Controlling Water Pollution from Agricultural Nonpoint Sources, supra, note 11, at 3-24.

18. 16 U.S.C. § 590a et seq.

19. M. Garner, "Erosion and Sediment Control Laws of the United States" (1975).

20. See two pamphlets published by the National Association of Conservation Districts, "America's Conservation Districts" and "Conservation Districts and Nonpoint Pollution Control"; and see W. Parks, Soil Conservation Districts in Action (1952), R. Morgan, Governing Soil Conservation, Thirty Years of the New Decentralization (1965), and R. Held and M. Clawson, Soil Conservation in Perspective (1965), for historical background.

21. See M. Garner, "Approaches to Urban and Rural Erosion and Sediment Control--Administrative Actions to Extend State Programs" (1972). That paper lists the following 27 states as having given districts authority to adopt land use regulations: Alabama, Arkansas, Colorado, Florida, Georgia, Illinois, Kentucky, Louisiana, Maryland, Mississippi, Montana, Nebraska, Nevada, New Jersey, North Carolina, North Dakota, Oregon, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming. Id. at 5.

22. Id. at 6.

23. 1975 N.J. Laws ch. 251, effective Jan. 1, 1976; codified at N.J. Rev. Stat. § 4:24-39 et seq.

24. Communication with Mary M. Garner, National Association of Conservation Districts (Dec. 20, 1976).

25. The local EPA coordinator is Harold Ryan, tel. (414) 338-1257.

26. This project is being undertaken jointly by the Lewis and Clark Soil Conservation District, the Montana Department of Natural Resources and Conservation, and the Department of Health and Environmental Sciences.

27. Districts may generally enter into agreements with each other to form cooperative associations. This has been done, for example, by eight districts in Colorado, which have agreed to form the Colorado West Area Association of Soil Conservation Districts to carry out the functions of the individual districts collectively.

28. Many of the state erosion and sediment control programs to be discussed in this and later sections have been the subject of study by the National Association of Conservation Districts (NACD) under its EPA-funded Sediment Control and Manpower Project (SCAMP). As the name

of the project suggests, the surveys done and materials gathered for SCAMP focus on manpower needs for erosion and sediment control. Discussion of manpower needs in this chapter will, therefore, be brief. (The reader is also referred to the NACD 208 Water Quality Project Information Letters for general descriptions of erosion and sediment control programs and for selected regulations, interagency agreements, etc., see note 30 infra.) The most relevant SCAMP Information Circulars are: No. 5 (Maryland Sediment Control Law, April 20, 1976); No. 7 (Virginia Erosion and Sediment Control Law, May 6, 1976); No. 10 (Iowa Erosion and Sediment Control Law, June 15, 1976); No. 11 (Montana Natural Streambed and Land Preservation Law, June 21, 1976); No. 12 (Pennsylvania Soil Erosion and Sedimentation Control Program under the Clean Streams Act, July 12, 1976); and No. 13 (Ohio Erosion and Sediment Pollution Abatement Program, Current and Proposed Authorities, August 1, 1976).

29. This publication is available from the Council of State Governments, Iron Works Pike, Lexington, Kentucky, or from the National Association of Conservation Districts, Room 1105, 1025 Vermont Avenue, N.W., Washington, D.C. 20005.

30. As part of a larger 208 Water Quality Project funded by the U.S. EPA, the National Association of Conservation Districts is developing and disseminating information on state erosion and sediment control laws. Their 208 Water Quality Project Information Letter No. 2 (June 1, 1976), along with a supplement (Jan. 1, 1977), includes a list of such laws, together with outlines of their key provisions. (The laws included are those from Georgia, Hawaii, Iowa, Maryland, Michigan, Montana, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Carolina, South Dakota, Virginia, and the Virgin Islands.)

    NACD informational materials are distributed to, inter alia, state associations of conservation districts, SCS state conservationists, state water quality agencies, EPA regional 208 coordinators and regional NPS coordinators, and areawide water quality management planning agencies. From late 1972 through early 1975, NACD held a series of 40 sediment control conferences to develop a greater public awareness of the need for state legislative action in this area, to discuss the provisions of the Model Act, and to report on recently enacted state sediment control legislation. EPA's Office of Water Planning and Standards published a summary of these conferences, prepared by NACD and entitled Report on State Sediment Control Institutes Program (April 1975).

31. Mont. Rev. Codes Ann. §§ 26-1510 through 26-1523.

32. 35 Pa. Cons. Stat. § 691.316.

33. See R. Goettemoeller, paper presented at a seminar on Non-Point Sources--Management/Institutional Problems," at 7 (Sept. 24, 1976).

34. See, for example, Virginia's Erosion and Sediment Control Law of 1973, Va. Code § 21-89.1 et seq. which exempts "tilling, planting, or harvesting of agricultural, horticultural, or forest crops." Id. § 21-89.3. A similar exemption is to be found in North Carolina's Sedimentation Pollution Control Act of 1973, N.C. Gen. Stat. § 113A-52(6). Maryland's erosion control law exempts agriculture but not silviculture. Md. Nat. Res. Code Ann. § 8-1102.

35. For all cites to Pennsylvania's program, see the outline in appendix A to this chapter. The Oct. 18, 1976 issue of Land Use Reports reported that the Agricultural Advisory Committee to Pennsylvania's Dep't of Environmental Resources has approved proposed changes to the erosion and sedimentation control regulations which would treat application to the local conservation district to have a plan prepared as compliance with the July 1, 1977 deadline and which would allow a farmer to delay implementation of any portion of a conservation plan which would present an "undue financial hardship."

36. The relevant section of New York's Soil and Water Conservation District Law stipulates that every owner or occupier of agricultural land must apply by Jan. 1, 1978 to the appropriate soil and water conservation district to have a plan prepared. The districts have until Jan. 1, 1980 to prepare such plans, after which they are to review each plan once every five years. "Agricultural land" is defined as any landholding exceeding 25 acres which is used for the raising of any agricultural or forestry products. "Concentrated agricultural operations" such as feedlots and poultry operations are also subject to the plan preparation requirement, with the exact categories of facilities covered to be defined by the state Soil and Water Conservation Committee. N.Y. Soil & Water Conserv. Dist. Law §§ 3(10), 3(11), and 9(7-a) (McKinney).

37. See Model Act § 5(e), which provides "any person whose normal agricultural and forestry practices are in conformance with the conservation standards established pursuant to this Act, shall not be deemed to be engaged in prohibited land-disturbing activities."

38. For a detailed explanation of the Universal Soil Loss Equation, see Control of Water Pollution from Cropland, supra note 12, at 16; and W. Wischmeier, "Use and Misuse of the Universal Soil Loss Equation," 31 J. Soil and Water Conservation 5 (Jan.-Feb. 1976).

39. See R. Goettemoeller, supra note 33, at 4; and telephone interview with Mr. Goettemoeller (Sept. 13, 1976).

40. U.S. EPA, Loading Functions for Assessment of Water Pollution from Nonpoint Sources (May 1976).

41. Id. at 26.

42. Wischmeier, supra note 38, at 7.

43. See infra note 255 and accompanying text.

44. Iowa Code § 467A.44(1) and (2) (1975).

45. Iowa Dep't of Soil Conservation, "A Guide for Formulation of Soil Loss Limit Regulations by Soil Conservation Districts" (Jan. 1972).

46. This is a commonly accepted definition derived from W. Wischmeier and D. Smith, Predicting Rainfall-Erosion Losses from Cropland East of the Rocky Mountains (Agricultural Handbook No. 282, 1965).

47. Iowa Code § 467A.44(3)(a) (1975).

48. See note 39 supra.

49. Telephone interview with Lawrence G. Vance, Fieldman, State Soil and Water Conservation Committee, Department of Natural Resources, Purdue University, West Lafayette, Ind. (Sept. 16, 1976).

50. Telephone interview with Thomas Koons, Bureau of Water Quality Management, Department of Environmental Resources, Harrisburg, Pa. (Sept. 13, 1976).

51. Indiana telephone interview, supra note 49.

52. Id.

53. This margin of failure reflects the consensus of opinion of officials interviewed in the states whose programs are discussed in the text and outlined in appendix A to this chapter.

54. The history of Iowa's decision to amend its soil conservation law to provide for mandatory soil loss limits is described in D. Lindquist, "Iowa's Sediment and Erosion Program" (Aug. 26, 1976).

55. Iowa Code § 467A.47 (1975).

56. For details of Ohio's proposed amendments to its soil and water conservation law, see outline in appendix A to this chapter.

57. Supra note 54, at 11.

58. For details of Indiana's draft proposal, see outline in appendix A to this chapter.

59. Supra note 54, at 11.

60. Id.

61. Id. at 10. Of course, state agencies and state subdivisions such as state or local public works departments are themselves often the

creators of erosion and sediment and should be subject to enforcement actions where this is so.

62. Iowa Code § 467A.52.

63. Id. § 467A.48.

64. Telephone interview with Dan Lindquist, Department of Soil Conservation, Des Moines, Iowa (Sept. 14, 1976).

65. Lindquist, supra note 54, at 10-11.

66. Indiana telephone interview, supra note 49.

67. For details on cost-sharing provisions of erosion and sediment control programs, see the outlines in appendix A to this chapter.

68. Indiana telephone interview, supra note 49.

69. Officials interviewed included those named in notes 39, 49, 50, and 64.

70. Goettemoeller, supra note 33, at 2.

71. While beyond the scope of this manual, it should be noted that writing conservation standards to achieve specific water quality standards is no mean task. In Ohio, the Division of Soil and Water Districts suggests that research needs to be accelerated to develop cost-effective practices which landowners can use in the flat lake plain soils "where per acre soil loss is low but the concentrations of associated materials (nutrients and pesticides) is high due to the makeup of the soil and intensity of agriculture." Id. at 7.

72. See Lindquist, supra note 54, and Iowa telephone interview, supra note 64.

73. Apparently Ohio has considered giving the Ohio Environmental Protection Agency these powers. Ohio telephone interview, supra note 39.

74. This is according to Montgomery County Soil Conservation District officials, as reported during a field tour of district projects in cooperation with the National Association of Conservation Districts on July 6, 1976.

75. Ohio Agricultural Pollution Technical Advisory Board, proposed "Agricultural Pollution Abatement Standards and Regulations" (revised June 21, 1976).

76. See supra note 15, and accompanying text.

77. 38 Fed. Reg. 18000 (July 5, 1973).

78. See U.S. EPA, Methods for Identifying and Evaluating the Nature and Extent of Non-point Sources of Pollutants 43 (Oct. 1973).

79. The National Pollutant Discharge Elimination System was created by § 402 of Pub. L. No. 92-500, the Federal Water Pollution Control Act Amendments of 1972. By regulations promulgated March 18, 1976 (41 Fed. Reg. 11458), EPA has included concentrated animal feeding operations within the NPDES program. The definition of such operations appears at 40 C.F.R. § 125.51(a)(2) and is basically the same as that given "feedlots" in the text of this chapter.

80. Under authority of §§ 301, 304(b) and (c), 306(b) and (c), and 307(c) of the FWPCA, EPA promulgated effluent limitations guidelines applicable to feedlots on Feb. 14, 1974 (39 Fed. Reg. 5706). Guidelines for best practicable control technology currently available, which appear at 40 C.F.R. § 412.12, require animal wastewater facilities to be constructed to contain all process generated wastewaters plus the runoff from a 10-year, 24-hour rainfall event. Guidelines for application of the best available technology economically achievable (required by 1983), upgrade the afore-described containment capacity required to that necessary to accommodate the runoff from a 25-year, 24-hour rainfall event (40 C.F.R. § 412.13); this same requirement applies to all new sources (40 C.F.R. § 412.15). Duck feedlots are subject to their own, individualized effluent guidelines (40 C.F.R. § 412.20 et seq.).

81. § 208(b)(2)(F).

82. See 37 Fed. Reg. 28290 (Dec. 22, 1972); 38 Fed. Reg. 10960 (May 3, 1973); 38 Fed. Reg. 18000 (July 5, 1973); and 40 Fed. Reg. 54182 (Nov. 20, 1975).

83. 41 Fed. Reg. 11458 et seq. Under these regulations, permit applications were required by Sept. 1, 1976.

84. As defined at 40 C.F.R. § 124.82(a)(3), the term "animal unit" means "a unit of measurement for any animal feeding operation calculated by adding the following numbers: the number of slaughter and feeder cattle multiplied by 1.0, plus the number of mature dairy cattle multiplied by 1.4, plus the number of swine weighing over 55 pounds multiplied by 0.4, plus the number of sheep multiplied by 0.1, plus the number of horses multiplied by 2.0."

85. 40 C.F.R. § 125.1(p) defines "navigable waters" as including:

(1) All navigable water of the United States;
(2) Tributaries of navigable waters of the United States;
(3) Interstate waters;
(4) Intrastate lakes, rivers, and streams which are utilized by interstate travelers for recreational or other purposes;

(5) Intrastate lakes, rivers, and streams from which fish or shellfish are taken and sold in interstate commerce; and
(6) Intrastate lakes, rivers, and streams which are utilized for industrial purposes by industries in interstate commerce.

86. 41 Fed. Reg. 11460 (March 18, 1976).

87. Thus Nebraska's "Rules and Regulations Pertaining to Livestock Waste Control, Envir. Rep. 836:0581 (BNA) (amended to be effective Jan. 23, 1975) provide:

> Rule 3. WHEN STATE CONSTRUCTION PERMITS AND/OR NPDES ARE REQUIRED
>
> 3.01 State construction permits will be required for all existing and proposed livestock operations when livestock wastes:
> (1) create a nuisance, or
> (2) violate Nebraska Water Quality Standards, or
> (3) discharge into waters of the State, or
> (4) violate the Nebraska Environmental Protection Act.
> 3.02 An NPDES permit will be required only when livestock wastes discharge into waters of the state.
> 3.03 Minor runoff of wastes onto adjoining property will be allowed, if the operator has obtained the permission of the owner of such property. In no event will runoff be allowed to violate Nebraska Water Quality Standards or be discharged into waters of the State except as provided by an NPDES permit.

The above-quoted rules were promulgated by the Nebraska Department of Environmental Control pursuant to its general authority to develop comprehensive programs for the control of water pollution and to adopt rules and set standards for water quality. Neb. Rev. Stat. §§ 81-1504(2), 81-1505(1).

88. For example, according to the Minnesota Pollution Control Agency, Minnesota's feedlot regulations cover all new and modified feedlots. See description of Minnesota's program included in Hearings, supra note 15, at 1127.

89. Thus, under Iowa's regulations, infra note 92, reproduced in Hearings, supra note 15, at 284 and 1089, roofed confinement feeding operations with more than 100 beef cattle or more than 70 dairy cattle must register if they discharge to a watercourse.

90. Indiana's Confined Feeding Control Law, Ind. Code § 13-1-5.7-1 et seq. Ind. Code § 13-1-5.7-2 provides that all existing confined feeding

operations "shall submit an application and pertinent information as may be required" by the Indiana Stream Pollution Control Board. "Confined feeding operation" is defined to include, inter alia, any operation with 300 or more cattle; any animal feeding operation electing to come under the chapter; and any animal feeding operation that is causing a violation of water quality standards. Id. § 13-1-5.7-1. Indiana officials distinguish their feedlot "approval" program from a "permit" program and indeed the difference in terminology may result in valuable psychological benefits in terms of acceptance by the feedlot owners and operators. The same is true of Iowa's "registration" system (see note 92 infra). Telephone interview with Rex Jones, Division of Water Pollution Control, State Board of Health, Indianapolis, Ind. (Sept. 23, 1976).

91. See, for example, the description of the Pennsylvania approach in Hearings, supra note 15, at 1200. Pennsylvania has not found pollution from feedlots to be a significant enough problem to justify the adoption of a specific feedlot program. Instead, the Department of Environmental Resources relies on the authority vested in it under the state's Clean Streams Law to abate pollution from all sources, regardless of size. Whether a permit will be required for any particular feedlot depends on an individualized review of its pollution potential.

Even among those states with specific feedlot pollution control programs, a number rely on onsite inspections to determine which existing operations are causing or threaten to cause water pollution and will therefore require permits and pollution control measures. Thus, Nebraska conducts onsite inspections of livestock operations to determine the need for livestock waste control facilities based on the following criteria:

1. location of watercourse to feedlot
2. type of watercourse
3. size and capacity of feedlot
4. drainage pattern from feedlot to watercourse
5. ground cover in drainage-way
6. slope of feedlot and drainage-way
7. amount of foreign drainage through feedlot
8. 10-year, 24-hour rainfall
9. soil type
10. process wastewater
11. groundwater tables and
12. feedlot waste management practices. Hearings, supra note 15, at 1143-44.

92. Water Quality Commission, Iowa Dep't of Environmental Quality, "Rules and Regulations--Confined Feeding Operations," adopted pursuant to Iowa Code § 455B.9 (Iowa Dep't of Environmental Quality, 3920 Delaware,

P.O. Box 3326, Des Moines, Iowa 50316), reproduced in Hearings, supra note 15, at 284 and 1089.

93. See statement of Alan G. Kirk II, Acting Assistant Administrator for Enforcement and General Counsel, U.S. EPA, in Hearings, supra note 15, at 58.

94. See note 85 supra.

95. That many states already have the manpower and the jurisdiction to review permits and plans for facilities not covered by the NPDES is evidenced by the broader definitions of applicability in many existing state programs. Outlines of those programs may be found in the responses to the September 1973 questionnaires sent to the states by the House Conservation and Natural Resources Subcommittee, which are reproduced starting at page 1018 in Hearings, supra note 15.

96. Some research indicates, furthermore, that larger feedlots are substantially more likely than small ones to have adequate facilities and management practices in place already. See statement of Richard M. Hall, Natural Resources Defense Council, and a letter from Dr. William T. Paynter, Indiana State Health Commissioner, quoted therein, in Hearings, supra note 15, at 155.

97. See the model regulations for feedlots contained in U.S. EPA, A Manual of Laws, Regulations, and Institutions for Control of Ground Water Pollution IV-53 (1976).

98. Different thresholds apply depending on whether the confined feeding operation is open or covered and how far the feedlot is from a watercourse, supra note 92.

99. Iowa Regulations, supra note 92:

> If the department determines that a confined feeding operation is, in fact, polluting or may reasonably pollute waters of the state, the operator shall obtain a permit for disposal of waste water therefrom and shall provide necessary water pollution control facilities which shall be constructed in accordance with plans and specifications approved by the department. The following factors will be considered when applicable, informing a judgement as to whether a confined feeding operation will or will not constitute a potential water pollution problem.
>
> (1) Soil type.
> (2) Distance to stream or other waters of the state.
> (3) Use of land between feedlot and stream or other waters of the state.

(4) Slope of the land or time for waste to seep into soil before entering stream or other waters of the state.
(5) Control of waste discharge in proportion to stream flow.
(6) Distance to structures occupied by humans.

100. Ohio's erosion and sediment control program is outlined in appendix A to this chapter.

101. Complications in fitting the two programs together can be ironed out by obtaining state certification to administer the NPDES program.

102. Supra note 97.

103. Hearings, supra notes 15 and 95, at 1018 et seq.

104. Council of State Governments, 1973 Suggested State Legislation, vol. 32 (Iron Works Pike, Lexington, Ky. 40505).

105. Prepared by and available from the Cooperative Extension Services. Purdue University, West Lafayette, Ind. 47907 (Mail Room, AGAD Building).

106. Prepared by and available from the Cooperative Extension Service, Ohio State University, Columbus, Ohio 43210.

107. Published by the Life Sciences and Agriculture Experiment Station, the Maine Soil and Water Conservation Commission, and the Cooperative Extension Service, University of Maine at Orono (Misc. Report No. 142, July 1972).

108. See A Manual of Laws [etc.] for Control of Ground Water Pollution, supra note 97, at II-36 to II-44 for other references.

109. U.S. EPA, Processes, Procedures, and Methods to Control Pollution Resulting from Silvicultural Activities 3 (Oct. 1973).

110. Id. at 2.

111. Id. at 1, 4.

112. In an article in the June 1976 issue of Planning magazine, Hallie Black, a forester, discusses the projected new demand for "puckerbrush": the dense, mixed stands of trees that have overgrown New England's (and, presumably, other areas') fields and woodlots. As the wood chips and other wastes once used by the timber industry to make particle board and other such products are used increasingly to generate heat and power in the companies' mills, "puckerbrush" stands to become increasingly in demand as a substitute. Id. at 22.

113. For the applicable definition of navigable waters, see note 85 supra.

114. 41 Fed. Reg. 24709 (June 18, 1976).

115. 41 Fed. Reg. 24711, and 40 C.F.R. § 124.85(a)(2) and (3) and the regulations cited therein.

116. 41 Fed. Reg. 24711, 40 C.F.R. § 124.85(a)(1).

117. See supra note 109 for a technical manual on this subject which EPA has already published, and see Office of Water Planning and Standards, U.S. EPA, Draft Nonpoint Source Control Guidance--Silviculture (Dec. 1976).

118. See, for example:

Alabama - "Best Management Practices Concerning Forestry and Water Quality in Alabama" (draft, Dec. 1976) (available from the Alabama Forestry Commission, 513 Madison Avenue, Montgomery, Ala. 36130);

New York - "Guidelines for Timber Harvesting in New York" (Feb. 1975) (prepared by the New York Section of the Society of American Forestry, available from the State University of New York, College of Environmental Science and Forestry, Applied Forestry Research Institute, Syracuse, N.Y. 13210); and "Rules and Regulations Governing the Wild, Scenic and Recreational Rivers System within the Adirondack Park (effective April 19, 1976) (promulgated by the Adirondack Park Agency, P.O. Box 99, Ray Brook, New York [these regulations incorporate the specifics of the "Guidelines" of the New York Section of the SAF referred to above]);

Oklahoma - "Best Management Practices Concerning Forestry and Water Quality in Oklahoma" (final draft, Dec. 1976) (available from the Oklahoma Forestry Association, 941 Susan Avenue, Ada, Oklahoma 74820);

Vermont - "Nonpoint Source Water Pollution Evaluation Handbook," and "Approved Forestry Cutting Practices" (Vermont Agency of Environmental Conservation, Dep't of Forests and Parks, Montpelier, Vt.); and "Recommended Forest Management Standards for Timber Harvesting in Vermont" (Vermont State Forestry Planning Committee);

Virginia - "Water Quality and Forestry Handbook" (revised June 15, 1976) (prepared by the Virginia Division of Forestry, Richmond, Va.).

Compare the standards set forth in the western statutes and regulations cited in appendix B to this chapter.

119. Telephone interview with Caleb Pennock, Virginia Division of Forestry, Charlottesville, Va. (Sept. 8, 1976); and see Perry R. Hagenstein (Exec. Director, New England Natural Resources Center, Boston, Mass.), "Legislating Regulation of Forest Practices--A New England Perspective," at 6 (paper presented at the AFA/EPA/Forest Service Workshop [supra note 2] in Boston, Mass., Oct. 15-16, 1975).

120. U.S. EPA Region X, 1200 Sixth Avenue, Seattle, Washington 98101 (March 1975) (EPA 910/9-74-007).

121. The Region X guide attributes the high erosiveness of roads in the past largely to the blind application of standard road engineering practices without adequate preconstruction planning to minimize road mileage and to choose locations and designs which reflect the individual topographic, geologic, soils, and climatic conditions (supra note 120, at 56, 95, 99, 114-15). As with every other potential pollution source discussed in this handbook, the planning stage has been slighted in the past but is in fact all-important. The information aids identified by Region X as necessary for proper planning of road location include: aerial photographs; topographic maps; detailed soil surveys; geologic maps; precipitation intensity/duration maps; vegetation maps; and hydrographic studies. All such information should be supplemented by field investigations (supra note 120, at 96, 101-45). It is generally agreed, as reflected in the technical literature (see suggested readings) and in the laws of states which have adopted laws and regulations or guidelines concerning forest practices (see supra note 118 and appendix B) that minimum locational and road design criteria include the following elements:

Road Location and Size

1. general location - roads should "follow the topography," that is, they should follow natural geologic formations such as benches or ridges which will provide stability; and should not be located mid-slope or on tops or toes of banks;
2. landslides - areas susceptible to mass soil movement should be avoided (this is a particular problem in the West);
3. grade - grades should be as low as possible (California's Northern District Regulations provide, for example, that road grades are not to exceed 15 percent--although 20 percent will be allowed for distances not to exceed 500 feet--unless justified in the individual timber harvesting plan which must be filed under California law);
4. wetlands and watercourses - roads should be kept out of wet, poorly drained areas and natural drainage channels; roads should be located far enough from streams to prevent road-generated sediment from entering them;
5. spoil - debris from road construction must be disposed of or graded and revegetated in such a way that it does not pose an erosion hazard;
6. number and size - roads should be as few and as narrow (preferably single lane with turnouts) as possible;

7. drainage design - many states (see, e.g., note 118, Virginia Guidelines, and appendix B, western state regulations) stipulate in great detail what kind of drainage structures should be placed at what intervals along roads;
8. stabilization and maintenance - fill material must be adequately compacted; all exposed areas must be stabilized with vegetation, rip-rap, mulch, etc. All drainage structures must be maintained. Abandoned roads must be seeded over.

Region X, supra note 120; California State Water Resources Control Board, A Method for Regulating Timber Harvest and Road Construction Activity for Water Quality Protection in Northern California 71 et seq. (Publication No. 50, 1973); G. Brown, Forestry and Water Quality 18 (reprinted 1976); and state standards, supra note 118 and appendix B infra.

122. California is one state which limits clearcutting because of erosion potential. Under California's forest practices act, the state Board of Forestry is authorized (1) to encourage selection, shelter wood, and other types of management where biologically appropriate and (2) to regulate the size and shape of areas in which even-age management (clearcutting) is used. The board's regulations for the Northern District limit the size of clearcuts based on the degree of Estimated Erosion Potential as follows: Extremely High - 20 acres; High - 30 acres; Moderate - 40 acres; Low - 80 acres. These limits may be exceeded, but the size of the proposed clearcut must be justified in a Timber Harvesting Plan, giving full consideration to "damaging effects to streams from land slips or slides, siltation, water yield, and debris deposits." Moreover, clearcutting is generally prohibited within the Stream or Lake Protection Zone (see appendix B for citations and details).

For discussions of the pros and cons of clearcutting, see: D. Smith, "Maintaining Timber Supply in a Sound Environment," in Report of the President's Advisory Panel on Timber and the Environment 369, 393 et seq. (appendix L) and 424 (bibliography) (1973); L. Wilson, "Man's Activities in Watershed Areas--A Need for Planning," 4 Environmental Law 229 (Winter 1974); and J. Bernstein et al., "Clearcutting: Can You See the Forest for the Trees?" 5 Environmental Law 85 (Fall 1974).

Much of the clearcutting debate has centered around clearcutting on national forest lands, and two sets of proposed guidelines which were developed for federal lands should be of interest to those contemplating restrictions on private lands as well. Those recommended guidelines are (1) ones developed by the Senate Subcommittee on Public Lands in March 1972 and submitted to the Senate Committee on Interior and Insular Affairs in a report entitled "Clearcutting on Federal Timberlands" (92d Cong., 2d Sess., 13 pp.); and (2) ones developed by

the Council on Environmental Quality and proposed but not issued as an executive order in January 1972. See also Hearings on "Clearcutting Practices" on National Timberlands Before the Subcomm. on Interior and Insular Affairs, 92d Cong., 1st Sess. (1971).

The National Forest Management Act of 1976, Pub. L. No. 94-588 (passed in the last session of the 94th Congress and submitted for the President's signature as S. 3090) requires the Secretary of Agriculture to promulgate guidelines for the development of land management plans which insure, inter alia, that clearcutting is used only where it is determined to be "the optimum method . . . to meet the objectives and requirements of the relevant land management plan." Id. § 6(9)(3)(E)(iv). Land Management Plans for units of the National Forest System are to have, as their objective, the coordination of multiple uses, including "outdoor recreation, range, timber, watershed, wildlife and fish, and wilderness." Id. § 6(e)(1). The act also provides for limits on the size and shape of clearcuts and for guidelines to insure that clearcuts, where allowed, "are carried out in a manner consistent with the protection of soil, watershed, fish, wildlife, recreation, and esthetic resources, and the regeneration of the timber resource." Id. § 6(g)(F)(v).

123. General Erosion Control Standards for Skid Trails and Landings include:

1. Avoiding tractor or wheel skidding on unstable, wet, or easily compacted soils and on steep slopes (Oregon's* rules for the state's Eastern Region stipulate slopes in excess of 35 percent, Idaho's* regulations stipulate 30 percent).
2. Stabilizing skid trails, whenever they are subject to washing, immediately following completion by water barring, cross draining, scarifying, seeding, or other suitable means.
3. Washington's regulations* note that landings should be mechanically compacted where necessary to avoid erosion and mass soil movement. The regulations for the Adirondack Park** in New York State stipulate that landings should be graded, leveled, and reseeded after use, where necessary.

Typical Limitations on Logging Work in Watershed Areas include:

1. No trees should be felled into or across streams, except under highly unusual conditions (see Washington's regulations*).
2. No landings should be established near streams (the Adirondack regulations** stipulate 200 feet from the mean high water mark; Washington's regulations* simply use the mean high water mark).

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* See outline of state forest practices acts in appendix B to this chapter.

**See note 118 supra.

3. Skidding and cable-yarding of logs or trees across streams should be avoided. Where absolutely unavoidable, crossings should be made at right angles and culverts or other means should be used to provide for unrestricted fish passage. In some states, New York** and Washington,* for example, stream crossing work requires a permit from an agency concerned with wildlife preservation.
4. All logging debris which is in or might enter a stream should be removed immediately, at least above ordinary high water mark (Washington's regulations* require disposal above the 25-year flood level for most streams).

124. See U.S. EPA, Compilation of Federal, State, and Local Laws Controlling Nonpoint Pollutants--An Analysis of the Law Affecting Agriculture, Construction, Mining, and Silviculture Activity 37 (Sept. 1975).

125. 16 U.S.C. § 583 et seq.

126. 16 U.S.C. § 583a.

127. Land and resource management plans are called for under section 5 of the Forest and Rangeland Renewable Resource Planning Act, 16 U.S.C. § 1604.

128. Pub. L. No. 94-588, § 6(g)(3)(E)(iii). Clearcutting guidelines mandated by the act are discussed supra note 122. For a discussion of these and other provisions of the act, see Comment, "Major New Public Land Laws Provide Detailed Guidance for Activities of Forest Service, Bureau of Land Management," 6 ELR 10240 (Nov. 1976).

129. Recent cases construing the reach of section 313 of the FWPCA and congressional authorization for state regulation of federal installations and agencies generally include Minnesota v. Hoffman, 9 Envir Rep. Cases 1353, 7 ELR 20066 (8 Cir. Oct. 28, 1976); EPA v. California U.S. , 8 Envir. Rep. Cases 2089, 6 ELR 20563 (June 7, 1976); Hancock v. Train, U.S. , 8 Envir. Rep. Cases 2100, 6 ELR 20555 (June 7, 1976); and Minnesota v. Callaway, 401 F. Supp. 524, 7 Envir. Rep. Cases 1473 (D. Minn. 1975).

130. See John R. McGuire, Chief, U.S. Forest Service, "A Historical Perspective of Forest Practice Regulation," at 2 (paper presented at the AFA/EPA/Forest Service Workshop [supra, note 2], Washington, D.C., Feb. 10, 1975).

131. For a summary of forest practice law developments during this period, see a publication of the Society of American Foresters (5400 Grosvenor Lane, Bethesda, Md. 20014), "Forest Practices Development in the United States 1940 to 1955." At least 16 states regulate cutting

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* See outline of state forest practices acts in appendix B to this chapter.

**See note 118 supra.

practices to some extent. See William C. Siegal, "State Forest Practic Laws Today," Journal of Forestry, April 1974, at 208; and Paul V. Ellefson, "Focus on the Issues," Journal of Forestry, April 1974, at 196. The latter article consists primarily of a table outlining the forest practices acts of California, Florida, Idaho, Louisiana, Maryland, Massachusetts, Mississippi, Missouri, Nevada, New Hampshire, New Mexico, New York, Oregon, Vermont, Virginia, and Washington. While other states may have laws pertaining to forests, they are usually confined to state forests (see Compilation of Federal, State and Local Laws, supra note 124, at 171 et seq.).

132. For citations to such laws, see Ellefson, supra note 131.

133. Massachusetts and New Hampshire are exeptions to this generalization. See P.R. Hagenstein, "Legislating Regulation of Forest Practices--A New England Perspective," at 3 (paper presented at the AFA/EPA/Forest Service Workshop [supra note 2] in Boston, Mass., Oct. 15-16, 1975). While the Massachusetts forest practices act is adequate in form, a shortage of manpower has left the notice and plan requirements largely unenforced. Letter from John H. Lambert, Jr., Chief Forester, Division of Forests and Parks, Mass. Dep't of Natural Resources, to Judith Aronoff, U.S. EPA (July 31, 1974).

134. Much of the opposition to state forest practices acts comes, naturally enough, from small operators who are least able to bear what they predict will be the costs of regulation. Several participants in the AFA/EPA/Forest Service Workshops, supra note 2, expressed this viewpoint. Larger timber operators often object not the the fact of a forest practices act but to its form. This is true, for example, of the Weyerhaeuser Company, which expressed its general support for a state forest practices acts while objecting to certain features of the model act suggested by EPA. See letter from Jack Wolff, Vice President for Land and Timber, to James Agee, Ass't Admin. for Water and Hazardous Materials, U.S. EPA (May 15, 1975). For a description of the suggested state forest practices act developed in 1974, see James L. Agee, "A Suggested State Forest Practices Act: One Implementing Mechanism for Improving Water Quality on Forest Lands," Journal of Forestry, Jan. 1975, at 40.

135. Carl H. Stoltenberg, Dean of the School of Forestry at Oregon State University, has come to the following conclusions respecting experience under the Oregon Forest Practice Act:

> I believe the major gains developing from the Oregon Forest Fractice Act are the following. (1) There has been a significant (but unmeasured) reduction in man-caused stream turbidity and stream-temperature increases associated with forestry practices. (2) The regulatory functions of several state and federal agencies are now funneled through a single state agency, the State

Forestry Department. This has made state regulatory activities more efficient and has simplified the job of compliance for forestry operators. (3) There is a better understanding and a closer working relationship between regulatory agencies and specialists within various state agencies; there is also better understanding and more constructive working relationships between these agencies, conservation groups, and forestry operators. (4) Loggers, landowners, and the general public have a much better understanding of water quality problems and their relationship to forestry practices, of solutions to such problems, and of reasonable forest practice standards. (5) I also believe there is improved regeneration of forests on private lands, but hard data on such progress is lacking.

These gains have been accomplished at a significant, but again unmeasured cost. Included among these costs, however, are the following: (1) Loss of most of Oregon's service forestry program. The administration of the Forest Practices Act has been underfunded and service foresters have been diverted to the administration of the Forest Practices Act. (2) Advantageous relationships with private fire protection associations have been reduced because private associations could not carry out the Act's regulatory activities. (3) Some of the required practices have been costly for private operators to apply--particularly in the short run, even though their long-run effects may be helpful.

It should be noted, however, that one Oregon official the author spoke to maintained that there was more onsite contact with loggers under the Forest Practices Act than previously; it was just that more stress was being put on activities which might impact water and less on seeding. Telephone interview with Eugene Mannock, Oregon Department of Forestry (September 1976). A Washington State official who has been intimately involved in the administration of that state's Forest Practices Act reports that in his opinion the act has helped service forestry and facilitated better contacts with small owners. When asked to explain the difference between this experience and that reported by Dean Stoltenberg in Oregon, that official pointed ot the fact that Washington, unlike Oregon, has increased its forestry budget substantially. Telephone interview with Howard L. Stolaas, Deputy Supervisor, Dep't of Natural Reosurces, Olympia, Washington (Sept. 13, 1976).

136. Citation to and details on this act, as well as on the forest practices acts of California, Idaho, Nevada, and Washington, may be found in appendix B to this chapter.

137. Idaho Rules and Regulations (for cite, see outline in appendix B to this chapter) § 812.01.

138. Again, see the outlines in appendix B to this chapter for cites to and details of these laws.

139. Siegal, supra note 131, at 210.

140. See citation and outline in appendix B to this chapter.

141. See Oregon telephone interivew, supra note 135.

142. See Washington telephone interview, supra note 135.

143. As noted earlier in the context of feedlot regulation (supra note 90), what something is called may well affect its political acceptability. One wonders if California's use of the term "license" instead of "permit" was wholly or in part motivated by such considerations.

144. March 7, 1975, available from Society of American Foresters, supra note 131.

145. See Washington telephone interview, supra note 135.

146. See citation in appendix B to this chapter.

147. See citations to and details on Washington's and California's acts in appendix B to this chapter.

148. Wash. Rev. Code § 76.09.040.

149. Cal. Pub. Res. Code, § 4562.5 (Deering).

150. Id. § 4515.

151. Id. § 4531.

152. Region X's road construction guide makes a particularly powerful case for case-by-case decision making, supra note 120, at 22, 94.

153. See section 5.0 infra for a further discussion of the certainty question.

154. Cal Pub. Res. Code § 4590 (Deering).

155. See appendix B to this chapter, Nevada outline, for an enumeration of the criteria for variances from the prohibition on activities near waterbodies.

156. Oregon telephone interview, supra note 135.

157. Wash. Rev. Code § 76.09.030(4).

158. Washington telephone interview, supra note 135.

159. Oregon and Washington telephone interviews, supra note 135.

160. See Weyerhaeuser letter, supra note 134.

161. Wash. Rev. Code § 90.58.010 et seq., and see section of Forest Practices Act dealing with this act (id. § 76.09.240(4). Weyerhaeuser has apparently brought suit contesting the application of regulations adopted under the Shoreline Management Act to one of its operations.

162. Wash. Rev. Code § 75.20.100.

163. See Washington outline in appendix B to this chapter.

164. Washington telephone interview, supra note 135.

165. For a detailed treatment of alternative mechanisms for coordinating permit procedures, see F. Bosselman, D. Fuerer, and C. Siemon, The Permit Explosion: Coordination of the Proliferation (1977).

166. Wash. Rev. Code § 76.09.240(1).

167. Cal. Pub. Res. Code § 4516.

168. Tahoe Regional Planning Agency, Ordinance No. 12, § 2.11.

169. Dunbar v. City of Spartanburg, No. 20147 (S.C. Sup. Ct. Jan. 7, 1976). 17 Municipal Attorney 264 (Sept. 1976). (Municipal Attorney is a publication of the National Institute of Municipal Law Officers, Washington, D.C.).

170. See chapter 2 and chapter 6 for futher discussion of erosion control and the police power. Local ordinances adopted for the preservation of urban and surburban woodland resources are discussed in an article by Mark B. Lapping and William B. Kurtz, "Protecting Privately Owned Urban Woodlands: Trends in Municipal Tree Ordinances," Journal of Forestry, Sept. 1976, at 622. That article refers to a number of particularly notable ordinances including those in: Leon County, Florida (Tree Ordinance No. 73-21, as amended by 75-3), and Oakland County, Michigan (Dep't of Planning and Physical Development, Planning Division, "Model Environmental Ordinance to Protect Woodlands" (1974). Other sources referred to include C. Bingham, Trees in the City (Planning Advisory Service Rep. No. 236, 1968) (American Society of Planning Officials, Chicago, Ill., 44 pp.; D.R. Neely, ed., A Standard Municipal Tree Ordinance (1972) (International Shade Tree Conference, Inc., 14 pp.); and S. Carter et al., "Local Environmental Management" in Municipal Year Book 237-59 (1974) (Inter-

national City Management Ass'n, Washington, D.C.). The last study reveals, apparently, that as of 1974 at least 343 localities had some form of tree-preservation ordinance. Examples of tree-preservation ordinances, timber-harvesting ordinances, and woodland protection ordinances are referenced and discussed in Charles Thurow, William Toner, and Duncan Erley, Performance Controls for Sensitive Lands--A Practical Guide for Local Administrators, ch.6 (Planning Advisory Service Report Nos. 307, 308, 1975) (American Society of Planning Officals, Chicago, Ill.).

171. N. Skill, Forest Practices Director, Oregon Dep't of Forestry, "A Contribution to Quality Forest Management--The Oregon Forest Practices Act," (March 1975). This paper includes the fiscal 1973 and 1974 statistical breakdowns referenced earlier in the text.

172. See Oregon telephone interview, supra note 135.

173. Idaho Code, § 38-1309.

174. See Oregon's, Washington's, and Idaho's forest practices acts as outlined in appendix B to this chapter.

175. Letter and compilation of official notice summary from Howard L. Stolaas, Deputy Supervisor, State of Washington Dep't of Natural Resources, Olympia, Washington, to the author (Sept. 14, 1976).

176. Supra note 171, at 2.

177. Cal. Pub. Res. Code § 4610.

178. See Washington telephone interview, supra note 135.

179. See Oregon and Washington telephone interviews, supra note 135.

180. Nev. Rev. Stat. § 528.044.

181. Comment, "Regulation of Private Logging in California," 5 Ecol. L. Q. 139, 179 (1979).

182. Cal. Pub. Res. Code § 4574.

183. Wash. Rev. Code § 76.09.100.

184. California state report to APA/EPA/Forest Service Workshop, supra note 2 (Portland, Ore., Dec. 9 and 10, 1975).

185. Wash. Rev. Code § 76.09.050 (8).

186. One state already considering this course, for a different reason, is Montana. A proposed Forest Practices Act, modeled after Oregon's, was

defeated in that state in 1975 "mainly because small land owners communicated strenuous objections to their elected representatives, "according to Montana's state report to the AFA/EPA/Forest Service Workshop, supra note 2 (Portland, Ore., Dec. 9 and 10, 1975). That report (presented by Howard McDowell, Executive Vice President, Inland Forest Resources Council) listed as among the laws available in Montana to control non-point pollution in the absence of a forest practices act, the following: Natural Streambed Preservation Act of 1975, Water Use Act, Water Pollution Control Act, Dredge and Fill (Navigable River Act), Flood Plain Management and Regulation Act, Lakeshore Protection Act, Montana Environmental Quality Act, and Water Resources Planning Act.

In its report to the AFA/EPA/Forest Service Workshop, supra note 2 (Chicago Ill., April 13-14, 1976), the delegation for the state of Michigan suggested that many existing silvicultural pollution problems from road and stream crossings, steep slopes, and conversion from forest to residential uses might be eased through enforcement of existing laws such as the Inland Lakes and Streams Act (requires permits for stream crossings and dredge and fill operations), the Soil Erosion and Sedimentation Act, and the Shoreland Protection and Management Act (which includes, inter alia, a citizen suit provision).

187. Op. Cal. Att'y Gen. 182, interpreting the Dickey Act, the predecessor of the Porter-Cologne Act, but applicable to the subsequent act as well. See California State Water Resources Control Board, supra note 4, at 10. Similarly, a 1971 opinion of Virginia's Attorney General interpreted that state's Water Control Law to include sediment and silt within the meaning of "pollutant." SCAMP Info. Circular No. 7, supra note 28, at 1 (May 6, 1976).

188. Mont. Rev. Codes Ann. § 69-4802.

189. Supra note 32.

190. 35 Pa. Cons. Stats. Ann. § 691.1 (Purdon).

191. See appendix A, outline of Pennsylvania Erosion and Sediment Control Program, for citations and further details.

192. The state forestry people in Indiana have already come to the conclusion that they would prefer to be included within a state erosion and sediment control program rather than to adopt a state forest practices act. Accordingly, they have suggested certain amendments to the proposed Erosion and Sediment Control Act, outlined in appendix A to this chapter, which are designed to make it better fit forestry circumstances. (Those suggestions were not available at the time of this writing.) See Indiana telephone interview, supra note 49.

193. See appendix A, outline of Model State Act for Soil Erosion and Sediment Control.

194. See appendix A, outline of porposed Ohio amendments.

195. New York Environmental Conservation Law §§ 9-0713, 9-0715 (McKinney).

196. See note 118 supra.

197. Virginia's Reforestation of Timberland Act of 1970.

198. Mississippi Forest Resource Development Law of 1974, Miss. Code Ann. §§ 49-19-201 through 49-19-227.

199. Virginia's technical and cost-sharing assistance is only available for tracts of 500 acres or less and for lands not receiving federal financial assistance (Va. Code §§ 10-90.24, 10-90.25). Excluded from eligibility under Mississippi's act are "private corporations manufacturing products" and industrial lands (Miss. Code Ann. § 49-19-205(c) and (d), as well as lands receiving federal funds (id. § 49-19-213).

200. Va. Code § 10-90.20.

201. Id. § 10-90.26(3).

202. See note 118 supra.

203. Mississippi Forestry Association, (620 N. State St., Jackson, Miss., 39201) "Forestry Practices in Mississippi." This booklet is out of print but is now in the process of revision for renewed publication.

204. Mary H. Sizemore and Richard A. Laurence, "Regulation of Forest Practices," at 2 (paper presented at several of the AFA/EPA/ Forest Service Workshops, supra note 2); and Virginia telephone interview, supra note 119.

205. Id., Virginia telephone interview. Virginia Seed Tree Law, Va. Code §§ 10-75 through 10-83.01.

206. See W. Sizemore and Sizemore Staff, "Improving the Productivity of Nonindustrial Private Woodlands," Appendix, "A Summary of State Laws Regulating Cutting Practices," in Report of the President's Advisory Panel on Timber and the Environment (1973); and Compilation of Federal, State and Local Laws, supra note 124.

207. New York Real Prop. Tax Law, § 480-a (McKinney).

208. Id. § 480-a.8.

209. Id.

210. Missouri State Forestry Law, Mo. Rev. Stat., § 254.210, and Op.

Att'y Gen. No. 70, Phillips, 2-24-53.

211. Mo. Rev. Stat. § 254.240.

212. Washington telephone interview, supra note 135.

213. Cal. Pub. Res. Code §§ 4571-4577 (Deering).

214. Letter form Glen Jones, Executive Vice President, Mississippi Forestry Association (620 North State Street, Jackson Miss. 39201)(Aug. 26, 1976).

215. In Virginia, the State Division of Forestry will, on request, make recommendations for private logging contracts and will inspect to see that the terms of the contract are being carried out. Virginia telephone interview, supra note 119.

216. David P. Overholt, Chief, Resource Conservation Planning Branch, Soil Conservation Service, Washington, D.C., "National Efforts to Improve Erosion and Sediment Control," at 5 (paper presented at the Annual Meeting, Potomac River Basin Commission, Nov. 7, 1974).

217. Supra notes 49 and 50 and accompanying text.

218. See the description of Iowa's soil loss limits and erosion and sediment control program, supra notes 44, 45 and 54 and 55, accompanying text, and appendix A.

219. See description of Ohio's standards in appendix A. See also North Carolina's Sedimentation Pollution Control Act of 1973, which includes certain mandatory requirements for "land-disturbing activities," including the following "buffer zone" provision:

> No land-disturbing activity during periods of construction or improvement to land shall be permitted in proximity to a lake or shall be permitted in proximity to a lake or natural watercourse unless a buffer zone is provided along the margin of the watercourse of sufficient width to confine visible siltation within the twenty-five percent (25%) of the buffer zone nearer the land-disturbing activity, provided, that this subdivision (1) shall not apply to a land-disturbing activity in connection with the construction of facilities to be located on, over, or under a lake or natural watercourse. N.C. Gen. Stat. § 113A-57.

(This act has not been discussed because it excludes agricultural and silvicultural activities from its coverage.)

220. See Ohio Livestock Waste Management Guide, supra note 106,

which includes an illustration of a grass filter area with switch-back and gradient terraces, and which says: "A grass filter is effective in treating dissolved and fine suspended solids [from animal wastes] by infiltration, filtration, absorption, adsorption, and decomposition. Considerable nigrogen can be lost to the atmosphere and a high proportion of the BOD can be removed." Id. at 23.

221. There is data which indicates that "a 100-125 foot wide strip of good sod should filter about 75 percent of the sediment from normal field runoff on moderate slopes [while] [w]ith a properly designed terrace system, less than 20 percent of the soil eroded from the between-terrace areas is transported completely off the field." Control of Water Pollution from Cropland, supra note 12, at 25.

222. See the "waterside portection zone" provisions outlined in appendix B to this chapter.

223. Goettemoeller, supra note 33, at 5.

224. Wisconsin state report to AFA/EPA/Forest Service Workshop, supra note 2 (Chicago, Ill., April 13 and 14, 1976).

225. See supra note 133.

226. Hagenstein, supra note 133, at 3-6. Mr. Hagenstein cites Maine's land use law, applicable to its unorganized townships of the state: its Shoreland Zoning Act; and Connecticut's, Massachusetts', and New Hampshire's wetlands laws, and he describes their existing or possible application to timber operations.

227. See chapter 3, section 4.1.

228. Haw. Rev. Stat. § 183-41.

229. Vt. Stat. Ann. tit. 10, § 6001 et seq., § 6001(3).

230. The possibility of using wetlands laws in New England to protect water from the adverse effects of timber harvesting has already been explored in the paper by Hagenstein cited at note 133, supra. It is worth quoting from this paper at length:

> It seems clear that silvicultural practices in New England are of little importance in relation to water quality, but there does seem to be some real concern over the impact of logging and logging road construction on the character of surface waters. Forest practices regulation may be needed. If it is needed, the question is, "What kind of regulation is most appropriate?" Do we need wholly new forest practice laws, can we use wetlands laws to control logging as well as other activities

in critical areas, or should we regulate road construction, including logging roads, wherever they might be built?

It seems to me that the case for new forest practice acts aimed at water quality problems is a strong one only if there is good evidence that cutting timber along streams, as contrasted with logging road construction and skidding, is a major problem. If the problem is logging and skid roads in wetlands, it seems to me that the appropriate route to regulation is through wetlands laws. The apparent exemption of forestry, including logging roads, from wetlands regulations in Connecticut and Massachusetts is a real anomaly in view of the much more limited kinds of actions that are regulated in wetlands in these states. Using wetlands laws has the advantage of using a system that already exists in four of the six New England states (in Maine, a combination of the Shoreland Zoning Act and the Land Use Regulation Commission apparently regulates all logging in wetlands) and a set of laws whose specific purpose is to minimize impacts on water flow and quality. Id. at 6.

231. Id.

232. Mont. Rev. Codes Ann. § 26-1510 et seq.

233. Id. § 26-1511.

234. "Model Rules for Adoption by Conservation Districts, Grazing Districts and Counties to Implement the Natural Streambed and Land Preservation Act of 1975," Rule 9 (compiled by Montana Dep't of Natural Resources and Conservation, 32 South Ewing, Helena, Montana).

235. The quotations from this ordinance are taken from the excerpts reproduced in Performance Controls for Sensitive Lands, supra note 170, at 113-115.

236. Id. at 114.

237. N.Y Environ. Conservation Law preceding § 15-0901 note (1972 addition to Conservation Law of 1911 § 429-k - 429-v).

238. "Rules and Regulations Governing the Wild, Scenic, and Recreational Rivers Systems Within the Adirondack Park," introduction (effective April 19, 1975) (see note 118, supra).

239. Id., § 584.3(a). Wild rivers are defined as rivers which, among other characteristics, "are free of diversions and impoundments, and are inaccessible to the general

public except by water, foot or horse trail. Their river areas are primitive and undeveloped in nature, with development, if any, limited to forest management and foot bridges."

240. Id. § 584.7.

241. Id. § 584.6(b)(1) and (2).

242. Id. § 584.13.

243. Id. § 584.15.

244. Id. § 584.16.

245. Id. § 586.2.

246. See the summary of California's stream and lake protection zone provision in the outline in appendix B to this chapter.

247. For a good discussion and good examples of hillside protection ordinances, see chapter 7 of Performance Controls for Sensitive Lands, supra note 170.

248. California state report to AFA/EPA/Forest Service Workshop, supra note 2 (Portland, Ore., Dec. 9 and 10, 1975).

249. This program, which is concentrated on the northern part of the central and Mississippi river waterfowl flyways, provides for 10-year agreements with owners and operators of eligible wetlands. Payment rates are $5 per acre, $4 if the wetlands are under a drainage easement.

250. 32 Wash. 2d 551, 202 P.2d 906 (1949), Annot., 13 A.L.R.2d 1081, 1120.

251. 202 P.2d 906, 908. To the same effect, see In re Opinion of the Justices, 99 N.H. 532, 114 A.2d 327 (1955), in which the New Hampshire Supreme Court pronounced the state's proposed preferential taxation scheme for timberland constitutional, using the following reasoning:

> It is generally recognized today that the encouragement of reforestation and forest conservation affects the public interest and the public welfare so that the General Court may enact legislation which will prevent the indiscriminate damage or destruction of the forests and water resources of the state even though this may involve some regulation and control over the private ownership of such property. Opinion of the Justices, 103 Me. 506, 69 A. 627, 19 L.R.A.,N.S., 422; State v. Dexter, 32 Wash.2d 551, 202 P.2d 906, 13 A.L.R.2d 1081, affirmed in 338 U.S. 863, 70 S.Ct. 147, 94 L.Ed. 529. This principle was stated

> as follows in Conway v. New Hampshire Water Resources Board, 89 N.H. 346, 349, 199 A. 83, 87: "The state clearly may engage in undertakings to develop its resources. It is no less in its interest than to conserve them . . . ." Since the protection and promotion of forests and water resources are within the ambit of public welfare the taxing power may be used to aid that public purpose. In re Opinion of the Justices, supra, 84 N.H. 574, 577, 149 A. 321; Baker v. Town of West Hartford, 89 Conn.394, 94 A. 283; Annotation 13 A.L.R.2d 1120; Schulz, Conservation Law and and Administration, 403 (1953). It follows that growing wood and timber may be classified separately from other property for the purposes of taxation. Note, 53 Harv. L.Rev. 1018; Report of the New Hampshire Timber Tax Study Committee (1954).
> Id. at 328.

252. 148 Colo. 285, 365 P.2d 902 (1961).

253. 148 Colo. 285, 290-91.

254. Cases involving local ordinances regulating the removal of topsoil, gravel, sand, etc., are collected at Annot., 10 A.L.R.3d 1226, § 18 (Prohibiting or Regulating Removal or Exploitation of Oil and Gas, Minerals, Soil, or Other Natural Products Within Municipal Limits). See also Kelleher v. Board of Selectmen of Pembroke, 294 N.E.2d 512, 519 (Mass. App. 1973), and Burroughs Landscape Const. Co., Inc. v. Town of Oyster Bay, 61 N.Y.S.2d 123 (1946) in which the Supreme Court for Nassau County had this to say:

> [T]he necessity of the conservation of the topsoil of Long Island needs little argument with those who have observed the removal of topsoil from large tracts of land and the subsequent abandonment of the land to become a barren waste eroded by wind and water, fit for nothing but to grow course vegetation and constituting a nuisance to the surrounding property as a source of wind blown sand and dust. Legislation such as has been adopted by the Town of Oyster Bay is both reasonable and necessary if the land is to be preserved and the welfare of the people and the community safeguarded. The prohibition of removal during a part of the year and the conditions imposed by the ordinance as to planting and reseeding constitute a practical and effective means of curbing the evils sought to be prevented . . . .
>
> In determining whether an ordinance is a reasonable regulation under the police power, the Court is not confined to the question solely of public health and public safety. The power is much broader and extends generally to the promotion of the public good and to so dealing with existing conditions as to bring out of them the greatest welfare of the people by promoting general prosperity. Id. at 126.

The Burroughs case has been quoted at such length not because of its weight as precedent, which is slight, but because its language is so readily applicable to the application of mandatory conservation standards to agricultural lands.

255. Lindquist, supra note 54, at 11-12, and see supra notes 38-43 and accompanying text for a description of the Universal Soil Loss Equation.

256. An Alaskan pollution control statute recently survived an attack which included an allegation that it was "void for vagueness" because the definition of "pollution" was itself vague and further because it applied to activities which were "potentially" harmful to public health, safety, or welfare. The Supreme Court of Alaska had this to say in response:

> Whatever may be the outer boundaries of conduct prohibited by [the subject statute] it is beyond dispute that the emptying of a lagoon of raw sewage into a stream running through residential areas comes within the definition of the term "pollution" . . . . Courts have often recognized that the possibility of difficult or borderline cases will not invalidate a statute where there is a hard core of cases to which the ordinary person would doubtlessly know the statute unquestionably applies . . . . [citing cases]
>
> . . . .
>
> We hold that by use of the word "potentially" the statute prohibits acts which a reasonable person would foresee as creating a substantial risk of making water actually injurious to the statutorily protected interests . . . . A foreseeability requirement assures that fair notice is given to the defendant that his conduct is within the ambit of the statute. Such an element added to the definition of the offense also criminalizes only that conduct which is serious enough to warrant enforcement and conviction, thus discouraging discriminatory enforcement.

Stock v. State, 526 P.2d 3, 9, 10-11 (1974). See also Annot., 32 A.L.R.3d 215, § 17a (Validity and Construction of Anti-Water Pollution Statutes or Ordinances).

257. See the earlier discussion of Oberst v. Mays, supra, note 252-53 and accompanying text for a case dealing with what procedures will be allowed in emergency situations.

258. The state of Washington's Forest Practice Rules and Regulations (see appendix B) included the following provision for informal conferences:

> WAC 222-46-020 INFORMAL CONFERENCES.
> (1) Opportunity mandatory. The department shall afford the operator or his representative reasonable opportunities to discuss proposed enforcement actions at an informal conference prior to taking further enforcement action, unless the Department determines that there may be imminent damages to the public resource. Informal conferences may be used at any stage in enforcement proceedings, except that the Department may refuse to conduct informal conferences wiht respect to any matter then pending before the Appeals Board or a court.
> (2) Reports required. Department personnel in attendance at informal conferences shall keep written notes of the date and place of the conference, the persons in attendance, the subject matter discussed, and any decisions reached with respect to further enforcement action.
> (3) Records available. Copies of written notes shall be sent to each participant in the conference, be kept in the Department files until one (1) year after final action on the application involved, and be open to public inspection.

259. D. Hartley and V. Price, Problems of Agricultural Doers in Implementing P.L. 92-500 (Sept. 1975).

260. See 32 A.L.R.3d 215, § 22 pp.253.

261. 56 Wis.2d 7, 201 N.W.2d 761, 771 (1973). Further discussion of this case may be found in chapter 2 section 3.6.

262. Virginia telephone interview, supra note 119.

263. Fred Bosselman, David Callies, and John Banta, The Taking Issue 302 (1973).

264. See for example, Id. ch. 16 and J. Montgomery, "Control of Agricultural Water Pollution: A Continuing Regulatory Dilemma," 1976 U. Ill. L.F. 533, 556-57.

CHAPTER SEVEN

AGRICULTURE AND SILVICULTURE

SUGGESTED READINGS

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CHAPTER EIGHT

SALT WATER INTRUSION

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CHAPTER EIGHT

SALT WATER INTRUSION

1.0 Introduction

Groundwater is contained in underground formations called aquifers. This stored water in aquifers is released to the surface through wells and springs or by seepage into lakes, rivers, and wetlands. Just as groundwater ultimately returns to the surface, it is also replenished from the surface, by percolation directly into the aquifer. Under natural conditions, there is a balance between the inflow and outflow of an aquifer. However, when fresh water is removed from the aquifer for use, or when replenishment of the aquifer is decreased, the fresh water level of the aquifer is lowered. This change tends to permit nearby salt water or minerals and salts found in the nearby soil to move into the fresh water zone of the aquifer. Salt water intrusion caused in this way is said to result from a reversal or reduction in the pressure gradient.

An aquifer functions as a reservoir, a filter, and as part of the hydrological cycle, and is a public resource which must be protected by water quality agencies. Though the problem differs in both kind and magnitude in coastal and inland areas, salt water intrusion is a potential source of pollution for all existing aquifers.

Though the specific controls have taken on unique characteristics in different areas of the country, three basic approaches to the prevention of salt water intrusion into underground aquifers have been attempted. They are (1) controlling the removal of water from the aquifer; (2) ensuring adequate recharge of the aquifer; and (3) constructing physical barriers between the fresh water and the salt water.

An estuarine region is the intermediate zone between fresh water rivers and open ocean. These regions are among the most biologically productive on earth and need to be protected by water quality management agencies. In all estuarine systems, the essential process is one of mixing between the waters of the ocean and the fresh waters from inland. The fresh water inflow and tidal currents primarily determine the circulation patterns. Estuaries and the coastal zones around them are affected by land and water use throughout an associated river system.

Estuaries suffer from major alterations of fresh water inflow, particularly where the changes accentuate natural fluctuations. Diminished inflows from upstream, as well as increased salinity in the water actually delivered by the rivers, can have an adverse effect. Salt water intrusion may reach further upstream, increasing the salinity of the estuaries and decreasing the amount of mixing. This change has an adverse impact upon estuarine ecosystems. For example, significant changes in the flow of fresh water from the Susquehanna River into the Chesapeake Bay could affect the Bay's oyster crop which thrives between certain salinity limits.1/

2.0 Control Techniques for Aquifers

Aquifer management can reduce the level of salt water intrusion in an area. Until recently, except in a few water short areas such as Southern California, there have been few economic or legal incentives for the institution of management regimes. Groundwater is generally the cheapest source of supply since it need not be diverted and stored in man-made reservoirs prior to distribution. The law has encouraged use of the resource; both the doctrine of riparian rights--the common law of groundwater--and the law of prior appropriation, despite the substantial variations between them, recognize capture as the basis for the acquisition of a right. As a result, only a few management techniques have been applied. The most important are: (1) regulation of well construction to increase the efficiency of the withdrawal; (2) regulation of well spacing much as oil and gas fields are unitized; (3) reduction in the absolute amount of water pumped in a basin (reductions can be accomplished by general permit systems or permit systems which only come into play when there is a declared emergency, e.g., a critical overdraft); and (4) the conjunctive operation of groundwater reservoirs to balance the use of ground and surface supplies. Conjunctive operation includes pumping withdrawals and methods of financing the purchase of surface supplies for aquifer replenishment.

In recent years a variety of controls have been used. Florida and California impose, under certain circumstances, standards for well construction. Regulation of pumping, both by limiting the amount of water removed and by creating good pumping patterns, can prevent the depletion of an existing aquifer. Controls over pumping are illustrated by the Virginia Groundwater Act of 1973 and the Santa Clara Valley Water District Act. An alternative to pumping controls is maintaining adequate recharge. Such replenishment of a depleted aquifer has been accomplished by special water replenishment districts in Florida and California. Other areas, such as Volusia County, Florida; Dade County, Florida; and Amherst, Massachusetts, are attempting to protect naturally recharged aquifers by controlling land use through traditional zoning techniques. Finally, the construction of physical barriers to prevent salt water from reaching the aquifer's fresh water has been tried in several areas. The use of injection wells to create new fresh water barriers in southern California has had noteworthy success.

2.1 Standards for Well Construction

Standards for well construction can be used to protect and preserve the groundwater supply in aquifers. Although poor well construction may not be the principal cause of salt water intrusion, the problem of aquifer contamination by salt water should be attacked from all possible angles. Wells or other excavations that intersect aquifers bypass the natural protection normally furnished to aquifers by nearby impermeable materials and provide an avenue for the entrance of contaminants, such as salt water. Salt water can enter during the drilling of the well, its operation, or following its abandonment. The proper construction

and destruction of wells can significantly reduce the impairment of aquifers.2/

California's state water code has provisions relating to water well drilling.3/ It sets out a scheme whereby whenever the state Department of Water Resources or one of the state's nine regional water boards determines that conditions warrant the imposition of well construction standards to protect water quality, such standards must be written by the affected cities and counties. The city or county ordinance is subject to changes by the regional board, and if a city or county does not adopt an ordinance or modify it to the regional board's satisfaction, the regional board can adopt standards for water well construction which have the same force and effect as if adopted as a city or county ordinance. Any action by a regional water board or any failure to act pursuant to the water code may be reviewed by the state water board on its own motion and must be reviewed by the state water board on the request of any affected city or county.

Not as a result of the above provisions of the California Water Code, but rather in recognition of its independent responsibility to prevent the pollution or contamination of the district's groundwater, the Santa Clara Valley Water District has imposed standards for both well construction and well sealing.4/ Although Santa Clara's regulation of the sinking of wells reflects their current concern about the general safety and purity of the wells in the area, the use of well construction standards is recognized as a potential and ready instrument in a future fight against salt water intrusion.5/ Santa Clara Valley Ordinance No. 75-6 includes standards for properly locating the well site, requires an annular seal in the upper portion of the well to prevent contamination from surface sources, and specifies construction requirements to prevent inter-aquifer transfer or mixing of degraded groundwaters with good quality waters through wells. The standards apply to all water wells and other permanent artificial excavations which intersect aquifers. Hence, wells and other potential manmade paths for salt water intrusion can be reached.

In Florida, the state water code requires the licensing of all persons who want to engage in business as water well contractors.6/ The state Department of Environmental Regulation administers an examination and reviews licenses annually. Coupled with this limitation on who may drill wells, Florida's state law gives the Department of Environmental Regulation discretionary control over well construction, repair, and abandonment. If the department deems it necessary to effectively protect the state's groundwater resource, it may designate critical areas where prior permission would be needed to build, repair, or destroy wells.7/ This power can be used to insure the proper placing of wells. Regulating the location, depth, and spacing of wells has already been useful in preventing salt water intrusion in Florida.8/

2.2 Limitations on Withdrawals from Aquifers

Salt water intrusion that results from a lowering of an aquifer's fresh water level can be prevented by placing limits on the amount of water withdrawn. This can be done independently of or in conjunction with the regulation of how, where, and when a well may be built.

The perennial yield, or amount of water that can be safely taken from an aquifer annually, is dependent upon the amount of water recharged into that aquifer. If more water is pumped out than is recharged, the level of the aquifer begins to fall. This overpumping, called mining, is a direct cause of salt water intrusion. In coastal valleys it can disrupt the natural equilibrium between the ocean water and the fresh groundwater in the aquifers, while in inland areas it can allow the inflow of inferior water from nearby rock materials.9/

In California, the Santa Clara Valley Water District uses a permit system to limit pumping in the area. The meticulous control of pumping along with the judicious location of wells within the district has proved very useful in ensuring that the district's supply of underground water is not depleted. Although it should be noted that salt water intrusion has not yet been a major problem there, should a problem arise, the pumping controls already in existence can be adapted to solve it.10/

Water withdrawals in Kings, Queens, Nassau, and Suffolk Counties in New York require the approval of the state Department of Conservation. Permits can be conditioned or denied in the interests of conserving available supplies.11/ By and large the litigated application rejections indicate that industrial users are sometimes denied permits to insure that sufficient municipal supplies remain available.12/

If sufficient information is available on water levels and geologic conditions, pumping can be controlled so that a maximum unit can be pumped while the intrusion of salt water is stopped. It should be noted that if the pumped water is for an overlying use, such as supplying a small farm, the reduction in pumping which occurs as the water starts to become saline acts automatically to apply this system of control.13/

2.3 Protecting and Enhancing Aquifer Recharge

An alternative or supplement to the above discussed methods of protecting an existing aquifer by controlling the removal of its fresh water is to ensure adequate recharge of the aquifer, which can be achieved both by enhancing its natural replenishment and by recharging the aquifer artificially. The artificial recharge, or planned introduction of water into an aquifer, can be accomplished either independently of, or in conjunction with, the naturally occurring replenishment which results from the percolation and infiltration of rainwater, irrigation water,

and other surface waters. Traditional land use controls have been used to protect and maximize naturally occurring replenishment as well as to ensure effective artificial recharge. Artificial replenishment of an aquifer is accomplished primarily through works designed to maintain high infiltration rates, increase wetted areas, and lengthen infiltration periods.14/ Moreover, aquifers can be replenished simply by applying imported water to the soil overlying the aquifer.

Human activity can impede the process of groundwater recharge. The connection between improper land use and salt water intrusion is clear, and proper care in land use decisions can be helpful in protecting and maximizing the natural recharge of aquifers. Areas where the soil is more permeable and porous are better for recharge and can be protected by zoning restrictions from extensive development which would impair their natural capabilities. Critical areas with high water tables, highly porous soils, or a thin soil mantle, and aquifer recharge areas should be identified and specially treated. Development in the recharge area and accompanying coverage with impervious surfaces will impair recharge to the underlying aquifer by physically sealing the recharge area to percolation, thereby increasing surface runoff and decreasing natural replenishment.

It is difficult to regulate land pursuant to a consistent environmental policy because there are no general standards against which to test the validity of a development. Since there is no societal consensus to stop developing land, there is no equivalent of a "no discharge policy" to define "pollution free" land. Nonetheless land use planners have in recent years attempted to use geological and hydrological studies to determine the carrying capacity of land for various kinds of development. One of the most sophisticated studies applying this concept into a series of guidelines for community growth is a study for Medford, New Jersey, which developed a set of performance standards for new subdivisions based on environmental considerations. (See chapter 3, section 2.4 and chapter 6, section 4.1 for a more detailed discussion of performance standards).

Likewise, a study of the Christina River Basin undertaken by the University of Delaware Water Resources Center15/ suggests the importance of defining the functions and values of recharge areas relative to the water yield of the aquifers as a necessary first step in evaluating land use regulations tailored for such areas. The study concludes that designing land use regulations which both maintain recharge areas and allow some development best serves the public interest. The University of Delaware researchers identified two regulatory options to protect the present water yield of the Potomac aquifer recharge area under study: either zone 64 percent of the land as an open space conservation area and allow development of the rest, or zone the entire area for low density with the option of higher density if the developer provides conservation measures to compensate for the loss of natural recharge.

Dade County, Florida, recognized the need to control development in the yet undeveloped southern portions of the county to insure the water supply for both Miami and the Everglades National Park and commissioned a study which resulted in the drawing up of a master plan that would limit urban development to certain areas. Primary and secondary land for groundwater recharge would be designated, with different types of zones for each established. Urban development would be concentrated into ridges of high ground that would not need dredging or filling. The rest of the land would be divided between an intensive agriculture zone; a recreation and agriculture zone; and a recreation and limited agriculture zone.16/

In Amherst, Massachusetts, the town's selectmen have adopted a policy to protect its recharge areas and are considering several regulatory techniques which, taken together, would constitute a unique and comprehensive plan administered at the local level. The system that has been recommended includes establishing a recharge zone which would restrict activities that particularly limit the recharge of water. Suggested regulations include establishing minimum lot sizes; requiring site plan approval; requiring a buffer layer between the water table and the bottom of an excavation; limiting roads across aquifers; requiring fiberglass tanks for fuel storage; inspecting septic tanks; restricting the dumping of salted snow to selected areas; and establishing inspection wells to monitor the recharge area.17/

While the large aquifer which Volusia County, Florida depends upon for its water supply is not presently being overpumped, this is likely to change, and salt water intrusion is a potential problem there. To control development in the area, and in an attempt to maximize natural rainwater percolation, a recharge ordinance was passed. The Volusia County Recharge Ordinance, recently allowed to expire,18/ had as its purpose "the protection of the water resources of the county and the prevention of the development or use of land in the potential recharge area in a manner tending to adversely affect the quality of water."19/ The ordinance defined and mapped the recharge area and required permits for virtually any change in land use, including construction, clearing, agriculture, demolition, refuse deposits, dredging, or filling. The few exceptions were private recreation, agriculture which required no landfill or drainage, and previously existing uses. A comprehensive procedure was designed, adapting the environmental impact statement as a regulatory mechanism. To obtain a permit, the applicant had to describe the probable impact of the proposed action on the environment, any adverse impacts which could not be avoided, and alternatives to the proposed action. The proposed development was evaluated by the Planning Department, the Environmental Control Department, and the Public Works Commission. The evaluations were submitted to the Department of Developmental Coordination and then to the County Council, which had to determine that there would be no adverse effects on the potential water recharge area or on the maintenance of natural recharge before a permit was issued.20/

2.4 Use of Fresh Water Injection Wells

Another approach to the prevention of salt water intrusion into underground aquifers is the construction of physical barriers between the fresh water and the salt water. This approach is especially suited to coastal areas and has been used successfully to prevent seawater intrusion in California. Where recharge by surface spreading is not feasible due to the presence of impermeable layers overlying the aquifers, maintaining a barrier to saline intrusion by the injection of fresh water through wells located along, or landward from, the fresh water/salt water interface may be possible. In metropolitan areas, where land values are too high to utilize the more common flooding and ditch and furrow methods, the use of injection wells may be more economically feasible.21/

Many attempts to recharge groundwater through injection wells have had disappointing results. However, the Los Angeles County Flood Control District is successfully operating large-scale injection well projects to create and maintain a freshwater ridge to halt seawater intrusion in the coastal plain of Los Angeles County. Favorable injection rates have been maintained by conducting a comprehensive well maintenance program. By periodically inspecting and cleaning the wells and using only high quality water for injection, the usual problems of silting and bacterial growths have been overcome.22/ Equally effective has been the Alameda Gap Area Project, a joint project of Los Angeles County and Orange County, administered by the Los Angeles Flood Control District. Because the aquifers there are relatively shallow, very high pressure would be required if the injection barriers alone were used. So, between the line of injection wells parallel to the coast, there are extraction wells, which extract the salt as it moves inland and send it back to the ocean.23/

3.0 Control Techniques for Salt Water Intrusion into Estuaries

Estuaries provide a natural barrier between salt and fresh water flows. This natural barrier can be disturbed by the construction of upstream diversion and storage works. During most of our history the emphasis in water resource management has been upon preventing floods and increasing supplies available for consumptive uses. Thus the law has only recently turned to the problem of flow maintenace, either through the maintenance of the status quo or through reservoir operation conditions which simulate the status quo.

There are two water law systems governing surface water in the United States.24/ Under the riparian system, prevalent in the eastern states, a water right is incident to ownership of land which is physically adjacent to a public water source. All rights along a stream have an equal claim and the number of holders of such right is subject to increase or decrease as ownership of the land changes hands. Each riparian is entitled to make a reasonable use of the water, taking into consideration the needs and uses of other riparians. When there are competing

uses, a court may decree an apportionment between the users, and where the uses are totally incompatible, a court may prefer one use over the other. Typically, domestic uses are given preference over industrial uses.

The appropriation system is prevalent in the western states and bases the water right upon beneficial use.25/ Under this statutorily imposed doctrine, land ownership is irrelevant. A right is obtained simply by taking water and applying it to a beneficial use, and may be lost by ceasing to make such use. Unlike the riparian system, where the water must be used on the riparian's land, the appropriation system places no limitations on the place of use. As between competing appropriations from the same source, priority in time is determinative. Protection of flow maintenance presents legal problems in both the riparian and appropriation systems, problems which will be summarized briefly here and discussed in more detail in the "Legal Issues" section below.

In its pure form the common or judicially created law of riparian rights protects the status quo because no riparian can diminish the quantity or quality of the stream as each user has a right to the natural flow. There are cases holding that the seasonal storage of water in a reservoir is not a proper exercise of riparian rights, but the natural flow doctrine has gradually been replaced by the reasonable use theory which allows some diversion and storage. Further, reliance on the natural flow theory of riparian rights is not a satisfactory basis for the protection of flows in riparian states. It has never been held that all riparians must let the water flow to the sea, which is exactly what estuary protection requires. All that the law requires is that the water flow to all riparian properties. In short, the common law is a law of private rights and public rights are accorded little recognition.

There is, however, a significant feature of the reasonable use theory which can support minimum flow maintenance policies. To encourage the construction of reservoirs, states -- either by statute, constitutional amendment, or judicial decision -- trimmed back common law riparian rights to exclude flood waters. In many states these waters are said not to be subjected to vested common law rights. Thus a state can either require them to be allowed to flow to the estuary or store them and release them -- free of claims of vested rights -- during dry periods.

In the western states which follow the law of prior appropriation, flow maintenance is more difficult. Flow maintenance has historically been thought to be antithetical to the law of prior appropriation because the purpose of the law was to get the water out of the stream. Technically this policy was implemented by doctrines which required an actual diversion to perfect an appropriation and the requirement that water be put to a beneficial use. Together these doctrines were used to deny instream appropriations for instream uses. Recently the courts have begun to retreat from these doctrines and hold that the state may appro-

priate water for instream uses so long as vested consumptive rights are not impaired. Instream uses are generally used to protect scenic resources such as wild rivers and springs. Some states, however, are experimenting with the broader concept of flow maintenance for environmental objectives. This is the concept of minimum flow maintenance. Base flows are set for a variety of environmental objectives which clearly include water pollution prevention. New appropriations are allowed, for example, in Washington, only where the volume of water in the stream is sufficient 50 percent of the time to fulfill prior vested rights.

3.1 Illustrative State Approaches to Minimum Flow Maintenance

Both eastern and western states are implementing minimum flow protection policies. Though estuarine protection is not a problem in Iowa, depletion of the state's surface water is a potential problem. The state statute that controls the issuing of permits to appropriate surface water attempts to protect the surface water in a way that would be useful in a fight against salt water intrusion. The statute requires that permits be of short duration, issued only for beneficial uses, and subject to a number of conditions specified in the act. The distinctive feature of the Iowa statute is that a permit issued for a "depleting" use must protect the average minimum flow of a stream.26/ The depleting use concept in the Iowa statute is vague. It is defined broadly to mean any use which "might impair rights of lower or surrounding users, or might impair the natural resources of the state or might injure the public welfare if not controlled."27/ The term is used in only one section, and in administering the act the state water commissioner has required permits of all regulated uses, whether the source would be depleted or not.28/

The concept of conditioning permits so as to protect average minimum flow of a stream is an important feature of the Iowa statute. The phrase "average minimum flow," though given a lengthy definition in the act, was difficult to administer. The water commissioner apparently decided that only permits for consumptive uses needed to contain a condition relating to the protected flow of a stream. For the most part, consumptive uses have been defined in practice to mean the use of water for irrigation.29/

How the average minimum flow of a particular stream should be determined was also a complex problem in Iowa. First, a statewide standard for protecting the level of stream flows was agreed to by the state's Natural Resources Council. It was a flow level "equalled or exceeded by the stream involved 84 percent of the time between April and September in the past years determined to be most representative of normal conditions."30/ This standard was then adjusted for special circumstances existing in connection with each particular stream and its tributaries. The past history of the flow of a stream was derived primarily from data in the records of the U.S. Geological Survey. Further

difficulties stemmed from the fact that several consumptive users might deplete the source below the limit set for individual users. The State Water Commissioner has, therefore, encouraged agreements among users. These have quite effectively dealt with situations in which the flow is above the protected level but is diminishing during late summer.31/

In some riparian jurisdictions, minimum flows are established pursuant to the public construction and operation of reservoirs. In Michigan, the state water resources commission can establish minimum stream flows to "safeguard the public health, welfare, and safety . . . ." More precisely, minimum flows are established to carry out the purposes of the Local River Management Act.32/ Local governments within a watershed can establish a Watershed Council and a River Management District. Councils are study bodies, but local river management districts can construct storage and river control facilities. Minimum flows set by the state limit the power of a district to impound water since all impoundment and control of water is subject to the minimum flows established for the watershed and thus environmental protection objectives can be accomplished through the watershed planning and management process.

Another way that salt water intrusion can be prevented is through the state's power to deny and condition approaches on a "public interest" standard. In the Colorado-Lavaca Basin watershed, the Texas Water Rights Commission has used its control over permits to appropriate water to control salt water intrusion. At a hearing on one permit to appropriate water for farming, it was contended by those opposed to the granting of the permit that during times of low water flow, salt water intrudes. As a condition of issuing the permit, the Commission required the applicant to design his diversion facilities in such a way that he could not divert water until the stream is above a certain flow.33/

The California experience with denying and conditioning permits according to a "public interest" standard is particularly instructive. The major technique used by the California Water Rights Board to protect instream uses is the imposition of seasonal minimum flow schedules on applicants who have been given the right to store water. Historically, the Board has required the bypassing of the natural flow or restricted the time during which water can be withdrawn. Initially, it required such action as a result of persuasion from agencies, such as the Department of Fish and Wildlife, which intervened in appropriation application proceedings. Later, the power to deny an application on the ground that it was inconsistent with the public interest came to include the power to condition withdrawals on the maintenance of minimum flows for fish and wildlife maintenance. Both the state and the Federal Power Commission have made increasing use of these techniques in recent years. Since 1972, the California Department of Fish and Game has been required to make recommendations concerning the amount of water needed for preservation and enhancement of fish and wildlife resources.

The far-reaching impact on flow maintenace of state environmental policy

acts and specific directives to maintain fish and wildlife is also illustrated by the California State Water Resources Board's Water Rights Decision 1379 setting minimum flow for the Sacramento-San Joaquin Delta.34/ The Delta of the San Joaquin and Sacramento rivers is a rich agricultural and recreational region depending on the maintenance of adequate fresh water inflows during the low flow months to offset the intrusion of salt water from San Francisco Bay. Large quantities of water flow across the Delta on their way to contract beneficiaries served by the federal Central Valley Project and the California State Water Project. The California State Water Resources Board (and its successor) had been hearing appropriation applications for these two projects since 1958 and had reserved jurisdiction to condition withdrawals in order to prevent salt water intrusion and to protect fishery resources. After a long and complex series of proceedings, the board decided that on the basis of legislative policy and the board's statutory powers to condition permits so as to best develop, conserve, and utilize in the public interest the water sought to be appropriated, it has the authority not only to require the project operators to refrain from interfering with the natural flow required for proper salinity control and for fish and wildlife in the Delta, but also to require release of a reasonable quantity of water stored under authority of the operators' permits for these purposes. For the first time, the board required that water stored under a previously granted permit might have to be released to provide adequate supplies of water to maintain public environmental benefits, as opposed to protection of discrete existing users. The crucial question of who should pay for the release of the previously stored water, however, remained unanswered.

It is one thing to tell an appropriator that water is unavailable for appropriation because the public places a higher claim on it. It is another to tell an appropriator that he must surrender some of the water previously captured. In the Delta Water Rights decision, which is being appealed, the state argues that all appropriators have long been on notice that storage releases would be required to protect the salinity balance. However, in other cases the notice may not be so clear and difficult issues of who should pay for the releases will arise. In the Delta Water Rights decision there were four classes of users affected by the decision -- holders of prior upstream rights, Delta water users, federal and state contract beneficiaries, and the general public. The board lacked jurisdiction over the first two classes and so it dealt only with the latter two classes. Further, the decision as it now stands is only an interim decision. No releases were ordered, so the decision does not resolve the question of who should pay. It suggests, however, that the costs of flow releases should be allocated between contract beneficiaries and the general public:

> The Legislature has determined that an adequate water supply for all uses in the Delta, including industrial and urban, must be maintained. It has indicated that this may be accomplished by providing a substitute water supply at no added financial burden

> to the users by virtue of such substitution . . . . [T]he Department [of Water Resources] suggests that the Board should distinguish between reimbursable and nonreimbursable project costs and indicate those who have responsibility for payment for benefits derived from project operations. However, how much those who receive benefits from the use of project waters, either as the result of better quality water or in other ways, should pay is a matter to be resolved by execution of repayment contracts with the Department or to be determined by the Legislature and not this Board . . . . Nowhere does the Board find any California law which provides that the Delta users shall be provided with supplies in excess of their vested rights without payment. On the other hand, depletions of water in the Delta are also caused by diversions from upstream tributaries that have been made by many metropolitan and agricultural systems for the last century or more. California law provides no method by which all of these diverters must share in the cost of maintaining an adequate water environment in the Delta channels. Some streams have been drastically depleted. The state and federal water projects have no effect on many of these streams.35/

3.2 The Role of the Federal Government in Flow Maintenance

With regard to minimum flow maintenance programs, the role of the federal government must be considered. By ownership of the public domain or land adjacent to navigable rivers, the federal government has the right to reserve water to fulfill the purposes of federal water programs as well as the constitutional power to allocate water to its contract beneficiaries. These federal rights are superior to all state created rights arising after the date of the federal reservation, not the date federal usage is initiated. Also, since federal reserved rights are not quantified, all state minimum flow programs must be coordinated with assertions of those rights, and a particular state program may be frustrated if the purpose of the federal reservation requires withdrawals along streams in which the state wishes to reserve water.

Despite a consistent series of cases holding that federal water allocation policies must prevail over state policies, it has been recently argued that the National Environmental Policy Act of 1969 gives the states the right to condition the operation of a federal reservoir.

In Environmental Defense Fund v. Armstrong,36/ for example, the plaintiff fund challenged the construction of the New Melonies dam in California, contending that the federal environmental impact statement failed to consider adequately both non-structural alternatives and alter-

native methods of using the stored water, as well as their respective environmental impacts. The Environmental Defense Fund further argued that the Bureau of Reclamation had failed to secure the necessary state appropriation permit from the California State Water Resources Control Board. Although the bureau objected to discussing alternative uses of the "conservation yield" because the reservoir would not be filled for eight years, the district court held that a tentative discussion of the best estimate was required and that the environmental impact statement would be subject to later supplementation. The court also held that it was impossible to evaluate the merits of the proposed project until the bureau had obtained the necessary permits.

Subsequently, the California State Water Resources Board decided to grant the appropriation upon the condition that the bureau agree to comply with 24 requirements relating primarily to the environment. The board also reduced the amounts of water requested, granting permission to the bureau to fill the reservoir to one-fourth of its proposed capacity during normal conditions. This capacity reduction was to be at the expense of storage for power generation in order to ensure that water would be available for preservation and enhancement of fish and wildlife, white water boating, and water control purposes. The board left open the possibility that an increase in storage would be permitted if a justifiable need were demonstrated in the future, thus suggesting that the environmental uses could be displaced by more beneficial uses. The bureau is presently contesting the permit limitations on the ground that California cannot impose these conditions on the federal government, and a federal district court has held that the bureau is not bound by state law. United States v. California 37/ held that the state cannot require minimum flow releases for the New Melonies project, since the irrigation and power purposes for which Congress authorized the project could not be achieved if the California Water Resources Board decision were upheld.

3.3 Controls on Canal Building

The digging and draining of canals causes a lowering of the water table and thus a change in pressure, which allows salt water to move in. This can be prevented by restricting the building of canals, by requiring the inclusion of barriers in actual design, or by building barriers in already existing canals.

In Florida, as a result of the extensive digging of drainage canals in the early 1900's, the water table no longer holds the ocean water in check. In response to this problem, Florida's water code prohibits the digging of canals beyond an established salt water barrier line.38/ This is a line inland of the coast beyond which "no canal shall be constructed or enlarged, and no natural stream shall be deepened or enlarged, which shall discharge into tidal waters without a dam, control structure or spillway at or seaward of the salt water barrier line, which shall prevent the movement of salt water inland of the salt water barrier line."39/ Lines are established by petition of local districts or county commis-

sions, who must agree to pay the state Board of Conservation for any expenses involved and enforce the line themselves. A public hearing must be held before a salt water barrier line is established. Variances are allowed at the discretion of the Board of Conservation with the concurrence of the agency that petitioned for the barrier line.40/

4.0 Institutional Arrangements: Intergovernmental Approaches

Agencies at the state level are generally the best prepared to handle long-range planning to prevent salt water intrusion. They have the required legal authority, the necessary flexibility, and the required expertise to begin effective control of salt water intrusion. Broad, minimal standards which would be applicable throughout the state should be imposed by a state agency, allowing room for modification and refinement of the standards as the unique needs of particular areas within the state become known.

In almost every state there are a variety of public districts which may be created at the local or regional level to aid in the resolution of specific water resource problems in specific areas. It is at this level that one can expect to find a definite commitment to the prevention and control of salt water intrusion. The unique problems of the locality would be understood at this level as well as such other factors as the relative cost and political acceptability of alternative controls. Within the framework imposed by the state agency, such a regional agency with a specific goal can most effectively control a specific salt water intrusion problem in a given area. Thus, statewide planning should be integrated with regional controls to best solve the problem of salt water intrusion.

In California, Florida, and Virginia, for example, special districts specifically designed to meet the peculiar requirements associated with water basin operations work together with state-level agencies. It should be noted that special districts have only those powers which the state legislature has conferred upon them and such other powers as are necessary and convenient to the exercise of these express powers.41/ All three states exemplify successful coordination between state level agencies and regional or local level agencies. Without much duplication of effort, unique problems of particular areas are handled individually by each district, while problems affecting more than one area are dealt with by the state. The states are responsible for long range planning and the integration of the actions of the several districts. This is accomplished by imposing broad, general standards. Enabling legislation, delegating specific authority and powers to the special districts, allows them to deal with their special concerns within the state agency's plans and minimal standards.

In California, while the Department of Water Resources and the state Water Resources Control Board have joint responsibility for the administration and control of the state's water, water replenishment districts may be organized in regions where the existing underground water supplies

are insufficient to meet demands placed upon them and where further excessive pumping without replenishment will destroy the usefulness of the aquifer.42/

Formation of water replenishment districts in California may be begun by petition, which is then referred to the state Water Resources Control Board for action. An investigation, followed by hearings, is made for the purpose of determining (a) whether the persons and land in the proposed district will actually benefit by planned utilization of the groundwater basin, and (b) whether the boundary of the proposed district includes all persons and lands which rely on the underlying water supplies. Following the hearings, the boundaries of the proposed district may be modified to include or exclude certain lands in accordance with the benefits derived.43/ The idea is to be sure that all the people residing in the district share the benefits of the agency so they can reasonably be expected to share the costs.

As authorized in California, water replenishment districts are specifically empowered to buy and sell water; exchange water; distribute water to persons in exchange for the cessation or reduction of groundwater extraction; spread, sink, or inject water into the ground; store, transport, recapture, reclaim, pump, treat, or otherwise manage and control water for the beneficial use of persons in the agency; build necessary works; and take action to protect water quality and water rights of persons or property in the district. Finally, California's water replenishment districts are authorized to levy assessments in proportion to the quantity of water pumped from underground aquifers.44/

After passage of the Water Replenishment Act in 1955, the Central and West Basin Water Replenishment District was organized. The district conducts an engineering survey each year to determine the groundwater conditions and the amount of needed replenishment. A yearly replenishment assessment is then levied and collected quarterly on each acre-foot of water produced in the ensuing year. All the money is used solely to buy and distribute water. Administrative expenses are paid for by a property tax imposed on all people residing in the district. The district uses its legislated power to arrange pumping patterns by contracting with certain producers to use imported water instead of pumped groundwater. The contracts, which do not nullify the producers' groundwater rights, have reduced extractions and rearranged pumping patterns, thereby decreasing the quantity of water needed to recharge the aquifer.45/

It should be noted that California's Water Replenishment District Act, in order to avoid duplication of or overlapping with other water agencies, provides that if an existing agency has adequate facilities to accomplish any part of the replenishment program, that agency shall investigate, determine the cost, and contract for the work.46/ The Central and West Basin Water Replenishment District has used this provision to have the Los Angeles County Flood Control District carry out the replenishment program at existing or future facilities of the Flood Control District.

In Florida, the Water Resources Act of 1972 vests in the state Department of Natural Resources the responsibility to accomplish the conservation, protection, management, and control of the waters of the state with sufficient flexibility and discretion to accomplish these ends through delegation of appropriate powers to water management districts.47/ The Department of Natural Resources may delegate any of its powers to the water management districts, or, conversely, exercise directly any statutory powers granted to the districts. The state is divided by the act into five water management districts, the boundaries of which "follow as nearly as practicable" natural river basin boundaries. The management districts have the power to do any act necessary to replenish the groundwater of the district. Florida's water management districts are specifically empowered to buy water; exchange water; distribute water to persons in exchange for ceasing or reducing groundwater extractions; spread, sink, and inject water into the ground; and store, transport, recapture, reclaim, purify, treat, or otherwise manage and control water for the beneficial use of persons or property within the districts.48/ Thus, they are quire similar to California's Water Replenishment Districts.

The Florida Water Resources Act of 1972 is unique in that it provides for the state to carry out a comprehensive plan regarding the licensing and constructing of wells and the pumping of groundwater. The coverage of wells by the statute is broad, though there are a number of exemptions. In addition to the rules and regulations relating to the method and manner of constructing wells, carried out by the use of a permit system, there are provisions governing the conducting of inspections and other regulatory functions necessary to adequately regulate pumping in the state.49/ While the formal requirements governing the issuing, modifying, and revoking of the permits--including provisions for notice, hearing, subpoenas, taking testimony, making findings and conclusions, and judicial review--are imposed at the state level, they are administered by the regional Water Management Districts.

In Virginia, the Groundwater Act of 1973 provides for comprehensive control of the state's groundwater basins. The act authorizes the state Water Control Board and the state Health Department to jointly regulate and control the use of groundwater in critical areas of the state. The Water Control Board may, either at its own discretion or by petition from a city or county, initiate a critical groundwater area proceeding whenever (1) groundwater levels in the area are declining or have declined excessively; (2) the available groundwater supply in the area in question is being or is about to be overdrawn; or (3) the groundwater in the area in question has been or may be expected to become polluted. Hearings are to be held to see if corrective controls need to be adopted, and if so, the board may declare the area in question to be a critical groundwater area. The order of the board must define the general boundaries of the critical groundwater area and must also indicate the exact location of specific aquifers.50/

After a groundwater area in Virginia has been declared critical by an order of the board, no groundwater may be used or wells constructed or operated without a permit. However, permits are not required for water for agricultural uses, human consumption or domestic purposes, or any single industrial or commercial purpose in an amount less than fifty thousand gallons a day. The use of groundwater for any such purpose to the extent that it is applied to a beneficial use would constitute a right to use equal to that established by a permit, should the state be called upon to decide between two competing users.51/

An advisory committee of residents of the critical groundwater area is formed in order to advise the board on the implementation of plans and procedures for the control of groundwater in critical groundwater areas. The board is specifically empowered to make rules regarding permits in any critical area, to collect administration fees, to require that flowing wells be capped or equipped with valves, to impose standards on well construction and operation, and to inspect the wells in the area.52/

A unique provision of the Virginia Groundwater Act of 1973 is that the board may encourage, promote, and recognize voluntary agreements among groundwater users in the same critical groundwater area. If the board approves such an agreement, then, until terminated, it controls in lieu of any formal order, rule, or regulation of the Board. The board may terminate any voluntary agreement when it finds it to be inconsistent with the intent, purposes, and requirements of the act.53/

In California, in addition to the Water Replenishment Districts formed under the authorization of the state water code, other districts, with several purposes, have been formed by special enabling legislation, and are controlling salt water intrusion.

The Los Angeles Flood Control District was created by the Flood Control District Act. The state legislature empowered the district to control storm waters and conserve them for beneficial use. It is this power which allows it to maintain and administer the injection well barriers in the Domingus Gap Area Project, the West Coast Basin Barrier Project, and the Alameda Gap Area Project.54/

The Alameda Gap Area Project involves a basin which exceeds the jurisdictional boundary of the Los Angeles Flood Control District, and is a joint project of the Flood Control District and the Orange County Water District, which was established in 1933 by a special act of the California State Legislature.55/ The enabling legislation gives the Orange County Water District the powers necessary to provide for the general management of the county's massive groundwater basin, specifically including control of seawater intrusion from the ocean into underground aquifers. In 1953 the state gave the district the power to assess a replenishment tax on all groundwater pumped from the basin in order to pay for imported water needed for aquifer recharge.56/

Another type of special district in California is that exemplified by the Santa Clara Valley Water District, created by the state legislature in 1951. The governing law, the Santa Clara Valley Water District Act, provides the power to adopt and enforce ordinances and to take any necessary action to "prevent contamination, pollution or otherwise rendering unfit for beneficial use the surface or subsurface water used or useful in the district."57/ Ordinance No. 75-6 imposing standards on the construction and sealing of wells and limits on the pumping of groundwater in the district was passed under this authority.58/

5.0 Legal Issues

In evaluating the above described controls over salt water intrusion and potential institutional arrangements to effect them, legal limitations must be kept in mind. Every state has the power to make regulations in the best interests of the health, safety, and welfare of its citizens. This "police power," though not unlimited, is exceedingly broad. The three criteria necessary to sustain an exercise of the police power are: (1) it must be enacted in furtherance of a proper legislative purpose; (2) it must bear a reasonable, not an arbitrary, relation to that purpose; and (3) it must not be discriminatory. (See the general discussion of the police power in chapter 2 of this handbook.) States clearly have the constitutional power to regulate the capture and use of water. The importance of water to a state and its citizens makes its regulation by states appropriate police power regulation.

Preventing salt water intrusion is clearly beneficial to the health and welfare of the people, and the rational relationship of the above described controls to the problem is evidenced by the success they have had in the past. Instituting a permit system for the pumping of groundwater, limiting development in aquifer recharge areas, and maintaining minimum flows in surface waters are clearly related to a legitimate state concern over salt water intrusion.59/

Although, in general, it can be said that the regulation of water is a legitimate end of the state, specific applications of the regulations have often been attacked on the ground that, as applied to the particular property in question, they constitute a "taking" of "vested property rights" without due process, prohibited by the federal and state constitutions. An evaluation of the merits of the vested rights argument requires a determination of the nature of water rights and the sense in which they are property.

Under the riparian system of water rights characteristic of the east, both surface and groundwater rights exist because of land ownership, and no use of the water is required to perfect them. Thus they can be asserted at any time and they can be asserted against existing users. When a riparian jurisdiction shifts to prior appropriation or some form of hybrid permit system, riparians often argue that such

a shift constitutes a taking of their vested riparian rights. Such taking claims are often based on hypothetical situations, for there is usually no showing that the pumper will be denied the right to use the water he needs in the future.

Because most of the suits have involved claims to pump in the future, the courts have held that a state may confine vested riparian waters to consumptive uses in effect at the time of shift or uses which would occur within some reasonable period of time in the future.60/ Riparian claims based on landownership and not use are subject to regulation by the state pursuant to its power to set the ground rules under which property rights in common resources can be acquired.61/

Pumping cutbacks in an appropriation jurisdiction (generally, the western states, see definition in section 3.0 above) raise equally substantial constitutional questions when existing pumpers are cut back. If pumping is prohibited in areas designated as critical surface or groundwater basins, those denied the right to pump generally have no standing to raise constitutional objections since the state has the power to control unappropriated water and this power includes the power to withdraw water from appropriation. Existing pumpers cannot be cut back unless the court concludes that the pumping limitation is inherent in the appropriative right. This is what California did when it recognized the doctrine of mutual prescription (see the discussion of this doctrine in section 5.1 below). Arizona on the other hand has not limited groundwater pumping except to deny new pumpers the right to sink wells in designated basins. As a result of this, Arizona faces serious overdraft problems including salt water intrusion.

5.1 Rights in Groundwater and Restrictions on Groundwater Extraction

Placing limits on the amount of fresh water allowed to be pumped from an aquifer in order to maintain a sufficient fresh water level to keep salt water out of the aquifer would probably withstand a challenge based on the "taking" issue.

California has developed an effective method of curtailing groundwater pumping which sets the stage for subsequent conjunctive management institutions. In theory, under California law all property owners overlying a basin have correlative rights to use the supply, and if there is a shortage, the curtailment burden must be shared. If, and only if, there is a surplus can the supply be appropriated by users (generally public entities) on land outside the basin. Surplus is defined as a supply in excess of the annual recharge and not the total groundwater resource accumulated over time. Thus, when annual pumping levels exceed the replenishment rate, the basin is said to be an overdraft although water which has accumulated over time remains in the basin. In the celebrated opinion in City of Pasadena v. Alhambra,62/ the California Supreme Court converted both overlying and appropriative rights

to prescriptive rights* to trigger conjunctive operation by putting floors on the right to pump. In an ingenious opinion, the court held that once there was an overdraft, each overlying owner was pumping adversely to himself as well as others, and thus each user had to cut back to the proportion that his pumping during the prescriptive period bore to the safe annual yield. All other groundwater rights not exercised during the prescriptive period are lost.

In a subsequent trial court opinion the doctrine of mutual prescription was extended to salt water intrusion prevention. Under Pasadena v. Alhambra the prescriptive period starts to run when pumping exceeds the safe annual yield. In San Luis Rey Water Conservation Dist. v. Carlsbad Municipal Water Dist.63/ safe annual yield was extended to the time that the basin is contaminated by salt water, even though, in terms of quantity, pumping does not exceed the safe annual yield.

In a 1962 case, Central and West Basin Water Replenishment District v. Adams,64/ the plaintiff sought an adjudication of water rights of all pumpers in the central basin of Los Angeles County and a restriction on their pumping. The complaint alleged among other things that a continuing overdraft and lowering of water levels resulted in sea water intrusion; that unless defendants' extractions were enjoined, continuing overdrafts would damage and destroy the basin by further sea water intrusion which would constitute an irreparable injury; and that to preserve the utility of the basin, extractions must be reduced to prevent further sea water intrusion. The judgment placed restrictions on groundwater extractions necessary to protect the quality of the basin's water.65/

In a 1964 case, California Water Service Co. v. Edward Sidebotham & Son, 66/ the plaintiffs filed suit to adjudicate water rights in the West Basin and to enjoin the overdraft on that basin to prevent eventual depletion of the supply and permanent injury by salt water intrusion. The trial court found that annual overdrafts since 1932 had resulted in continual lowering of the groundwater elevations, which permitted salt water infiltration; that the overdrafts if allowed to continue unabated would result in a progressively increasing area of salt water infiltration; and that this situation would lead to eventual destruction of the groundwater in the basin and elimination of the basin as a common source of water supply. The appellate court held that the trial court had the authority to limit the taking of groundwater to protect the supply.67/

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*Prescriptive rights are rights acquired by adverse use. A person with a recognized water right can lose the right if another person uses the water for a long period of time in a manner inconsistent with the prior claimant's right, and the prior claimant fails to assert his rights.

While the continued reiteration of the doctrine set forth in the Raymond Basin case (Pasadena v. Alhambra, discussed above), the apparent acceptance of the equities embodied therein by a vast majority of groundwater pumpers, and the continual decline of basin levels may appear to indicate that limits on the right to pump groundwater from aquifers will in the future be determined within such a framework,68/ a recent significant exception to the mutual prescription cases should be noted. The case of City of Los Angeles v. City of San Fernando 69/ amended the "mutual prescription" doctrine and held that prescriptive rights do not apply against public entities. Thus, the holding effectively rules out any future "mutual prescription" settlements or judgments in basins where some or all of the rights are held by public entities.70/ Of course, a public entity could still voluntarily agree with other users to limit their pumping of an aquifer.

The future of using the courts to enjoin harmful pumping which allows salt water intrusion is, therefore, unsettled. The procedure in California is further complicated, though perhaps in a necessary and positive way, by a provision in the California Water Code which gives the Water Resource Control Board authority to enjoin and limit harmful pumping in basins which are the subjects of court adjudications. Section 2020 of the state water code spells out the procedure.71/ This section of the water code has not, however, been applied in practice.72/ Where actions are brought to adjudicate underground basins in the Southern California counties of Santa Barbara, Ventura, Orange, San Diego, and Los Angeles, the State Water Resources Control Board may seek injunctive relief to prevent serious sea water intrusion where it is acting as court referee. After the board has filed its report as referee, it may conclude that groundwater extractions, if not restricted, would result in destruction of or irreparable injury to the basin due to sea water intrusion before final judgment. If so, the board may apply for a preliminary injunction to restrict pumping so as to avoid such destruction or injury to the basin's waters during the litigation period. However, the final judgment must equitably compensate in quantities of water for variations between the rights on which the preliminary injunction is based and such rights as are determined in the final judgment.73/

While plenary adjudication of all rights in a basin by a court may be the most definitive and final answer to who has a right to what water, administrative control of a state's water supply can be a legal and effective way for a state to mold its water policy.

Regarding authority to recharge groundwater supplies through the use of stored water, the California Water Code recognizes the deliberate artificial recharge of a groundwater basin,74/ and the principles underlying this statutory authority have been upheld by the courts. In the leading case of City of Los Angeles v. City of Glendale,75/ the city of Los Angeles was allowed to both transport and store water in the aquifer under the San Fernando Valley. Los Angeles was successful

in its suit to prevent other municipalities from acquiring a right to the imported supply conserved underground.76/ Glendale was reaffirmed in City of Los Angeles v. City of San Fernando,77/ in which Los Angeles was given the right to store water it imported as well as return flows produced by the water it imported.

5.2 Rights of Surface Owners Damaged by Underground Storage Programs

Another form of taking can occur when a jurisdiction implements a salt water intrusion program, and replenishment water damages surface uses. Quarries are frequently injured by storage programs since the area being mined can be flooded. A California district court of appeals held in Alameda Water District v. Niles 78/ that an overlying landowner who is injured by the storage of water has no damage or equitable action for injuries against the entity storing the water. A quarry, which was depleting a groundwater basin and impairing a replenishment program in the course of trying to pump enough water to work its quarry, sued the water district for a million dollars in damages and the district sued to enjoin the quarry from pumping out the replenishment water. The trial court denied the quarry's inverse condemnation action for damages and limited its right to pump to the historic groundwater levels in the district. The court based its decision on an analogy to the California groundwater doctrine of correlative rights which gives each overlying pumper a right to only a reasonable amount of water in order to protect the common interest of all overlying owners. The trial court reasoned that overlying landowners also had an "acknowledged public servitude" to raise underground water levels to their historic maximum level. Just as each pumper must limit his pumping in the interests of an equitable distribution of common supply, so must each overlying owner refrain from using his land in such a manner as to impair a public storage program undertaken for the benefit of all groundwater users in the basin.

5.3 Legal Issues with Respect to Maintenance of Minimum Flow

5.3.1 Rights in Surface Water and Limitations on its Diversion Under a Riparian System

To generalize, riparian states possess the power to implement a minimum flow program by declaring the waters within their jurisdiction public and either storing them and releasing them in dry periods or by limiting the rights of riparians and others to divert or impound in a manner inconsistent with the preservation of minimum flows. Only a riparian with a preexisting consumptive use should be able to claim compensation if such a program interferes with a riparian use. For example, under this approach an industry which discharges into a river has no vested right to the natural assimilative capacity of the river.

A constitutional challenge to a statute imposing a permit system (with

conditional permits over the use of surface water) on holders of common law riparian rights would probably arise only during a period of water shortage. The most likely complainant would be the irrigator since he is the primary consumptive user of water. He is the one most likely to be adversely affected by a minimum flow restriction.79/ The typical irrigator would not have a valid constitutional claim. Though the user is required to obtain a permit and to pay a fee for it, this is not a substantial deprivation. His permit states a limit to the amount of water he can take, and the limits are probably sufficiently high that he can take all he can use. As long as the water in the watercourse remains above the minimum flow, the irrigator would be in no worse position than he was under the common law.80/

Even when the minimum flow is reached and no futher water can be taken, the irrigator is adversely affected by the act only to the extent that the established minimum flow exceeds the point at which he would have been denied further access to the watercourse under the "reasonable use" theory of the riparian rights doctrine. It is doubtful that this relatively minor imposition is sufficient to outweigh the benefit derived by the public from the guarantee of a certain minimum flow in the states' streams.81/

Professor N. William Hines has suggested that a provision be included in the statute which sets up the permit system which would effectively avoid the possibility of the act being held to have unconstitutionally destroyed valid rights. Such a provision should require all persons claiming rights to use the states' waters as the result of interests acquired prior to the effective date of the act to file their claims with the commissioner before a certain date or the right to enforce their claims would be barred. Any claims filed within the period would have to be closely examined and if a meritorious claim turned up it would have to be recognized, but it is likely that not many such rights would be claimed, and that fewer could be substantiated.82/

The ability of a state to control intrusion of a canal system by constructing a barrier was upheld in Carmazi v. Board of County Commissioners of Dade County.83/ The case involved the Little River Canal which existed before the Flood Control District was formed. The canal had originally been a natural stream. Dade County had installed a salinity control dam in the canal portion without providing for navigation. The suit was brought by several landowners who lived landward of the dam and contended that they were damaged because the location of the dam prevented their access by boat to Biscayne Bay. They claimed they had riparian rights of which they were now deprived and so were entitled to compensation. The court decreed that navigation itself was a public right, but that the only riparian right was the right to enter the water body adjacent to the property. Loss of access to the bay was, therefore, not compensable.84/

5.3.2 Rights in Surface Water and Limitations on its Diversion Under an Appropriation System

Historically three doctrines of the law of prior appropriation have limited the ability of public entities to appropriate water for minimum flow maintenance. First, all water must be put to beneficial use. Second, an appropriation can only be perfected by an actual diversion; the water must be taken out of the stream. Third, it is often said that the state "owns" the waters within its jurisdiction in a "sovereign" rather than "proprietary" capacity; hence the state can only deny citizens the right to use waters, it cannot acquire rights on an equal footing with its citizens.

The policy behind the beneficial use doctrine is a crude recognition of correlative rights among appropriators in order to prevent the "evils" of speculation and monopolization of a common supply. A use is not beneficial if it is grossly inefficient compared to appropriation customs in the area. Early cases rejected an appropriator's claim to the entire or a substantial portion of the flow of a stream on the ground that the use was too inefficient compared to the needs of other water users, and thus it was not beneficial. The actual diversion doctrine also rests on the prevention of speculation as well as the policy that physical diversion works give notice of prior claims to other potential appropriators. The notion that a state cannot acquire rights because its ownership is only as a sovereign, is a 19th century effort to eliminate the state as a competitor for resources and thus promote private enterprise.

None of these doctrines are relevant today, and they should not be used to deny public instream appropriations to preserve minimum flows. A carefully coordinated minimum flow program is a legislative or administrative recognition that instream uses are valuable, and thus one can no longer argue that minimum flows are a grossly inefficient use of water. If the water is valuable instream, there is no reason to require that it be removed, so the reason for the actual diversion requirement has ceased. The third doctrine is no longer applicable in an era where we recognize the value of public rights to environmental quality. The most recent western state to consider these issues, Idaho, upheld an appropriation to preserve a spring system against all the standard appropriation challenges, thus the case suggests that in the future minimum flows can be integrated into the appropriation system.85/

CHAPTER EIGHT

SALT WATER INTRUSION

FOOTNOTES*

1. National Water Commission, Water Policies for the Future 30 (Washington, D.C., 1973).

2. Iwamura, Standards for the Construction of Wells (Santa Clara, Cal.: Santa Clara Valley Water District, 1975).

3. Cal. Water Code §§ 13800-13806 (Deering).

4. Santa Clara Valley Water District Act, § 5(5).

5. Telephone conversation with Albert Henley, general counsel for Santa Clara Valley Water District (July 1975).

6. Fla. Stat. § 373.323.

7. Id. § 373.313.

8. F. Maloney, S. Plager, and F. Baldwin, Water Law and Administration: The Florida Experience 94 (1968).

9. American Society of Civil Engineers, Ground Water Management No. 40, at 9 (1961).

10. Telephone conversation with Albert Henley, supra note 5.

11. N.Y. Envir. Conserv. Law § 15-1527 (McKinney).

12. E.g., In re Long Island R.R. Co., 50 State Dep't Rep. 93 (N.Y. 1934).

13. American Society of Civil Engineers, Ground Water Basin Management No. 40, at 89 (1972).

14. Ground Water Management, supra note 9, at 72.

15. C. Thurow, W. Toner, and D. Erley, Performance Controls for Sensitive Lands 30 (American Society of Planning Officials Planning Advisory Service Report Nos. 307, 308, 1975). See also Joachim Tourbier, Water Resources as a Basis for Comprehensive Planning and Development in the Christina River Basin (Univ. of Delaware Water Resources Center, 1973).

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*In order to conserve space, publication information pertaining to works included in the suggested readings for this chapter has been omitted from the footnotes.

16. Thurow, Toner, and Erley, supra note 15, at 32.

17. Id. at 33. See also Dale Pope, Planning for Ground Water Protection: Amherst, Massachusetts, A Case Study of the Hydrogeologic Implications of Land Use on an Unconsolidated Aquifer 67-72 (Dec. 1972).

18. Telephone conversation with official in Volusia County, Florida (Aug. 1976).

19. Aquifer Recharge Ordinance of Volusia County, Florida, Ordinance No. 73-9, § 2.

20. Thurow, Toner, and Erley, supra note 15, at 31-32.

21. Ground Water Management, supra note 9, at 86.

22. Telephone conversation with Jim Rencillio, Los Angeles County Flood Control District (July 1976).

23. Id.

24. For general discussions of the law of water rights, see 1 and 2 W. Hutchins, Water Rights Laws in the Nineteen Western States (1971); J. L. Sax, Water Law Planning and Policy: Cases and Materials (Indianapolis: Bobbs-Merrill, 1968); and R. Dewsnup and D. Jensen, A Summary Digest of State Water Laws (1972).

25. For a discussion of western water law, see sources cited in note 24 supra.

26. Iowa Code § 455A.2.

27. Id. § 455A.1.

28. Dewsnup and Jensen, supra note 24, at 306.

29. Id. at 307.

30. Id.

31. Id. at 308.

32. Mich. Comp. Laws Ann. § 323.301-.318 (1975).

33. Telephone conversation with A. E. Richardson, Texas Water Rights Commission (April 8, 1976).

34. Delta Water Rights Decision, No. 1379 (Cal. State Water Resources Control Bd. July 1971).

35. Id. at 14-15.

36. 352 F. Supp. 50 (N.D. Cal. 1972), supplemented, 356 F. Supp. 131, aff'd, 487 F.2d 814 (9th Cir. 1973), cert. denied, 416 U.S. 974 (1974).

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38. Fla. Stat. § 373.033(1).

39. Id.

40. Id. § 373.033(2)-(5).

41. Peter Davis, Institutional Design for Water Quality 142 (Univ. of Wisconsin, 1970).

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43. Id.

44. Dewsnup and Jensen, supra note 24, at 152.

45. Id. at 151.

46. Id. at 152.

47. Fla. Stat. § 373.069.

48. Id. § 373.106(2).

49. Id. § 373.309-.339.

50. Va. Code § 62.1-44.83-44.103, § 62.1-44.95-.96.

51. Id. § 62.1-44.97.

52. Id. § 62.1-44.92.

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54. Telephone conversation with Jim Rencillio, supra note 22.

55. 1933 Cal. Stats. act 5683.

56. Orange County Water District Act, § 27.

57. Santa Clara Valley Water District Act, § 5(5).

58. Santa Clara Valley Water District Ordinance No. 75-6, §§ 6 and 7.

59. See, e.g., Hatcher v. Board of Supervisors, 165 Iowa 197, 145 N.W. 12 (1914), in which the Iowa Supreme Court spoke extensively to the state's right to regulate water for the greater collective benefit of the public. The court recognized that water was an important "public" resource and therefore a proper subject of police power regulation.

60. Williams v. City of Wichita, 190 Kan. 317, 374 P.2d 578 (1962).

61. See Waite, "Beneficial Use in a Riparian Jurisdiction," 1969 Wis. L. Rev. 864. As Professor N. William Hines has pointed out in his article, "A Decade of Experience under the Iowa Water Permit System," 8 Nat. Res. J. 46 (1968), riparian rights are "property" only in a very limited sense. The common law riparian owner had no property rights in the water of a stream, but only a restricted right to use it. This right is subject to similar rights in all other riparian owners on the watercourse, as well as to applicable federal and state laws.

62. 33 Cal.2d 908, 207 P.2d 17 (1949), popularly known as the Raymond Basin case.

63. No. 184855 (San Diego County, Cal. Super. Ct. Aug. 3, 1959).

64. No. 786, 656 (Los Angeles County, Cal. Super. Ct., filed Jan. 2, 1962).

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70. California Department of Water Resources, California's Ground Water 126 (Bulletin No. 18, 1975).

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CHAPTER EIGHT

SALT WATER INTRUSION

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CHAPTER NINE

MINING

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CHAPTER NINE

MINING

1.0 Introduction

Mining activities in the United States cover a broad range of methods used and resources sought. Most mining activities have the potential for producing some form of water pollution, whether correctable (such as sedimentation from small sand or gravel quarries) or exceedingly difficult to abate (such as acid runoff from giant coal mines). Attempts to control pollution from mining have not generally been sucessful until recently.1/

Metals such as iron and copper, nonmetals such as sand, gravel, and stone, and fuels such as coal and uranium are the principal resources recovered by mining. They will not be discussed individually except where there is a pollution problem unique to the particular resource being mined. Coal, however, will be discussed, since it is responsible for so many water pollution problems resulting from mining activities.2/

1.1 Mining Methods and Pollution Problems

There are basically two different kinds of mining methods: underground, or deep mining, and surface mining. Deep mines may be differentiated by either the kind of chamber left after mineral extraction or the nature of their entryways.3/ Surface mining is usually performed by stripping,4/ open pit, or dredging methods.

The principal pollution problems resulting from mining operations are sedimentation and acid drainage. Sedimentation is primarily associated with surface mining, where large expanses of unconsolidated materials, often of a highly erodable nature, are exposed to runoff. Deep mining also causes sedimentation but on a smaller scale, from roads constructed for haulage and from piles of wastes (spoil) cast out from the mine.

Acid drainage is present in both deep and surface mining. Acid formation typically results from the exposure of a substance such as pyrite to air and water which causes it to oxidize. This creates acid and ferrous iron which then can be leached into nearby surface water and groundwater and which, when fully oxidized, result in acid, sulfates, and iron oxide or "yellowboy."

Pollution problems resulting from mining acitvities do not usually stop when the mining operation is halted. Abandoned mines, both surface and underground, can continue to pollute almost indefinitely unless corrective measures are taken. In 1973, abandoned mines were the largest single source of acid mine drainage pollution in the United States.5/ Abandoned mines should be a major concern of any pollution abatement program and will be discussed in section 6.0 of this chapter.

1.2 Methods of Pollution Abatement

1.2.1 Surface Mines

a. Sedimentation

Of the two most serious pollution problems from surface mining, sedimentation and acid drainage, the former is the most easily controlled. In the planning stages, sedimentation may be abated through careful site selection. In locating a surface mine, consideration should be given to the steepness of the area to be mined, the makeup of the overburden and spoil that will be removed, and the amount of water that will run through the area. Mine locations in arid or alpine areas are extremely difficult to revegetate and should therefore be avoided.

Certain construction and operation techniques can substantially reduce sedimentation from mines. The first step may be creating drainage structures, above the site, to keep runoff from flowing through the open cut and, below the site, to check velocities and catch any sediment. Pipes, ditches, dams, channels or other water control devises may be used for this purpose, depending on the nature of the mine and the quantity of water to be diverted. This should be followed by the separation, removal, and safeguarding of the topsoil portion of the overburden, which will substantially facilitate the revegetation process when the mine is regraded and the topsoil replaced.6/

The mine should be operated to ensure that the minimum area and overburden are exposed at any given time. In area strip mining, this entails filling, grading, and revegetating one trench as a new one is dug. In a contour mine, this might mean using a technique such as the box cut.7/ Any overburden or waste that is exposed at any particular time should be protected against erosion with temporary revegetation or some other form of protective covering. If, as is often the case, erosion cannot be completely prevented, it might become necessary to build a series of holding ponds to allow the sediment to settle out before it enters nearby rivers and streams.

As soon as possible after the mineral is removed, the mine excavation must be refilled, regraded, and the surface returned to either its approximate original contour 8/ or a usable, nonpolluting topography. After regrading, the topsoil should be restored and revegetation begun.9/

b. Acid Drainage

Acid drainage and other polluting runoffs from surface mines may be controlled with much the same methods used to control erosion and sedimentation. In the planning stage, sites should be selected to minimize oxidizable and pollution-producing materials and the seepage of surface and underground waters.

When surface mining is conducted where pollutants are present, it is important that such materials be handled in a way that minimizes pollution. This can best be accomplished by isolating and protecting them from water flow or seepage. Spoil piles awaiting reclamation should be covered, and both surface water and groundwater should be prevented from coming in contact with them. If it is impossible or impractical to prevent the leaching of pollutants from a surface mine, then the polluted runoff itself should be treated. Treatment can be effected through the use of of settling ponds, evaporation ponds, or, as is most commonly practiced with acid runoff, lime or limestone neutralization.10/

1.2.2 Deep Mines

The major difference between the control of pollution from deep mining and that of surface mining is the method used to prevent acid drainage. There are three ingredients necessary for the production of mine acid--the oxidizable material associated with the mineral being mined, air, and water. If one of these three components is eliminated, the acid will not be produced.

The site-selection process should be used to minimize the presence of oxidizable materials and excessive water. Avoidance, however, is often impossible, so steps must be taken to treat the acid produced or to reduce the rate of oxidation. In active mines it is difficult to reduce the rate of oxidation since normal condensation provides enough water to form acid, and the removal of the air presents obvious practical problems.11/ Once the acid has been formed, its impact may be reduced or eliminated by controlling the flow of water through the mine and treating the effluent that flows or is pumped from the mine. Treatment may be carried out in a number of ways, but lime or limestone neutralization is most frequently used.12/

Acid drainage from an abandoned mine does not lend itself well to treatment because the problem is likely to continue indefinitely, and the cost of permanent treatment would be prohibitive. However, it is possible to reduce or eliminate the formation of the acid by removing the air from the mine. This may be most sucessfully accomplished by flooding the mine, but often flooding is not practical.13/ Air seals can be used instead; they are, however, less effective since it is difficult for them to completely prevent air from entering the mine.14/

Methods of abating pollution from mining activities, although discussed separately above, are not totally independent and will often be used in conjunction with each other. The use of erosion-prevention techniques does not necessarily eliminate the need for settling ponds, and even when acid drainage has been reduced, it may still be necessary to treat the effluent from a mine.

1.3 Federal Controls

The Federal Water Pollution Control Act Amendments of 1972 15/ (FWPCA) is the major piece of federal legislation concerned with pollution from

mining on nonfederal lands. The National Pollutant Discharge Elimination system established by section 402 of the FWPCA requires that a permit be issued by the administrator of EPA or under an approved state program for the discharge of a pollutant from a point source. This includes point source pollutants from mines such as effluents from "any discernible, confined and discrete conveyance."16/ It does not include nonpoint source pollutants from mines such as much of the sedimentation and drainage. Section 208(b)(2)(G) of the FWPCA requires that water quality management plans include "a process to (i) identify, if appropriate, mineral related sources of pollution including new, current, and abandoned surface and underground mine runoff, and (ii) set forth procedures and methods (including land use requirements) to control to the extent feasible such sources."

Other federal laws governing control of pollution from mining activities are generally concerned with activities taking place on federal lands. The principal legislation that deals directly with the question of water pollution is the Federal Coal Leasing Amendments Act of 1975.17/ The act requires that the Secretary of the Interior or the Secretary of Agriculture, if national forest lands are involved, prepare a comprehensive land use plan for any area for which a mineral lease is sought.18/ Before issuing a lease, the secretary must consider the possible effects of the proposal on the environment, but he is specifically barred from denying the lease on this basis.19/ The act further requires that after the lease is granted but before the lessee takes any action that might significantly disturb the environment, he must submit an operation and reclamation plan, which the secretary can either approve, disapprove, or require to be modified.20/

Pursuant to the Mineral Leasing Act of 1920, 21/ the Department of the Interior (DOI) has adopted rules and regulations governing the issuance of leases 22/ and the operation of mines 23/ involving federally-owned coal. This regulatory authority extends to areas beyond simply the public lands, for under the Stock Raising and Homestead Act the United States reserved the subsurface mineral rights when granting surface rights to public lands.24/ Under regulations recently adopted pursuant to the Mineral Leasing Act, the Department of the Interior proposes to apply state laws and regulations if after review it determines that they "afford general protection of environmental quality and values at least as stringent as would occur under exclusive application of [DOI's standards]."25/ The application of state laws and regulations is restricted by the reservation that they will not be used if they "would unreasonably and substantially prevent the mining of Federal coal in such State," and "it is in the overriding national interest that such coal be produced without such application of such requirements."26/

The above regulations go on to require that DOI consult with representatives of states where the development of federal coal is taking or will take place,

> for the purpose of formulating and entering into agreements to provide for a joint Federal-State program with respect to surface coal mining reclamation operations for administrative and enforcement purposes. Such agreements shall, whenever possible, provide for State administration and enforcement of such programs, provided that Federal interests are protected.27/

DOI has proposed the application of Wyoming's 28/ and Montana's 29/ reclamation statutes, but several important provisions have been omitted. The Montana and Wyoming provisions designating lands unsuitable for

surface mining 30/ and the Wyoming provision requiring the surface owner's consent prior to commencement of mining operations 31/ have been eliminated in the proposed federal application of the laws.

DOI's failure to adopt the entire state law raises a substantial question: can a state apply its own stricter regulatory program to the mining of federal coal, or is it preempted by the DOI's regulations? The Mineral Leasing Act provides:

> Nothing in this chapter shall be construed or held to affect the rights of the States or other local authority to exercise any rights which they may have, including the right to levy and collect taxes upon improvements, output of mines, or other rights, property, or assets of any lessee of the United States.32/

This section has been held to allow state taxation of federal leasehold operations, 33/ and police power regulation to the extent of allowing state oil and gas policy regulations to apply to federal leases.34/ Whether or not state reclamation statutes may apply, however, is the subject of considerable dispute.35/ DOI's position is that state reclamation laws can be applied unless their effect is to prohibit mining of federal coal. The state of Wyoming has brought suit to test this position, 36/ and until that case has been decided the question will remain unresolved.

There are other federal laws regulating mining in specific areas, but because they lack general applicability it is unnecessary to discuss them here.37/

2.0 Statutory Authority for Control of Pollution from Mining Activities

Regulation of mining activities in order to reduce or eliminate water pollution is a controversial and complex process. This chapter will discuss various methods have been or could be used to control pollution from mining activities and will point out the possible advantages or disadvantages that they present. First the existing statutory development that might be used will be discussed, and then the elements of an overall program will be presented and analyzed.

Statutory authority for the control of pollution from mining activities may be found in different legislative programs and at different levels of government. In this section, the programs that are or could be used and the limitations of their coverage will be briefly discussed. While different statutory schemes and levels of government are discussed separately, a comprehensive program for control of pollution from mining activities may need to draw on several of the approaches reviewed here.

2.1 State Level Controls

2.1.1 Reclamation Statutes

At the state level, pollution from mining activities may be subject to controls from several different statutory programs. The most directly applicable are reclamation statutes. As of December 1975, 38 states had some form of reclamation program, 38/ but the coverage of these statutes varies substantially. Most acts are applicable only to the recovery of specific minerals, and apply only to surface mining since it creates more obvious problems than deep mining.39/

2.1.2 Mine Sealing Statutes

States with reclamation statutes not applicable to deep mining sometimes provide for the plugging of abandoned mine shafts as part of their mine safety acts.40/ These provisions are designed to prevent entry into the mine. With some modificaton they might be used as a method of requiring airtight or watertight sealing of deep mines to prevent acid formation.

Pennsylvania had modified its mine sealing statute so that it is specifically directed toward the prevention of water pollution. The statute requires that "operators engaged in the mining of coal in this Commonwealth shall, upon the abandonment of a mine, seal any and all openings leading from such mine to the surface through which water may flow into any of the streams of this Commonwealth and through which appreciable quantities of air may enter the mine."41/ The act goes on to define mine sealing as "the closing of openings into a mine in such a manner as to minimize or stop the pollution of the waters of the Commonwealth by mine water and to prevent access to the mine by persons or animals."42/

2.1.3 Water Pollution Control Statutes

Of more general applicability are state water pollution control statutes. These are occasionally made specifically applicable to pollution from mining activities but more often than not, mine-related pollution will only be controlled by the general language of the statute. Maryland's general water pollution control statute 43/ is a fairly typical example of a statute whose language is not specifically applicable to pollution from mining activities, but is general enough to cover it and is in fact used to require a mine operator to obtain a permit before he may discharge a pollutant into the waters of the state. The act requires that a permit be obtained by

> any person intending to construct, install, modify, extend, alter, or operate any industrial commercial or recreational facility or disposal system or any state owned treatment facility or any other outlet, or establishment, the operation of which would result in or be capable of causing a discharge of pollutants or an increase in the discharge of pollutants into the waters of the State. . . .44/

Regulations promulgated under the act define discharge as "the addition, introduction, leaking, spilling, or emitting any pollutant to waters of the state, or the placing of any pollutant in a location where it is likely to pollute."45/

In West Virginia, the Water Pollution Control Act 46/ requires that a permit be obtained from the Department of Natural Resources in order to:

> open, reopen, operate or abandon any mine, quarry or preparation plant, or dispose of any refuse or industrial wastes or other wastes from any such mine or quarry or preparation plant; Provided, that the department's permit shall only be required wherever the aforementioned activities cause, may cause or might reasonably be expected to cause a discharge into or pollution of waters of the State.47/

West Virginia's act is used principally to regulate discharges from deep mines or coal processing operations, since discharges from surface mines are regulated under the West Virginia Surface Mining Reclamation Act.48/ The Water Pollution Control Act applies to all operations or proposed operations that will discharge into the waters of the state. Only operations with closed water systems would be exempted from its requirements.

In Pennsylvania, the Clean Streams Law is made even more directly applicable to all phases of mining activities. Under the Clean Streams Law, a permit is required for all mining operations, including "preparatory work in connection with the opening or reopening of a mine, backfilling, sealing and other closing procedures, and any other work done on land or water in connection with the mine."49/ A permit is also required for any discharge from a mine, including "a discharge which occurs after mining operations have ceased."50/ This kind of direct applicability helps to eliminate any confusion about authority to control pollution from mining and mine-related activities. The principal problem with the use of water pollution control statutes is that they often are directed only at point source discharges, and are not or cannot be used to control nonpoint sources that are the cause of much of the pollution from mines.

2.1.4 Other State Regulatory Authority

Other state programs that are being or could be used to control pollution from mines at the state level include land use planning and soil conservation programs. Virginia51/ and Florida,52/ for example, have a critical areas designation process for areas of special environmental importance deserving of special protection. Once such areas are designated, standards and criteria are adopted by the legislature or responsible agency to insure that these areas are used and developed in such a fashion as to preserve their unique character.

In Virginia, no legislation has been adopted to protect these areas; however, the fact that the Green Springs area has been designated as critical was used in support of arguments opposing strip mining there. In Florida, development which must be regulated in areas of critical state concern is specifically defined to include mining operations.53/

In Hawaii, the Land Use Commission exercises zoning authority over the entire state.54/ State lands are divided into four classifications--urban, rural, agricultural, and conservation. In all of these except urban (where permitted uses are determined by local governments), mining would require a permit from the commission. A permit might be restricted as necessary to bring the use in keeping with the overall purposes of the land use program.

Soil conservation and sediment control statutes are principally concerned with construction in urbanizing areas and with agricultural and silvicultural practices.55/ However, some erosion and sediment controls apply to mining as well. Maryland's law, administered by soil conservation districts, requires that:

> Before any person clears, grades, transports or otherwise disturbs land for any purpose including, but not limited to constructing buildings, mining minerals, developing golf courses, or constructing roads and streets, the appropriate soil conservation district first shall receive, review, and approve the proposed earth change. Land clearing, soil movement, and construction shall be carried out in accordance with the written recommendations of the soil conservation districts regarding control of erosion and siltation and elimination of pollution.56/ (emphasis added)

2.2 Regional Controls

There exist few regional agencies with authority to regulate pollution from mining activities. The San Francisco Bay Conservation and Development Commission, which has jurisdiction over San Francisco Bay, 57/ requires that a permit be obtained from it by "any person or governmental agency wishing to place fill, to extract materials, or to make any substantial change in use of any water, land or structure, within the area of the commission's jurisdiction."58/ This provision would cover any mining activities that might be attempted in the bay.

The Ohio River Valley Water Sanitation Commission (ORSANCO) is an interstate agency concerned with the abatement of water pollution in the Ohio River Basin. The compact creating it gives the commission the authority to promulgate rules, regulations, and standards for control of sewage and industrial wastes discharged or permitted to flow into those portions of the Ohio River and its tributaries that are in two or more signatory states.59/ At first, acid mine drainage was exempted from

the definition of industrial wastes, but in 1960 ORSANCO adopted a resolution endorsing control measures for acid mine drainage abatement.60/ This resolution has been instrumental in encouraging signatory states to remove mine drainage from an exempt category of industrial waste discharge.61/ ORSANCO regulations have the force of law, but due to the nature of the commission's charter they are difficult to enforce. Before ORSANCO may take action against an individual in violation of its regulations, it must have the assent of the majority of the commissioners from a majority of the states, and, more important, it must have the assent of a majority of the commissioners from the state in which the violation is taking place.

Other interstate compacts generally similar to ORSANCO that are concerned with the control of water pollution and might be used to authorize, or at least encourage, the control of pollution from mining activities are referenced in the footnotes.62/

2.3 Local Controls

Local control of water pollution from mining may be derived from land use planning and zoning authority. The language in Georgia's zoning enabling statute is typical; it empowers the local governing authorities to adopt zoning regulations for the purposes of "promoting the health, safety, morals, convenience, order, prosperity, or general welfare of the municipality or county or both."63/ A recent case, Georgia Marble Co. v. Walker, 64/ held that under this statute a local government could require a special zoning permit from a mine operator even when the operator had already obtained a permit under the Georgia Surface Mining Act of 1968.65/

A similar case in Pennsylvania, Appeal of Mutual Supply Co., 66/ upheld a municipality's right to prohibit the mining of coal within its jurisdiction based on its general zoning authority. West Virginia is an example of a state whose planning and zoning enabling act specifically authorizes local governments to regulate mining activities.67/ Wyoming, on the other hand, specifically denies them that authority.68/

3.0 Appropriate Level and Agency of Government

Reclamation, water pollution, and land use control programs should function interdependently in order to eliminate pollution from mining activities. Unfortunately, this is not always the case. The overlapping responsibilities and divergent interests of the various agencies and governmental bodies involved can create confusion and unnecessary duplication.

3.1 Interstate Agencies

The interstate compact, such as ORSANCO, should provide a good method for coordinating programs and reducing duplication. When

the area covered by an interstate compact is an entire watershed, it represents the ideal geographic area within which to deal with pollution problems. The principal concern of most interstate compacts is information gathering and dissemination. This function should not be underrated because it can and should provide the affected states and local governments with the technical means to formulate coordinated and effective control programs.

The usefulness of an interstate compact may be substantially limited by political restraints. States are understandably reluctant to give up any authority, particularly in an area as controversial and economically important as mining. They are, therefore, hesitant to create an interstate commission to serve anything other than an advisory function. Even when real regulatory authority is granted, enforcement is procedurally hobbled.69/

3.2 State Agencies

The state level, where the authority to regulate pollution from mining activities is most commonly found, probably represents the most practical level from which to exercise that authority, since the greatest expertise and resources are available there. In many states, the basic authority for the control of the discharge of pollutants is in one department and the authority for regulation of mining activities in another.70/ This is not necessarily bad if there is adequate delineation of authority and duplication of effort is avoided. Duplication of effort may be avoided by a statutory provision such as Virginia's multiple permit process which allows an applicant needing a permit from more than one state environmental regulatory agency to make a single unified application to the administrator of the Council on Environment, who may "consolidate, coordinate and expedite the permit review process including but not limited to the elimination of redundant or overlapping procedures; consolidation of any formal hearings . . . and coordination of the processing of permits."71/

The split of authority between agencies can have a beneficial effect by reducing the possibility that a single agency's orientation might make it favor certain values and goals over others. The responsible agencies will tend to oversee each other to ensure that their particular interests are not being ignored.

Having a single agency responsible for all parts of the mining operation does, however, administratively simplify the control of pollution. Pennsylvania, which at one time had substantial fragmentation of responsibility, reorganized all the responsible agencies into the Department of Environmental Resources. In this reorganization, much of the interagency division of responsibility was retained, but at the departmental level. This provides for sufficiently broad representation to ensure that all interests are protected, but, at the same time, provides a single administrative unit to exercise authority over all phases of

a mining operation.

3.3 Regional (Intrastate) Agencies

Regional regulation of mine pollution has a number of advantages. It can be structured to deal with specific problems that might be unique to a particular region whose jurisdiction is broader than a county's but narrower than a state's. Regulations could be tailored to suit the needs of a specific region, and need not be applied to areas of the state for which they are inappropriate. Control, though, would still be exercised over an entire geographic unit, whose size would justify a staff sufficiently large to effectively regulate mine pollution. However, besides the San Francisco Bay Conservation and Development Commission which is only peripherally concerned with mining, there are few, if any, intrastate regional commissions directly concerned with the abatement of mine-related pollution.

3.4 Local Agencies

At the local level, regulatory capability is limited. Local officials are not likely to have the expertise necessary to control mining in order to eliminate pollution. The nature of pollution from mining activities is also such that it is usually a multijurisdictional problem that individual localities cannot readily correct. However, particularly in the absence of a state siting program, local governments through the exercise of their zoning authority can ensure that mining activities do not take place in areas where they would be incompatible with maintaining environmental quality and with future land uses.

Soil conservation districts also provide local administrative authority that can be used to control harmful effects of mining on water quality. They are concerned with the control of sedimentation and erosion, two major problems from mining, and offer the same advantages of familiarity with local problems and accessibility claimed for other local govermental agencies. (Soil conservation districts are discussed in some detail in chapter 6, section 3.3.1 and chapter 7, sections 2.1.2 and 2.1.5.)

An interesting compromise between local and state administration is contained in California's Surface Mining and Reclamation Act of 1975.72/ That act provides that the overall policy and standards under which surface mining operations are to be conducted be established at the state level by the state Mining and Geology Board. The actual granting of permits and admininstration of the act, however, is left to the local governmental unit within whose jurisdiction the proposed mining operation is to take place. This legislative arrangement certainly improves state and local cooperation and clarifies areas of responsibility, but it has a substantial drawback. Although the local government may consult the state geologist for assistance in reviewing a permit application and reclamation plan, and the plan must be drawn according to state guidelines, the ultimate responsibility for determining its adequacy rests with the local governmental body.73/ As a result, the most difficult administrative

decision, that of predicting the environmental risks involved in a given mining proposal, is left up to the level of government with presumably the most limited resources and expertise.

4.0 Planning, Operational Controls, and Standards

A basic program of pollution control from mining activities should address the following facets of the operation, regardless of the mining techniques used: critical areas, exploration, location and plan, operation, and abandonment and reclamation. Within these general areas there may be a great deal of variation, but before a sucessful program of pollution control may be established, each general area must be considered. In discussing how various states have dealt with these areas, reclamation statutes have been relied upon extensively, since they apply most directly to mining operations. However, there is no reason why these regulatory procedures could not be part of other statutory schemes. These regulatory options are discussed in the order in which they affect a mining operation.

4.1 Critical Areas

One of the most important and perhaps most frequently neglected methods for controlling pollution from mining activities is designation of critical areas in which, due to their unique value or high pollution risk, no mining activity may take place. In Texas, the Railroad Commission, which administers the Surface Mining and Reclamation Act, 74/ may designate certain lands off-limits to all or to certain types of surface mining. The decision to designate these lands must be based on five criteria set out in the act: (1) the feasibility of reclamation; (2) the risk of damage to renewable resources such as water supplies or food or fiber production; (4) the likelihood of flooding or unstable geology; and (5) effects on any park or damage to any public road or building.75/

The designation process in Texas cannot begin until an application for a mining permit is made in an area for which there is an outstanding petition for designation. If the commissioner determines that a petition is valid, he must hold a hearing at which affected parties may present evidence in support of their positions. Although the criteria established in the Texas act are good, substantial discretion is left in the hands of the administrator by allowing him to determine the validity of a petition. Also, because designations are not made until a permit is applied for, uncertainty will remain in areas in which mining has not yet been attempted.

Ohio grants even more discretion in its designation process. In its Strip Mining and Reclamation of Mined Land Act, 76/ it provides that the "chief [of the Division of Reclamation] may [emphasis added], by rule, designate as unsuitable for strip mining" 77/ certain ecologically critical, unique, or publicly valuable areas. In North Dakota, surface mining is prohibited in areas where reclamation is determined to be impossible, 78/ and in Maryland, surface mining may not be conducted

on slopes of more than 20 percent.79/ Flexibility is retained in the North Dakota procedure, since the determination of whether reclamation is impossible is left up to the Public Service Commissioner. However, if it is determined that reclamation is impossible, or if criteria like those specified in the Texas statute exist, discretion in the designation decision should be limited.

A major weakness in all the critical areas designation procedures that are part of reclamation statutes is that they do not include deep mining operations. This is a particularly unfortunate shortcoming in eastern coal-producing states because the authority to ban deep mining in areas of high sulfur content could be an extremely successful method of controlling acid mine drainage. However, this weakness could be corrected if a critical areas designation process were included in a state land use control program, as in Florida and Virginia, 80/ since it could encompass all incompatible activities.

4.2 Exploration Permits

Exploration activities are conducted, although on a smaller scale, much the same way mining activities are and cause many of the same water pollution problems that an actual mining operation does. Therefore, it is important that any comprehensive pollution abatement program include regulation of these activities.

West Virginia requires that, in an area not covered by a surface mine permit, a permit be obtained from the Department of Natural Resources before excavating equiment may be used to remove overburden for the purpose of exploring for coal.81/ In order to obtain a permit, an applicant must submit a map of the seam to be explored, a complete reclamation plan, and a performance bond to insure that the reclamation is completed. Reclamation may be postponed if the exploration permit is exchanged for a surface mining permit. This provision would appear to adequately control surface exploration, though it does not cover underground exploration.

In Montana, unlike most other states, state law is sufficiently comprehensive to bring virtually all forms of mining exploration under regulation. The Montana Hard Rock Law requires licensing of all persons engaged in exploration.82/ To obtain a license, an applicant must submit a map of the area proposed for exploration, sufficiently detailed to locate the area to be explored and to determine whether significant environmental problems would be encountered. A reclamation and revegetation bond must also be submitted.83/ If a license is granted, the licensee must agree to construct his temporary roads and conduct his drilling and excavating operations in a manner established by the Department of State Lands.84/

Under the Montana Strip and Underground Reclamation Act, a permit

must be obtained to prospect on lands not covered by a valid strip or underground mining permit. To acquire a permit, an applicant must submit a map of the area to be explored, and a reclamation and revegetation plan.85/

4.3 Mining Permits

Perhaps the most important device for the control of pollution from mining, and certainly the most widely used, is the permit required before the actual mining operation begins. Either through its denial or the imposition of conditions within it, this permit provides the best opportunity to ensure that a mining operation is conducted in a way that will minimize water pollution.

Pennsylvania provides a good example of the elements necessary for an effective permit program.86/ There an applicant must provide the Department of Environmental Resources (DNR) with:

A. a map or a plan showing

1. the location of the land affected;
2. the drainage above and below affected lands;
3. the location of all streams;
4. the results of the test borings showing the nature and depth of the various strata;
5. an analysis of any coal, mineral seam and overburden; and

B. a detailed reclamation plan including

1. the highest and best use before mining;
2. the proposed use after reclamation;
3. the manner in which topsoils will be segregated;
4. the manner by which the soil and fill will be compacted;
5. a complete planting program designed to permanently revegetate;
6. a plan for recontouring, or in lieu thereof, terracing or other alternatives that will not pose water pollution risks;
7. a timetable for the implementation of this plan;
8. an explanation of how acid drainage and siltation or other stream pollution will be avoided.

DNR then reviews the application, making further inquiries and inspections as may be necessary. If DNR objects to all or any part of the application, it is required to notify the operator in writing and give him the opportunity to correct the objectionable aspects. No action taken by the department is final until the applicant has had the opportunity to appeal to the Environmental Hearing Board.87/ The board is a quasi-judicial, three-member panel empowered to hear appeals from decisions made by the Department of Environmental Resources.

A shortcoming in Pennsylvania's permit application is that it does not require the operator to submit a plan of proposed operating procedures. As a result, an opportunity to regulate and plan operating procedures on an individual basis is lost. In Virginia, by contrast, a separate operations and drainage plan must accompany the permit application and reclamation plan. The plan must contain "the proposed method of operation, including the manner, time and distance for back filling and grading work where appropriate, and stating the nature and extent of anticipated adverse disruptions and injurious effects, . . . [and] proposed control techniques to minimize or prevent such disruptions or effects."88/ With respect to drainage, it shall include plans, if necessary, for sediment ponds, drainage above the highwall, bench drainage, permanent stream protection, and acid treatment.89/ Through the use of an operation and drainage plan, an agency may ensure, before a permit is granted, that the mining itself will be conducted in such a manner as to reduce of eliminate water pollution. If such plans are not required, operating procedures can only be controlled after the permit is granted, by regulations like those discussed in the next section.

The permit procedures discussed above apply only to surface mining operations, a shortcoming common to many reclamation statutes. Since the water pollution causes and effects are similar, these procedures could, however, easily be applied to at least the surface-disturbing aspects of deep mining operations, as in New York 90/ and Oklahoma.91/ Montana not only controls the surface-disturbing activities resulting from underground mining, but also requires that a permit application for underground mining include "cross-sections and maps showing the proposed underground locations of all shafts, entries, and haulageways or other excavations to be excavated during the permit year."92/ This requirement affords the Department of State Lands the opportunity to regulate the design of a deep mine in order to reduce water quality deterioration while it is operating and to facilitate sealing it when it is abandoned. The department may not approve a permit application unless, on the basis of the information set forth in the application, water pollution control and reclamation of the area can be accomplished in a manner which will maintain the state's clean environment and prevent the degradation of its natural resources.93/

4.4 Operating Requirements

No matter how extensive, the gathering of information and the preplanning that go into the permit application and approval procedures do not always provide sufficient basis for projecting and preventing all forms of water pollution that might occur. Therefore, regulations governing the operation of a mine should be imposed above and beyond the restrictions contained in the permit. These regulations should usually be quite general in order to retain a high degree of flexibility. Rather than setting specific standards, they ought to provide parameters within which mining operations must be conducted. In Virginia, operating regulations only

provide time limits within which grading and backfilling must be begun (60 days following the removal of the mineral) and methods for stockpiling coal, treatment of toxic material, covering of the pit, grading of spoil, and grading of the final bench.94/

West Virginia's regulations governing the operation of surface mines are much more detailed. They provide specific standards for haulageways, drainage facilities, methods of operation, revegetation and evaluation of vegetative cover.95/ The drainage system regulations 96/ provide minimum standards for constructed drainways, sediment control, and water quality control. In addition, they set minimum quality standards for water leaving the permit area.97/ Although this level of detail in the regulations may inhibit administrative flexibility, it does provide basic guidance for both the operator and the regulatory agency. Such detailed standards also allow consistent control of mining methods, and serves as a framework within which the operating plan can be prepared and evaluated. However, in promulgating detailed standards, care should be taken to avoid a situation in which a variety of problems arising from different methods cannot be taken into consideration. For example, a provision in regulations 98/ promulgated under Kentucky's strip mining statute 99/ which required construction of drainage diversion facilities was suitable for contour mining in the eastern part of the state put proved impossible to use in area mining operations in western Kentucky.100/

5.0 Administration and Enforcement

Permits, conditional permits, and regulations governing mining procedures are of little use if they are not accompanied by sufficient procedures for supervision and enforcement capabilities. A discussion of various supervisory and enforcement provisions follows.

5.1 Reporting

The most common supervisory technique is a reporting requirement. Maryland requires that mine operators submit a report once a year describing the extent of the mining conducted during the year, the amount and type of reclamation carried out, and estimates of the extent of the next year's operation. This is to be accompanied by a map showing the same information.101/ Most reporting procedures are similar to Maryland's. Some states, including West Virginia 102/ and Texas, 103/ leave determination of the reporting interval up to the regulatory agency. West Virginia also requires the operator to analyze and report to the director of the Department of Natural Resources any sizable accumulation of stormwater or breakthrough of water caused by his operation.

5.2 Inspections

The reporting procedures described above are, of course, only as reliable as the operator submitting them. They should be accompanied

by monitoring and onsite inspections by agents of the responsible regulatory department. The inspections should be of sufficient frequency and throughness to determine whether or not the permit, reclamation plan, and departmental regulations are being complied with. Virginia specifically provides for onsite inspection only after the mining and reclamation plan are completed.104/ In Pennsylvania 105/ and Texas, 106/ inspections are conducted at the discretion of the regulatory agency or the inspector himself. In Colorado, 107/ inspections must be performed annually. In West Virginia, they must be performed at least every 15 days.108/

Different circumstances will require different intervals of inspection; it is, however, safe to say that provision for inspection only after the mining and reclamation are complete, as is the case in Virginia, is inadequate. Irregular inspections performed at frequent intervals, as required in Texas and Pennsylvania, should be adequate to ensure compliance if conscientiously administered, but fixed and frequent intervals like West Virginia's would be the safest way to ensure compliance.

5.3 Permit Renewals

A potentially highly effective method of supervising mining operations is to require frequent permit renewals. In West Virginia, an operator must renew his permit every year, and his renewal application must contain "such information as the director may reasonable require."109/ The renewal shall be granted if the "operation is in compliance with the provisions of the [Surface Mine and Reclamation] Act."110/ This requirement affords a regulatory agency an excellent opportunity to review an operator's activities. On the other hand, in jurisdictions such as Maryland, where a permit can be issued for a period of as long as 25 years, 111/ the opportunity is lost.

5.4 Bonding Requirements

The most important and most frequently used method of ensuring compliance with pollution abatement and reclamation plans is a bond requirement. Generally, the operator is required to post a bond before his permit is granted and, as his reclamation progresses, that bond is either gradually released or held until the entire reclamation program is completed. Virtually all reclamation statutes have some sort of bonding provision.112/ The potential effectiveness of these provisions varies substantially, depending on the sufficiency of the bond required and the procedures involved in its release.

Several states, such as Michigan and New Mexico, give ther permit-granting agency the option to require that a bond be posted. In Michigan, the bond option is exercised when the chief of the Geological Survey Division of the Department of Natural Resources "has reasonable doubts as to an operator's financial ability to comply."113/ In New Mexico, a bond is required "[w]henever the commission finds it necessary to insure compliance with the Coal Surface Mining Act."114/ These types of provisions tend

to defeat the purpose of a bonding requirement, which should provide an automatically available fund for reclamation if an operator fails or refuses to reclaim. The financial reliability of an operator may change during the term of a permit, and even if it does not, it may still prove difficult to extract sufficient funds from him to perform the necessary reclamation. Unless the operator is seeking a new permit, he has no incentive to comply until he is forced to do so.

Iowa and South Dakota have bonding requirements that leave the amount of bond to the discretion of the permit-granting agency. In Iowa, the standard for determining the amount is the "estimated cost of rehabilitation" 115/ based on factors such as topography, mining methods, depth and composition of overburden, and depth of the mineral deposit. In South Dakota, the standard is "an amount sufficient to cover the cost of reclamation as determined by the commission."116/ If conscientiously administered, this kind of standard could provide a good, flexible method for determining the amount of a bond so that it would realistically reflect the cost of reclamation in a variety of circumstances. However, this kind of discretion does lend itself to abuse. Some states set a fixed sum per acre to be mined or a lump sum for the entire operation. This reduces the flexibility of the bonding procedure in differing circumstances, but it does provide consistency and eliminates potential for abuse.

In addition to the amount of the bond, the method by which it is released will have much to do with determining its effectiveness. Virginia has a typical bond release system. After mining and reclamation are completed, the operator submits a report, the director of the Department of Conservation and Economic Development makes an inspection and, if he "is satisfied that the requirements of the operations, drainage and reclamation plans have been fully complied with," 117/ the bond is released. The problem with this sort of provision is that it provides no mechanism for encouraging early reclamation, and it releases the bond before sufficient time has elasped to accurately assess the success and sufficiency of the reclamation.

In Texas, by contrast, no more than 75 percent of the bond may be released upon completion of the mining operation and reclamation. The remainder is to be released after four years if the Railroad Commission determines that revegetation and reclamation have been successful.

Texas 118/ and Montana 119/ provide a system of incremental bond release which should encourage the operator to continuously reclaim. In those states, as each portion of the mine is backfilled and graded and drainage controls are put in place, a proportionate amount of the bond is released. When reclamation and revegetaton are finally completed (in Texas, four years after replanting; in Montana, when the land's capability of supporting livestock or wildlife equals its former capacity),120/ the remainder of the bond is returned. Through incremental bond

release and delay of the final release, continuous reclamation is encouraged and successful revegetation assured.

5.5 Permit Revocation and Denial

An enforcement technique vital to any program is permit revocation or denial of a new permit. Most reclamation statutes provide for these penalties. Maryland's law is typical: when a violation of either a permit or regulation is found, the Department of Natural Resources shall give notice, provide an opportunity for a hearing, and, if the violation is not corrected, revoke the operator's permit.121/ An operator whose permit has been suspended or revoked may not be issued a new permit.122/ This provision, however, is only as strong as the inspection and reporting requirements that would enable a regulating agent to discover violations.

If a bond is forfeited, most reclamation statutes prohibit the operator from conducting any other mining activities in the state, unless he completes the required reclamation himself or pays to the state a sufficient amount for it to conduct the reclamation.123/ In order to ensure that these provisions are effective against a changing corporate identity, a clause such as Maryland's, which holds a corporation responsible for previous violations of "any officer, director, or principal owner," 124/ should be included. The fear of loss of ability to mine in a particular state provides any operator whose permanent occupation is mining a powerful incentive to complete reclamation.

5.6 Citizen Suits

Citizen suits constitute a useful enforcement technique against a recalcitrant regulatory agency. Frequently, however, statutes lack any provisions for citizen suits, and when they are included, they are often so restricted that their usefulness is limited. Montana's citizen suit provision permits any citizen of the state, not just an aggrieved party, to bring to the attention of the responsible officer any violation of the Strip and Underground Reclamation Act. If the official fails to take any action, the citizen may bring an action of mandamus in the district court to compel the officer to enforce the act.125/ If only affected or aggrieved parties are allowed to bring suit, as in West Virginia, then the number of potential plaintiffs is substantially reduced.126/

5.7 Injunction

If it becomes necessary to seek judicial relief against an operator, an injunction is the most effective remedy. However, resort to injunctive relief may be restricted by limiting those who may seek it, the time at which it may be sought, and the conditions under which it may be sought. In Virginia, the director the the Department of Conservation and Economic Development can seek injunctive relief only when "adverse ecological disruptions or other injurious effects of mining operations

seriously threaten or endanger health, safety and property rights of any individual, and abatement is not feasible by application of control techniques."127/

West Virginia provides for considerably more liberal use of injunctions. The Department of Natural Resources, the state attorney general, or the prosecuting attorney of the affected county may seek injunctive relief to compel compliance with or enjoin violations of the Surface Mine Reclamation Act before all the remedies and penalties provided in the act have been pursued.128/

5.8 Penalties

There are a variety of judicial penalties that may be sought instead of injunctions including damages, fines and criminal sanctions. In Montana, penalties range from a civil fine of $100 to a criminal fine of $5,000 for a willful violation. Each day of a violation may be treated as a separate offense.129/ These penalties do not, however, necessarily provide sufficient incentive to comply or adequate funds for reclamation. West Virginia has a similar fine provision, but also includes possible jail sentences of up to six months. Perhaps the most important of West Virginia's penalties is the provision that a person convicted of a violation shall pay, above any fine, an amount sufficient to reclaim the area to which the conviction relates.130/ Not only is this provision severe enough to ensure compliance, it also provides a method of recovering a sufficient amount of money to enable the state to carry out reclamation.

Due to the seriousness of the water pollution problems associated with mining and the expense involved in abating them, enforcement procedures must be effective and penalties must be strong. The options discussed above should not be thought of individually. Rather, they should be used in conjunction with each other to exert the maximum amount of pressure on the mine operator to ensure that he minimizes or eliminates water pollution. Effective reporting requirements do not eliminate the need for frequent inspections, nor does the posting of a sufficient bond eliminate the need for civil and criminal sanctions.

6.0 Abandoned Mines

Although not an activity, and therefore not controllable as such, one of the most severe pollution problems from mining, particularly in the Appalachian states, is that created by abandoned mines. Because the problems involved in controlling pollution from abandoned mines are so different from those involving active mines, they will be treated separately here. As mentioned in the introduction to this chapter, abandoned mines are the largest single source of acid mine pollution in the United States. A major obstacle to solving this problem, in addition to physical and technological ones, is assigning responsibility for abatement.

Basically, there are four entities which could assume responsibility or to which responsibility could be assigned: (1) the original mine operator; (2) the present mine operator; (3) the landowner; and (4) the state. Of these, the first alternative--assignment of responsibility to the original mine operator--has the least potential for success. The original operator probably no longer has any legal interest in the mined lands and may no longer even exist. Even if he can be found, if he has no interest in the mined lands, he cannot be held responsible for a nuisance which was legal when he created it and over which he no longer has any control.

Present mine operators can be made indirectly responsible for the abatement of pollution from abandoned mines by a requirement that they pay a sum into a general reclamation fund as a license fee for or tax upon the operation of a mine within a state. In Montana and Pennsylvania, all funds from license fees, bond forfeitures, cash deposits and securities go into a fund to be used for reclaiming lands affected by surface mining.131/ In addition, present operators may be required to abate any existing discharge of pollutants when they reopen an old mine, as they are in Pennsylvania under the Clean Streams Act.

Assigning responsibility for pollution abatement to the present owner of the land where an abandoned mine exists may be legally possible.132/ A statute could declare that the discharge of pollutants from an abandoned mine constitutes a nuisance subject to injunctive relief. This is basically the approach taken by the Pennsylvania Clean Streams Act, but that act's impact has been lessened by exempting mines abandoned prior to 1966.133/ Assigning responsibility to present owners presents the very real possibility of forfeiture, since very often the cost of reclamation or sealing will far surpass the value of the land. Difficult questions of equity must also be considered when the landowner had nothing to do with construction or operation of the mine.

Assumption of responsibility by the state is probably the most likely solution to the problem of pollution from abandoned mines. The federal government, at least on an experimental level, has been involved in mine sealing projects for some time.134/ Either permission is obtained to enter upon the land or the land is purchased, and the Department of the Interior conducts the necessary work. However, because statutes authorizing these procedures were designed to prevent mine fires and flooding, sealing, in the past, has not been performed in a way that would completely abate pollution.

Pennsylvania has assumed responsibility for the construction of seals on abandoned mines not in possession of the operator 135/ and for maintaining seals, whether installed by the operator or the state.136/ In order to ensure access, the Department of Mines has been authorized by statute to "enter upon any lands where openings to abandoned mines are located for the purposes of sealing such openings, [and] for inspecting and maintaining such seals."137/

The eventual solution to the problem of abandoned mines will probably entail the sharing of the responsibility for their sealing and reclamation, with the state assuming the bulk of the burden.138/

7.0 Legal Issues

The legal problems resulting from attempts to control water pollution from mining activities may be divided into two distinct categories: (1) those arising from control of present and future mining activities; and (2) those arising from attempts to correct harm from past mining activities. The first category raises more traditional questions regarding the scope of permissible regulation, whereas the second raises more difficult problems of ownership and responsibility.

The basic question involved in control of present and future mining operations is whether the regulation constitutes a valid exercise of the police power, as opposed to an unconstitutional taking of private property. Perhaps the best known case in this area is Pennsylvania Coal Co. v. Mahon, 139/ in which a statute banning any coal mining that caused the subsidence of any structure used for human habitation was declared an unconstitutional taking of property. Justice Holmes, in delivering the opinion, stated that the extent of the diminution in value of the property was the determinative factor in deciding whether or not the act constituted a taking. He wrote:

> It is our opinion that the act cannot be sustained as an exercise of the police power, so far as it affects the mining of coal under streets or cities in places where the right to mine such coal has been reserved . . . . To make it commercially impracticable to mine certain coal has very nearly the same effect for constitutional purposes as appropriating or destroying it.140/

This opinion would appear to put in doubt a great deal of the legislation controlling pollution from mining, but, in fact, courts applying the diminution of value test have generally found most statutes constitutionally valid. In Goldblatt v. Hempstead, 141/ the Supreme Court upheld a local ordinance which prohibited excavating below two feet above the maximum groundwater level. The fact that this ordinance prevented the continued operation of a sand and gravel pit did not overcome the presumption that the regulation was a reasonable exercise of the police power.

Simply requiring operators to take measures in their operating and closing procedures to reduce or eliminate pollution has, for the most part, been considered a legitimate exercise of the police power.142/ This has only been seriously questioned when the economic loss has been severe, and the benefit derived in some doubt. This was the case

in Reserve Mining Company v. EPA, where the U.S. Court of Appeals for the Eighth Circuit refused to enjoin the operation of a plant that was in violation of state and federal water pollution standards, and instead gave the defendants time to bring themselves into compliance. In refusing to enjoin the operation of the plant, the court stated that "an immediate injunction cannot be justified in striking a balance between unpredictable health effects and the clearly predictable social and economic consequences that would follow the plant closing."143/ Even in this case, the ability to regulate water pollution was not questioned, only the severity of the individual application.

Statutes prohibiting mining activities altogether are, of course, subject to very close constitutional scrutiny. Often, if the surface and mineral rights are severed, a prohibition against mining will cause a complete loss of value to the owner of the subsurface rights. Therefore, total prohibitions against subsurface mining are extremely rare. Prohibitions against surface mining, on the other hand, are fairly common, but they have occasionally been found constitutionally invalid. Thus, in Midland Electric Coal Corp. v. Knox County, a local zoning ordinance banning strip mining was found to be unconstitutional because it imposed extreme hardship upon the coal company and had "no real or substantial relation to the public health, safety, morals comfort or general welfare."144/ Once again, the question as framed by the court was whether the harm inflicted on the individual was so great as to outweigh the benefit to the public. If the landowner or mineral rights owner is left with some reasonable use of his land or method of exercising his mineral rights (e.g., deep mining), and the public harm to be prevented is substantial, then in all likelihood the regulation will be upheld.

In Farmington River Co. v. Town Plan and Zoning Commission, the Connecticut Superior Court held that regulations requiring the plaintiff to acquire a mining permit and to comply with certain safety precautions were a legitimate exercise of the police power and that "The property of the plaintiffs has not been taken without just compensation. They may still operate, and a compliance would not be onerous, harsh or unreasonable. Even if it would, the governmental agency might act in such a case."145/ The Supreme Court of Illinois went even further by upholding a prohibition (in this case, on oil wells) where the prohibited activity might pollute a town's drinking water. The court held that the protection of a municipal drinking water supply was a legitimate area for the exercise of the police power and that "the fact that the exercise of the police power precludes the most profitable use of property in private hands does not make the exercise invalid as such nor render invalid as a 'taking' of the primary use, and hence the essence of the property."146/

Attempts to control pollution from abandoned mines present more complex legal problems. Imposing liability on present owners

causes difficulties since often they are not responsible for the pollution they are being required to abate. Housing codes, however, create a similar hardship; they require present owners to abate statutory nuisances that they themselves did not create or which in the past were not considered nuisances, and housing codes have long been considered acceptable exercises of the police power.147/ In Pennsylvania v. Harmer Coal, a coal mine operator was held responsible for the abatement of polluton from an abandoned mine which the operator found necessary to drain in order to construct a new mine nearby. The Supreme Court of Pennsylvania held that although the present operator did not cause the formation of the acid in the old mine, he had to treat the acid before he could discharge it into the state's surface waters in connection with the operation of his present mine.148/

The Pennsylvania Supreme Court, in Commonwealth v. Barnes and Tucker, has also upheld the imposition of liability on the former operator for acid drainage from an abandoned mine, even though the activity which created the problem was legal at the time it was conducted and the operator was no longer working the mine. In upholding this imposition, the court stated:

> [S]ince the activity involved is a public nuisance it cannot be regulated, but must be abated. We believe that the abatement of water pollution is unquestionably a reasonable exercise of the police power in the abstract. We are not swayed in this belief by the fact that the mining activity which gave rise to the present condition is past conduct which cannot now be abated.149/

The Pennsylvania court reasoned that liability could be imposed on the former operator, even absent a finding of negligence on his part, because acid drainage constituted both a statutory and common law public nuisance. It would seem logical to take this holding one step further and impose liability on the present owner, even if he is not engaged in any mining activity or in any way responsible for creation of the mine. The court, however, tempered its holding by suggesting that if the relief granted the state were unduly oppressive upon Barnes and Tucker, it might constitute a taking of property without just compensation.150/ In all likelihood, if the cost of abatement were greater than the value of the land, imposition of liability for abatement on an innocent landowner would be viewed by the court as unduly oppressive.

Imposing a licensing fee or tax on present operators to pay for the reclamation of abandoned mines raises equal protection problems. In order that a tax or penalty imposed on a specific group not be considered in violation of the equal protection clause of the Constitution, it must be shown that the classification is "based upon some reasonable ground--some difference which bears a just and

proper relation to the attempted classification--and is not a mere arbitrary selection."151/ The Pennsylvania Supreme Court held that requiring operators of open pit mines to pay a registration fee did not constitute a violation of the equal protection clause, and that "The classification is within the power of the legislature because the record shows substantial differences between bituminous coal mining by the open pit method and other mining or quarrying."152/ The distinction was based on various pollution problems and other hazards which the court held were, taken together, unique to surface mining of coal.

Two legal questions arise when the state assumes responsibility for reclamation of abandoned mines: (1) is it proper for the state to exercise eminent domain for the purpose of reclamation; and (2) if eminent domain is not exercised, does the state have authority to enter upon private property to correct an acid drainage problem? In order to exercise the right of eminent domain, it must be shown that the property is taken for a public use or for a public purpose.153/ Urban renewal cases have held the condemnation of property for the purposes of abating an evil to be a public use.154/ The Mississippi Supreme Court held, in a case involving condemnation of property bordering a reservoir, that "the land in question is to be used for pollution control and control of access. That alone justifies the taking insofar as the question of public use is concerned."155/ The courts tend to defer to the legislature's determination of what constitutes a public use, as it seems probable that the control of pollution from abandoned mines would be a legitimate area for the exercise of eminent domain.

Without the exercise of eminent domain, entrance by a state upon an abandoned mine site on private land, either to place or maintain a seal or to reclaim an abandoned mine, might present legal and constitutional problems. To enter the property without the consent of the landlord, there must at least be a provision, such as that in Pennsylvania's abandoned mine sealing act, which permits state entry onto private land to seal or maintain a seal.156/ Entry on the property even with the consent of the owner may still raise problems of conferring a betterment on a private landowner, and might raise difficulties in states (e.g., Maryland) whose constitutions prohibit state involvement in works of internal improvement.157/ Constitutional restrictions on a state's ability to incur debt might limit its ability to reclaim abandoned mines, but so many judicial exceptions have been made to these restrictions that it is unlikely that they would pose a major obstacle.158/ The public benefit to be derived should be great enough to assure judicial lenience in most cases, but an amendment to the state constitution might be necessary in some states.

CHAPTER NINE

MINING

FOOTNOTES *

1. Federal abatement activities date back to mine seal projects started in 1935.

2. For a description of the extent of pollution caused by coal mining activities, see Office of Water and Hazardous Materials, U.S. EPA, Inactive and Abandoned Underground Mines--Water Pollution Prevention and Control 5 (1975).

3. Chambers may be either supported or caved. Supported chambers are left by many conventional extraction techniques, and are supported either naturally by leaving pillars of unexcavated materials, or artificially by using backfilled wastes or other manmade supports. Caved chambers are those in which roof and walls are permitted to collapse as the mineral is extracted. Entryways are either updip, in which the entrance leads up to the mineral seam; downdip, in which the entrance leads down to the mineral seam; or shaft, in which the entrance goes vertically down.

4. Stripping methods vary according to the nature of the mineral seam and topography of the area where it is found. In relatively flat places where the mineral seam is just below the surface, area stripping is used. A rectangular cut is made, the overburden placed to one side, and the mineral removed. Successive cuts are made this way, the overburden from each cut being deposited in the preceding cut. Contour stripping is performed in mountainous areas where there is an outcrop of the mineral seam. This seam is cut, creating a bench and a highwall, until the overburden becomes so deep that it is no longer economical to remove it.

5. Inactive and Abandoned Underground Mines--Water Pollution Prevention and Control, supra note 2, at 8.

6. Topsoil may be segregated by placing it in a distinct pile and covering it with the remaining overburden. When the mine is reclaimed, the process is reversed and the topsoil is the last of the overburden to be replaced.

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*In order to conserve space, publication information pertaining to works included in the suggested readings for this chapter has been omitted from the footnotes.

7. A box cut involves the exposure of an area of constant size; the section where the mineral has been exhausted is continuously filled and regraded with the wastes from the section being developed.

8. In mountaintop mining operations, the new contour will often be more gradual than the natural contour.

9. In areas where the reclaimed contours are very steep, terracing and drainage systems may be required to reduce erosion.

10. U.S. EPA, Processes, Procedures and Methods to Control Pollution from Mining Activities 289 (1973).

11. A feasibility study on controlled atmosphere mining was conducted for the Federal Water Pollution Control Administration. This process involves replacement of normal mine atmosphere with an oxygen-free noncombustible gas. The mineworkers must wear complex life support and communication systems. Id. at 196.

12. Id. at 298.

13. Flooding updip mines can produce tremendous hydrostatic pressures on the entrance where the mine is close to an outcrop, rendering sealing prohibitively expensive or impossible.

14. Changes in atmospheric pressure will cause an airsealed mine to "breathe" through geologic faults or unconsolidated earth.

15. 33 U.S.C. § 1251 et seq.

16. Id. § 1362(14).

17. Pub. L. No. 94-377.

18. 30 U.S.C. § 201(a)(3)(A)(i).

19. Id. § 201(a)(3)(C).

20. Id. § 207(c).

21. Id. § § 181-287.

22. 43 C.F.R. § 3041.

23. 30 C.F.R. § 211.

24. 43 U.S.C. § 291 et seq., § 299.

25. 30 C.F.R. § 211.75(a).

26. Id.

27. Id., § 211.75(b).

28. 41 Fed. Reg. 35716 (1976).

29. Id. at 39036.

30. Mont. Rev. Codes Ann. § 50-1042; Wyo. Stat. §35-502.12(a)(v).

31. Wyo. Stat. § 35-502.24(b)(xi).

32. 30 U.S.C. § 189.

33. Mid-Northern Oil Co. v. Walker, 268 U.S. 45 (1925); Hagood v. Heckers, 513 P.2d 208 (Colo. 1973).

34. Texas Oil and Gas Corp. v. Phillips Petroleum Co., 277 F. Supp. 366 (1967), aff'd, 406 F.2d 1303, cert. denied 90 S. Ct. 80.

35. For more discussion of this problem, see J. Haggard, "Regulation of Mining Activities on Federal Lands," 21 Rocky Mountain Mineral Law Institute 349 (1975).

36. Herschler v. Kleppe, ___ F. Supp. ___, ELR 65359 (D. Wyo. 1976).

37. See, e.g., Trans-Alaska Pipeline Authorization Act, 43 U.S.C.A. §§ 1650-55; Regulation of Hydraulic Mining in the Sacramento and San Joachin River, 33 U.S.C.A. §§ 661-687.

38. See E. Imhoff, T. Friz, and J. LaFevers, "A Guide to State Programs for the Reclamation of Surface Mined Areas," at table 1, Geological Survey Circular No. 731 (1976).

39. Some States do include deep mines in their reclamation plans. The Montana Strip and Underground Mine Reclamation Act, Mont. Rev. Codes Ann. § 50-1034, applies both to surface and underground mining. In New York, a mine producing over a thousand tons a year must obtain a permit, which requires a reclamation plan. N.Y. Envir. Conserv. Law § 23-2713 (Consol.). Mining is defined in the statute as "the extraction or removal of minerals from the ground." Id. § 23-2703(8). In Oklahoma, the Mining Lands Reclamation Act, Okla. Stat. Ann. tit. 45, § 721, defines mining as "the extraction of minerals from natural deposits by any method or process." Id. § 723(c).

40. West Virginia's mines and minerals chapter, W. Va. Code § 22-1-1 et seq., requires that "when any coal mine is worked out or indefinitely closed, such mining operations shall be properly sealed within ninety days after the mine is abandoned." Id. § 22.2-64(a). Ohio is a bit more exact in its description of what constitutes adequate closing (see Ohio Rev. Code Ann. § 4153.40), but the sealing requirement is still a safety measure and not an anti-pollution device.

41. 52 Pa. Cons. Stat. § 28.3(a).

42. Id. § 28.2(2).

43. Md. Nat. Res. Code Ann. § 8-1401 et seq.

44. Id. § 8-1413(b).

45. Md. Regs. § 08.05.04.01(B)(14).

46. W. Va. Code § 20-5A-1 et seq.

47. Id. § 20-5A-5(b)(6).

48. Id. § 20-6-1 et seq.

49. 35 Pa. Cons. Stat. § 691.315(a).

50. Id.

51. Va. Code § 10-187.

52. Fla. Stat. Ann. § 380.012 et seq. (West).

53. Id. § 380.04(d).

54. Haw. Rev. Stat. § 205-1 et seq.

55. For further discussion of sediment control, see chapters 6 and 7.

56. Md. Nat. Res. Code Ann. § 8-1104(a).

57. Cal. Gov't Code § 66610 (West).

58. Id. § 66632(a).

59. Ohio River Valley Water Sanitation Compact art. VI.

60. Acid Mine Drainage Control Measure, ORSANCO Resolution § 5-60.

61 See E. Chary, The ORSANCO Story--Water Quality Management in the Ohio Valley under an Interstate Compact 219 (Resources for the Future, Johns Hopkins University Press, 1967).

62. New England Interstate Water Pollution Control Compact, Pub. L. No. 80-292, 61 Stat. 682 (1947); New York Harbor (Tri-State) Interstate Sanitation Compact, Pub. Res. No. 74-62, 49 Stat. 932 (1935); Ohio River Valley Water Sanitation Compact (1948), Pub. L. No. 76-739, 54 Stat. 752 (1940); Potomac River Basin Compact (1939), Pub. Res. No. 76-93, 54 Stat. 748 (1940); Tennessee River Basin Water Pollution Control Compact (1955), Pub. L. No. 85-734, 72 Stat. 823 (1958).

63. Ga. Code Ann. § 69-1207.

64. Georgia Marble Co. v. Walker, 224 S.E.2d 394 (1976).

65. Ga. Code Ann. § 43-1401 et seq.

66. 77 A.2d 612 (Pa. 1951).

67. West Virginia's planning and zoning law authorizes local planning commissioners, in developing a comprehensive plan, to include "conservation of water, soil, agriculture and mineral resources." W. Va. Code § 8-24-17(b)(17).

68. In Wyoming, the zoning statute specifically exempts mineral extractive industries from local regulations. The law states that "no zoning resolution or plan shall prevent any use or occupancy reasonably necessary to the extraction or production of the mineral resources in or under any lands subject thereto." Wyo. Stat. § 18.289.1.

    For discussion of local controls on mining, see C. Crawford, Jr., "Zoning Law and Extractive Industry: The Michigan Experience," 51 N.D. L. Rev. 341 (1974); F. Morrison, "Land Use Planning and the Natural Resources Industry," 18 Rocky Mountain Mineral Law Institute 135 (1972); P. Schaluch, "Tripartite Federalism: The Emerging Role of Local Government as a Regulator of the Extractive Industries," 20 Rocky Mountain Mineral Law Institute 359 (1974).

69. See ORSANCO enforcement limitations discussed supra.

70. For example, Virginia assigns responsibility for granting discharge certificates to the State Water Control Board, while the Department of Conservation and Economic Development is in charge of regulating mining activities.

71. Va. Code § 10-184.2.

72. Cal. Pub. Res. Code § 2710 et seq. (West).

73. Id. § 2774.

74. Tex. Civ. Code Ann. tit. 5920-10 (Vernon).

75. Id. § 13(c).

76. Ohio Rev. Code Ann. § 1513.01 et seq. (Page).

77. Id. § 1513.02(B).

78. N.D. Cent. Code § 38-14.05.1.

79. Md. Nat. Res. Code Ann. § 7-505(i).

80. See section 2.1.4 supra.

81. W. Va. Code § 20-6-7.

82. Mont. Rev. Codes Ann. § 50-1201 et seq.

83. Id. § 50-1207.

84. See Dep't of State Lands Rules and Regulations pursuant to Mont. Rev. Codes Ann. § 50-1201 et seq. (Reclamation of Mining Lands).

85. Id. § 50-1041.

86. 52 Pa. Cons. Stat. § 1396.4.

87. Id. § 1386.4(b).

88. Va. Code § 45.1-203.

89. Va. Dep't of Conservation and Economic Development, Division of Mines and Reclamation, Coal Surface Mining Regs. § 9.

90. N.Y. Envir. Conserv. Law § 23-2713 (Consol.).

91. Okla. Stat. Ann. tit. 45, § 721 (West).

92. Mont. Rev. Codes Ann. § 50-1039(2)(j).

93. Id. § 50-1042(1).

94. Va. Coal Mining Reclamation Regs. § 8, adopted pursuant to the Coal Surface Mining Law, Va. Code § 45.1-198 et seq.

95. W. Va Dep't of Natural Resources, Surface Mining Reclamation Regs. §§ 5, 7, 8, 9, adopted pursuant to the West Virginia Surface Mining and Reclamation Act, W. Va. Code § 20-6-1 et seq.

96. W. Va. Surface Mining Reclamation Regs., supra note 95, § 7.

97. Ph: 5.5 to 9.0; iron: 10 milligrams per liter or less; turbidity: no more than 1,000 Jackson units of turbidity 4 hours following a major precipitation event, and not more than 200 J.U. after 24 hours. Id. § 7C.01.

98. Ky. Dep't of Natural Resources and Environmental Protection, Strip Mine Regulation, Regs. Pt. 1E, SMR-11 (1971).

99. Ky. Rev. Stat. Ann. § 350.010 *et seq*. (Baldwin).

100. For a discussion of this situation, *see* D. Hall, "Montana Coal: The Alamo of Interstate Commerce," 51 *N.D. L. Rev*. 439 (1974).

101. Md. Nat. Res. Code Ann. § 7-6A24.

102. W. Va. Code § 20-6-9.

103. Tex. Civ. Code Ann. tit. 5920-10, § 19 (Vernon).

104. Va. Code § 45.1-206(a).

105. 52 Pa. Cons. Stat. § 1396.4c.

106. Tex. Civ. Code Ann. tit. 5920-10, § 19(b) (Vernon).

107. Land Reclamation Board of Colo., Proposed Regs. § VI.A.(4), at 19.

108. W. Va. Code § 20-6-5.

109. W. Va. Code § 20-6-8.

110. *Id*.

111. Md. Nat. Res. Code Ann. § 7-6A11.

112. Florida does not.

113. Mich. Stat. Ann. § 18.601.

114. N.M. Stat. Ann. § 63-34-18.

115. Iowa Code Ann. § 83A.23 (West).

116. S.D. Compiled Laws Ann. § 45-6A-12.

117. Va. Code § 45.1-206(b).

118. Tex. Civ. Code Ann. tit. 5920-10, § 23 (Vernon).

119. Mont. Rev. Codes Ann. § 50-1044.

120. *Id*. § 50-1045.

121. Md. Nat. Res. Code Ann. § 7-6A18.

122. *Id*. § 7-6A18(b).

123. Mont. Rev. Codes Ann. § 50-1050(2); Md. Nat. Res. Code Ann. § 7-6A23.

124. Md. Nat. Res. Code Ann. § 7-504(b).

125. Mont. Rev. Codes Ann. § 50-1055.

126. W. Va. Code § 20-6-11.

127. Va. Code § 45.1-210.

128. W. Va. Code § 20-6-30(c).

129. Mont. Rev. Codes Ann. § 50-1056.

130. W. Va. Code § 20-6-30.

131. 52 Pa. Cons. Stat. § 1396.18; Mont. Rev. Codes Ann. § 50-1052.

132. See section 7.0 supra.

133. 35 Pa. Cons. Stat. § 691.315(a).

134. 30 U.S.C. §§ 555, 571.

135. 52 Pa. Cons. Stat. § 28.4.

136. Id. § 28.5.

137. Id. § 28.6.

138. For a more detailed discussion of abandoned mines, see Office of Water and Hazardous Materials, U.S. EPA, Criteria for Developing Pollution Abatement Programs for Inactive and Abandoned Mine Sites (1975).

139. 260 U.S. 393 (1922).

140. Id. at 414.

141. 369 U.S. 590 (1962).

142. Commonwealth v. Black, 69 A.2d 376 (Pa. 1949); Md. Coal and Realty v. Bureau of Mines, 69 A.2d 471 (1949).

143. 514 F.2d 492, 536 (1975).

144. 115 N.E.2d 275, 287 (Ill. 1975).

145. Farmington River Co. v. Town Plan and Zoning Comm'n, 197 A.2d 653, 659 (Conn. 1963).

146. City of West Frankfort v. Fullop, 129 N.E.2d 682, 687 (Ill. 1955). See also Ex Parte Throop, 145 P. 1029 (Cal. 1915); Ex Parte Angelus, 150 P.2d 908 (Cal. 1944); Calve Bros. Co. v. Norwalk, 124 A.2d 881 (Conn. 1956); People v. Sessano, 29 N.Y.S.2d 45 (1941); Annot., 10 A.L.R.3d 1226; 54 Am. Jur.2d Mines and Minerals §§ 167-176.

147. State v. Price, 151 N.E.2d 523 (Ohio 1958), 364 U.S. 855; Ajootian v. Housing Board of Review, 201 A.2d 905 (R.I. 1964); Houston v. Lurie, 224 S.W.2d 871 (Tex. 1949); Perepletchikoff v. Los Angeles, 345 P.2d 261 (Cal. 1959); Annot., 14 A.L.R.2d 73; 13 Am. Jur.2d Buildings § 3; 40 Am. Jur.2d Housing Laws and Urban Development § 8.

148. Commonwealth v. Harmer Coal, 306 A.2d 308 (Pa. 1973).

149. Commonwealth v. Barnes and Tucker Co., 319 A.2d 871 (Pa. 1974).

150. On remand the Commonwealth Court of Pennsylvania ordered Barnes and Tucker to treat the effluent since they had not presented sufficient evidence to demonstrate that the economic burden of treatment would be sufficiently great in relationship to the company's earnings and assets to be an unconstitutional taking of property. No. 896-A (Pa. Commw. Ct. March 2, 1976) (Bowman, P.J. for the entire bench), 6 ELR 20466.

151. Gulf, Colorado and Santa Fe R.R. v. Ellis, 165 U.S. 150, 165 (1896).

152. Dufour v. Maize, 56 A.2d 675, 680 (Pa. 1948).

153. Berman v. Parker, 348 U.S. 26 (1954), equates public use with the kind of public purpose which is necessary for a reasonable exercise of the police power.

154. Id.

155. Pearl River Valley Water Supply District v. Brown, 156 So.2d 572, 577 (Miss. 1963).

156. 52 Pa. Cons. Stat. § 28.6.

157. Md. Const. art III, § 34.

158. For a discussion of this problem, see E. Goldberg and G. Power, Legal Problems of Coal Mine Reclamation 116-19 (1972).

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CHAPTER TEN

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CHAPTER TEN

LAND DISPOSAL OF SOLID WASTES AND SLUDGES

1.0 Introduction: Elements of a Comprehensive Residual Waste Management Program

1.1 Statement of the Problem

Human activity unavoidably entails the generation and discharge of residual wastes into the environment. The capacity of the environment to assimilate wastes is finite, and the quality of human life is impaired when that capacity is exceeded.

In an inexorable progression from the initial demand for goods and services, there follows the extraction of natural resources, production, consumption, and ultimate disposal. But at many points in this progression, physical measures in combination with legal and institutional arrangements may be interposed to reduce the overall quantity of residuals, to change their form, and/or to lessen their adverse effects on the environment. It is the function of the planner to formulate a residuals management strategy that will combine the best physical, legal, and institutional measures from the standpoint of efficacy, cost-effectiveness, political acceptability, flexibility, and ease of implementation and administration.1/ Just this kind of comprehensive approach to planning is required of states and localities by section 208 of the Federal Water Pollution Control Act Amendments of 1972, 2/ and by subtitle D of the recently enacted Resource Conservation and Recovery Act of 1976.3/

The U.S. Environmental Protection Agency (EPA) estimates that Americans currently generate approximately 135 million tons of municipal solid waste each year. This figure represents about 3.5 pounds per person per day, or more than 1,200 pounds per person per year of paper, glass, metals, plastics, food wastes, and other discards from homes and businesses. Tonnage has almost doubled in the past 20 years and is projected to reach 165 million tons a year by 1985. Currently, the cost of municipal solid waste management nationwide runs about $3.5 billion per year, a rate that is expected to increase substantially over the next five to ten years as relatively inexpensive disposal options such as landfills continue to disappear.

The residuals problem is further complicated by the approximately 275 million dry tons of solid waste generated each year by industry in the United States, some 10 to 15 percent of which contains hazardous materials such as toxic metals and organic solvents in sufficient concentrations to be potentially hazardous to public health if disposed of improperly. While these hazardous wastes require special procedures in handling, storage, transport, processing,

and disposal, at present only about 4 percent of them are treated before disposal on the land, while another 4 percent are recycled. Industrial wastes that require land disposal are projected to increase by 50 percent during the next decade as a result of such factors as the progressive implementation of air and water pollution control laws and ocean dumping bans. Finally, our municipal sewage treatment plants currently generate approximately 7 million dry tons of sludge annually. That amount is also increasing, as more communities build new and more effective wastewater treatment facilities.4/

1.2 Coordination with Land Use Planning and Pollution Control Systems

As noted above, the section 208 planning process must be comprehensive in order to deal effectively with the growing magnitude of residual wastes. This means, first of all, that since the residuals generated in a given locality are a direct result of the lifestyle and productive activities of that community, residuals management planning will have to be conducted as an integral component of the broader land use and development planning process. In some instances, the capacity of the management system to handle the various types of residuals may have to be the leading factor in determining not only the timing and location but also the nature of future development (compare the controls on the timing and location of sewer extensions discussed in chapter 4). Thus, for example, as a precondition to its construction and operation, an industrial plant that will generate a particular hazardous waste byproduct should have to assure that a satisfactory recovery or disposal facility, public or private, will be available to receive such waste. Similarly, development permission for a large new subdivision may have to be withheld if the trash and garbage it is expected to generate cannot be accommodated in an already overloaded nearby landfill, and no site for a new facility has been approved. This principle was given legal recognition in Natural Resources Defense Council v. Nuclear Regulatory Commission (Vermont Yankee), 5/ holding an environmental impact statement on the licensing of a nuclear power plant to be deficient on the grounds that it did not adequately consider the problem of disposing of the plant's radioactive wastes.

Moreover, residuals management planning must be coordinated with other related pollution control systems. The scrubbers, precipitators, catalytic converters, advanced wastewater treatment facilities, and other control devices, processes, and procedures which contribute to the improvement of ambient air and water quality represent at the same time entirely new sources of residuals. If the residuals management system is not prepared to deal with these wastes, which are often hazardous, they will find their way back into surface or groundwaters or into the air.6/

The Resource Conservation and Recovery Act of 1976 encourages and facilitates the development of regional planning for solid waste management by ordering the administrator of EPA to issue guidelines for the identification

of those areas which have common solid waste management problems and are appropriate units for planning regional management services. These guidelines must consider:

- the size and location of areas which should be included;
- the volume of solid waste which should be included;
- the available means to coordinating regional planning with other related regional planning and for coordination of such regional planning into the State plan.7/

The Act also provides for interstate regional planning where deemed appropriate.

1.3 Waste Reduction and Resource Recovery Systems

In planning for residuals management, planners should work with a broad field of options, looking beyond the customary "end of pipe" approaches. Methods of storage, collection, hauling, pretreatment, and disposal of residuals should all be restudied and upgraded to reduce adverse impacts on the environment. In addition, however, strategies must be devised and implemented to reduce the amount of waste that is generated and, through resource recovery programs, the volume of unreclaimable residues that must finally be disposed of. Such strategies have the added benefit of conserving energy and other natural resources.

The five general approaches to waste reduction are: (1) shift to cleaner production processes (e.g., wet to dry); (2) product reuse (returnable bottles); (3) reduced resource intensiveness (smaller autos); (4) increased product lifetime (more durable and/or more easily repaired household appliances); and (5) decreased product consumption (reduced consumption of packaging and of other disposable products).8/ Implementation of any of these options would require changes in existing production and marketing systems of many companies, as well as in consumer habits. Since those systems are often national in scope, state and local governments can do little to induce waste reduction (beyond their own procurement policies), despite the fact that they must ultimately bear the burden of increasing rates of waste generation.9/

One approach which could be adopted on the state level 10/ would be to provide direct economic incentives or disincentives to producers and consumers. For example, a disposal charge could be collected in advance on all nonrecyclable consumer products and the proceeds given to local solid waste management agencies. Or refundable deposits could be required on beverage containers and other items to provide an incentive for their return in lieu of disposal or littering. The economic incentive approach has the advantage of making product prices reflect heretofore "hidden" environmental costs, while still permitting the market system to determine final product choices.11/ In addition, this approach, based on a gradual change in consumer habits, should help avoid the hardship of immediate large-scale economic and labor dislocations.

Resource recovery is a related strategy that makes sense both as a component of residual waste management and as a means of promoting national independence from other countries for supplies of certain raw materials. Mixed municipal solid waste is composed largely of combustible materials. On the basis of weight, more than 75 percent is combustible, but over 90 percent of the volume can be eliminated by means of thermal reduction in the process of energy recovery.12/

Studies also indicate that when two production systems are compared--one using virgin materials and the other secondary materials--the system using recycled wastes causes less air and water pollution, generates less solid waste, and consumes less energy.13/ In this connection, it is worth noting that the United States, which represents only 6 percent of the world's population, consumes more than 40 percent of the world's raw materials. Annually, the nation consumes over 200 million tons of metals, paper, glass, rubber, and textiles, about three-fourths of which comes from virgin resources and the remaining quarter from resource recovery operations. Virtually all of the recovered materials are industrial discards rather than post-consumer wastes. EPA has identified over 60 major metropolitan areas where energy or materials recovery seems economically feasible. These areas account for about 180,000 tons of solid waste a day, 66 million tons annually, or more than half of the municipal waste stream. Nevertheless, we are now recovering a lower percentage of our resources than ever before in history.14/

Economic factors determine whether energy and materials are recovered or whether these resources are lost to the waste stream. The fundamental requirement is to create incentives for use of more secondary materials. Short-sightedly, government procurement policies often give preferences to virgin materials. Depletion allowances and other tax policies encourage extractive industries, and put recycled materials at a competitive disadvantage. Existing freight rates also discriminate against recyclable materials. The imposition of a waste charge on products that eventually enter the waste stream, as mentioned above, would stimulate the market for secondary materials. Other impediments to the implementation of resource recovery programs by government or the private sector have been high capital costs, the risk of obsolescence in view of a still-developing technology, and the problems of securing an adequate long-term flow of refuse necessary to achieve economies of scale and to assure potential buyers a reliable supply.

Connecticut illustrates one state-level response to the problems of waste reduction and resource recovery. The Connecticut Solid Waste Management Services Act 15/ created the Connecticut Resources Recovery Authority (CRRA), a self-sufficient political subdivision of the state. CRRA is empowered to contract with municipalities and regional authorities to receive their wastes for a fee; with private companies to have them build and operate resource recovery facilities; and with buyers of energy and materials to sell them the output from such facilities. The authority may

issue revenue bonds. The municipal users pay debt service on the bonds plus service charges for waste processing, less the sum of revenues cleared by the authority from its sales of recovered resources. Any surplus is passed back to the municipalities.

Federal initiatives in the field of waste reduction and resource recovery should be briefly mentioned. The Solid Waste Disposal Act of 1965, as amended by the Resource Recovery Act of 1970, 16/ authorizes the administrator of EPA to make grants for research, development, and demonstration of innovative resource recovery systems, as well as for planning and the training of personnel. The Resource Conservation and Recovery Act of 1976 authorizes further research, development, and demonstration grants for new resource recovery systems and technologies, including not only capital intensive approaches suitable for large metropolitan areas, but also less sophisticated, small-scale approaches, better suited to smaller cities and other less densely populated areas. Also authorized is a study of problems and alternative methods for the use of sludge, including agricultural applications and energy recovery.

Subtitle D of the 1976 Act calls for development and implementation of state or regional solid waste plans pursuant to federal guidelines which must consider, among other things:

- types of resource recovery facilities and resource conservation systems which are appropriate; and
- available new and additional markets for recovered materials.17/

The plans must provide:

- that no local government within the state shall be prohibited under state or local law from entering into long-term contracts for the supply of solid waste to resource recovery facilities;
- for such resource conservation and recovery and for the disposal of solid waste in sanitary landfills or any combination of practices as may be necessary to use or dispose of such waste in a manner that is environmentally sound.18/

To assure rapid dissemination of new ideas and technologies from research, development, and demonstration to the state and regional level, the Act calls for creation of Resource Recovery and Conservation Panels within EPA to provide assistance in the financial, marketing, technical, legal, and institutional aspects of resource recovery and conservation programs.19/ The Secretary of Commerce is directed to encourage greater commercialization of proven technology for resource recovery by providing:

- accurate specifications for recovered materials;
- stimulation of development of markets for recovered materials;
- promotion of proven technology; and
- a forum for the exchange of technical and economic data relating to resource recovery facilities.20/

The Act also requires that federal procurement policies give a preference to goods and materials composed of the highest percentage of recovered materials consistent with performance standards.21/

1.4 Hazardous Waste Management Systems

The next element of a comprehensive residual waste management plan is a set of special provisions for handling hazardous wastes. The general categories of hazardous wastes are: toxic chemical, flammable, radioactive, explosive, and biological. They may take the form of solids, sludges, liquids, or gases. They derive from industry (the greatest source); certain federal facilities (notably Department of Defense installations); agricultural activities using pesticides; hospitals; and laboratories, among other sources. EPA estimates that the generation of nonradioactive hazardous waste is approximately 25 million tons per year. Although this is only a small fraction of the nation's solid wastes, hazardous wastes pose serious chronic and acute threats to health and the environment.22/

A hazardous waste program should be a subsystem of the larger residuals management system--parallel to it in many respects, but separate and distinct. In every phase from generation through disposal, each hazardous waste must receive the special handling called for by its peculiar characteristics, and special procedures must be followed to assure that it does not at any point enter the general waste stream or otherwise leak into the environment. Subtitle C of the Resource Conservation and Recovery Act of 1976 creates a national program for dealing with hazardous wastes. It provides for identification of these wastes and, by means of a manifest system, for their tracking in commerce from point of generation to final disposition. All persons responsible for generating, hauling, treating, storing, or disposing of hazardous wastes are made subject to regulations to be developed by the administrator of EPA, the broad outlines of which appear in the Act. No treatment, storage, or disposal facility may accept hazardous wastes except in accordance with a permit to do so. Provision is made for competent states to take over administration of the program.23/

By way of further introduction, it should be noted that there are similarities between the approaches recommended in the remainder of this chapter and the regulatory scheme for hazardous wastes outlined in the Resource Conservation and Recovery Act of 1976. These similarities should not be surprising. In a very real sense, all wastes are "hazardous" if disposed of improperly.

Section 208 requires states and designated areas within states to plan and implement programs to resolve any water-related residual waste problems they may have. Due to this emphasis on the protection of water resources, section 208 planning deals not so much with the waste reduction and resource recovery strategies discussed above, as it does with programs and policies for the environmentally sound landfilling and land application of residuals, as discussed in the remainder of this chapter. Needless to say, however, a reduction in the amount of residual, non-recyclable wastes will reduce the threat to water as well as to land resources, and it is for this reason that waste reduction and resource recovery strategies have been outlined here. Further references to the Resource Conservation and Recovery Act of 1976 are based on the expectation that this legislation will necessitate significant changes in many existing state and local residual waste management programs.

2.0 Regulation of Sanitary Landfills

Provisions for ultimate disposal will have to be included in every residual waste management plan, for while resource recovery will greatly reduce the volume of residues, some will always remain. Accordingly, this section is devoted to regulation of sanitary landfills. The next section extends the discussion to the handling and disposal of sludges.

There are some 18,500 known land disposal sites in the United States, of which fewer than 6,000 meet existing state regulations. It is questionable whether even sanitary landfills in compliance with current best management practices can avoid posing threats to groundwater supplies from potential leachate damage.24/

Even more troublesome is the large but uncalculated number of open dumps. Under subtitle D of the Resource Conservation and Recovery Act of 1976, state and regional plans must provide for the closing or upgrading, under compliance schedules, of all open dumps identified in the planning area.25/ This requirement, coupled with EPA's ban on ocean dumping of sludge by 1981, puts new pressure on land disposal systems.

2.1 Planning

2.1.1 The Planning Requirement

The United States is in the midst of a waste disposal crisis. A study conducted in 1973 by the National League of Cities/United States Conference of Mayors predicted that almost half of our cities would run out of then-existing disposal capacity within one to five years.26/ Meanwhile, potential sites that can meet strict environmental criteria for landfill disposal are allowed to disappear in the path of suburban development. This state of affairs reflects the failure of government to adopt and implement waste reduction and resource recovery programs; to identify and reserve sufficient disposal sites for future needs; and to coordinate planning for development with planning for residuals management.

As already noted, section 208 of the Federal Water Pollution Control Act Amendments of 1972 and subtitle D of the Resource Conservation and Recovery Act of 1976 call for comprehensive solid waste management planning, both at the state and regional levels. A number of states already have legislation directing their department of environmental protection (DEP)* to prepare statewide solid waste management plans that address present and projected needs of the state, promote regionalism, and encourage implementation of resource recovery to the maximum practicable extent. Consistent with these policies and with regulations of the DEP, localities are then required to draft plans for disposing of waste originating within their respective borders. Local plans must be submitted to the DEP for its approval. Within this general framework, two states whose planning requirements merit examination in some detail are Connecticut and New Jersey.

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*The term DEP will be used in this chapter to denominate a state's cabinet-level agency responsible for the state residual waste management program. Individual state's agencies will, however, be called by their actual names.

Under the Connecticut Solid Waste Management Act, 27/ the commissioner of the state DEP had to prepare a solid waste management plan for the entire state. The current Connecticut plan, completed in 1973, sets forth criteria for solid waste management, with particular stress on resource recovery, and suggests approximate locations for regional resource recovery plants and sanitary landfill sites. The plan is not mandatory, nor is it site-specific. It was felt that local or regional agencies would be in a better position to prepare site-specific plans for their jurisdictions than more remote, state-level authorities. Connecticut law makes each municipality responsible for disposing of its own wastes, in accordance with either a local plan or a regional plan prepared jointly with neighboring communities.

The recently enacted New Jersey law 28/ designates each county and the Hackensack Meadowlands Development Commission as a solid waste management district and vests each with the power, singly or jointly with one or more other districts, to develop and implement a plan that meets the needs of every municipality. District plans must meet objectives, criteria, and standards set forth in a statewide solid waste management plan to be prepared by the state DEP. Connecticut encourages regionalism, particularly through the Connecticut Resources Recovery Authority but leaves to each locality the final decision whether or not to join in a regional program. The New Jersey act is superior inasmuch as it assures that solid waste management is undertaken at least at the county level. Moreover, the New Jersey law reserves to the DEP the power to order any district to develop a joint program with one or more adjacent districts.

The scope of required planning is similar in the two states. The Connecticut act defines "solid waste management plan" as "an administrative and financial plan for an area which considers solid waste storage, collection, transportation, volume reduction, recycling, reclamation and disposal practices for a twenty-year period, or extensions thereof."29/ The act envisions local plans that specifically designate future disposal sites. Guidelines issued by the DEP to assist municipalities in developing their plans require that these include information on the specific disposal areas to be used, on the environmental problems associated with each site, and on the actions proposed to remedy or avoid those problems.

The New Jersey Act specifies 10-year plans with provisions for automatic review at least once every two years. District or regional plans must be prepared with the assistance of advisory solid waste councils (including mayors or their designees, persons engaged in the collection and disposal of wastes, and environmentalists) and after consultation with county or municipal agencies concerned with water pollution control, water policy and supply, zoning, and land use control. Before plans can be adopted, public hearings must be held on them. Every district plan must include a waste inventory; future waste projections; an inventory and appraisal—including the identity, location, and life expectancy—of all solid waste facilities within the district; and an analysis of existing collection

and transportation routes. Furthermore, every plan must designate such additional sites, both suitable and available, as may be needed for solid waste disposal.

By requiring identification of prospective landfill sites, a state can exert pressure on its local governments to confront and resolve, at the planning stage, the major political, economic, and environmental difficulty in the way of rational solid waste management: where to put the wastes. On the other hand, once a site has been designated, the costs of acquiring it (if it is not already publicly owned) may be pushed upward by speculative pressures. Accordingly, statutes or regulations should permit the designation of several potential sites, or better still, furnish state aid for advance acquisition of the most suitable ones.

Both Connecticut and New Jersey require the submission of approvable plans by a fixed deadline. But Connecticut law is deficient in that it provides no action-forcing mechanisms to assure that adequate plans will be prepared and implemented. In New Jersey, by contrast, if deficiencies in a local or regional plan are not corrected when noted by DEP, or if no plan is submitted to DEP, the commissioner is authorized to impose on the defaulting district a state-prepared plan, after consultation with other interested state agencies.

2.1.2 Implementation and Enforcement of Plans

The New Jersey act prohibits its DEP from approving the registration of any new facility that is not in conformity with the relevant district or regional plan. More loosely, Connecticut's Solid Waste Management Regulations provide that permits for solid waste facilities may be denied if the commissioner determines that the facility does not reasonably comply with the municipal or regional authority's 20-year solid waste management plan. In practice, however, the Connecticut Office of Solid Waste, like that of Pennsylvania, is inclined to issue a permit for any landfill that is located and will be operated according to sound environmental principles, whether or not the location and service area are consistent with a previously approved local or regional plan.

The practice of permitting facilities not in conformity with existing plans reflects the limited role which solid waste agencies (SWAs)* may prefer to play in the process of choosing among alternative land uses. Adjacent landowners, often backed by politically sensitive municipal governments, are stirred by the vision of malodorous and rat-infested dumps as long-term neighbors, and succeed in delaying, if not preventing, the establishment of new sites when and where they are needed. Under these circumstances, a number of SWAs feel that their task is a technical, nonpolitical one:

*The term SWA will be used in this chapter to denominate an agency, usually within a DEP, directly responsible for the state solid waste management program.

-o issue permits for any suitable sites approved by local zoning boards, without regard to the rigidities of any pre-existing solid waste plans. This is a questionable practice. Planning need not inalterably fix the course of solid waste management for 10 or 20 years, but departures from originally adopted plans should emerge from a legislatively mandated process for periodic reappraisal and revision. To allow the state permitting agency to stray from existing plans on an ad hoc basis is to undercut the efficacy of planning as a management tool.

Most states have confined themselves to a reactive role with respect to the siting of new facilities: when local governments propose sites, the state approves (or disapproves) them. But too few sites have been agreed upon in this manner. Just as states may need the power in reserve to plan for non-complying localities, so may they have to override local vetoes to implementation of plans. Provisions affording such powers to state agencies and establishing the supremacy of state solid waste programs over the local zoning power should be included in legislation so as to avoid unnecessary delay.30/ State DEPs should be empowered, as a last resort, to condemn sites for landfills or other facilities and to contract out for their operation. This power could be used to promote regionalism in situations where one locality balks at playing host to a regional landfill. In Wisconsin, the state has title to the solid waste, determines where it will go, and can require any municipality to join in a regional solid waste management scheme.31/

Localities are often reluctant to join regional solid waste management arrangements for fear of being stuck with the regional facility. Georgia is an example of a state that encourages local obstruction to regionalism by requiring approval of a receiving county's board of commissioners before another county's solid waste may be imported for disposal. In contrast, the New Jersey Supreme Court held in Southern Ocean Landfill v. Ocean Township 32/ that a municipality could not close down its landfill to wastes originating in other municipalities, characterizing such an action as "offensive to the concept of regionalization of facilities, one of the key provisions of the Solid Waste Management Act." The New Jersey act gives DEP the power to order any district to develop a joint program with one or more adjacent districts providing resource recovery facilities. Among its powers aimed at promoting regionalism, DEP is authorized to arbitrate the location of a regional landfill. In any event, a district must pay its fair share for facilities located in another district.

Another significant impediment to regionalism may be the ability of one locality to pull out of a regional plan, leaving the others in the lurch. To avoid such occurrences, state law should not only require regional plans, but should make compliance with them mandatory. The next best solution would be to encourage cooperating localities to sign legally binding agreements as early in the planning process as possible. In addition, every state law should include a provision preventing any locality from withdrawing from a regional scheme unless all participants have economically and environmentally acceptable alternatives.

Once the guidelines for identification of regions have been drafted by EPA pursuant to Section 4002(a) of the Resource Conservation and Recovery Act of 1976, all states will have to take the initiative in designating solid waste management regions, a step which some states have not taken because of strong traditions of local independence.

A final impediment to the implementation of plans comes from the various limitations, found in state or local law, on a locality's power to enter into long-term contracts for the disposal of solid waste. For example, Georgia law prevents any board of commissioners from binding a county beyond its own term of office. Such provisions discourage the private sector from making the large capital investments needed to open and operate modern facilities. The Connecticut act provides that any municipality or regional authority may make contracts for solid waste handling for a period of up to 20 years. Section 4003(5) of the Resource Conservation and Recovery Act of 1976 stipulates that, as one of the minimum requirements for approval, state or regional plans must "provide that no local government within the State shall be prohibited under State or local law from entering into long term contracts for the supply of solid waste to resource recovery facilities." State laws should contain similar provisions respecting waste flows to sanitary landfills.

The George Solid Waste Grant-in-Aid Program incorporates a noteworthy incentive to promote regionalism and resource recovery. Funds are awarded on a 50/50 matching basis, up to a maximum of $50,000 per applicant, for equipment costs and other items, excluding land acquisitions, planning, and recurring costs. The limited funds are awarded to applicants on the basis of a priority point system which favors regional facilities if supported by interlocal agreements documenting the responsibility of each jurisdiction for operating and financing the system; equitable user charges based on the volume and type of garbage, if these fees provide a minimum of 50 percent of annual expenditures; and implementation of a continuous, systematic recycling program.33/

2.1.3 Site Selection and the Planning Process

Perhaps the most important element of solid waste planning is the identification of specific disposal sites to meet present and future needs of the community. After projecting the types and volumes of waste that will have to be disposed of over the life of the plan, the responsible agencies should proceed to set aside sufficient suitable landfill capacity.34/

In furtherance of their planning responsibilities, local or regional solid waste management agencies ought to conduct reconaissance level studies resulting in establishment of an inventory of apparently satisfactory sites. The studies should encompass existing and projected land uses in the planning area in order to relate waste sources to disposal locations.35/

The first set of criteria to be applied in assessing a site's suitability for a landfill concerns its renovative properties: whether it can absorb leachate without contamination of ground or surface water. But the science of determining renovative capacity is still imprecise. This depends on a number of variables, primarily the amount of rainfall, the geology and topography of the site, the permeability of underlying soil and rock formations

and the proximity of the water table. The amount and concentration of leachate will also depend on operating practices, such as the types and pretreatment of wastes accepted at the site; the mix, depth, and compactness of wastes as buried; and the amount, compactness, and permeability of the soil cover.

State DEPs should be authorized by statute to specify the characteristics, whether natural or engineered, which sites must or must not possess in order to receive operating permits. These specifications would represent the agency's educated guess, on the basis of the best available scientific and technical knowledge, that conforming sites operated according to best management practices will meet the state's environmental standards. Section 4004(a) of the Resource Conservation and Recovery Act of 1976 defines "sanitary landfill" as a facility which poses "no reasonable probability of adverse effects on health or the environment." If this rather vague performance standard is interpreted to mean that the facility must discharge no leachate, then the act sets a standard that is very difficult, if not impossible, to meet. But the best chance of approaching it is by wise initial siting. (For a fuller discussion of performance standards see section 2.2.3 entitled "Operating and Performance Standards.")

In view of the imprecise state of the science, it remains to be determined just how siting regulations should be drafted. Regardless of the characteristics of underlying soil and rock formations, some states require a minimum vertical distance between the maximum water table elevation and the lowest elevation of the contemplated landfill, ranging from 2 feet in Delaware to 10 feet in Minnesota and Wisconsin.36/ Michigan law contains several specifications for various types of soil, bedrock, and water situations.37/

A set standard based on any one factor, such as soil permeability or distance from the water table might be too strict for some sites and too lax for others. This approach may be workable in states such as Georgia and Illinois which are blessed, virtually statewide, with relatively impermeable natural clay and glacial till, respectively; but it may not work in a state such as Pennsylvania with its more varied soil types and underlying fractured bedrock, or New Jersey with its many different site characteristics and heavy rainfall. In fact, until enough reliable data is assembled to compute a standard which is a function of all relevant variables, the best approach to site selection in most areas may be a fairly general standard of maximum feasible leachate containment, administered through a case-by-case permit system.

Pennsylvania's Department of Environmental Resources, for example, takes a very liberal approach, rarely if ever rejecting a proposed site as unsuitable per se, but only requiring employment of whatever engineering and operating techniques it deems necessary to assure that operation

will not cause water pollution or other environmental harm. Regulations might contain only a few basic prohibitions and minimum requirements. Or better, they might contain a nonexclusive list of the kinds of natural characteristics that will cause rejection of a permit application unless specifically designed around. This approach, coupled with the state's performance standard, should provide adequate notice of requirements to applicants and legally sufficient guidance for the exercise of administrative discretion by the permitting agency. (The due process function of standards is discussed in the "Legal Issues" section below, at section 4.2.)

While proper engineering and operation can minimize pollution, initial site selection remains the most critical factor. In assessing the suitability of potential sites, local planners and the state permitting agency must consider topography, hydrology, underlying soil characteristics, and geology. Leachate is not produced until all or a sizable portion of a landfill becomes saturated with water. Climatic conditions should accordingly be considered. Especially in areas of high rainfall, natural features which should exclude a site from consideration, unless specifically designed for, are hilltops and ridges, swamps and marshes, natural channels, and drainage basins.38/ Elements of landfill design, such as diversion from the site of surface watercourses and runoff by means of trenches, grading, and other engineering techniques can overcome many of these natural impediments.

Some states absolutely prohibit siting a landfill in a floodplain. Thus, the Colorado act provides that no landfill may be located within the area covered by the floodplain of the 50-year flood.39/ The Michigan statute provides minimum setback distances from bodies of water.40/ Another precautionary site selection practice might be to plot all aquifers in the planning area and to reject sites located above some or all of them. Florida's regulations prohibit the location of landfills on the banks of any stream connected to the Floridian aquifer.41/ Alternatively, some minimal degree of groundwater degradation might be recognized as unavoidable. Sites with subsurface drainage towards nearby, freeflowing streams might ordinarily be preferred, since they will pollute only limited zones of groundwater before the leachate enters a stream. Violations of surface water quality standards should not, however, be tolerated. Other factors bearing on a site's suitability for a landfill include:

- Accessibility--Candidate sites should have two or more all-weather access roads.

- Haul distance--Landfill sites should be located where they are closest to the sources of refuse, within parameters dicated by other site selection criteria. Where a regional landfill is planned, it should be equidistant from all point served, insofar as practicable.

- Availability of cover material--A suitable and adequate source of cover material should be available at the site or at an economical haul distance from the site.

- Surrounding uses -- Landfills should be established only where they will be compatible with neighboring land uses, both existing and planned. From the standpoint of aesthetics, landfills should not constitute public eyesores, especially to residents of nearby housing. One study recommends a distance of at least 300 meters from the nearest thoroughfares unless adequate shielding is provided by natural barriers or manmade structures. It is also recommended that landfills be located downwind from human activity and residences wherever possible to avoid odor and noise nuisance.42/

Site selection must also consider present and projected groundwater uses in the vicinity. The pumping of groundwater can actually attract a leachate plume from a landfill site. Minnesota's regulations prohibit location of a landfill within one mile of a municipal well or water intake.43/ Florida prohibits establishment of a landfill within 200 feet of a habitation or place of business served by a public water supply or within 1,000 feet of one that depends upon a shallow well supply.44/ Still, it would also help to have reasonable restrictions on groundwater withdrawal rights established by state law.

Application of the foregoing criteria requires coordination of planning for solid waste management with planning for land use development. Land in the vicinity of projected facilities should be zoned for compatible uses only, and, as part of an overall program of groundwater allocations, states should also undertake to regulate the sinking of wells in the vicinity of landfills. Coordination of solid waste planning and land use planning will also rationalize decisionmaking as to the ultimate use of landfill sites after closure. Finally, sites suitable for use as landfills should be acquired for future needs. While land banking requires large outlays of public revenue when undertaken, it has the long run benefits of lowering land acquisition costs, improving planning, and assuring that environmentally sound sites will be available when needed. State laws should authorize and fund government acquisition of lands to meet long-term needs, and especially to preserve scarce impermeable sites which are ideally suited to receive hazardous wastes.45/ (See the American Law Institute's A Model Land Development Code.)46/

2.1.4 Site Selection Implications of Liner Technology 47/

The use of impermeable liners for landfill sites is theoretically a zero-discharge technology which is not based on natural renovation. If and when liner technology is perfected, it could vastly increase the number of suitable landfill sites. Higher site preparation costs might then be offset somewhat by reduced hauling costs.

Use of this technology turns the disposal site into something like a bathtub. The bottom of the excavation is sloped to a sump where a pump is installed, and the resulting leachate is collected for treatment. However, while many of the materials used as liners have been used in other similar applications (such as reservoirs and industrial holding ponds), it is still uncertain how they will hold up over the long term in the chemically active environment of

a landfill. Materials that are usually considered inert, such as clay and polymeric membrances, may react with the leachate. Liner failure, whether from chemical degradation or from accidental puncture in the course of installation or operation, could result in worse pollution than if no liner had been used at all, since large concentrations of leachate would then be channeled to one small area outside the liner. Leak detection devices have not been perfected and do not pinpoint the location of a failure with any precision. Even if the location of a leak were identified, the repair process, including removal of filled waste, would be expensive and might result in further damage to the liner. In any case, use of double liners is therefore recommended. Leachate is exceedingly difficult to treat separately, and if discharged into sewerage systems, it may well upset central treatment processes.

Use of liner technology is, therefore, a controversial matter. Pennsylvania permits the use of liners for collection and treatment of leachate. Connecticut does not, because it is not convinced that liners are reliable over the long term. In Connecticut, plans for landfill disposal must accordingly rely on the natural renovative capacity of the soil.

2.2 Permitting

Subtitle D of the Resource Conservation and Recovery Act of 1976 specifies as one of the minimum requirements for approval of state solid waste management plans that they "provide for the establishment of such state regulatory powers as may be necessary to implement the plan." Unlike subtitle C, which calls for a permit system to regulate the handling and disposal of hazardous wastes, greater latitude is afforded the states in their selection of management strategies for other, potentially less dangerous classes of wastes. Nevertheless, most states regulate solid waste disposal through some form of permit program, and this is the approach recommended here. The case-by-case permitting of individual sites puts the burden on each applicant to show he has an acceptable site and operating plan; provides a convenient forum for the public to participate in determining whether particular sites should be allowed; and enables certain requirements, such as final contours and operating plans, to be tailored to the pecularities of each site, while reinforcing the applicability of general regulatory standards to all sites. In fact, permits play an indispensable role in the implementation and enforcement of solid waste management laws and regulations.

2.2.1 Permit Requirements and Issuance Procedures

Typically, the laws of the more advanced states make it mandatory to secure a permit for any solid waste facility that will be established or altered after a statutorily fixed date. Permit issuance signifies approval by the commissioner of the DEP of the site reconaissance plan, design plan, and operating plans. It may--or should--also signify proof of financial responsibility submitted by the applicant. (The elements of the permit application are discussed later in this section.) It represents, moreover, the issuing agency's considered opinion that the facility, as situated and designed,

can be expected to meet the statutory performance standards for environmental impact, especially on ground and surface waters, if run in accordance with operating standards. (Operating and performance standards are discussed later in this section.)

In Connecticut, applications for permits are considered by the Office of Solid Waste (OSW) and the Office of Water Compliance within the DEP. A permit from the OSW is always required to open a landfill. A permit from the Office of Water Compliance is also required if a new site is expected to discharge leachate to ground or surface water. To avoid entangling an applicant in a web of bureaucracy, however, a one-stop permit system might be preferable. Georgia has adopted a lead agency concept, with the Land Protection Branch of its Department of Natural Resources circulating the application and consulting with other interested agencies.

In Connecticut, the commissioner of the DEP must inform an applicant of the decision on his permit within 60 days of receiving it or within 120 days if the commissioner gives notice of such extension. An application may be denied where the commissioner determines that the facility will not be operated in compliance with law, that the location is environmentally unsuitable, or that the facility does not reasonably conform to the relevant local or regional authority's 20-year plan. Notice of denial must set forth the specific reasons for the action taken, and is considered an order of the commissioner for purposes of administrative appeal. Any person aggrieved by an order of the commissioner is entitled to a full due process hearing under the "contested case" provisions of the Connecticut Administrative Procedure Act.

Connecticut's statute does not require a public hearing to be held on a proposed issuance or denial of a permit application, and applicants usually are not interested in having one. But local residents are likely to become informed of the pendency of an application, and if a public hearing on the application is demanded, the OSW will hold one. The OSW gives no notice of this possibility. The argument against holding a hearing is that the municipality in which the site is located must already have approved its use as a landfill, as a matter of local land use policy and in accordance with whatever local procedures exist for public participation. A further hearing at the state level would therefore be redundant. On the other hand, a public hearing before the state agency would afford interested citizens an opportunity to challenge the permit on purely technical grounds, or on the basis of representations made in the permit application. Moreover, though a public hearing may not be constitutionally required, it may be good public policy to hold one because of the controversial and politically sensitive nature of landfill siting decisions. (Procedural due process rights of applicants and third persons are discussed under "Legal Issues", sections 4.2 and 4.4 below.)

In Texas, a public hearing is required by the state water quality law before its state water quality board can issue a discharge permit.48/ In Wisconsin, environmental impact statements must be prepared on large or controversial new landfills, and public hearings covering social and economic as well as environmental issues are part of the EIS process.49/ But the entire procedure takes approximately 18 months to complete and is expensive. It is worth noting here that the procedures advocated for handling "developments of regional impact" in article 7, part 3 of the American Law Institute's Model Land Development Code include a mandatory public hearing at the regional planning level.

2.2.2 Permit Terms and Conditions

A permit should, and ordinarily does, confer a revocable privilege upon the permittee to operate a landfill in compliance with all legal requirements. Permit issuance does not give the landfill operator a vested right to continue operations until the capacity of the site has been reached (or until expiration of the permit, in jurisdictions where a system of periodically renewable permits is preferred). Rather, permits may be revoked or modified whenever facilities fail to conform to the particular permit conditions or to the relevant statutes and regulations, which are incorporated by reference into each permit. Furthermore, landfills must comply with all legal requirements, including both operating and performance standards, whether or not these are already in force at the time particular permits are issued. In the exercise of its police power to protect the public health and welfare, including the integrity of its natural resources, a state cannot be estopped from changing its regulatory requirements or even from closing down polluting landfills, regardless of what the originally issued permits may say (see section 4.1 below.)

The commissioner of a DEP should be authorized by statute to promulgate regulations governing solid waste management practices in the state; to impose site-specific preconditions on approval of a landfill; to modify a noncomplying facility's permit by ordering alteration of operating practices or addition of remedial design features to bring the facility up to standard; and, if a polluting condition is deemed irremediable, to order the facility's closure. (For a fuller discussion of the commissioner's power to order modification or revocation of a permit, see section 2.4.1 below, entitled "Enforcement Procedures.") In the exercise of these powers, the commissioner's discretion is confined by the legislative purpose of preventing injury to public health and environmental quality and should be guided by the best scientific and technical knowledge available.

Should permits be issued for the life of the site, or should they be periodically renewable? As we have just noted, permit issuance does not give the landfill operator a vested right to operate. Rather, he may be ordered to modify or cease operations whenever the facility is found to be in noncompliance

with any legal requirement. Under these circumstances, a system of periodically renewable permits might be redundant if continual monitoring procedures are adequate. Even if the burden of proving compliance were placed on the permittee, the task of reviewing renewal applications might tax the resources of a solid waste agency to no particular advantage. In Conrecticut, the OSW issues permits for the life of the site. Permits issued by the DEP's Office of Water Compliance are reviewed perfunctorily every five years as required by the state water quality laws, and can be amended to impose new operating requirements. In Wisconsin, permits are reviewable every several years, the burden of proof being on the permittee. In South Dakota, a conditional permit is issued for a one-year period, after which time it is made into a permanent permit. It would appear to be sound procedure for initial approval of a permit application to be made conditional on development of the site in accordance with design plans. The permanent permit could then be granted following a satisfactory inspection.

2.2.3 Operating and Performance Standards

As noted above, permit issuance should be based on the DEP commissioner's estimation that the facility, as it is situated and designed, will meet all legal requirements. Retention of a permit once issued should be conditioned on the facility's demonstrated conformity with those requirements. Specifically, all landfills should be evaluated on the basis of their compliance with operating and performance standards.

Operating standards, as set forth in the statute, regulations, and in each facility's permit, comprise the management practices which must be followed at the site itself. One notable example of an operating standard is the requirement that the landfill's active working face be covered at the close of each day. This practice is so basic to the operation of a sanitary landfill that it should be required by a generally applicable regulation, as one of many best management practices (BMPs). (For a fuller discussion of the BMP concept see chapter 6 , dealing with stormwater, section 2.1). The practice of incorporating the whole body of solid waste agency regulations into operating permits is a convenient way of subjecting all facilities to a range of BMPs. Depending on their subject matter, they may be in the form of universal requirements and prohibitions, or they may be general statements of principles to be applied on a site-specific basis. In addition, particular operating requirements may be imposed on a facility because of peculiar characteristics of the site. (Operating standards are also covered in the discussion of elements of the permit application later in this section.)

Performance standards, as prescribed in the statute and regulations, specify how the site as a whole should perform with reference to its impact on the environment. The site selection process, design elements, and operating standards are all aimed at assuring that the facility meet the legal performance standard. Conceivably, performance standards might be met even if not all operating standards are met, but the reverse is more likely; despite compliance with all operating standards, the landfill still may discharge unacceptable quantities of leachate. Dealing with this type of problem is a difficult matter, but before exploring it, the concept of the performance standard itself merits some discussion.

The question of how to define the performance standard is the single most important and difficult question in the field of landfill regulation. At a minimum, statutes should prohibit operation of any landfill which--perhaps beyond some mixing or attentuation zone designated in the permit--will result in degradation of ground water quality beyond the physical, biological, and radiological levels for raw or untreated sources of drinking water supply specified in the National Drinking Water Standards (including future additions and modifications) adopted pursuant to the Safe Drinking Water Act.50/

Most states have adopted a strict policy of nondegradation of ground and surface water as their official performance standard.51/ Nevertheless, it is generally recognized that few, if any, landfills which rely on natural renovation will perform at the zero-discharge level. Connecticut, for example, applies a more flexible standard. It incorporates a leachate allowance into each facility's permit. Expressed in terms of gallons per day of leachate, the allowance is set with an eye to keeping groundwater quality above the federal drinking water standard.

Pennsylvania has also adopted the nondegradation standard. In practice, however, that state's Solid Waste Management Division of the Department of Environmental Resources allows each naturally renovating landfill a "mixing" zone--an area beneath and around the active portion of the landfill in which leachate can (at least in theory) be assimilated and renovated as it passes into and through waterbearing strata. The Solid Waste Management Division allows groundwater degradation within the bounds of the mixing zone. Where BMPs are followed and leachate is found beyond the mixing zone, enforcement action may still not be taken if groundwater meets the drinking water standard. And even some level of degradation below that standard may be tolerated if no existing water withdrawal use is impaired or threatened.

Unfortunately, neither the leachate allowance nor the mixing zone approaches are really satisfactory. As noted, Connecticut's leachate allowance is expressed in terms of gallons per day, but this is an impossible standard to monitor. A naturally renovating landfill is not a point source, and there is no single place at which to measure the volume of leachate produced. Secondly, the negative impact of leachate is a function of both volume and concentration, and any leachate allowance should comprise both elements, not volume alone. The Pennsylvania mixing zone approach runs into the same problems noted earlier with reference to site selection. Each landfill has its own natural mixing zone, depending on the natural physical characteristics of the site, climatic conditions, engineered site modifications, the characteristics of the wastes disposed of, operating practices employed, the extent of groundwater use outside the landfill, and other imponderables. The imprecision of current scientific knowledge makes the determination of the extent of a natural mixing zone an exercise in educated guessing. It is possible that some sites will have no mixing zone at all. Moreover, even if its extent could be determined, monitoring problems will arise. Since no one can know exactly where a leachate plume will break out, it cannot be assumed that monitoring wells on the periphery of the site will necessarily detect groundwater pollution beyond the zone.

Of the two approaches discussed, the use of mixing zones appears to be the more realistic alternative to the nondegradation standard. Once given legal status, natural mixing zones might be determined for each site, with a margin for error. The operator would then be obliged to acquire a buffer coextensive with the zone by purchasing the necessary marginal lands or easements. For its part, the state would have to regulate withdrawal of groundwater in order to assure that leachates continue to be quarantined within the zones allowed for their assimilation.

Another approach to the performance standard problem would simply require maximum practicable containment of leachate, whether by natural or artificial means, for every facility. The rationale underlying this approach is that the myth of zero discharge must first be dispelled (except where full collection and treatment of leachate are feasible) before sites can be selected, designed, and operated with a view to minimizing--not eliminating--environmental damage. For example, a site with subsurface drainage toward a nearby free-flowing stream might be the environmentally least harmful alternative, because it limits groundwater pollution to the space between the site and the stream. Of course, state water quality standards would still have to be met, and serious objections may also be posed to locating new landfills on riparian wetlands or flood plains. But at least some sensible alternatives might become available if state officials and operators were no longer bound by unattainable zero-discharge and anti-degradation standards. To hold that no degradation can be tolerated is tantamount to saying that virtually all landfills should be closed down and no new ones created--a possibility clearly envisaged by the new federal act, but not likely to be realized until resource recovery and recycling have reached the point of supplanting land disposal of wastes.

2.2.4 Elements of the Permit Application

Applicants for permits to operate landfills, whether public or private, should be required to submit complete site reconaissance plans covering the elements discussed in the preceding section on site selection. Where land-capability studies and inventories have already been conducted by the responsible local or regional agency in consultation with the solid waste agency, the application process will be expedited. All applications should conform to regulations specifying required form and content. The regulations should also require applicants to conduct tests, take samples, sink wells, and make borings. EPA's Manual of Laws, Regulations and Institutions for Control of Ground Water Pollution includes regulations outlining specific data to be included in this element of the permit application.52/ In addition, advisory guidelines of the DEP can facilitate the process by informing applicants how to go about it, without compelling them to do so in a particular way. Thus, guidelines are more flexible than regulations and, unlike the latter, can easily be amended from time to time to take account of scientific or technical developments without going through the formal amending process typically prescribed in a state's administrative procedures act.

Preparation of a complete permit application can be a costly and time-consuming undertaking. Guidelines should encourage consultation with the solid waste agency before any engineering work is committed. In Connecticut, applicants may request that the OSW conduct a preliminary site survey. If the site looks favorable, the applicant is given a conditional approval contingent on the preparation, submission, and approval of a complete application, including a fully detailed site plan, and of the requisite design and operating plans.

The next element of a permit application consists of a proposed design plan for the landfill site. Drafting regulations on this subject is difficult because not much is yet known about the effectiveness of various design features in preventing or minimizing leachate. Uniform design regulations, which ignore the uniqueness of each site, may not be cost-effective, but different specifications for different types of sites may not be warranted either, and may constitute regulatory overkill. Recognizing this problem, Massachusetts provides a formal variance procedure from design regulations in order to accommodate individual cases. Case-by-case evaluation of each facility in light of more general statutory performance standards may well be the most reasonable approach, because it allows greater flexibility in design and operation. But a high level of engineering expertise is required in order to make this approach work fairly and effectively over a range of cases. The more detailed the regulatory specifications, the easier they are to apply in reviewing applications and to enforce in the courts. Perhaps a set of minimum specifications can be defined for all sites or for particular classes of sites, to be supplemented by whatever further measures may be necessary to meet performance standards.

Another critical element of a permit application is the proposed operating plan. Certain operating procedures may be generally appropriate for all landfills, and these BMPs should be enacted as solid waste agency regulations and incorporated by reference into every landfill permit. Operating plans should be required by regulation to cover such topics as daily flow control; measuring and unloading procedures; designation of specific disposal areas and methods of handling and compacting various solid wastes; placement and characteristics of daily and intermediate cover material; procedures for self-monitoring and reporting ground and surface water quality; procedures for litter, erosion, and vector control; contingency plans for fire and bad weather; staffing requirements and standards for the training of the various levels of personnel; and schedules for equipment maintenance. The operating plan should also include a closure plan specifying final cover and contours, ultimate land use if known, a continuing site monitoring program, and placement of vents for decomposition gas.53/

Several of the foregoing points are worth emphasizing. First, the operating plan should be required to specify exactly what wastes a particular landfill will be permitted to receive. Final authority to restrict the types of material that may be placed in an approved landfill should be granted by statute to the SWA. This practice will prevent hazardous wastes from being

disposed of at sites not certain to contain their highly dangerous properties. It will also conserve the capacity of the few highly impermeable landfill sites for the disposal of hazardous wastes by keeping out ordinary municipal wastes, incinerator ash, or inert construction wastes, except as may be required as foundation or mix for hazardous wastes. The solid waste agency should also be empowered to specify a volumetric ratio of solid to liquid wastes for each site. Permits should specify what categories of waste a particular site may accept, and should indicate, whether by reference to regulations or by site-specific permit terms, how each category is to be handled. The California Hazardous Waste Management Act, for example, provides for differentiating between categories of wastes and classes of landfill sites, and a classification system was accordingly formulated by that state's Department of Water Resources.54/

Another aspect of a facility's operating plan concerns the closure of the site when its design capacity has been reached (or earlier if the site cannot be made to meet performance standards). Since buried wastes will continue to decompose for years after disposal operations have ceased, it is important to assure that facilities are closed in such a way as to discourage saturation or erosion, or other conditions favoring the formation of leachate and its escape into the environment. A good closure plan will respond to regulations requiring the placement of vents for decomposition gas, the application of final cover, seeding, grading, and contouring, and other reclamation work. The plan will also furnish guarantees--through performance bonds, escrow accounts, or otherwise--that sufficient funds will have been set aside to meet closure and post-closure requirements. (For a discussion of the monitoring aspects of the closure plan see section 2.3, below.)

The final elements of the permit application relate not to the site itself, but to the qualifications of the operator and his employees, and to the legal and financial responsibility of the owner or operator of the facility. To assure that the operation will be run professionally, by people trained in the field of sanitary engineering, prospective operators should be required to prove that they and a sufficient number of supervisory personnel have the requisite qualifications. Connecticut's regulations provide that a certified operator or his designee must be at the site whenever it is open. The Connecticut act makes the qualifications of operators subject to the approval of the commissioner.55/ Operators are required to pass an examination testing their knowledge of approved operational procedures. Operator certificates are valid for a two-year period and are revocable, following a hearing, for noncompliance with state laws and regulations. To renew an expired certificate, operators must have completed an ongoing training course. A combined training and certification program should help promote environmentally sound operations and job safety, not only by disseminating technical information but by instilling in personnel a sense of pride in and responsibility for their work.

The permit application is also the best vehicle for assuring that the

owner or operator is financially solvent and able to meet both regular and extraordinary operating expenses. Private operators, especially, might well be expected to insure against the risks that are inherent in their business and to post performance and closure bonds guaranteeing some or all of the following: indemnification of those who may be injured by landfill operations; clean-up or provision of alternate water supply to injured well owners; other remedial action on or off the site as required; and full performance of the closure plan. The operator should be held responsible not only for compliance with the initial engineering aspects of the site closure plan including grading, final cover, and seeding but also for the cost of post-closure monitoring, remedial work, and any damages which result. Operators might also be asked to agree, as part of the permitting procedure, to remain personally subject to state court jurisdiction. Alternatively, some of the foregoing financial responsibilities and liabilities could be met by means of a state environmental fund. Statutes might provide that part of current operating revenues be used to purchase ongoing performance and closure bonds, or be deposited in a state environmental fund on which the state or injured parties could draw to correct or compensate for damages arising from landfill operations.

Under Pennsylvania's Clean Streams Act, 56/ landfills with leachate collection and treatment must post a 10-year collateral bond for closure. The bond is collected either at the time the permit is issued or piecemeal during operation. For sites without leachate collection and treatment, the act requires only a one-year closure plan. This period is not only unrealistically short, but also has the practical effect of making the Solid Waste Management Division wary of demanding remedial measures which the operator will not certainly be able to afford, lest he abandon the site leaving the state with the full cost of curing the defects. (Closure procedures are further discussed in section 2.3, below, "Monitoring.")

Finally, some form of no-fault insurance would be desirable to protect operators or owners who may be held strictly liable for injuries even if they are not to blame (e.g., injuries occasioned by surreptitious nighttime dumping of hazardous wastes at the site). Georgia holds the owner of a leased site secondarily liable for damages resulting from the landfill operation. Where this is the law, the owner's potential liability should be clearly spelled out beforehand, perhaps by making him a copermittee with the operator.

2.2.5 Permitting of Old Landfill Sites

Subtitle D of the Resource Conservation and Recovery Act of 1976 specifies, as another minimum requirement for approval of state plans, that they "provide for the closing or upgrading of all existing open dumps within the State . . . ." The act directs the administrator of EPA to promulgate regulations containing criteria for distinguishing between sanitary landfills and open dumps: "At a minimum, such criteria must provide that a facility may be classified as a sanitary landfill and not an open dump only if there is no reasonable probability of adverse effects on health or the environment

from disposal of solid waste at such facility." 57/ The administrator is further required to compile and publish an inventory of all facilities in the United States that are open dumps within the meaning of the act. Each state plan will have to contain a requirement that all listed open dumps be upgraded to sanitary landfills if not closed down. Where no waste disposal alternatives exist, then upgrading or closure of open dumps must be governed by a timetable "which specifies a schedule of remedial measures, including an enforceable sequence of actions or operations, leading to compliance with the prohibition on open dumping of solid waste within a reasonable time (not to exceed five years from the date of publication of this inventory . . .)." 58/ These provisions are bound to raise substantial regulatory problems for states with old "landfills" that are suddenly reclassified as "open dumps" under the federal law.

In Connecticut, landfills which antedate passage of the state act are not ordinarily required to apply to the OSW for permits unless they are planning to expand operations. If the OSW finds that the expansion will result in significant new discharges, it will refer the application to the Office of Water Compliance (OWC) for issuance of a water quality permit. Or if a landfill violates water quality standards or otherwise interferes with existing water uses, a permit may be issued to the operator requiring him to upgrade his operating practices or to make such remedial design changes as will minimize pollution. Only if the violation of water quality standards or the interference with withdrawal uses cannot be corrected will the DEP take action to close down the site. Otherwise, neither the OSW nor the OWC seeks to regulate discharges from old landfills. Connecticut, like many other states, will probably have to amend its act to comply with the federal statute.

All state solid waste management programs should regulate pre-existing landfills through a comprehensive permit system. In this way, environmentally sound sites can be distinguished from both remediable and irremediable noncomplying sites. In all cases, permits can incorporate operating practices that are tailored to the particular site and can restrict the types of wastes they will henceforth be allowed to receive, thereby minimizing further damage to the environment. Design plans can be incorporated into permits, specifying remedial engineering actions and the final contours of the landfill. Except for the worst sites, immediate closure may prove to be counterproductive and will not be necessary if a state has in place a regulatory program sufficient to take advantage of the five-year compliance period in the federal act (see above). Where a locality or region makes a showing of necessity or hardship, even an irremediable site may be issued a variance indicating a definite date on which the facility will be closed. But in no event should such a variance extend beyond the five-year period permitted under the federal act.

2.3 Monitoring

Even the best-conceived regulations for site selection and permitting will prove ineffective in preventing environmental damage unless provisions are

also made for the monitoring of permitted facilities by a sufficient number of trained personnel. Monitoring responsibilities can be shared between agents of the solid waste agency (SWA) and the landfill operators themselves.

Regulations should provide that authorized agents of the SWA may enter at any reasonable time for the purpose of inspecting any facility and conducting any tests to assure compliance with relevant laws, regulations, and terms of the permit. Records which landfill operators are specifically required to maintain pursuant to SWA regulations should likewise be open to inspection. In accordance with their permits, operators should be required to sink monitoring wells where and as the SWA deems necessary; to collect and analyze samples periodically for leachate, running tests more frequently at hazardous waste disposal sites; to keep records of all testing data and to forward results periodically to the SWA; and to report at once to SWA any significant changes in water quality, or any special occurrences, including fires, explosions, flooding, injury, and incidents causing or threatening damage to life or property. To supplement and verify self-monitoring reports, the SWA ought to conduct its own periodic tests of groundwater.

Pennsylvania requires at least one well in each dominant direction of groundwater movement.59/ An additional monitoring well, installed and maintained in such a location as to provide comparative data on the background quality of the groundwater, is also advisable.

Responsibility for assuring that only permissible wastes are received for disposal at the site should be placed on the operator, who can be obliged to provide for inspection of wastes before disposal. Pursuant to the requirements of subtitle C of the Resource Conservation and Recovery Act of 1976 60/ hazardous wastes must not be accepted unless accompanied by a properly completed manifest indicating the name of the source; the process by which they were generated; a description of the wastes, including their type, composition, and hazardous properties; and special handling instructions. Operators should be required to maintain records of the type, volume, and origin of wastes received. They may have to do so anyway if, as may shortly be the case in New Jersey, they must pay "tipping fees" to the state in amounts based on the types and volumes of wastes received at the site. Record-keeping requirements for hazardous wastes should be even more exacting, including all information on the manifest, precise manner of handling, and ultimate location of disposal at the site.

Other requirements, aimed at helping the operator to keep out impermissible waste and to maintain adequate records of wastes accepted for disposal, should specify that the hours of operation be indicated at the facility gates, that a certified operator be present whenever the facility is in operation, and that adequate security measures be adopted to prevent surreptitious dumping.

To assure that all aspects of the closure plan are carried out, time-phased certificates of closing might be advisable. Under this system, an inspector would visit the site, list deficiencies, and give the operator a specified number of days to correct them before a second inspection. Following

correction of the deficiencies, the operator would be given a temporary certificate of closure. Subsequently, the solid waste agency would perform another inspection. The operator would be required to correct any further problems that might have arisen since the facility had closed or that had not previously been detected and remedied. Then a final certificate of closure would be issued. The closure bond would still provide funds to correct any deficiencies uncovered after issuance of the final certificate. Operators should be required to maintain monitoring wells throughout the closure period. These procedures would encourage operators to exercise care not only in the final site-closing, but also in their day-to-day operations during the life of the site.

Having in mind the various effects of waste decomposition which may manifest themselves after site closure, a number of states (including Connecticut) provide that when a permit is issued, a certified copy of it, including a detailed description of the site and a plat, must be filed on the land records of the county in which the site is located.61/ Copies of closure certificates, including cescriptions of the wastes buried at the site, should similarly be filed. This practice would provide future owners with adequate information regarding the previous use of the site. The SWA might also be authorized to warn present and future owners of neighboring sites that the pumping of groundwater may attract a leachate plume.

The Oregon statute tries to avoid the problems of subsequent use of a hazardous waste site by requiring its conveyance to the state before permission will be given to operate it for that purpose. The statute prohibits disposal of hazardous wastes upon real estate not owned by the state.62/ In general, it is a good idea for the state to own or to regulate future uses of sites that have ended their useful lives as landfills, whether for hazardous or supposedly non-hazardous wastes.

2.4 Enforcement

The primary objective of enforcement in this context must be the expeditious correction of landfill violations that threaten public health and environmental quality or, if necessary, the closure of facilities that fail or are unable to correct such violations. Enforcement procedures should be designed to promote consultation and cooperation between noncomplying operators and the solid waste agency as a first-line response to violations, and to avoid recourse to expensive and time-consuming adversary proceedings wherever possible. This amicable mode of law enforcement, aimed primarily at problem-solving rather than punishment, is particularly appropriate in view of the many unknowns and imponderables which persist in the field of landfill management. Thus, an operator may be in full compliance with BMPs and all other conditions of his permit imposed by the SWA, and yet still discover that his facility has failed to meet the performance standard. Under these circumstances, the best course of action would be for the operator and the SWA to pinpoint the source of the poblem and work out a solution together.

Even where an operator is guilty of a negligent violation of operating standards, penalties may not necessarily be in order. For example, where a facility has accepted an impermissible category of waste in violation of its permit, the appropriate response might be for the SWA to send an expert to train the operator, his supervisory personnel, or other employees in the means of distinguishing between various types of waste. Of course, this would not relieve the operator of liability for any damages sustained by third persons as a result of his negligence. Neither would it free him from the burden of undertaking whatever remedial action the SWA deems necessary. But, especially in those situations where a financially strapped operator is faced with costly corrective work, the imposition of penalties may prove counter-productive by reducing the operator's ability to retain qualified personnel and to repair equipment. Therefore, punitive actions should only be taken in cases of willful or repeated negligent violations of the law. While punitive measures should be reserved as a second-line response, their incorporation into the law is necessary as a disincentive to operators who persistently fail or refuse to bring themselves into compliance.

As we have noted, the Resource Conservation and Recovery Act of 1976 mandates the closure or scheduled upgrading within five years of all facilities identified as open dumps.63/ This provision can be expected to put new pressure on existing enforcement systems while some affected operators resort to delay and evasion. Compliance schedules should be backed by enforcement orders, and these backed in turn by the threat of closure and fines. Irremediable sites should be ordered closed as soon as practicable. Only in this way will public nuisances be abated and local governments truly compelled to consider regional approaches and resource recovery alternatives.

2.4.1 Enforcement Procedures

The state of Connecticut has adopted an effective enforcement system which combines the cooperative and punitive elements discussed above. When an Office of Solid Waste (OSW) inspector detects a violation, whether in the course of the routine inspection of a facility and its records or in response to a citizen complaint, he gives the operator a solid waste disposal area inspection report on which he has checked off the items in need of correction and has added his own evaluation and recommendations for remedial action. At the same time, he issues a notice of violation which, in addition to the information contained in the first form, cites the legal authority of the OSW and demands that the operator correct the violation by a specified date and notify the OSW when the facility is once again in compliance. The notice warns that a formal order will be issued if remedial action is not taken, but also invites the operator to consult with the OSW before the deadline date.

Continued noncompliance results in the issuance of an enforcement order by the commissioner of DEP on advice of the OSW.64/ The order sets a deadline for compliance and informs the operator that he has 30 days within which to request a formal hearing. Failure to make a timely administrative appeal will mean that the facts recited in the order cannot be challenged in any subsequent judicial proceeding to enforce the order. If the operator requests a hearing, an informal prehearing conference is first held. The terms of any settlement reached are incorporated into a final consent order which again enumerates the remedial actions required and a deadline for their completion. In the event no settlement is reached informally, a full adjudicatory hearing is held before an examiner appointed by the director of the OSW, who submits this proposed decision to the commissioner of the DEP. The commissioner may reject or adopt the proposed decision in whole or in part or may hold his own additional hearing before issuing his final order.

Final orders of the commissioner may be appealed to the courts, which apply the usual standards for judicial review of this type of administrative action. Thus, appeals will be limited to allegations that there is no substantial evidence in the record to support the finding of the administrator or that the decision was otherwise arbitrary or capricious. An aggrieved owner or operator might also allege denial of procedural due process, lack of authority, or unconstitutionality of the act on its face, or as applied in the particular instance.

If a final consent order or adjudicatory order of the commissioner is violated, the case may be referred to the attorney general for enforcement action in the courts. The typical remedy sought is injunctive relief. Where, as noted above, the operator has failed to make a timely request for a formal hearing, the doctrine of res judicata will operate to bar any challenge to the facts recited in the order. Since questions of fact are fairly clear cut in the usual case, temporary restraining orders, based on allegations of irreparable harm to public health and environmental quality, are relatively easy to obtain.

California has eased the legal requirements for issuance of all forms of equitable relief (injunctions) by eliminating, at any stage of the proceedings, the need to allege or prove either irreparable injury or the inadequacy of monetary remedies.65/ Due to the general lack of controversy over factual issues, the typical case does not go to trial in California but results in a stipulated order or consent decree which is issued by the court as a permanent injunction. Violation of the court order would, of course, subject the operator to contempt proceedings.

2.4.2 Enforcement Problems

Establishing proof of alleged violations can occasionally present difficulties. To facilitate proof of performance standard violations, wells should be

sunk and samples of water analyzed prior to operations to establish background water quality. Results can then be compared with samples taken in the course of operations both up and down gradient from the landfill to establish the presence and cause of the pollutant. Reliable proof that an operating standard has been violated is generally easier to establish and, where possible, prosecutors will base legal action on these grounds. Nevertheless, investigators may have to make several visits to establish a pattern of violation or to catch the operator in the act.

In Pennsylvania, an inspector who detects a violation must find a police officer to issue a citation. The better alternative would be for state law to invest solid waste agency inspectors with the status of law enforcement officers, with the legal power to issue notices of violation.

Operators of noncomplying facilities confronted with orders to undertake expensive remedial action or to cease operation will pursue all available administrative and judicial remedies, simply as a means of delaying the inevitable and obtaining the last possible dollar from their landfills. Accordingly, the DEP should be empowered to issue cease and desist orders suspending or barring expansion of operations during the appeals period. The state should also institute a system whereby the operator is fined for each day he remains in violation. In New Jersey, a noncomplying operator may be issued a notice of prosecution, which gives him the option of paying a fine and taking remedial action, or of having the state bring suit to assess a larger fine. The amount of the administratively requested fine is set to be somewhat less than the amount the operator would have to spend for legal defense. If paid, the fine proceeds are held in escrow, and when the operator makes the demanded corrections and remains in compliance for at least six months, the state remits to him 90 percent of the fine.

While, as noted above, the punitive aspects of an enforcement program should be secondary to the primary goal of bringing facilities into compliance, a schedule of civil penalties for a variety of violations can be an effective deterrent, especially in cases where the threat of closure seems unrealistic. In Connecticut, the comissioner of the DEP is authorized to adopt schedules of civil penalties which may be assessed after hearing in amounts up to $25,000 for the most serious violations.66/ In addition, pernalties of up to $10,000 per offense may be imposed for the willful or negligent violation of provisions relating to environmental quality.67/

State statutes should clearly preserve the right of political subdivisions to abate nuisances, and the right of any person to maintain an appropriate action for abatement of nuisances or for damages. The Michigan Environmental Protection Act goes even further and gives every public or private entity the right to sue any other public or private entity in the state courts to protect the environment.68/ The Act grants each citizen the standing to sue as a "private attorney general," that is, without having to show particular personal injury or other interest greater than that held by the public at large.

2.5 The Allocation of Functions: Appropriate Level and Agency of Government and Public v. Private Management

The provisions of the Resource Conservation and Recovery Act of 1976 place a large measure of the responsibility for the planning and regulation of solid waste management on state governments. Much of the foregoing discussion has been based on the assumption that this legislation will shape future developments within a state.

States commonly invest their subdivisions (counties, cities, towns, special districts) with authority to perform particular governmental functions, including collection and disposal of solid wastes. Substate governments must then decide, in light of community resources and needs, how best to provide these services. They must choose between public and private operation, or elect some combination of the two (e.g., lease of publicly owned sites to private operators). Since the siting of landfills is still considered, by and large, a question of local land-use, the power to veto a siting proposal usually exists--and is all too frequently exercised--at the local level. Localities also regulate by ordinance the form and quality of services to be provided, the obligations of users of the services, and the fees to be charged or taxes levied for them.

Due to the vast growth in volume of residuals, the growing scarcity of acceptable sites for disposal, and the increasing costs of handling wastes consistently with standards of public health and environmental quality, local governments have found themselves hard pressed to maintain satisfactory levels of service. The Council of State Governments reported in 1974 that probably less than 40 percent of this nation's population lives in areas with governments of sufficient size to provide solid waste collection and disposal services at reasonable cost.69/ Many localities lack not only the fiscal resources but also the requisite levels of technical and managerial expertise to administer all aspects of a sound solid waste management program.

2.5.1 Regional Entities

Part of the solution to the problem of providing adequate services lies in the regional approach to solid waste management, which allows several localities to accomplish together what they cannot do alone. Regionalization permits economies of scale, and costs can be fairly allocated among the participating jurisdictions. An intergovernmental entity created for the regional management of solid waste can operate larger, properly run and adequately equipped landfills, as well as resource recovery facilities of economical size. There are several types of regional organizations that may be used for solid waste management, including public authorities, nonprofit public corporations, multicommunity cooperatives, and special districts. The choice among the alternatives will depend on the characteristics and needs of the participating communities and on the pecularities of state law.70/

A public authority is a corporate body, chartered by the state legislature and functioning largely outside the regular structure of government, with powers to finance, construct, and operate revenue-producing public facilities.

It may exercise regulatory powers limited to its own operations, if so stated in its charter. It raises capital funds by issuing long and short term notes that are met by levying charges on users of the authority's services. Public authorities are useful where participating localities have run up against constitutional limits on their debt ceilings, where it is difficult to obtain voter approval for financing through the tax base, or where political activity related to the service has hampered previous programs. Run by boards of directors, public authorities offer greater autonomy and freedom from municipal budgetary and administrative control. The danger arises, however,that this independence will make authorities remote, unresponsive, and self-serving.

Nonprofit public corporations derive their powers from articles of incorporation approved by member jurisdictions and the secretary of state. Dependent on local governmental action for regulatory functions, the corporation is nevertheless useful for shifting financing requirements outside the immediate municipal bureaucracy. To gain tax-exempt status, the corporation must satisfy the following Internal Revenue Service criteria:

- the city council must approve the project and accept the assets after the bonds are paid.

- the corporation must agree to give its assets to the city after bonds are paid.

- the city must provide all easements to the corporation at no cost.

- the directors of the corporation must be city or state officials.

- the corporation must provide a public service.71/

Local governments thus have more control over a nonprofit public corporation than they do over a profit-making firm.

The multicommunity cooperative is a system developed by one community to provide service to itself and several other communities on a contractual basis. Regulatory functions are borne entirely by the individual local governments. The ability to raise capital under this approach depends on the lead community's debt capacity and financial strength.

The special district is an agency of government which operates outside the regular structure of government to perform a single function and which relies for financial support primarily on special tax levies. In some states special districts can regulate, levy assessments, operate, contract, or do whatever is necessary to perform their single function. The special district has an advantage over the public authority in that the district has a distinct constituency of residents, not merely a group of bondholders living in widely scattered places. Coordination of special district functions with the activities of general-purpose local governments can be furthered by having local elected officials serve on the governing body of the special district.

The Des Moines Metropolitan Area Solid Waste Agency (DMSWA) is one example of an intergovernmental entity, the creation of which was promoted by favorable state legislation. The legal authority to establish DMSWA rests in chapters 28E and 236 of the Iowa State Code. Chapter 28E is typical of state "intergovernmental cooperation acts" generally, which provide that units of federal, state, and local governments may exercise jointly any powers, privileges, or authority that they are authorized to exercise independently. Chapter 236 specifically provides the authority to issue revenue bonds for capital improvements and operating equipment. DMSWA operates as a "quasi-municipality", a legal and administrative entity separate from the twelve cities and towns and two counties which joined together to create it. It has exclusive authority to handle waste management planning and service delivery as outlined in the intergovernmental agreements signed in 1969 by the official representatives of the cooperating political entities and registered with the Iowa Secretary of State. The agency is run by a sixteen-member board. It operates enough collection equipment to collect the solid waste from more than 60,000 residential units and has enough heavy equipment to dispose of the residential, commercial, and industrial solid waste generated in a metropolitan area of 280,000 population. In 1970, after consultation with responsible metropolitan officials and agencies and reconaissance of several sites, including engineering and geological studies, DMSWA was issued a special use permit for its new 400 acre landfill site by the Polk County Zoning Board of Adjustments.72/

The Hackensack Meadowlands Development Commission (HMDC) in New Jersey is an example of a special purpose subdivision with potential to handle the wastes generated within and without its own boundaries. HMDC has a combination of powers relating to solid waste management not ordinarily found in supra-local governments in the east. The Hackensack Meadowlands Development Act of 1969 73/, designed primarily for the control of development in the meadowlands, also gave HMDC express powers over solid waste management, including authorization to sell bonds, to promulgate codes and standards, and to exercise the power of eminent domain to provide for solid waste disposal. The land use decisions of the Commission override any local zoning to the contrary. One provision of the act obliges HMDC to continue receiving wastes from all municipalities that had been disposing of their solid waste in the meadlowlands in 1969. The Commissioner is currently seeking a franchise from the Public Utility Commission to secure a monopoly on disposal of wastes from those 114 municipalities, most of which are located outside its own jurisdiction. HMDC contends that if it must dispose of the wastes, the municipalities ought to guarantee that their wastes will in fact be delivered for disposal. Long-term contracts with the municipalities would enable HMDC to undertake construction of facilities and to procure advanced waste handling equipment. (Public utility regulation of solid waste handling is discussed below in section 2.5.4)

The regionalization of solid waste management may be accomplished by state mandate, or induced by state pressure (e.g., the closure of several substandard landfills, leaving neighboring communities little choice but to cooperate). Where such direct state measures are not authorized or are not politically feasible, regionalization may be promoted by state incentives (e.g., grant-in-aid programs for regional planning and plan implementation),74/ or by amendment of state constitutions and statutes to remove impediments to the voluntary creation of regional entities. By whatever methods regionalization is fostered, the resulting improvement of services should greatly reduce the impetus for more direct state involvement in the business of solid waste management.

Nevertheless, some states have opted for a more active role in service delivery. (See the discussion of the Connecticut Resource Recovery Authority above, section 1.3). The Maryland Environmental Service (MES) created in 1970 was given the function of constructing and operating solid and liquid waste disposal facilities.75/ MES is a public corporation within the Department of Natural Resources which functions like a statewide sanitary district in that it takes a service delivery approach to residual waste management, rather than a purely regulatory one. It has specific authority and funds to draft and implement solid and liquid waste facilities plans, in order to promote regional approaches to waste management. As described by a Council of State Governments' study entitled The States and Solid Waste Management: Our Effluent Society:

> MES can assume its waste control function in three ways: (1) through implementation of the five-year regional plans for solid and liquid wastes, which are drafted by the service and outline a mutually agreed upon division of services between state and local governments; (2) when a local government or industry request aid, MES must provide the desired facilities or services; (3) if an industry or municipality violates a compliance order to conform to water quality standards or regulations governing solid waste disposal, the Secretary of Natural Resources or the Secretary of Health and Mental Hygiene can direct the Service to take over the violator's waste treatment and disposal facilities until compliance is achieved.76/

Local governments retain a veto over the location of MES facilities and over its regional waste management plans.

2.5.2 The State Role

States should not simply delegate to their political subdivisions the responsibility for providing certain services, but should retain an interest in seeing that services of a particular quality, or meeting a set of minimum criteria,

are delivered. In addition, states should retain those functions which they deem to be of statewide rather than of chiefly local concern.

State governments have come to appreciate their obligations to assure that local governments provide environmentally sound solid waste management for their inhabitants. Protecting environmental quality is now seen as a state trust. Since leachate from poorly sited and operated landfills pollutes the "waters of the state," the disposal aspects of solid waste management are of particular statewide concern. State governments are also more likely than their localities to command the requisite technical expertise to draft and administer regulations for environmentally sound planning, site selection, design, and operation of disposal facilities. Also, since local governments are the principal providers of solid waste collection and disposal services, they are not in the best position to monitor their own performance and may be politically unable to improve it unless some higher level of government takes enforcement action against them. Even when an offending facility is privately operated, a municipality may refuse to close it down voluntarily unless an immediate and politically acceptable alternative exists.

However, the logic of having state agencies do the monitoring and enforcement is compromised by serious resource limitations. Many state SWAs have insufficient budgets to take on these tasks entirely and convincingly. Intergovernmental cooperation may therefore be sought. The New Jersey statute, 77/ for example, authorizes the state DEP to contract with county and municipal boards of health for monitoring compliance by solid waste facilities with state standards. DEP may also provide for the training of local health officers detailed to this work, and if it does so, the training experience and state certification should give them some degree of professional reliability and independence from local political pressures.

Particular facets of solid waste management call for a high degree of state involvement. At the top of the list is the management of toxic and hazardous wastes. Because of the substantial threat to public health and environmental quality posed by these wastes, the relative scarcity of appropriate disposal sites, and the need for long-distance hauling between producers, pretreatment facilities, and disposal sites, a leading state role is advisable. This does not mean that state governments should necessarily run all disposal facilities for such special wastes. Localities or private concerns may well operate the necessary facilities, but only under detailed regulatory supervision by the state governments (in accordance with federal standards, or by the federal government itself, under the Resource Conservation and Recovery Act of 1976). Most local governments do not have the technical expertise to establish and oversee procedures for the safe handling and disposal of special wastes. The necessary capability is more likely to be found at the state level. Also, a local government might find it politically difficult to take enforcement action against a large employer in the community who mishandled his hazardous effluent.

State programs are also needed to promote resource recovery, which depends on availability of generous capital financing, long range sources of supply, extensive service areas (perhaps assured through monopoly franchises), and removal of legal obstructions to the marketing of recovered products--all conditions that cannot be met by a multiplicity of local governments acting on their own.

The state should also use its resources and expertise to train landfill operators and other local government personnel involved in solid waste management. In general, relations between state and local officials should be characterized by ongoing patterns of consultation, cooperation, and problem-solving. These are particularly important in the field of solid waste management, where the state of the art is still in flux and many unknowns are still to be resolved.

As argued above, states must exercise their regulatory powers over aspects of solid waste management that affect public health or environmental quality. This does not mean, however, that state laws should not also empower localities to adopt and enforce solid waste regulations of their own, in addition to but not in conflict with those of the state. Because of local conditions, some communities may wish to regulate more strictly than the state, and might well be allowed to do so. Local obstruction is, however, another matter. Because landfills make unpopular neighbors, many localities have tried to use their zoning powers to keep them out. The risk of localities or regions imposing unnecessary impediments to the permitting of new landfills should be reduced where they are charged by statutes, as they should be, with the responsibility of meeting their own disposal needs. But it may be necessary to have laws in place under which state agencies, despite local objections, can designate sites, issue permits, and decree service areas.78/ Solid waste management is not, after all, a matter of purely local concern.

2.5.3 Public v. Private Operation

Local governments have the option of providing solid waste disposal services themselves or of relying, in whole or in part, on the private sector for that purpose. Among the advantages of a public operation are that it provides services on a nonprofit basis and may be eligible for low interest rate loans or government grants for construction and equipment. Performance and closure bonds are not ordinarily required of publicly operated facilities since, as a last resort, the public tax base can be used to fund remedial action. On the other hand, many local governments cannot command the necessary resources to operate sophisticated modern facilities. Skimpy local budgets compromise equipment maintenance and perpetuate non-compliance with standards. It is necessary to go through the town meeting or city council every time an appropriation is needed for repairs or purchase of new equipment, and localities have many higher priorities for use of their tax revenues. Civil service restrictions may prevent governments from hiring the best operators available and from firing incompetent ones. Moreover, it is politically difficult to enforce DEP orders against local governments. States have been hesitant to assess civil fines against them, even for persistent violations.

The chief advantage of private operation of facilities is that the community will not have to finance the system nor bear the entire cost of implementing new technologies. By and large, private owners also have greater expertise to operate technically advanced facilities than the typical local agency. Private operators will generally move quickly to repair or replace equipment as needed. They have far more reason than local governments to fear enforcement action by the state if they fail to meet standards. Disadvantages of private operation may include lack of community control over fees in the absence of public utility regulation; the risk that an operator will cut corners to increase his profits at the expense of environmental quality and service to the community; and the taint of corruption that has traditionally infected some segments of this industry. Since financially irresponsible operators may be unable to meet the cost of expensive remedial action, performance and closure bonds should routinely be required of them.79/

2.5.4 Public Utility Regulation

In some states, the "free market" for waste disposal services has spawned various abuses, such as collusive bidding on public contracts, rate gouging, inequitable rate structures, arbitrary refusal of service, and financial irresponsibility. The reaction of a number of states, beginning with New Jersey, has been to classify landfill disposal operations as public utilities and to bring their rate structures and service areas within the scope of public utility regulation. For example, New Jersey's Solid Waste Utility Control Act of 1970 80/ provides that no person shall engage in the business of solid waste collection or disposal until found by the Board of Public Utility Commissioners (PUC) "to be qualified by experience, training, or education to engage in such business;" until he has furnished "proof of financial responsibility;" and until the PUC has issued him a certificate of public convenience and necessity.81/ All rates charged by landfill operators are made subject to PUC approval. The New Jersey PUC is further authorized to designate franchise areas to be served by one or more operators. For purposes of the present inquiry, the major problem with regulation by the New Jersey PUC is how to coordinate its regulatory powers and concerns with those of the DEP's Solid Waste Administration (SWA). The mission of the PUC is to assure that services are provided where needed at reasonable cost; the overriding concern of the SWA is protection of environmental quality. Conflict may arise between these two objectives.

The New Jersey act eliminates most problems of coordination at the permitting level by providing that the PUC can issue a certificate for a landfill only after it has been approved by the SWA. Still, in their deliberations over issuance of a certificate or permit, it is not yet clear to what extent environmental issues should be considered by the PUC and questions of public convenience and necessity by the SWA. Further clarification of their respective responsibilities would improve the permitting process and reduce the risk of legal challenges to government actions.

A more serious problem is whether the PUC will recognize the rising costs of complying with the DEP's regulations by permitting rates for service to rise accordingly. Disagreements may arise over an operator's ability to absorb those costs without a rate increase and still realize a reasonable return on his capital. While the matter drags on through rate proceedings and judicial review, compliance with environmental standards may be delayed. State laws ought to make clear the primacy of such standards and the necessity for meeting them on schedule, regardless of any disputes that may be pending over rates. There should also be a provision in the state law that any long-term contract for the delivery of solid waste services must be made subject to adjustment in the event of higher costs imposed by the SWA for environmental protection.

The greatest problems of interagency coordination arise over the question of facility closure. In several court actions initiated by the SWA to enforce closure orders, the PUC has intervened, arguing that closure was inconsistent with public convenience and necessity in the absence of feasible alternative sites or means for disposal. But alternatives usually are available, or can be found within prescribed deadlines, if it is determined that the costs of environmentally sound disposal will be paid. In New Jersey the SWA and the PUC have begun to conduct joint hearings in closure cases, a salutary innovation. Still, it needs to be made clear as a matter of state law that closure of a polluting facility may not be put off indefinitely until an inexpensive, locally acceptable alternative can be developed. Powers to decree mandatory regionalization of facilities may aid the closure of hopeless ones, while longer-range plans for resource recovery move towards implementation.

3.0 Regulation of Sludge Management

3.1 Introduction

One aspect of this nation's residual waste management crisis is the spiralling quantity of sludge, the by-product of municipal and industrial wastewater treatment, that must be disposed of in a manner consistent with public health and environmental quality. This increase reflects not only the growth in population and in the rate of waste generation generally, but also the more stringent wastewater treatment requirements that have been imposed under the Federal Water Pollution Control Act Amendments of 1972 (FWPCA).

The upgrading of treatment levels prescribed under the FWPCA is anticipated to result in increased volumes of sewage sludges, in many cases a two or three-fold increase.82/ The challenge to residual waste management agencies is further heightened by the fact that sludges resulting from advanced treatment operations are more difficult to handle than some of the common biological sludges.83/ The greater efficiency of wastewater treatment facilities in removing pollutants, particularly heavy metals, is reflected in the content of the sludge residue. Moreover, some wastewater treatment technologies may themselves contribute to the problem. Much of the increase in the amount of sludge generated has occurred with the use of chemical precipitants for nutrient control and the upgrading of secondary treatment facilities. EPA is currently seeking new technologies for the recovery and reuse of these chemical additives.84/

Section 208 makes it incumbent upon the designated state and areawide agencies to plan for the management of these quantities and qualities of sludge.

Sludge management should be undertaken as a distinct component of the overall residual waste management program. One characteristic that justifies this special consideration is the relatively high water content of sludges, which distinguishes them from other solid wastes and presents a potentially greater threat to ground and surface water if sludges are mishandled. Also, due to the likely presence of pathogenic organisms and heavy metals, sludges may require special treatment prior to ultimate disposal or reuse to prevent adverse public health or environmental affects. The contents and special properties of all sludges must be ascertained to assure that sludges of a particular quality are directed to the disposal or reuse alternative best suited to prevent adverse impacts on the environment and also to avoid the unnecessary waste of recyclable resources.

Even though all sludges, irrespective of type, will not meet the criteria for inclusion on state or federal hazardous waste lists, the regulatory approaches discussed in this section bear a close resemblance to those of the federal hazardous waste program as out-

lined in subtitle C of the recently enacted Resource Conservation and Recovery Act of 1976. (See the discussion in section 1.4, above, and in note 23). In particular, the sludge program discussed in this section places on the generators of the sludge a greater responsibility (a) for accurate identification of components, properties, and characteristics, and (b) for appropriate intermediate handling and ultimate disposal or reuse than is typically the case for generators of nonhazardous solid wastes. An adequate regulatory program will follow the sludge from point of origin to point of disposal or reuse by means of a manifest system which alerts all handlers along the way to use the special management practices required to protect the environment and to satisfy government regulations.

In other respects, the sludge management program is not dissimilar to that for other solid wastes, many elements of which have been covered in the preceding sections. For example, as discussed in the planning section, 2.1, above, all state DEPs should be directed by statute to prepare state-wide sludge management plans as a component of their residual waste management plans. Also, local or regional authorities should be required to submit to the DEP long-term plans of their own for the management of the quantities and qualities of sludge that will be generated in their jurisdictions. These plans, prepared in coordination with larger land development objectives, should specifically identify sufficient disposal or reuse capacity for the life of the plan, at existing or projected sites which meet or can be developed to meet state permitting criteria.

As we will see, the technical, administrative, and legal aspects of permitting, monitoring, and enforcement under the sludge program discussed in this section are also similar or identical to those for other solid wastes.

3.2 The Regulation of Sludge Generators

Primary responsibility for the appropriate disposition of sludge might well be placed on the generator. The best administrative mechanism for affixing this responsibility is to require every generator of sludge, public or private, to obtain a permit from the state water quality agency (WQA) as a precondition to operation.

To be issued an operating permit, all sludge generators should have to submit a detailed sludge disposal plan to the WQA for approval. WQA regulations and guidelines covering plan preparations should require generators to provide the following kinds of information:

1. As regards the sludge--
   (a) a description of the processes by which it is produced and treated;

(b) a description of the sludge including its composition (e.g., minerals, heavy metals); characteristics (e.g., water content, presence of pathogens); and properties (e.g., corrosiveness, toxicity, flammability, explosiveness); and

(c) a prediction of the volume to be produced annually and seasonally.

2. As regards intermediate sludge handling--
   (a) if the sludge is to be stored at the facility, a detailed description of the storage facilities including provisions for emergency storage capacity;

   (b) if the sludge is to be hauled from the facility for advanced treatment or disposition, the identity of the permitted haulers and waste handlers.85/

3. As regards the ultimate disposition of the sludge--
   (a) if the sludge is to disposed of at a landfill, the identity of the specific landfill to be used;

   (b) whether the landfill is permitted by the SWA to receive that type of sludge;

   (c) and whether sufficient appropriate disposal capacity has been reserved for at least a one-year period; and

   (d) if the sludge is to be disposed or reused by any other means, whether all government regulations (state or federal), if any, will be met.

The operating permit for sludge generators should include all the information contained in the approved sludge disposal plan. The operating permit should also incorporate by reference the following operating requirements as found in the relevant statute or WQA regulations:

1. Periodic self-monitoring of sludge for consistency with the description found in the disposal plan;

2. Record-keeping of all test results;

3. Immediate suspension of sludge shipments and notification to the WQA of all breakdowns in the sludge treatment operation, or of all test results showing variations in the sludge beyond set parameters;

4. Compliance with the manifest system which informs subsequent

handlers as to the composition, characteristics, properties, and volumes of any given sludge shipment, and which alerts them to use the appropriate management practices; and

5. Maintenance of liability insurance covering damages from improperly handled sludge.

The state statute should give the WQA the authority to run tests and inspect required records and operations when and as deemed necessary. As regards the manifest system, the WQA must devise a system to process the data contained in the bills of lading, so that their value as a monitoring tool is not lost.

As discussed for sanitary landfills in section 2.2.2 above, permits for generators of sludge should not be considered as giving a vested right to continue operation for the term of the permit. Rather, permits should be conditioned on compliance with all terms and conditions, regulations, and relevant statutes. Due to the great number of possible contingencies (e.g., loss of operating permits by the landfill operator, hauler, or other intermediate handler), operating permits for generators of sludge should be reevaluated periodically. Generators should be advised to notify the WQA in advance of any anticipated change in production or treatment that will affect the quality of the resulting sludge, so that the agency can review the permit accordingly.

A full range of enforcement tools, including the authority to issue enforcement orders and impose civil penalties, should be available. A schedule of fines is especially important when dealing with municipal treatment facilities since the threat of closure for violations of the permit is not convincing. The commissioner of DEP should impose fines when warranted, even upon municipal facilities. (See section 2.4, above, "Enforcement.")

3.2.1 Regulating Municipal Treatment Facilities

The residue of municipal sewage treatment facilities is essentially organic in nature, although measurable quantities of heavy metals, minerals, and other components may also be present. Industrial effluents, especially if not pretreated, frequently contain substantial amounts of inorganic residuals such as metals and chemicals. Thus, where industrial wastewater is treated together with municipal sewage, the potential for additional foreign materials in the resulting sludge is increased. Moreover, because the presence in sewage of concentrations of particular heavy metals can upset some wastewater treatment technologies, pathogenic organisms may survive and remain in the residue.86/ Herein lies the importance, from the standpoint of the sludge management program, of the industrial pretreatment requirements specified, or to be specified, under §307 of the FWPCA. These inorganic components of sludge are more easily

isolated at their source, where treatment for specific components can be undertaken, than at the municipal facility. Furthermore, the expense involved in treating and disposing of these often hazardous industrial sludges is properly placed on their producers.

The permitting of the sludge management operations of municipal sewage treatment facilities should be undertaken as a component of the larger NPDES program. The sludge program should be administered by the state agency charged with responsibility for the NPDES program, or by EPA where the federal government retains control over NPDES functions.

One common weakness in existing programs for the regulation of sludge management at municipal treatment facilities is the failure to require identification of the specific disposal or recycling facility to which the sludge will be sent. There are commendable exceptions to this rule. Pennsylvania's Bureau of Water Quality Management, for example, will not issue a permit for the operation of a municipal facility unless it designates a specific landfill or other disposal or recycling facility approved by the Solid Waste Management Division of the Department of Environmental Resources.

Another common gap in existing programs is an inadequate monitoring requirement. Many states require the analysis of sludge when a treatment facility is applying for its permit. But the content of sludge can change radically depending on the season, new industrial hookups, or breakdowns. Routine testing at the facility for heavy metals, pathogens, and other potentially dangerous components should be backed up by periodic monitoring by the WQA.

3.2.2 Regulating Industrial Treatment Facilities

All industrial generators of sludge, whether or not they discharge their effluent into the municipal sewage system, should be required to receive operating permits from the WQA.

Connecticut is an example of a state that has had in affect rigorous pretreatment requirements for industrial users of municipal systems since before the promulgation of the federal regulations on the subject. Industrial facilities that are not hooked up to the municipal system must provide full treatment for their own wastes before discharging treated effluents directly to surface waters. Both categories of industrial sludge generators must be permitted by the Office of Water Compliance. All such permits should incorporate the sludge management provisions discussed above.

3.3 The Regulation of Sludge Disposal/Reuse Facilities

3.3.1 Regulating Landfills

The regulatory program for landfills is fully discussed in section

2.0 of this chapter. Provisions of special importance as regards the disposal of sludge are discussed below.

State SWAs should be authorized by statute to set standards concerning the liquid and pathogen content of sludges that may be disposed of at landfills. Regulations might simply provide that landfills accept only sludges that have been dewatered and stabilized. Connecticut excludes liquid sludges from landfills by regulation, but this is occasionally overlooked when dewatering equipment breaks down.

Because of the high biological content of many sludges, odor beyond the boundaries of the landfill may present a problem. New Jersey requires landfills to apply a daily cover of no less than 12 inches in depth over sludge. The stabilization of sludge will also minimize odor problems.

Landfills permitted to receive sludge should be especially careful to meet the requirements of the manifest system and to comply with all special handling instructions. No sludges should be accepted from a hauler without the required documentation and a current hauling permit. Care should be exercised to maintain required records properly.

3.3.2 Regulating Incineration

While incineration of sewage sludge or solid waste is often considered a disposal alternative, it is in fact only a volume reduction technique since this process leaves a residue that requires disposal. Incineration reduces the quantity of sludge that must be disposed of to three to five percent. If sludge ash is to be landfilled it should be remembered that while the residue is biologically inert it may still contain heavy metals. The most serious problems associated with incineration are the cost and air pollution.87/ All facilities should be required to meet all relevant state and federal air pollution statutes and regulations.

3.3.3 Regulating Ocean Dumping

EPA is currently trying to phase out the ocean dumping of sludge by 1981, but operators of treatment facilities now using this method may continue doing so in the meantime. EPA's regulations and criteria to govern this method of disposal are set forth at 40 C.F.R. §§220-227. The agency controls such disposal by a system of permits for the discharge, transportation, and dumping of all sludge into the marine environment.

Since all cities presently using this alternative are dumping sludges which exceed the EPA criteria, the agency has issued them interim permits. One of the conditions of these interim permits is the requirement for an implementation plan to either reduce the

toxicity of the materials to meet the criteria or find another method of disposal. Interim permits are issued for one year only, and extensions are based on the progress demonstrated by the permittee on this implementation plan.88/

3.3.4 Regulating Land Application

One reuse alternative that has been receiving increased attention in recent years is the application of sludge on land as a soil conditioner and low grade fertilizer. Sludge can be applied to crop and forest land to maintain or restore depleted soil fertility levels and to reclaim abandoned strip-mined and marginal lands. Other potential uses of sludge include erosion control projects and application on golf courses, cemeteries, highway median strips, parkland and airports, and for turf grass and ornamental shrub production.89/

Sewage sludges contain macro plant nutrients (e.g., nitrogen, phosphorous, and potassium) at levels that are about 20 percent of those found in commercial fertilizer. Biological sludges also contain necessary micro nutrients, at levels which are also below those of commercial chemical fertilizers.90/ Sludges with comparatively low available nutrient concentrations can be enriched with chemical fertilizers. The relatively high water content of sludge can serve as supplemental irrigation.

Sludge may be applied in the liquid, dewatered, or dried states. The two most common methods are liquid application and open dumping followed by plowing. Other less common methods include burial in trenches, ridge and furrow irrigation, spray irrigation, plow injection, and irrigation by flooding.91/

The primary drawback to the widespread land application of sludge is the fact that the long-term effects on soils are not known conclusively at this time. Heavy metals, pesticides, and polychlorinated biphenols (PCBs) are present in sludges and these substances are toxic to plants and microbial life at low concentrations in the soil solution. Cadmium and lead, among other possible heavy metal components of sludge, may be particularly hazardous if allowed to enter the food chain.92/

The objectives of the regulatory program for the land application of sludge must be, therefore, the prevention of damage to soil and crops; the prevention of adverse public health effects from the entry of toxic substances into the food chain; and the prevention of ground and surface water pollution from infiltration and runoff of sludge contaminants, both biological and chemical.

The best administrative mechanism for meeting those objectives is to require every operator of a land application facility to obtain a permit from the SWA (in consultation with the WQA and the state

public health and agriculture agencies). This lead agency approach should avoid entangling applicants in a bureaucratic web while assuring that all legitimate state concerns are addressed by the agency best equipped to handle them.

The problems involved in drafting a set of regulations for the land application of sludge include the many scientific and technical questions that remain to be answered and the variables that must be considered in evaluating any given project. As a consequence, regulations governing land application should generally be directed toward procedure and performance, rather than being detailed, specific standards.93/

To be issued an operating permit, all operators of land application facilities should have to submit detailed plans to the SWA for evaluation and approval. SWA regulations and guidelines covering plan preparation should require operators to provide the following kinds of information:94/

1. A site reconnaissance plan covering--
   (a) General Description--including the location, boundaries, and dimensions of the site, and the compatibility of the proposed project with existing land development plans;

   (b) Climate--including seasonal information on precipitation, temperature, wind, and evapotranspiration (i.e., the evaporation of water from the soil surface and vegetation, plus the transpiration of water by plants);

   (c) Topography--including elevation, ground slope, and erosion and flood potential of the site and adjacent land;

   (d) Soil Characteristics--including physical characteristics (e.g., gravel, sand, silt, clay), chemical characteristics (e.g., pH, salinity, nutrient levels, and adsorption and fixation capabilities for various inorganic ions), infiltration and percolation potential, soil profile;

   (e) Geologic Formations;

   (f) Groundwater--including quality, depth, direction and rate of flow, location and volume of current, and planned withdrawal uses;

   (g) Surface Water--including quality, proximity of the facility, and location and volume of current and planned uses. (Where the project will involve discharge into a receiving surface water body, the operator would also require a permit from the WQA under the NPDES.)

(h) Regulations should clearly provide that applicants are required to conduct tests, take samples, sink wells, and make borings where and as the SWA deems necessary to determine the background quality of soils, ground and surface water.

2. A design and operating plan covering--
   (a) Method of application to be used;

   (b) Site engineering to prevent ground and surface water pollution from runoff and infiltration; and the provision of buffers for odor and mixing zone, where necessary;

   (c) A description of the composition, characteristics, properties, sources, and volumes of sludge to be applied seasonally;

   (d) The particular crops or other vegetation to be cultivated, their uptake of various sludge components, and their ultimate use or disposition;

   (e) Application rates and the schedule of application periods;

   (f) Contingency plans for bad weather, including provisions for adequate onsite storage capacity;

   (g) Periodic self-monitoring schedule by the operator for crops, soil, ground, and surface water; and record-keeping and notification to the SWA;

   (h) Compliance with the manifest system;

   (i) Proof of liability insurance covering damages from improperly handled sludge.

In evaluating this data, the SWA and the other consulting agencies must check for compatibility of the method of application with the characteristics of the particular site. Application rates will likewise depend on site characteristics, sludge type, and the crops or other vegetation to be cultivated.

No permit should be issued for a facility that will result in ground or surface water quality becoming inferior to the physical, biological, and radiological levels for raw or untreated drinking water supply sources as specified in the National Drinking Water Standards, including future additions and modifications.95/

Pretreatment standards for sludge to be applied to land should be set. Standards may vary depending on the soils and crops involved and on whether the crops will enter the food chain. In any event, all sludges should be stabilized. Until more data can be evaluated,

it would seem prudent to bar all industrial sludges from land application facilities, and certainly from disposition on agricultural land.

The operating permit for operators of land application facilities should be issued for the life of the facility but conditioned on compliance with all terms and conditions, regulations, and relevant statutes. Agents of the SWA should be authorized to enter the facility and run tests and inspect required records and operations. Enforcement mechanisms should include a full range of remedies, including the power to issue enforcement orders and impose civil penalties. (See the "Enforcement" section, 2.4, above).

A number of states are currently drafting standards and regulations for the land application of sludge, but few seem to have instituted a comprehensive program. In California, the Department of Agriculture regulates the use of sludge for commercial purposes, while the Department of Public Health controls the noncommercial application. Under the California Hazardous Waste Act of 1972, DPH could have considered sludge a hazardous waste, but it has not done so. Neither agency has set special pretreatment standards for land application or application rate standards. No monitoring of land application projects is conducted.

Oregon has a specific regulation for the spreading of sewage sludge.96/ It requires either that sewage sludge disposal be adequately covered by specific conditions of a waste discharge permit, or that a special permit be obtained based upon detailed plans and specifications. Spreading of raw sewage sludge is prohibited unless it is specifically determined by the Department of Environmental Quality or the state or local health agency that such disposal can be conducted with assured adequate protection of public health and environmental quality. If non-digested sludge is spread on land within 1/4 mile of a residence, community, or public use area, it must be plowed into the ground, buried, or otherwise incorporated into the soil within five days after application.97/

Some states cover land application of sludge in their specifications for the operation of municipal wastewater treatment facilities. For example, the criteria for review of facilities of the Colorado Department of Health98/ allows land spreading of stabilized sludge only. Plans must be submitted containing a detailed description of the process and design data.99/ The Illinois criteria for wastewater treatment plants100/ requires that ultimate disposal of sludge wastes not cause air, land, or water pollution, including pollution of ground and surface waters. A permit must be obtained from the Division of Land Pollution to dispose of non-liquid sludges, or from the Division of Water Pollution Control to dispose of liquid sludges. Basic feasibility study information is required to be submitted for review prior to submitting the detailed project design.101/

3.4 The Allocation of Functions: Appropriate Level and Agency of Government*

The highly specialized and technical nature of the regulatory functions required for an effective sludge control program would seem to dictate the assignment of this responsibility to the state level. Also, the objectivity of local or regional authorities in taking enforcement action against a facility operated by itself or by a locally important industrial generator is open to question.

Since primary responsibility for administering the NPDES program is placed in the WQA (unless the function is performed on the federal level by EPA), this agency is the best placed to regulate the generators of sludge. In order to cover the sludge handling requirements discussed above, the WQA need only expand the criteria for permit issuance for point sources and for industrial dischargers into municipal systems.

Since many of the considerations regarding the evaluation of land application facilities are similar or identical to those for regulating landfills, the SWA would seem to be the logical candidate for lead agency to regulate this reuse alternative. The state agriculture agency might be authorized to set application rates, and the public health agency to set standards for permissible crop content of heavy metals and other potentially toxic substances. The SWA would consult with these agencies on questions involving their particular areas of expertise. Pursuant to the NPDES program, all disposal and reuse facilities discharging effluent into surface water would require a permit from the WQA.

4.0 Legal Issues

Numerous questions of law calling for the services of competent legal counsel may arise in the course of planning and implementing programs for residual waste management. Some of the more salient ones will be addressed in this section.

There is, first, a range of legal issues concerning the allocation of powers between state governments and their political subdivisions. Will a permit from a state agency override local land use restrictions? (See the discussion of this issue in section 2.1.2 above and at note 30). May the state compel localities to enter into agreements for regional solid waste management with their neighbors, or to initiate resource recovery programs? Do the political subdivisions of the state possess the requisite powers to create intergovernmental entities on their own initiative, or to enter into long-term contracts with the private sector for the pro-

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*For further discussion of these issues see section 2.5, above.

vision of solid waste services? Questions of this sort can usually be answered by reference to statutes and judicial precedents of the state, and the answers will vary considerably from one state to the next. As a rule, whatever powers may be exercised by a state may be delegated by it to its political subdivisions, or may be withheld from them, as it sees fit.

A second category of legal issues, which we will discuss presently in greater detail, goes to constitutional limitations on the manner in which state powers are exercised. These issues are identified by such legal catchphrases as "due process of law" and "equal protection." With respect to solid waste management, constitutional problems largely reflect the fact that, while ours is a legal system founded on the principle of clear and reasoned rules fairly and uniformly administered, the scientific and technical pool of knowledge upon which the rules in this particular field are based is still imprecise, filled with unknowns, and constantly changing as a result of ongoing research. The challenge in this context is to draft laws and regulations which are at once demanding and realistic, flexible and yet precise enough to give notice to the regulated and to guide the exercise of discretion by the regulators.

4.1 The Problem of the Flexible Permit

A permit to operate a landfill typically incorporates by reference the relevant statutes of the state and the regulations of the SWA, including operating and performance standards. Additionally, the enabling statute may empower the SWA to write into permits, originally or by subsequent amendment, such additional terms and conditions as it deems necessary for the protection of public health and environmental quality. Suppose, then, that a permit is issued requiring six inches of daily cover over the working face. The operator calculates his costs and concludes a contract with the city to take its wastes at $4 per ton. Then the SWA discovers that the site is leaching badly, and accordingly raises the cover requirement to twelve inches. The city refuses to renegotiate the price. The operator loses money. Has he a legal claim against the state for changing, to his detriment, the rules on which he originally relied? It is generally accepted that a permittee under a regulatory program must comply with all laws, whether enacted before or after the issuance of his particular permit. Thus it was held in Yellow Cab Taxi Service v. City of Twin Falls,102/ a case involving the revocation of a license to use a taxi stand, that since the police power of a city is a continuing one, a permit did not exempt the applicant from the operation ordinances subsequently enacted in the exercise of that power. In general, a government cannot be equitably estopped from increasing the restrictions it imposes on activities that may be detrimental to public health, safety, or welfare. Permits are not contracts. Nor do they grant property rights that can withstand legitimate exercises of the police power.

Moreover, it has been held repeatedly that while the scope of administrative discretion in the field of licensing and permitting must be guided by standards found in the enabling statute, the enactment need not cover every detail nor fix every condition. In Moyant v. Borough of Paramus,103/ a case involving an ordinance for the licensing of solicitors and canvassers, the court observed that where discretionary power to grant or deny a license reposes in an administrative body, adequate standards to guide discretion must be found in or be inferrable from the ordinance. The court added, however, that the standards need not be minutely detailed, and that the whole ordinance may be looked into in light of its context and objectives for the purpose of deciding whether sufficient standards exist.

Nevertheless, legal challenges to solid waste programs can best be avoided by statutes that clearly guide the exercise of administrative discretion by the SWA and that put operators on adequate notice of the standards they will be called upon to meet. The scope of the agency's discretion should be defined by the statutory purpose of protecting public health and environmental quality, and should be further circumscribed by requiring all administrative action to reflect the best available scientific and technical knowledge. The writing and amendment of permit conditions should be governed by clearly formulated standards and objectives set forth in state enabling laws and regulations. Moreover, it is advisable to provide by statute that if a permitted facility subsequently develops a pollution problem, its operator may be required, by order or amendment, to do whatever is necessary to solve it: dig trenches and collect leachate, divert the flow of impacted ground or surface water, increase cover, stop receiving a particular class of wastes, or, if need be, cease operations entirely.

It is permissible to treat different sites differently where the distinctions can be explained by reference to the best available knowledge and particular site characteristics. Thus the court held in Tom's Tavern v. City of Boulder, 104/ a liquor licensing case, that classifications in the municipal code are permissible if founded upon distinctions which are natural, reasonable, intrinsic, and germane to the exercise of the police power. In states with widely varied soils, hydrology, and geology, it may be impossible to create regulatory classifications for all the different kinds of sites that may be encountered. But some distinctions are bound to be justified by reference to those variables, and others can emerge in the course of well-reasoned permit determinations, case by case. What is important in the eyes of the courts is that all decisions be made rationally, not in an arbitrary or capricious manner.

4.2 The Procedural Due Process Rights of Operators

The greater the degree of administrative discretion allowed in a permit program, the greater the need to afford permit applicants and

operators a full measure of procedural due process in actions affecting their facilities. For while a permit is not property and does not create a contract or vested right, still it may give to its possessor something of value that resembles a defeasible property right.105/

The provisions of the state's administrative procedure act will govern both rulemaking and adjudication unless specifically superseded by the solid waste management act or other relevant statute. Generally speaking, state administrative procedure acts require that interested parties be given notice of proposed rulemaking by publication and that they be afforded an opportunity to be heard either by timely appearance or submission of written comments. This is not to say that such opportunity is a constitutional right. Professor Davis has written that, except when a trial-type hearing is required because adjudicative facts are in dispute, due process probably does not require a hearing.106/ But the trend is evident in the field of administrative rulemaking for legislatures to require public hearings and for courts to review whether administrative agencies have based their discretionary decisions on some rational and legally permissible basis. Thus the court held in Environmental Defense Fund v. Ruckelshaus:

> Judicial review must operate to ensure that the administrative process itself will confine and control the exercise of discretion. Courts should require administrative officers to articulate the standards and principles that govern their discretionary decisions in as much detail as possible.107/

Professor Davis comments in his administrative law text that this is the best protection against the arbitrary exercise of discretionary power. It is his opinion:

> . . . that the hope for better protection lies not in better statutory standards but in administrative standards and safeguards, that the best instrument for providing administrative standards is the rulemaking power, and that the courts should require clarification of standards through rules.108/

While procedural due process does not require trial-type "adjudicatory" hearings to resolve nonfactual issues of law, policy, and discretion (such as are involved in making rules of general applicability to govern landfill operations), such hearings are probably required to solve disputed issues of fact which directly affect a party's rights or interests.

Under the traditional "privilege" doctrine, which still has vitality in some state jurisdictions, the holder of a permit or license did not possess the requisite interest to demand an adjudicatory hearing. His

interest, having been created by the grace of government, was characterized as a privilege, and as such it was held not to merit the same legal protection as an interest characterized as a right.109/ However, the "privilege" doctrine has been substantially eroded by a more recent line of cases. For example, in People v. Gottelieb,110/ it was held that where a state confers a license to engage in a profession, trade, or occupation, not inherently inimical to public welfare, such license becomes a valuable personal right which cannot be denied or abridged in any manner except after due notice and a fair and impartial hearing before an unbiased tribunal.

Many jurisdictions have come to recognize that while a person may not have a legal right to a permit or license, he is nevertheless entitled to fair treatment from government. Thus, landfill operators are probably entitled to adjudicatory hearings where the denial, modification, or revocation of their permits turns on a disputed factual issue. For example, in Connecticut, the commissioner of the DEP must set forth in the notice of permit denial the reasons underlying the decision. The notice of denial is considered an order of the commissioner for purposes of administrative appeal, entitling the aggrieved applicant to a full due process hearing under the "contested case" provisions of the Connecticut Administrative Procedures Act. Similarly, issuance by the commissioner of an enforcement order for alleged violations entitles the operator to a formal hearing

4.3 The Problem of the Unrealistic Performance Standard*

Performance standards, as prescribed by statute and regulation, specify how landfills must perform with reference to their impact on the environment in order to merit issuance and retention of their operating permits. As we have noted, a number of states, including Connecticut and Pennsylvania, have adopted a strict nondegradation standard in their water quality statutes. At the same time, however, it has generally been recognized that the goal of zero discharge of leachate can rarely if ever be attained by landfills relying on natural renovation. While courts would hesitate to strike down a statutory standard, they might be compelled to do so on due process grounds if it can be demonstrated that the standard is not only difficult, but impossible, to meet. Strict adherence to the nondegradation standard would have the result of closing down all conventional landfills and requiring a wholesale shift to facilities equipped with liners for the collection of leachate. When reliable liners are developed and when the volume of residuals is reduced following implementation of a resource recovery program, this course of action may well prove to be both desirable and economically feasible. But in the meantime, some states, including Connecticut, remain unconvinced that liners are in fact reliable and do not permit them. Other states, including Pennsylvania, permit but do not require their use.

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*(See the discussion of performance standards in section 2.2.3)

Unwilling to order closure of most existing disposal facilities and to require implementation of a still unproven liner technology, SWAs have adopted more flexible standards for application to particular cases. In Connecticut, a leachate allowance is incorporated into the permit of each facility, despite the nondegradation requirement of state law. The Pennsylvania mixing zone standard has no legal status but is used de facto as a device for determining which cases to refer for enforcement action. In both instances, the adoption of administrative standards which are below the standard prescribed by statute is subject to legal challenge, particularly by third persons, on the ground that the agencies are failing to enforce statutory standards and that they are exceeding the authority delegated to them by their legislatures. The solution to this problem would be for state legislatures to adopt realistic performance standards in the first place to guide the exercise of administrative discretion by their solid waste agencies. It is especially important to have a workable statutory standard in a state like Connecticut, whose courts have traditionally allowed administrative agencies little freedom to engage in the kind of interpretive rulemaking commonly practiced by federal regulatory agencies.

Performance standards are particularly important in that they alert the SWA to the need to take enforcement action. In this regard, not only should standards be realistically set, but they should be amenable to measurement in the field. Furthermore, to satisfy notice requirements, standards should be so drafted as to include all factors which are actually considered by the agency in making decisions to grant, deny, or enforce permits. As noted earlier, it is virtually impossible to monitor compliance with the Connecticut-type leachate allowance. In general, the Connecticut OSW has taken the expedient course of tolerating groundwater pollution so long as the operator complies with BMPs and leachate from the landfill does not interfere with current or planned water uses. If such interference does occur or is imminent, the operator is ordered to take whatever corrective measures are necessary, including closure as a last resort. Such enforcement action would be taken even if the complainant's polluted well, for example, were sunk after the landfill commenced operation and the rate of water withdrawn from the well were so great as to attract the leachate plume. In fact, enforcement action is taken whenever interference with a competing water use occurs, even though the landfill might actually be operating in accordance with all applicable engineering and performance standards. An operator ordered to close his facility under these circumstances, however, could defend on the ground that he is in full compliance with the law. If he is nonetheless ordered to close because of interference with another water use, he could challenge the closure on the due process ground that this factor is not an element of any performance standard found in the applicable statute, regulations, or permit issued to him.

4.4 The Due Process Rights of Third Persons

The next question is whether third parties, such as neighboring landowners, have rights to be heard at the various stages of the regulatory

process when decisions indirectly affecting their property are made. The answer seems to be that, in the absence of specific statutory provisions giving them that right, they probably cannot demand a hearing as a constitutional matter.111/ If the agency holds a hearing, however, persons with sufficient interest at stake may intervene as a matter of right. The aggrieved landowner may seek judicial review of a rulemaking or adjudicatory decision of the SWA, on the ground that the decision was based on an unconstitutional statutory provision, amounted to a taking without compensation, otherwise violated due process, or lay beyond the authority delegated to the administator. But judicial review is conducted on relatively narrow grounds and is no substitute for an opportunity to be heard before the challenged administrative action is taken or becomes final.

States are free to grant "affected" persons, as defined by statute, such rights to be heard in the administrative process as they deem advisable. In general, it seems only fair to afford affected landowners an administrative forum in which to present their views. Moreover, procedures that expose administrative decision-making to different opinions and points of view can only enhance the quality of the process.

A wide variety of such procedural safeguards may be found among the states . In Wisconsin, public hearings covering social and economic factors as well as environmental issues are part of the environmental impact statement process which is required before a permit decision is made. Texas holds wide open hearings on all proposed permit determinations, and in Connecticut public hearings are required by the state water quality law before the Office of Water Compliance can issue a discharge permit. A public hearing is not required by the Connecticut act, however, on proposed issuance or denial of an operating permit by the Office of Solid Waste. It will hold a hearing if demanded, but notice of this possibility is not given. As a result, the affected landowner may be deprived of a forum in which to raise scientific and technical issues bearing on the decision to permit. In line with the trend toward openness in government proceedings, Connecticut's act and others like it should be amended to afford greater participation in siting decisions on the part of the affected or interested public. Such a practice would not only reduce the pressure for judicial review, but would tend to increase political acceptance of whatever decision is reached, since no interested person could then argue that he was not given a fair opportunity to be heard.

4.5 The Question of Governmental and Private Liability

The final question we confront is whether a permit may be seen as an implicit warranty by the state to the public that the operation will not interfere with anybody's right to clean water or to an otherwise beneficial environment. In other words, does the permit system expose the state and its individual permitting officers to liability in the event that a permitted facility pollutes someone's water supply, devalues

his adjacent property, or causes him bodily injury? Here again, the answer would seem to be in the negative. The general rule may be set forth as follows:

> . . . [In] the absence of constitutional or statutory provision therefor, a state exercising governmental functions cannot be made to respond in damages for tort, and such sovereign immunity may not be waived or abrogated except by an express statutory enactment or by necessary inference from a statute.112/

Thus, a New York court held in Van Buskirk v. State 113/ that riparian landowners were not entitled to recover for property damages allegedly caused by negligence of the state Water Resources Commission in granting a permit for construction of a dam and in failing to inspect and insure compliance with conditions of the permit. Permit issuance was held to be a governmental function of a quasi-judicial nature which did not give rise to any rights and obligations with respect to any private individual.

Next, suppose that leachate from a landfill does pollute the groundwater beneath an adjacent property, with the result that the adjacent property suffers a decline in value. What liabilities would arise? If state-regulated facilities pollute beyond their boundaries, then the state should require the purchase of sufficiently large buffer zones or of easements covering that use of groundwater. Alternatively, the state should enact legislation allocating or authorizing allocation of groundwater among competing uses. If no such action is taken, the owner of the adjacent site might have an argument to the effect that his property has been taken for a public purpose without compensation, or that the landfill owner should compensate him for damages in tort. For if the cost of providing environmentally sound solid waste disposal includes restrictions on the use of more surrounding property than has been recognized heretofore, then the burden should fall either on the one who engages in and profits from the polluting activities--the landfill operator--or on the state itself for permitting a facility that serves the public at the expense of one or more adjacent property owners.

Under the laws of most states, neighboring landowners can sue the facility operator or owner for damages or for abatement of a nuisance. Private operators enjoy no immunity from liability to third persons, and in fact, are likely to be held strictly liable upon proof of proximate cause. And where, in the case of a publicly owned or operated facility, sovereign immunity is not available or has been waived for torts committed in performance of a governmental function, that government may likewise beheld liable. Nor can the operator count on the fact that he is in complete compliance with all legal requirements and conditions of his permit as a defense in an action against him for damages or abatement.114/ Many state acts specifically reserve the right of injured third parties to take legal action to redress private grievances. On

the other hand, a landfill is not considered to be a nuisance per se - though it may become one as a result of the manner in which it is operated - and courts will act with extreme caution where granting injunctive relief would result in interference with an operation of government.115/

Questions of potential governmental and individual liability also arise in the context of the land application of sludge. Would the state be liable under a theory of implied warranty to farmers or to consumers for injury resulting from the use of toxic sludges from state-permitted facilities? It is tempting to cite cases such as Van Buskirk, above, and answer in the negative. But the sovereign immunity argument seems to lose much of its force and the warranty argument appears particularly strong where, as in Pennsylvania, the state actually surveys the farm and writes out specifications for the farmer. Isn't the state implying that the farmer, if he follows specifications, will be in no danger of injuring his property or the health of ultimate consumers? It is also questionable whether the supplying of sludge for use as fertilizer can really be considered a governmental as opposed to a proprietary function of government. Even if the state is not held liable, a chain of potential liability may run from the injured consumer, through the distributor and farmer, to the municipal treatment plant. It is beyond the scope of this paper to resolve these serious legal questions. They are mentioned to underscore the importance of standards for land application of sludge and for adequate sludge monitoring and enforcement systems, as discussed above in section 3.0.

CHAPTER TEN

LAND DISPOSAL OF SOLID WASTES AND SLUDGES

FOOTNOTES*

1. These concepts are fully explored in Richard S. Howe and Nicholas L. White, Development of Residuals Management Strategies (Office of Research and Development, U.S. EPA, 1975).

2. 33 U.S.C. § 1251 et seq.

3. Resource Conservation and Recovery Act of 1976, Pub. L. No. 94-580, ELR 41901-18 (1976) (to be codified in 42 U.S.C. §§ 6901-6987) [hereinafter cited as RCRA].

4. Address by EPA Administrator Russell E. Train, "Solid Waste Management: Horizons Unlimited," International Waste Equipment and Technology Exposition, in Chicago (June 2, 1976).

5. 6 ELR 20615 (D.C. Cir. 1976).

6. Address by EPA Ass't Administrator Roger Strelow, "Engineering for a Better Environment," National Waste Processing Conference of the American Society of Mechanical Engineers (May 24, 1976).

7. RCRA, supra note 3, § 4002(a).

8. Post-consumer solid waste resulting from the discard of packaging material (including beverage containers) was estimated at between 40 and 50 million tons in 1971, or somewhere between 30 and 40 percent of municipal solid waste. In 1971, packaging accounted for approximately 47 percent of all paper production, and approximately 29 percent of plastic production. At that time, energy used for production of packaging materials represented an estimated 5 percent of total United States industrial energy consumption. Shipments of containers and packaging were valued at $19.5 billion in 1975, an increase of 82 percent since 1960. On a per capita basis, packaging material consumption and waste generation increased by over 63 percent between 1958 and 1976. In addition to the reusable package, industry must reinvestigate the utilization of larger package sizes when appropriate; the utilization of easily recyclable package configurations and materials; the elimination of potentially hazardous packaging materials; and the elimination of packaging materials whose production creates more pollution than would reasonable alternatives.

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*Publication information pertaining to works included in the suggested readings for this chapter has been omitted from the footnotes.

Address by Thomas F. Williams of the U.S. EPA Office of Solid Waste Management Programs, "Conservation and Common Sense," National Conference of the Soil Conservation Society of America: Land Application of Waste Materials, in Des Moines (March 17, 1976).

9. Office of Solid Waste Management Programs, U.S. EPA, Decision-Makers Guide in Solid Waste Management 118 (2d ed. 1976) [hereinafter cited as Decision-Makers Guide].

10. Two examples of state legislation encouraging returnable bottles are Vermont's mandatory container return deposit act (Vt. Stat. Ann. tit. 10, §§ 1521-1525) and Oregon's tax on nonreturnables that pays the cost of litter cleanup while encouraging the expanded use of returnables (Or. Rev. Stat. § 459.810-.890), upheld in American Can v. Oregon Liquor Control Comm'n, 4 Envir. Rep. Cas. (BNA) 1584 (Or. Cir. Ct. 1972), 6 Envir. Rep. Cas. (BNA) 1350 (Or. Ct. App. 1973). Both states have experienced significant reductions in their container litter counts, ranging between 60 and 80 percent. A city ordinance requiring a refundable deposit was upheld in Bowie Inn v. City of Bowie, 3 Envir. Rep. Cas. (BNA) 1502 (Md. Cir. Ct. 1971), 7 Envir. Rep. Cas. (BNA) 2083 (Md. Ct. App. 1975). Likewise, a county bill prohibiting sale of "throwaways" was upheld in Allview Inn v. Howard County, 3 Envir. Rep. Cas. (BNA) 1863 (Md. Cir. Ct. 1972). But see Society of Plastics Indus. v. New York City, 3 Envir. Rep. Cas. (BNA) 1370 (N.Y. Sup. Ct. 1971), wherein a city tax on plastic containers enumerated in state taxing enabling act was found to exceed state authorization and to violate the due process clause of the Fourteenth Amendment because it would result in the destruction of the plastic container industry without any legitimate public reason.

11. Address by John F. Skinner of the U.S. EPA Office of Solid Waste Programs, Resource Recovery Division, "Reduce the Incentive to Waste," 80th National Meeting of the American Institute of Chemical Engineers, in Boston (Sept. 8, 1975).

12. Decision-Makers Guide, supra note 9, at 88.

13. Address by Thomas F. Williams of the U.S. EPA Office of Solid Waste Management, "Environmental Protection: The People's Choice," Second Northeast Regional Conference of the National Audubon Society, in New Paltz, N.Y. (June 8, 1974).

14. "Solid Waste Management: Horizons Unlimited," supra note 4. Of the 13 basic raw materials required by our modern economy, we depended in 1970 on imports for more than half of our supplies of 6 of these, including all our chromium and manganese, vital to steel-making, and most of our bauxite. It has been projected that by 1985 we will be

primarily dependent on imports for supplies of 9 of those 13, including iron ore and tin. Meanwhile, it has been estimated that 7 percent of the iron, 8 percent of the aluminum, 5 percent of the copper, 3 percent of the lead, 19 percent of the tin, and perhaps half of the paper consumed each year could be supplied from what is now waste. In addition, the mixed municipal waste from our larger urban areas could be made to generate 830 trillion Btu's of energy.

15. Conn. Gen. Stat. ch. 361a § 19-524a *et seq*.

16. 42 U.S.C. § 3251 *et seq*.

17. RCRA, *supra* note 3, § 4002(c)(10)-(11).

18. *Id*. § 4003(5)-(6).

19. *Id*. § 2003.

20. *Id*. § 5001.

21. *Id*. § 6002(c).

22. *Decision-Makers Guide*, *supra* note 9, at 122-24.

23. The administrator of EPA is directed to develop criteria for identifying hazardous waste and to promulgate a list of these substances. Generators of these wastes are required to keep accurate records and to submit reports on demand of EPA or the authorized state agency, detailing the quantities of hazardous wastes generated during a particular period of time and the disposition of the same; to use appropriate containers for their storage, transport, or disposal, and labeling to identify the contents; to furnish information on their chemical composition to persons transporting, treating, storing, or disposing of them; and to use a manifest system to assure that all the hazardous waste generated is designated for treatment, storage, or disposal in facilities which have been issued permits to handle them.

    Transporters of hazardous wastes are, likewise, required to keep accurate records of the source and delivery points of all wastes transported; to transport only properly labeled wastes; and to comply with the manifest system, delivering the wastes only to the designated facilities. Regulations for the transport of wastes which are also subject to the Hazardous Materials Transportation Act (49 U.S.C. § 1801 *et seq*.) are to be coordinated with the U.S. Secretary of Transportation.

    All facilities for the treatment, storage, or disposal of hazardous wastes must be issued a permit as a precondition to operation. Applications for permits must specify such detailed information as required by regulations promulgated by the administrator, including estimates of the kinds, quantities, and concentrations of wastes

they propose to handle; the rate at which they propose to handle them; and the site at which such handling is to take place. Issuance of permits will depend, among other things, on compliance of the sites with the criteria for their location, design, construction, and operation; and on additional qualifications as to ownership, continuity of operation, training for personnel, and financial responsibility; as detailed in regulations developed by the administrator. Permits are subject to revocation for noncompliance with the regulations. The act requires owners and operators of hazardous waste treatment, storage, and disposal facilities to keep records of all wastes handled, detailing the manner in which they were handled; and to comply with the manifest system and with prescribed operating methods.

24. "Conservation and Common Sense," supra note 8.

25. RCRA, supra note 3, § 4003(3).

26. "Environmental Protection: The People's Choice," supra note 13.

27. Connecticut Solid Waste Management Act, Conn. Gen. Stat., § 19-524a et seq.

28. New Jersey Solid Waste Management Act, N.J. Stat. Ann. § 13:1E-1 (West) et seq.

29. Conn. Gen. Stat. § 19-524a(m).

30. In Ringlieb v. Township of Parsippany-Troy Hills, 59 N.J. 348, 283 A.2d 97 (1971), the court held that the New Jersey statutes adopting a plan to control all facets of the solid waste industry preempted the field and invalidated a township ordinance regulating solid waste disposal and collection. Decided on somewhat narrower grounds O'Connor v. City of Rockford, 3 Ill. App. 3d 548, 279 N.E.2d 356 (1972), held that the Illinois statute empowering municipalities to acquire land outside their corporate limits for disposal of refuse superseded the zoning power conferred on counties by the relevant zoning enabling legislation. The court in Waterford Processing & Reclaiming Co. v. Township of Waterford, 25 Mich. App. 507, 181 N.W.2d 675, 677, was faced with the Garbage and Refuse Disposal Act, which provided in part that local governments could adopt more stringent regulations than those in the state act, and which required prospective operators to secure proper zoning permits. The court nevertheless ruled: "Once the [state health] commissioner has approved a certain site and imposed operating conditions, the local governing body may impose any additional reasonable regulations designed to eliminate any foreseeable health hazard. However, these local regulations may not exclude what the state has permitted."

The decision in Town of Oronoco v. City of Rochester, 197 N.W.2d 426, 429 (Minn. Sup. Ct. 1972), makes reference to the general rule (101 C.J.S. Zoning § 135) that a governing body is not subject to zoning restrictions where property is to be used for governmental as opposed to proprietary purposes. But, citing the need for reasoned land use planning, which "serves as foundation for the exercise of police power in the area of zoning," the court rejected this traditional freedom from regulation in favor of a balancing-of-interests test. The court found that the need for the immediate establishment of a new facility, coupled with the fact that the state Pollution Control Agency had issued a permit and was invested with the power to regulate the future operation of the landfill, adequately outweighed the town's fear that the site would be an environmental hazard. But see Township of Haring v. City of Cadillac, 35 Mich. App. 260, 192 N.W.2d 384 (1971), holding that the Michigan DNR lacked authority to grant city permission to use state-owned land located within the township for a landfill facility, where that use did not conform with local zoning. This case may be distinguished by the fact that the legislature had never mandated the issuance of permits by the department. The policy of the department regarding landfills was set forth in a forestry division policy manual.

31. Wis. Stat. Ann. § 144.445 (West); and see Solid Waste Recycling Act, id. § 499.01 et seq.

32. 64 N.J. 190, 314 A.2d 65 (1974).

33. Environmental Protection Division, Georgia DNR, "Guidelines for Fiscal Year 1977, State Solid Waste Grant-in-Aid Program" (Memorandum to All Mayors and Chairmen of Boards of County Commissioners).

34. It has been estimated that given a solid waste density of 1,000 pounds per cubic yard in place, and one part (volume) earth cover to four parts solid waste, a population of 10,000 generating approximately 3.5 pounds of waste per day would require on the order of 10 acre-feet of space per year for residential and commercial waste. Actual densities may vary from about 800 to 1,200 pounds per cubic yard, and cover ratios may vary from 1:1 to 1:4. This volume requirement may be significantly reduced where wastes are processed for volume reduction (i.e., incineration, shredding, baling) prior to disposal in the landfill. Decision-Makers Guide, supra note 9, at 112. To take advantage of economies of scale, planners should favor large sites over a number of small sites, even if the former may require slightly higher haul expenses.

35. D. MacDonald et al., Residual Waste: Model State Legislation 3-18 (1976).

36. Delaware Water Pollution Control Regulations; Minnesota Pollution Control Agency, Division of Solid Waste Regulation SW 1 et seq.; and Wisconsin DNR, Regulations ch. NR 151 (Solid Waste Management).

37. Mich. Stat. Ann. § 14.435(4).

38. J. Wyatt and P. White, Jr., Sludge Processing, Transportation and Disposal/Resource Recovery: A Planning Perspective 84 (1975).

39. Colo. Rev. Stat. § 30-20-101.

40. Mich. Stat. Ann. § 14.435(4).

41. Environmental Land-Water Management Act of 1972, Fla. Stat. Ann. § 380.012 et seq. (West).

42. Wyatt and White, supra note 38, at 84-85.

43. Minnesota Pollution Control Agency, Division of Solid Waste Regulation SW 1 et seq.

44. Environmental Land-Water Management Act of 1972, Fla. Stat. Ann. § 380.012 et seq. (West).

45. B. Weddle and G. Garland, "Dumps: A Potential Threat to Our Groundwater Supplies," Nation's Cities (National League of Cities), Oct. 1974, at 21-26.

46. American Law Institute, A Model Land Development Code (Proposed Official Draft 1975).

47. A. Geswein, Liners for Land Disposal Sites: An Assessment (1975).

48. Tex. Water Code Ann. tit. 2, § 21.080.

49. Wis. Admin. Code, Solid Waste Management, § NR 151.01 et seq.

50. 42 U.S.C. § 300f et seq.; 40 C.F.R. Part 146.

51. See, e.g., Connecticut Water Pollution Control Act, Conn. Gen. Stat. § 25-54a.

52. J. Lehr et al., A Manual of Laws, Regulations and Institutions for Control of Ground Water Pollution IV-9 to IV-12 (1976).

    1. The permit application shall contain an economic and environmental analysis of the proposed system and comparative consideration of one or more alternative solutions.
    2. The permit application shall identify the location of the proposed disposal site on the latest available topographic quadrangle map or maps of the United States Geological Survey, on a scale of

1:24,000. If no such maps are available, equivalent alternatives shall be supplied with the application.

3. The permit application shall include a detailed map, on a scale of one inch equals 200 feet, or larger, showing:
   (a) topography within the area of the disposal site, with a contour interval not exceeding two feet,
   (b) the area at least one-half mile beyond the site limits, which shall show contours on five-foot intervals,
   (c) detailed survey boundaries and dimensions of the proposed project,
   (d) cultural features, streams, springs, sinkholes, swamps, mines, pits, quarries, and other natural and man-made features as may be pertinent to ground water quality,
   (e) existing wells, test borings, excavations, percolation test sites, etc.,
   (f) roads, pipelines, power lines,
   (g) location of proposed monitoring wells,
   (h) details of ground water flow,
   (i) location and thickness of glacial, colluvial, alluvial, and lacustrine deposits,
   (j) bedrock depth, or outcrop, and lithology; depth to highest impermeable clay.
4. The permit application shall include a description of regional and local structural geology. Regional information shall include an area of five miles by five miles centered on the proposed site.
5. The permit application shall include a complete and detailed description of the hydrology, geology, and soils at the proposed site. This shall include, but not be limited to, description of ground water conditions; rock types, structural conditions such as faulting, folding, jointing, etc.; type and thickness of materials overlying bedrock, including soil classification; permeability and percolation rates of soils; flooding frequency; soil ion exchange capacity; gradation analyses to a depth five feet below the lowest proposed fill; and other existing conditions such as may be present at the site. A cored soil sample shall be taken and permanently retained to show initial soil characteristics.
6. The permit application shall include complete data establishing the background, or indigenous, ground water quality, including analyses for at least the following conditions:
   (a) temperature, pH, specific conductance,
   (b) hardness, alkalinity,

(c) BOD 5 day,
(d) COD 25 w $K_2Cr_2O_7$,
(e) dissolved solids, suspended solids,
(f) total iron (Fe),
(g) manganese (Mn),
(h) sulfate (SO_4),
(i) chloride (Cl),
(j) fluoride (F),
(k) Nitrogen - Kheldahl (N)
(l) nitrogen - ammonia (NH_4),
(m) nitrogen - nitrate (NO_3),
(n) chromium (Cr),
(o) nickel (Ni),
(p) zinc (Zn),
(q) copper (Cu),
(r) mercury (Hg),
(s) phosphorus (P),
(t) aluminum (Al),
(u) lead (Pb),
(v) methylene blue active substances (MBAS),
(w) other constituents as indicated by the nature of the material being disposed.

The permitting agency may require additional samples before issuing the permit.

53. U.S. Environmental Protection Agency, Sanitary Landfill Design and Operation 31 (Washington, D.C.: Government Printing Office, 0-470-406, 1972).

54. Cal. Health and Safety Code § 25100 et seq. (Deering); State Water Resources Control Board, "Waste Discharge Requirements for Waste Disposal on Land," Disposal Site Design and Operation Information (Oct. 1974).

Class I disposal sites, as defined in the regulations, are those which are expected to provide complete protection for all time, for the quality of ground and surface waters occurring in that area. These sites are deemed safe for all wastes to be deposited therein, and the site represents no hazard to public health or wildlife resources. Geological and hydrological criteria for site classification are set forth in the law. Group 1 wastes, defined as containing toxic substances and substances which could significantly impair the quality of usable waters, may be deposited only in Class I sites. The regulation lists the wastes which are considered to fall into the Group 1 category. California regulations also formally establish Class II sites, to receive Group 2 waste category, and these are primarily ordinary municipal solid wastes. A

> Class III site and Group 3 waste category accommodates disposal of inert solid wastes. These are not considered to have as significant an impact on water quality as residual wastes deposited in the Class I and Class II sites.

MacDonald et al., supra note 35, at 5-16 to 5-17.

55. Connecticut State Agencies Regulations, Solid Waste Management Regulation § 19-524-5; Conn. Gen. Stat. § 19-524(b)(b).

56. Pa. Stat. Ann. tit. 35, § 691.1 et seq. (Purdon).

57. RCRA, supra note 3, § 4004(a).

58. Id. § 4005(c).

59. Pennsylvania Department of Environmental Resources, Rules and Regulations, Solid Waste Management, ch. 75.

60. RCRA, supra note 3, § 3001 et seq. See note 23 supra for a summary of the hazardous waste provisions of the federal act.

61. Conn. Gen. Stat. § 19-524(b)(d).

62. Or. Rev. Stat. § 459.590.

63. RCRA, supra note 3, § 4005.

64. Conn. Gen. Stat. § 19-524(b); and id. § 22a-6, which empowers the commissioner to enter orders for the enforcement of any statute, regulation, order, or permit administered, adopted, or issued by him.

65. Cal. Water Code § 13361(c)(Deering).

66. Conn. Gen. Stat. § 22a-6b.

67. Id. § 25-54q.

68. Mich. Stat. Ann. § 14.528(201) et seq.

69. The more than 20,000 municipal corporations and over 3,000 counties represent, in most States, the local governments which are normally obligated to provide solid waste collection and disposal services for inhabitants of their jurisdictions. The level and quality of services presently provided and the inability to improve these services primarily rest with the administrative and fiscal capabilities of these governments.

> In 1970 roughly 90 percent of all municipal corporations and about 60 percent of all counties had populations of fewer than 25,000 inhabitants. Most municipal corporations in the United States, about 66 percent, had populations of fewer than 2,500 inhabitants in 1970. Various studies have shown that adequate collection or disposal services can be directly provided by government at reasonable cost when the local solid waste service area includes a population approximating 30,000 inhabitants.
>
> Local governments with smaller populations and economic bases can provide adequate services by increasing per capita costs, but reductions in the levels of services provided are more common. Many local governments are too small to justify the costs of directly providing solid waste services. However, when the local population base approaches 50,000 persons, economies of scale can normally be expected.

Council of State Governments, The States and Solid Waste Management: Our Effluent Society 10 (1974).

70. Decision-Makers Guide, supra note 9, at 8-12.

71. Id.

72. Robert C. Porter, "Regional Solid Waste Management Authority: A Case Study," in Solid Waste Demonstration Projects: Proceedings of a Symposium, Cincinnati, May 4-6, 1971, at 149-56 (U.S. EPA, SW-4p, 1972). See also Goreham v. Des Moines, 1 Envir. Rep. Cas. (BNA) 1649 (Iowa Sup. Ct. 1970), upholding the constitutionality of DMSWA's authority to issue bonds.

73. N.J. Stat. Ann. § 13:17-1 et seq. (West).

74. See the discussion of the Georgia Solid Waste Grant-in-Aid Program in section 2.1.2, "Implementation and Enforcement of Plans."

75. Md. Nat. Res. Code Ann. § 3-101 et seq.

76. The States and Solid Waste Management: Our Effluent Society, supra note 69, at 23-24.

77. N.J. Stat. Ann. § 13:1E-6b(5) (West).

78. Wis. Stat. Ann. § 144.445 (West); and see Solid Waste Recycling Act, id. § 499.01 et seq.

79. See, for example, the Nejedly-Z'berg-Dills Solid Waste Management and Resource Recovery Act of 1972, Cal. Gov't Code §§ 66700-66793 (Deering).

80. N.J. Stat. Ann. § 48:13A-1 *et seq*. (West).

81. Id. § 13A-6.

82. *Decision-Makers Guide*, *supra* note 9, at 132.

83. Wyatt and White, *supra* note 38, at 1.

84. Municipal Sludge Management: Environmental Factors, 41 Fed. Reg. 22532 (1976).

85. The details of a regulatory program for residual waste haulers and other intermediate handlers are not discussed in this report, except as regards compliance with the manifest system. But note the following:

> Transportation of residual wastes in equipment that is not suitable for the job or in defective equipment can be highly dangerous, e.g., acid leakage or sludge spills on highways. Specifications for the equipment and procedures for its use should be reviewed, and maintained at the state level because of mobility of the equipment. Where states have thus far failed to provide regulations specific to this problem, the Motor Vehicle or Health Department should have some authority to do so. The State should have an agency to set standards, which would be applied against the source of the wastes. For example, if a piece of transportation equipment fails to meet the standards, the waste producer would be prohibited from placing his wastes aboard it.
>
> Routing of intransit wastes of either the special, hazardous or toxic classes, should be controlled in such a manner that a traffic accident or equipment malfunction (including leakage) will not endanger water supplies in the area. Permissible routing should also take into account direct hazards to large numbers of people (downtown areas) and particularly children (schools should be avoided). Movement of particularly hazardous wastes may also be restricted to daylight hours that do not coincide with peak traffic congestion, as a further effort to reduce the probability of accidents.
>
> Hauling permits should prohibit use of roads in the vicinity of reservoirs, rivers and streams. Trucks bearing hazardous or toxic waste should be required to display an appropriate sign on front, rear and both sides as a warning to other vehicles and to alert law enforcement patrol cars, in the event a truck uses a prohibited route.

> Accidents in transporting hazardous wastes can lead to serious problems of toxic impact on the public and on wildlife, pollution of ground and surface waters, air pollution, fire, explosion, etc. (These problems can also stem from illicit dumping.) Here, also, the planning agency should encourage waste haulers and manaagement agencies to work out contingency plans with highway departments, fire and police departments, hospitals and similar groups to minimize the adverse consequences of accidental dumping of hazardous wastes. Preventive action in the form of licensing programs and generating awareness among waste producers, transporters, and site operators, as already mentioned, should help minimize such episodes.

MacDonald et al., supra note 35, at 3-24 to 3-25.

> A Pennsylvania regulation [Pennsylvania Department of Environmental Resources, Rules and Regulations, ch. 101], for instance, requires individuals responsible for a spill to immediately notify the regional office of the Department of Environmental Resources. If the spill may affect ground water, the Regional Geologist of the state's Ground Water Section attempts to respond within a maximum of two hours to make a technical appraisal and enable prevention of ground water effects, if possible. Certain industries in Pennsylvania are required to develop a Pollution Incident Prevention Program which establishes a specific procedure for informing the state of spills or other major pollution problems.

Lehr et al., supra note 52, at II-136.

86. Municipal Sludge Management: Environmental Factors, supra note 84, at 22533.

87. Decision-Makers Guide, supra note 9, at 133-35.

88. Municipal Sludge Management: Environmental Factors, supra note 84, at 22536.

89. Decision-Makers Guide, supra note 9, at 132.

90. Wyatt and White, supra note 38, at 104-05.

91. Decision-Makers Guide, supra note 9, at 132.

92. Wyatt and White, supra note 38, at 105-06.

93. Lehr et al., supra note 52, at IV-31.

94. Metcalf & Eddy, Inc., Evaluation of Land Applications Systems 31-39 (1975).

95. Lehr et al., supra note 52, at IV-34.

96. Oregon Department of Environmental Quality, Regulations Pertaining to Solid Waste Management K, Special Rules Pertaining to Sludge Disposal Sites.

97. Lehr et al., supra note 52, at II-118 to II-119.

98. Colorado Department of Health, Criteria Used in the Review of Waste Water Treatment Facilities (1973).

99. Lehr et al., supra note 52, at II-119.

100. Illinois Environmental Protection Agency, Design Criteria for Waste Treatment Plants and Treatment of Sewer Over-flow, Technical Policy 20-24 (rev. July 1971).

101. Lehr et al., supra note 52, at II-119.

102. 190 P.2d 681 (Idaho Sup. Ct. 1948).

103. 30 N.J. 528, 154 A.2d 9 (N.J. Sup. Ct. 1959).

104. 526 P.2d 1328 (Colo. Sup. Ct. 1974).

105. 53 C.J.S. Licenses § 42a.

106. Kenneth Culp Davis, Administrative Law Text 170 (St. Paul: West Publishing Co., 3d ed. 1972).

107. 439 F.2d 584, 598 (D.C. Cir. 1971).

108. Davis, supra note 106, at 147.

109. An example of this philosophy is Darling Apartment Co. v. Springer, 22 A.2d 397 (Del. Sup. Ct. 1941), a case involving licensing for the sale of alcoholic beverages, wherein the court held that a license to sell liquor is not property in any legal or constitutional sense, no right being conferred on the licensee, but is a mere temporary permit issued under authority of the state to do that which otherwise would be unlawful. Hence, the court reasoned, the right of the licensee can rise no higher than the terms of law under which the license is issued. The licensee accepts his privilege subject to such conditions, including the cause and manner of revocation or suspension, as the legislature may see fit to impose. See Davis, supra note 106, at 175 ff.

110. 190 N.Y.S.2d 39, 19 Misc. 2d 524 (1959).

111. Davis, supra note 106, at 170, 206 ff.

112. 81 C.J.S. States § 130.

113. 329 N.Y.S.2d 381, 38 App. Div. 2d 349 (1972).

114. People v. Reedey, 66 Cal. App. 409, 226 P. 408 (1924).

115. Wood v. Town of Wilton, 240 A.2d 904 (Conn. Sup. Ct. 1968).

CHAPTER TEN

LAND DISPOSAL OF SOLID WASTES AND SLUDGES

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CHAPTER ELEVEN

WELL INJECTION OF RESIDUAL WASTES

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Appendix: Nebraska Department of Environmental Control Rules and Regulations for the Control of Disposal Wells to Protect Groundwater and Other Subsurface Resources of the State of Nebraska

Footnotes

Suggested Readings

CHAPTER ELEVEN

WELL INJECTION OF RESIDUAL WASTES

1.0 *Introduction*

As a method of disposing of municipal and industrial wastes, well injection is a relatively recent development. Although at least one waste injection well was operating as early as 1931, by 1960 there were only 30 such wells in existence.1/ As federal and state controls on surface emissions of polluting effluents grew more stringent, however, the use of injection wells increased rapidly. By 1967 there were at least 110 wells in service, 2/and by 1974 there were 333 well sites in 25 states.3/ This rate of development is likely to continue, if not increase, in the future.

Apart from federal permits issued under the National Pollutant Discharge Elimination System (NPDES), what regulation of well disposal has occurred to date has been undertaken at the state level. Those states that have dealt with the issue have adopted one of the following three approaches: (1) imposed a ban on all well injection of wastes; 4/ (2) allowed it, but only as a last resort where all other methods fail or are considered too impractical; 5/ (3) accepted it as a viable waste disposal method to be treated on an equal basis with other methods.6/

Well injection of industrial or municipal wastes should not be confused with oil field brine injection. The latter is commonly practiced in oil and gas producing areas to dispose of the saltwater byproducts of oil production or to increase the pressure in the oil-bearing strata in order to force more oil to the surface. Brine injection usually involves the return of a natural subsurface liquid to the stratum of its origin or at least to oil-bearing strata where it poses little threat of freshwater contamination.

Industrial and municipal waste injection, on the other hand, generally entails the injection of highly toxic or polluted liquids into a receiving aquifer that is occupied by existing waters. Although referred to as a disposal method, underground injection does not really dispose of the pollutants since the conditions underground are seldom conducive to the degradation of the pollutants. With the exception of acids injected into carbonate minerals and radioactive materials with short-lived isotopes, pollutants underground are likely to retain their undesirable characteristics indefinitely.7/

The difficulty in monitoring these liquids once they are injected and the uncertainty concerning the effects of the increased pressures, changes of chemistry, and possible migration of the liquid add to the concern over the desirability of the method. The more obvious risks involved are best exemplified by the seismic activity that followed, and is generally attributed to, two events. One was the construction and operation of the Rocky Mountain Arsenal well, and the other was the spectacular blow-out

of the Hammermill Paper Company well in Erie, Pennsylvania that threw equipment 30 feet in the air and spilled waste liquid into Lake Erie at the rate of 200 gallons per minute for several days.8/ Although the method has had a low rate of failure to date, these examples demonstrate the nature of its potential hazards.

Even if the unknown risks of well injection are accepted, certain known problems remain. The method requires the irrevocable commitment of certain potential resources, and poses a threat to existing resources by the injection of liquid wastes. Although the aquifer into which the liquid is injected may not be of any other present or foreseeable use, changing needs of society might someday find a use for that aquifer in an uncontaminated state. In addition, valuable freshwater aquifers may be endangered by well leakage or unexpected migration of the injected liquids. Unlike surface water, groundwater, once contaminated, is very slow to decontaminate itself once the polluting source is removed.9/

On the positive side, well injection does constitute a relatively inexpensive method of dealing with particularly pernicious wastes. It also has positive environmental aspects; it consumes less energy, causes less deterioration of surface water quality, and results in less aesthetic damage (by eliminating the need for extensive treatment facilities) than many other pollution abatement methods.

2.0 Authority

2.1 Federal Statutory Authority Over Injection Wells

For the most part, well injection of liquid residuals has been controlled at the state level. The federal role, however, is increasing as the practice becomes more widespread. Most federal activity is limited to supervision of state programs, with little direct regulatory authority. Under the Atomic Energy Act, 10/the Safe Drinking Water Act, 11/ the Refuse Act, 12/ and the Federal Water Pollution Control Act Amendments of 1972, 13/ some direct regulatory authority exists or has been exercised. The Atomic Energy Act, through the Nuclear Regulatory Commission's Standards for Protection Against Radiation, 14/ controls the disposal of radioactive materials. The Refuse Act was applied once in 1971 to exercise control over well injection, but the circumstances were unusual and it is unlikely that the act could be used as authority for any substantial federal programs.15/ This application of the Refuse Act preceded adoption of the Safe Drinking Water Act of 1974 and of the Federal Water Pollution Control Act Amendments of 1972, which provide more substantive federal controls over injection wells.

2.1.1 The Safe Drinking Water Act

Under section 1424(e) of the Safe Drinking Water Act, if the administrator of EPA determines that an aquifer is the primary source of drinking water for a given area, no federal financial assistance may be given for a project which the administrator determines may contaminate that aquifer. Indirectly,

the act will exert a great deal of influence, since under section 1421 the states are required to establish underground injection programs pursuant to EPA-promulgated regulations. The proposed regulations have been published 16/ but have not yet been approved. They will provide minimum standards with which state underground injection control programs must comply, and should be used as the basic guidelines for state regulation of injection wells.17/

The scope of the Safe Drinking Water Act is far wider than the material on well injection covered in this chapter. The proposed regulations' definition of "well injection" includes "a subsurface emplacement through a bored, drilled, or driven well, or through a dug well where the depth is greater than the largest surface dimension, whenever a principal function of the well is the subsurface emplacement of fluids."18/

According to the introduction to the proposed regulations,

> As well as including what is normally referred to as the "deep well" injection of industrial or municipal wastes, the proposed definition of "well injection" also includes a number of well injection practices other than "deep well" waste disposal, including the subsurface emplacement of fluids generally, not just waste disposal.19/

This chapter does not attempt to cover so broad an area; it is restricted to the well injection of industrial or municipal wastes, as described in the introduction.

2.1.2 The Federal Water Pollution Control Act Amendments of 1972

Substantive federal regulatory authority over well injection also exists under the Federal Water Pollution Control Act Amendments of 1972. Although NPDES permits are required for discharges of pollutants into "waters of the United States," 20/ that language has not been broadly interpreted to include groundwaters.21/ EPA does exercise jurisdiction over well disposal systems when they are part of an activity requiring an NPDES permits or are replacing an activity that required an NPDES permit. The regulation describing this jurisdiction states:

> If an applicant for a permit is disposing or proposes to dispose of pollutants into wells as part of a program to meet the proposed terms and conditions of a permit, the Regional Administrator shall specify additional terms and conditions in the permit which shall (i) prohibit the disposal, or (ii) control the disposal in order to prevent the pollution of ground and surface water resources and to protect the public health and welfare.22/

The FWPCA extends federal influence over state programs in two ways. First, it requires that, in order to be approved, state NPDES programs contain authority "*to control the disposal of pollutants into wells.*"23/ This means that under a state-approved program all disposal wells require a

permit and must be controlled to protect groundwater and surface water.24/ For the most part, in complying with this provision, the states have included groundwater as water of the state to be protected under their NPDES programs, rather than establishing specific programs to regulate well injection. Second, and more important to this handbook, pollution from injection wells must be controlled as a condition of approval for section 208 water quality management plans. Section 208(b)(2)(K) of the act requires that such plans include "a process to control the disposal of pollutants on land or in subsurface excavations within such areas to protect ground and surface water quality."

2.2 State and Local Authority Over Injection Wells

There are a number of sources of authority that a state or areawide water quality planning agency might draw upon to fulfill its obligation under the FWPCA to provide for control of pollution from injection wells. This section will briefly discuss those sources that are or could be used by state and local governments.

2.2.1 State Authority

A very few states, including Texas 25/ and Michigan, 26/ have adopted statutes specifically for the control of well injection of liquid wastes. Texas has had a long history of regulating the injecton of oil field brines and in 1961 was the first state to adopt a law directly concerned with the control of injection of industrial wastes.

More frequently, injection wells are regulated under a broader statutory program that has been made specifically applicable to the injection of wastes. Ohio's oil and gas law is make applicable to the injection of all wastes, regardless of whether the injection is connected with the production of oil and gas.27/ Hawaii's statute covering the drilling of wells in general is made specifically applicable to well injection.28/

a. Pollution Control Statutes

General pollution control laws often include well injection as a source of pollution subject to regulation. Oregon's water pollution control statute is a good example of this sort of control. It requires that a permit be obtained to "[c]onstruct, install, modify or operate any disposal system or part thereof or any extension of addition thereto."29/ The statute defines a proposal system as "a system for disposing of wastes, either by surface or underground methods, and includes municipal sewerage systems, domestic sewerage systems, treatment works, disposal wells and other systems."30/

Pollution control laws that do not specifically mention pollution from disposal wells will generally constitute sufficient authority to establish a regulatory program if they cover groundwaters as well as surface waters. Difficulty may arise, however, if a general pollution control law defines pollution

in terms of adverse effect on other water uses. California, for example, defines pollution as the "alteration of the quality of the waters of the state by waste to a degree which unreasonably affects: (1) such waters for beneficial uses, or (2) facilities which serve such beneficial uses."31/ California further specifically prohibits the injection of wastes into a "subterranean water-bearing stratum that is used or intended to be used as, or is suitable for, a source of water supply for domestic purposes."32/ Even if California's two provisions were combined, it might be difficult to regulate well injection into a saline aquifer since, for the time being, saline aquifers offer no beneficial uses. Of course, it might be argued that the potential migration of pollutants into useful waters is a sufficient basis on which to regulate injection wells, even in states with no more authority than a general pollution law that defines pollution in terms of damage to its waters' usefulness.

b. Environmental Impact Statements

State environmental impact statements (EIS) requirements constitute another general statutory method that can be used in a well injection regulatory program. As of January 1975, 32 states had adopted, either legislatively or administratively, some form of environmental impact statement requirement.33/ The applicability of these requirements to injection wells varies from state to state. Some states' EIS requirements are limited either geographically or by activities covered. Thus Delaware, under its Coastal Zone Act, 34/ requires impact statements only for industrial activities taking place in the coastal zone, and Arkansas requires impact statements only for utility plant siting.35/

Even state EIS requirements of general applicability may be limited in their usefulness for control of well injection if they apply just to projects undertaken by the state itself. Connecticut's EIS requirement is limited to projects undertaken by state agencies or funded in whole or in part by the state, 36/ and Indiana specifically exempts state actions which merely involve the granting of a license or permit.37/

The California Environmental Quality Act of 1970 defines a "project" requiring an impact statement as including "activities involving the issuance to a person of a lease, permit, license, certificate, or other entitlement for use by one or more public agencies."38/ That act, therefore, ensures that impact statements will be prepared for injection wells requiring permits. Other states, such as Wisconsin, have followed the language of the National Environmental Policy Act, which requires impact statements for "proposals for legislation and other major federal [in state laws, "state"] actions significantly affecting the quality of the human environment."39/ This has been defined as including projects involving "lease, permit, license, certificate or other entitlement for use," 40/ and would include injection wells which require a permit.

In states that do not require a permit to be obtained for the construction of an injection well, such construction might still be subjected to the EIS process under a provision such as Minnesota's which requires an impact statement for major private actions "of more than local significance . . . where no governmental permit is required."41/

2.2.2 Local Authority

Local sanitation codes or even zoning laws might give local governments the statutory authority to regulate well injection, but, as will be discussed later in the section entitled "Institutional Considerations," injection wells are an unlikely candidate for local control. If local regulatory authority is exercised, it is important that it be accompanied by an environmental impact statement requirement to ensure that adequate consideration is given to the environmental advantages and disadvantages of the process. Only California, Massachusetts, Puerto Rico, and Washington currently impose EIS requirements on the actions of local governments.42/ Depending on the state constitution, however, local governments may be able to adopt their own EIS requirements as a part of their zoning ordinance 43/ or subdivision ordinance, 44/ or they may be able to do so pursuant to an EIS enabling statute such as those of North Carolina 45/ and Montana.46/

3.0 Planning and Standards

The general consensus among writers on the subject and among states that have adopted extensive legislative or administrative controls for injection wells is that there are five basic areas with which regulation should be concerned: (1) at the planning stage, consideration should be given to alternative methods and comparative advantages and disadvantages of the well disposal technique; (2) preliminary studies should be made concerning the nature and feasibility of the site and its compatibility with the proposed injection liquids; (3) standards for the design, construction, and operation of the well should be established; (4) once the well is constructed, procedures for reporting and monitoring should be spelled out; and (5) abandonment should be regulated when the well has exhausted its usefulness.

3.1 Consideration of Alternative Methods

Before any other issue is broached, an initial determination should be made as to whether well disposal is a desirable technique for dealing with a particular waste disposal problem. This includes considering the other available techniques and weighing their hazards and costs against those of well injection. Several states, including Missouri 47/ and North Carolina, 48/ have simply prohibited the construction of injection wells altogether. Obviously, this approach avoids the potential hazards of the method, but it also eliminates the possible advantages and benefits.

If injection wells are to be permitted, it is important that due consideration be given to their environmental desirability in each instance. A provision such as that recommended by the EPA, requiring that injection wells be approved only after "[a]ll reasonable alternative measures have been explored and found less satisfactory in terms of environmental protection," 49/ provides some incentive to explore alternatives. It would be more effective, however, to require that an environmental impact statement be prepared before an injection well is approved. An impact statement, in the proper form, will ensure that alternative methods and potential hazards are thoroughly investigated and considered. It provides an opportunity (one not available in subsequent regulatory procedures affecting injection wells) to compare other methods of waste disposal with the proposed injection method and evaluate the relative merits and potential for environmental harm.

Probably the best format for an impact statement is the one required by the National Environmental Policy Act, which requires that a statement cover:

(i) The environmental impact of the proposed action,
(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,
(iii) alternatives to the proposed action,
(iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.50/

Following NEPA's language removes much of the uncertainty that might surround a state's EIS requirements, since many of the questions concerning the adequacy of federal impact statements have been resolved in the courts. Indiana, Maryland, Montana, New Mexico, Puerto Rico, and Washington have adopted NEPA's five requirements, 51/ and by doing so have ensured that the environmental effects of and alternative solutions to a proposed injection well will be considered.

3.2 General Considerations of Feasibility

If injection wells are accepted as a reasonable alternative method of waste disposal, procedures should be adopted to ensure that a proposed well be constructed in such a location and manner as to minimize the potential risk. Following are some of the key criteria:

1. Geologic feasibility - Of primary concern in deciding on a site for an injection well is the presence of a suitable injection aquifer or receptor zone. The aquifer must be of sufficient size and permeability to accept the quantity of waste liquid to be injected without the use of excessive hydraulic pressures that might cause fracturing. Sand, sandstone, limestone, and dolomite formations generally make good receptor

zones. Within the zone, the existing water should be too highly mineralized to be usable as a present or potential resource.

The receptor zone should be contained by an impermeable layer, or aquaclude. This may be relatively thin or thousands of feet thick, but it is essential that it provide a watertight seal in order to prevent the upward migration of contaminated waters. This zone may be of clay, shale, or other substance of low permeability.

Ideally there should be no underground resources, such as freshwater, oil, gas, or valuable mineral deposits near the well which might become contaminated by the injection fluid. Since this will not always be the case, particularly with respect to potable water, areas with active or abandoned wells, frequent geologic faults, or high seismic activity should be avoided since they might provide channels through which the liquid could escape.

2. Chemical feasibility - Also important to the potential for well injection is the chemical relationship between the injection liquid and the receptor aquifer. The ideal situation arises when an acid waste is injected into a carbonate or limestone aquifer. This not only tends to neutralize the injection liquid, but the chemical reaction also increases the permeability and, therefore, the capacity of the receptor aquifer. Situations to be avoided arise when the injected and interstitial fluids combine to produce a precipitate that might clog the well or at least substantially reduce its capacity.

3. Hydraulic feasibility - Perhaps the most difficult quality to determine in analyzing the feasibility of a disposal site is the hydraulic character of the receptor zone. A site is most desirable when the aquifer is completely stagnant. This makes the migration of the injection liquid more predictable and helps to ensure that it will stay within the confines of the injection zone. However, there is usually a certain degree of natural hydrodynamic gradient in the injection zone which will cause an uneven and often rapid dispersion of the injection liquid. The unpredictibility and lack of understanding of the causes of subsurface hydraulic movement suggest that injection wells should be placed farther from other wells or geologic faults than might ordinarily be thought necessary.

4. Design of the well - The proper design of the well will vary greatly, depending on the nature of the fluids to be injected, well depth, injection pressures, and geologic character of the site. In general, a well will consist of a surface casing installed to below the depth of the deepest freshwater aquifer, and one or more smaller casings set all the way to the injection zone. The liquid waste is injected through a separate interior tubing which should be made of, or lined with, a material that will not be corroded by the injection fluid.52/

5. Regulatory coverage - The Environmental Protection Agency, in

Ground Water Pollution from Subsurface Excavations, published pursuant to section 304(e)(2)(D) of the FWPCA, 53/ lists 10 control methods that should be employed:

1. Evaluation of hydrogeologic framework and restriction on unsuitable locations and aquifers for waste injection.
2. Evaluation of fluids for injection including estimation of nature and extent of chemical reactions between injected fluids and aquifer fluids and minerals and of heat generation and its effects in the case of radioactive wastes, with restrictions on those deemed suitable.
3. Requirement of proper design and construction of injection wells including hardware and sealants.
4. Requirement of thorough hydrogeologic evaluation during construction and testing of wells.
5. Determination of aquifer response to injection, and direction and rate of movement of injected fluids and aquifer fluids.
6. Restriction on operating programs for injection wells.
7. Surface equipment and programs for emergency procedures in the event of a malfunction, including rapid shutoff and standby facilities and programs for long term decontamination.
8. Abandonment procedures for all wells.
9. Monitoring programs for injection wells.
10. Monitoring programs for aquifers.54/

4.0 Permit Procedures

4.1 Application Information

The most frequently used and perhaps most effective method for ensuring both that sufficient information is gathered and considered and that the well is properly located and constructed is the permit application and review process. A requirement that the applicant include extensive information relating to the feasibility of his proposal is an integral part of many regulations or statutes concerned with injection wells. The Idaho injection well law describes in general terms the kind of information that should be provided:

> Such application shall be upon forms furnished by the director which shall require information concerning the location and description of the waste disposal and injection well, the quantity, quality, and nature of the material being or proposed to be injected, the description of the underground formation and aquifer into which the material is proposed to be or is being injected, the availability of alternative sources of disposal, and such other information as will enable the director and the director of the department of health and welfare to determine the effect of the injection of the material

> upon the quality of the ground water, the effect upon the beneficial uses of said ground water, the effect upon the public health and the effect upon public benefits derived therefrom, if any.55/

Other regulations, such as Nebraska's (portions of which are reproduced in the appendix to this chapter), give much more detailed lists of information required to be submitted. Combining detailed application requirements with an environmental impact statement requirement is probably the safest method of making certain that all environmental information is disclosed. The application should provide information to determine the feasibility of the proposed well, and the EIS should ensure that alternative disposal methods are adequately explored.

These information requirements have a substantial drawback, however. They leave the administrative agency entirely at the mercy of the applicant or his consultant for the provision of adequate and accurate information. Although the applicant is often in the best position to provide this information, his role as an interested party may tend to make his information less than objective. To put the burden of gathering this information entirely on the administrative agency, on the other hand, would be both administratively and economically impractical. A compromise, such as having a state or regional authority provide the areawide geologic information and the applicant provide the specific site information, would constitute a more reasonable distribution of responsibility. Another method of ensuring the objectivity of the information is to require that the applicant employ an independent expert. Colorado's Rules for Subsurface Disposal Systems authorize the Water Quality Control Division of the Colorado Department of Health to require that an applicant obtain an independent expert, satisfactory to the division, to verify any of the data.56/ In practice, this has meant that the division has selected the expert, and the applicant has paid him.

4.2 Standards for Review

A problem with existing information requirements is that they are seldom combined with clear standards or criteria for evaluating the proposal. Considerations such as the thickness of the confining strata, the permeability of the injection aquifer, and maximum permissible injection pressures, are left to the discretion of the administrative agency.

In some states, however, there are standards governing the minimum dissolved mineral content of the injection aquifer and well design. The permissible minimum dissolved mineral content in the injection zone varies from state to state, but a number of states have accepted the standard of 10,000 mg/l.57/ Well design and construction standards range from a flexible case-by-case approach coupled with recommended standards, as in Texas, 58/ to the detailed minimum design standards set out by Nebraska covering casing, injection tubes, safety valves, and emergency surface equipment.59/

Giving the administrative agency a high degree of discretion may work well in a state like Texas which has had a great deal of experience in regulating injection wells, but in a state where there has been little or no experience with the method, minimum standards such as those required by Nebraska would reduce possible error.

4.3 Permit Conditions

When a permit is issued it should, obviously, be conditioned on the permittee adhering to his proposed plans. There should also be a provision, such as that contained in Michigan's rules governing well operations,60/ which requires that after a well is constructed it cannot be operated until it is tested and approved by the administering agency. EPA, in its proposed rules for state underground injection programs, requires that state permit procedures include "plans for monitoring both well head and annular fluid pressure, fluids being injected in injection zone and other aquifers."61/

4.3.1 Monitoring

Monitoring techniques that might be used consist of monitoring the pressure at the well head, the annulus, and the injection aquifer. Changes in pressure in any of these would provide warning that problems may be developing in the well. A provision like Michigan's would require the operator to report anomalous behavior to the supervising agency, which would then order cessation of the operation and require additional testing.62/

Even in the absence of anomalous behavior, periodic testing should be carried out by the operator and reported to the supervisor. Methods of inspecting wells consist of pulling of the tubing and inspecting it above ground; inspecting the tubing or casing in-place using magnetic, caliper, or teleview logs; pressure testing; and inspection of casing cement with cement bond logs.63/

Monitoring injection wells by the use of observation wells is often recommended, but is a controversial and somewhat questionable method. Although observation wells constitute the most accurate method for determining movement and changes in the injection aquifer and nearby freshwater aquifers, they present a number of substantial disadvantages. The irregularity of underground hydrographics makes the installation of more than one well necessary if accuracy is to be achieved. These wells are expensive to construct, and to impose this cost on the operator might render the whole process economically infeasible.

Monitoring wells present another problem that is perhaps more serious than their expense. Most of the danger of migration of the disposal liquid and contamination of freshwater aquifers comes from the well itself or from other nearby wells. A well, if it leaks, provides a channel of escape for the injected wastes; therefore drilling a number of monitoring wells substantially increases the possibility of pollution.64/

This danger can be reduced by not extending the monitoring wells all the way to the injection aquifer, and instead only using them to monitor the freshwater aquifers in the vicinity of the injection well. This would provide a warning of contamination without drilling into the injection zone and thereby providing a potential escape route for the waste liquid.

4.4 Enforcement

To make sure that permit provisions are being complied with and the injection well is being properly operated, the supervising agency should have the authority to enter the permittee's premises, have access to records, inspect the facilities, and sample injection fluids.65/ Should the supervising agency discover any violation of a permit's provisions or possible danger from the well, it should be able to shut down the well and revoke the permit (as, for example, the Idaho injection well law provides.)66/

A requirement, such as Michigan's, that the operator post a bond or a surety as a prerequisite to permit approval 67/ would be a useful enforcement mechanism. The sum, however, would have to be sufficient to encourage to operator to comply or to pay for sealing and abandonment if the operator failed to comply.

4.5 Controls on Abandonment

Since wells provide the greatest danger for escape of pollutants, it is necessary that procedures for their abandonment be adopted. States that have abandonment procedures usually require that a permit be obtained providing that the well be plugged in accordance with certain minimum requirements. In Oklahoma, detailed regulations for the cementing of wells at the surface, the bottom, and through freshwater aquifers are provided.68/ In Nebraska, the whole well must be cemented.69/ In Michigan, the regulatory agency sets the plugging requirements on a case-by-case basis.70/ The varying requirements of different types of wells suggest that the flexibility of the Michigan approach might be the most practical. At the same time, Nebraska's requirement that the well be totally cemented would seem to be the safest and most permanent way of ensuring that no leakage will occur.

The location of abandoned wells should be recorded by the appropriate regulatory agency so that future drilling operations in their vicinity can be conducted with that knowledge. The abandonment permit should be sufficient to satisfy this need. In addition, the plugged well should be permanently marked, as required by Oklahoma.71/

5.0 Institutional Considerations

5.1 Appropriate Level and Agency of Government

Because of its technological complexity, well disposal is not, nor is it likely to be, controlled at the local level. The degree of expertise necessary to evaluate a well injection proposal, and the

infrequency with which these proposals are made, would make it virtually impossible to develop an adequate program at the local level. Control of injection wells does lend itself to regional administration, particularly at the interstate level, since the geologic formations that are used as injection aquifers are often not confined within the boundaries of a single locality or state.

The only interstate agency presently concerned with injection wells is the Ohio River Valley Water Sanitation Commission (ORSANCO). That commission has assumed no direct regulatory authority over injection wells, but it has taken three steps towards the establishment of an areawide program. First, it maintains a registry of injection wells in the Ohio River Valley Region which includes information concerning the location of the well, geological and geophysical logs, test results, operational characteristics, and chemical characteristics of the injected waste.72/ Second, it is undertaking an evaluation of the Ohio River Basin to determine the physical feasibility of injection. Finally, ORSANCO has adopted a statement of policy towards well injection with recommendations to the member states. Briefly stated, the policy is that injection wells should be used when they are the best available alternative under the specific circumstances of the case.73/

Determining which agency or agencies should have authority over the regulation of well disposal depends primarily on the availability of expertise and resources. In states such as West Virginia, where authority over disposal wells rests entirely in one agency (the Department of Natural Resources), 74/ there might be a tendency to ignore other agencies with additional expertise for analyzing a proposed injection well. This problem is avoided in West Virginia by requiring that when a determination is made on an application for an injection well permit, the chief of the Division of Water Resources must consult with the director of the state Geological and Economic Survey and the deputy director of the Oil and Gas Division of the Department of Mines.75/ An environmental impact statement review process will also ensure that there is interagency cooperation and participation. The review procedures should provide that all concerned agencies have the opportunity to review the statement.76/

Perhaps the best situation exists in states where several agencies are concerned with the actual, final decisionmaking process. This is the case in Ohio, where approval is required by the chief of the Division of Oil and Gas, the director of the Environmental Protection Agency, the chief of the Division of Geological Survey, and, if it is a coal-bearing area, the chief of the Division of Mines.77/ Application is made only to the director of the Environmental Protection Agency who then submits it for approval to the other agencies. Hearings are not required by statute, but are frequently held if there is sufficient public interest. A reviewing agency may deny approval only on the basis of its particular area of concern. This multiple agency review process may seem excessively complicated,

but because the lines of administrative responsibility are clearly spelled out in the statute, a permit application in the proper form may be processed in as few as 30 to 45 days. Multiple review may be the only way to guarantee review by all relevant disciplines.

5.2 New Institutional Arrangements--The Public Alternative

Arthur M. Piper, in his paper, "Disposal of Liquid Wastes by Injection Underground--Neither Myth nor Millennium," 78/ has proposed an entirely new approach to the control of well injection. He suggests that rather than leaving site selection, construction, and operation to individual industries with waste disposal needs, a public agency should be created with the authority to select desirable sites and construct and operate the disposal wells. Industry would then be charged by volume for the use of the well. This would put complete control of the operation in the hands of the public, and any tendency toward incomplete disclosure or illegal operation of the well would be avoided. Furthermore, a public agency would have an interest in efficient utilization of underground space, and waste-producing industries would have an interest in reducing the amount of their wastes since they would be charged for the use of the well on a volume basis.

This approach would require substantial institutional rearrangement and perhaps federal financial and technical assistance, but in the long run it might provide the most practical solution to the problems of protecting the public from the pollution of underground resources and of providing industry with a practical method for disposing of particularly difficult wastes.

6.0 Legal Issues

The issue of legal ownership of underground space is far from firmly resolved. It has not been generally determined to be in the public domain, nor is it the exclusive property of the surface owner. Idaho's injection well law declares that the groundwater of the state is "a public resource which must be protected against unreasonable contamination," 79/ but even in states where groundwater and underground space have not been legislatively determined to be in the public domain, absolute private ownership cannot be assumed. Cases dealing with air space have rejected the doctrine of infinite ownership, 80/ and much the same reasoning could be applied to underground space, i.e., that ownership extends only to that which can be occupied or reasonably be made use of in connection with the land.

Assuming that the question of ownership of underground space has not been resolved by statute, then the problem becomes how and to what degree its use can be regulated. Regulation of the use of other underground resources such as oil and gas, 81/ and subterranean water 82/ has long been upheld as a legitimate exercise of the police power if the regulation involved prevention of waste of the resource. By analogy, it

could be argued that injection of pollutants into an underground aquifer has the potential of wasting a resource and therefore should be subject to police power regulation. There is the possibility that aquifers so highly mineralized as to render them suitable for well injection might not be considered a resource deserving of protection. However, there can be no doubt that freshwater aquifers that might be contaminated as a result of a faulty injection well are a natural resource which can be protected by regulation.83/

Most cases, though, uphold such regulation on the ground that other surface owners with rights in the particular resource regulated are entitled to legislative protection of their common asset. The United States Supreme Court, in Ohio Oil Co. v. Indiana, upheld a state regulation prohibiting the waste of natural gas by oil wells. However, the Court refused to adopt the position argued by Indiana that these subterranean assets were the same sort of public property as wild animals and hence could be absolutely protected by the state. The Court instead based its decision on the state's right to protect one property owner from being divested of his property by another.84/ This case was erroneously cited by the California Court of Appeals in upholding a statute regulating waste from artesian wells.85/ The California court suggested that the Supreme Court supported the position that underground resources were public property, which it specifically did not. Thus, while regulatory statutes which control well injection on the basis that they are protecting a public resource could run into some constitutional difficulty, the protection of private rights in subsurface waters has been generally accepted as a legitimate area for state regulation.

The regulation of injection wells based on the state police power to protect public health would also appear to be constitutionally valid. In United States v. 531.13 Acres of Land, the U.S. Court of Appeals for the Fourth Circuit held that a state statute barring the dumping of wastes into the waters of the state was "undertaken as a health measure well within the State's police power" and that "[c]ontrol of this kind by the State is unassailable."86/ This case was concerned only with surface waters, but its reasoning could be applied to the protection of groundwaters since they are an integral part of the hydrologic cycle and are usually included in state water pollution laws as waters of the state.87/

Appendix

RULES AND REGULATIONS FOR THE CONTROL OF DISPOSAL WELLS TO PROTECT GROUNDWATER AND OTHER SUBSURFACE RESOURCES OF THE STATE OF NEBRASKA

STATE OF NEBRASKA
DEPARTMENT OF ENVIRONMENTAL CONTROL

EFFECTIVE: June 25, 1975

J. JAMES EXON
GOVERNOR

Department of Environmental Control
Rules and Regulations for the Control
of Disposal Wells to Protect Groundwater
and Other Subsurface Resources of the State of Nebraska

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Rule 1. DEFINITION OF TERMS

Unless the context otherwise requires, the following terms shall have these meanings:

"Abandoned Well" is any well that is abandoned, subject to plugging, and has ceased to serve the purpose for which it was drilled, and there is no intention to renew such activity.

"Aquifer" is an underground zone or layer capable of yielding water in useable amounts to wells.

"Brackish Water" is any water containing more than 5,000 milligrams per liter total dissolved solids but less than 10,000 milligrams per liter total dissolved solids.

"Department" is the Department of Environmental Control.

"Disposal Well" is any well drilled or used for the purpose of injecting, transmitting or disposing effluent into subsurface formations, except those wells under the jurisdiction of the Nebraska Oil and Gas Conservation Commission pursuant to Chapter 57, Article 9, Reissue Revised Statutes of Nebraska, 1943, As Amended.

"Groundwater" is that water which occurs, moves, seeps, filters or percolates through the ground beneath the land surface.

"Groundwater Subject to Protection" is that water acceptable for drinking which contains less than 5,000 milligrams per liter of total dissolved solids.

"Injection Zone" is that geologic formation which either receives or is intended to receive effluent from the disposal well.

"Owner" is the legal owner of lands, royalties or minerals as recorded in the official records of the county or counties which may reasonably be expected to be affected by the subsurface disposal of wastes.

"Person" is any legal owner and may extend and be applied to corporations, to bodies political and corporate, and to partnerships and other unincorporated associations.

"Plug" or "Plugging" is the sealing of any well bore or the abandonment of any producing well in a manner to prevent all vertical migration of fluids of any kind into the subsurface water.

"Pollution" is the presence or effect of any foreign substance (organic, inorganic, radiological, biological, or thermal) in water which tends to lower the quality of groundwater or other resource to a point that it constitutes a nuisance, creates a health hazard, or impairs the usefulness of the resource.

"Saline Water" is any water containing more than 10,000 milligrams per liter total dissolved solids.

"Waste" is any substance, solid, liquid, or gaseous, including radioactive particles thereof, which pollutes or may tend to pollute.

Legal Citation: Rule 1, CDW, Nebraska Department of Environmental Control

Rule 2. PERMIT; WHEN REQUIRED

No person shall erect, modify, commence, alter, or operate any well for the disposal of waste into the subsurface of the State, except those wastes derived in association with oil and gas production and disposed of under the jurisdiction of the Nebraska Oil and Gas Conservation Commission pursuant to Chapter 57, Article 9, Reissue Revised Statutes of Nebraska, 1943, As Amended, without first securing a permit to do so from the Department. Disposal wells in operation at the time of the adoption of these regulations shall be required to obtain a permit to continue operations. Such permit is issued and shall be issued by the Department in technical consultation with the Conservation and Survey Division, University of Nebraska, and the Oil and Gas Conservation Commission. Such conditions shall be designed to carry out the purposes of the Nebraska Environmental Protection Act, Chapter 81, Article 15, Reissue Revised Statutes of Nebraska, 1943, As Amended, and the Water Quality Standards Applicable to Nebraska Waters adopted thereunder. Such permit shall not be issued without proper notice to owners as defined herein and pursuant to public hearing and shall be issued in two parts, namely construction and operating.

Statute: 81-1504 (2)(11)(20)
Legal Citation: Rule 2, CDW, Nebraska Department of Environmental Control

Rule 3. PERMITS; CONSTRUCTION; APPLICATION AND REPORT

For the construction, alteration, or modification of disposal wells or systems the applicant shall file with the Department an application for a public hearing requesting approval of plans, and requesting issuance of a construction permit. Such application shall contain a favorable report submitted by a registered engineer and a qualified geologist consisting of the following:

(A) General Conditions

(1) A legal description of the area within a radius of two (2) miles of the proposed system and a legal description of the site upon which the system would be located.

(2) An accurate map of the area within a two (2) mile radius of the proposed system showing the location of the system, property boundaries, surface and mineral ownership of record, the location of all water wells and oil and gas wells and whether the same are operating or have been abandoned and if appropriate, whether such wells have been plugged; and the location of all mines, test holes and other artificial penetrations or excavations.

(3) A description of the depths and deepest formations to be penetrated by each of the wells, mines, excavations or penetrations required to be shown on the map required at (2) above.

(4) A description of local topography, industry, agriculture, population densities, culture, wildlife, and fish and other aquatic life within the area of the proposed system with a projection as to the probable effects of the system upon industry, agriculture, population, culture, wildlife, and fish and other aquatic life.

(5) A description of the mineral resources believed to be present in the area of the system and the probable effect of the system upon such mineral resources, together with a map or maps illustrating the regional geologic setting. Such exhibits shall be prepared by a qualified expert.

(6) A description and definition of all water resources within the probable zone of influence of the system, the available amounts and potential uses thereof and a map or maps indicating vertical and lateral limits of surface and subsurface water supplies.

(7) Location and nature of present and potential use of fluids from the disposal or affected aquifer formations in the general area.

(B) Evaluation of Geologic and Hydrologic Conditions

The application shall contain an evaluation of the generalized geologic and hydrologic conditions of the well site and area which may be reasonably expected to be affected by the proposed disposal project. The generalized geologic and hydrologic conditions may be appraised by drilling and testing and by obtaining data from published sources, public agencies, or geophysical prospecting methods.

(1) The following geologic conditions must be demonstrated:

(a) The disposal well shall be located in an area known to contain geologic structures capable of containing the proposed injected effluent.

(b) The injection zone shall have sufficient porosity, permeability, thickness, structural configuration, and areal extent to act as a safe storage reservoir.

(c) The injection zone shall be isolated vertically by formations that are, for practical purposes, impervious to the effluent.

(d) The injection zone should not contain natural resources in the same geologic structure which may be affected by said injection.

(2) The following hydrologic conditions must be demonstrated:

(a) The injection zone should contain interstitial water having a concentration of at least 5,000 milligrams per liter total dissolved solids.

(b) The rate and direction of groundwater movement in the injection zone should be evaluated.

(c) If the injection zone is known to contain groundwater subject to protection in other areas, the direction and distances from the injection well to the brackish water or saline water interface shall be estimated within reasonable limits.

(d) An estimation of the fluid chemistry of the interstitial water in the injection zone shall be made.

(C) Design and Construction of the Disposal Well should be summarized as follows:

(1) Size of hole and estimated total depth of well.

(2) Type, size, weight, strength, and related data with respect to all surface intermediate and production casing.

(3) Specifications and proposed installation of tubing and packers.

(4) Proposed cementing procedures and type of cement.

(5) Proposed coring program.

(6) Proposed information testing program.

(7) Proposed injection procedure, i.e., open hole, perforated casing.

(D) Disposal System

(1) Flow chart of all plans and specifications for the system and its appurtenances.

(2) Volume, rate and injection pressure of the fluid to be injected.

(3) A description of the chemical, physical, radiological, and biological properties and characteristics of the wastes to be disposed of through the system, and the treatment proposed for such wastes.

(4) Compatibility of injected waste with physical and chemical characteristics of the injection zone.

(5) Diffusion and dispersion characteristics of the waste and formation fluid, including effect of gravity segregation.

(E) Operation of System

(1) Plans for monitoring the system and the plans for monitoring injection pressures and formation pressures, i.e., disposal wells and observation wells.

(2) Expected changes in pressure, rate of fluid displacement by injected wastes, directions of dispersion and area affected by the system.

(F) A statement giving all sources relied upon for the information set forth in the application.

(G) Supply such other and further data as the Department may reasonably request. An applicant may upon its own initiative, or when requested by the Department, furnish an opinion of independent experts, satisfactory to the Department in respect to the accuracy and completeness of any information or data furnished by the applicant and on any aspect of the applicant's disposal system or the contemplated operation or effects thereof.

Statute: 81-1504(2)(10)(11)(20)
81-1505(1)(2)(3)(4)(9)
81-1506(2)(e)
Legal Citation: Rule 3, CDW, Neb. Dept. of Environmental Control

Rule 4. *PERMITS; OPERATING; APPLICATION AND REPORT*

For approval of the actual operation of the system and issuance of the operating permit, the applicant shall file with the Department an application for public hearing which shall contain the following:

(A) Design of well within but not limited to the following specifications.

(1) At least two strings of casing shall be placed and centered in the well. The outer string shall extend at least 100 feet below the lowest limit of groundwater subject to protection in the area. The inner string of casing shall extend at least into the upper portion of the injection zone. All casing shall consist of new seamless casing meeting or exceeding American Petroleum Institute specifications for casing. The casing strings shall be designed utilizing the following safety factors:

Collapse	1 1/8
Tension	2
Internal Pressure	1 1/8

All casing shall be cemented from bottom to top utilizing cement conforming to American Petroleum Institute specifications and shall be of a type recommended by a cementing specialist after analysis of the effluent and the effect of such effluent on said cement. All cement shall be placed by the displacement method under pressure and shall be allowed to set under pressure for a minimum of 24 hours. The cementing operation shall be performed by a qualified and experienced well servicing company. A cement bond log shall be run upon completion of each cementing operation.

(2) The well shall be logged upon completion of drilling by a qualified well servicing company by the appropriate mechanical, electrical or radioactive logs to indicate the general lithology, permeable bed thickness, porosity, and resistivity of interstitial water.

(3) Samples of all rocks obtained by drilling and coring of the disposal well or other accessory holes and any results of tests performed upon these rocks shall be placed on file with the Conservation and Survey Division, University of Nebraska.

(4) The well shall be constructed so that the effluent is transported to the injection zone through a string of injection tubing. Tubing shall be fabricated of corrosion resistant materials or shall be coated to provide corrosion resistance to the effluent injected.

Injection tubing shall be fixed to the inner string of casing by a tubing packer located near the injection interval. The packer shall be of the permanent type and shall feature a back pressure valve and be adaptable to the use of a stinger for injection. The packer shall be fabricated of corrosion resistant material or shall be coated to provide corrosion resistance to the effluent injected. The annular space between the injection tubing and the inner casing string shall be filled with a liquid approved by the Department.

(5) The wellhead shall contain automatic safety valves which will provide shutdown in case of tubing-casing annulus pressure buildup, loss of wellhead pressure, or wellhead fire.

(B) Evaluation of Injection Zone

The characteristics of the injection zone shall be evaluated before an operating permit is issued by the Department. Some properties of the rock and fluid of the injection zone may be evaluated from logs run and cores taken from the injection zone, and other properties may be evaluated from tests conducted on the injection. The following properties of the injection zone shall be determined:

(1) Effective porosity.

(2) Effective permeability and relative permeability between the interstitial water and the effluent.

(3) Chemical constituents of the interstitial waters and the chemical and physical characteristics of the injection zone rocks including the approximate fracture pressure.

(4) Temperature of the injection zone.

(5) The static bottom hole pressure in the injection zone.

(6) Permeable thickness of the injection zone.

(7) Injection profile of the injection zone based on injectivity tests at various injection rates utilizing fluid having substantially the same viscosity as the proposed effluent. The lowest injection rate shall be at least one-half of the proposed injection rate. The highest rate should be at least twice the proposed injection rate but should in no case exceed the fracture pressure of the injection zone rocks. Injection data should be presented on a graph with the injection rates plotted against injection pressures.

(8) Applicant shall demonstrate that the proposed effluent is compatible with the injection zone and its interstitial water and that no undesirable chemical or physical reaction will occur.

(C) Surface Equipment Design

(1) A flow diagram showing the surface facilities shall be provided.

(2) Surface equipment, including pump, wellhead, transmission lines, holding tanks and treatment facilities shall be designed and constructed so that the system can be safely shut down in the event of component failure.

(3) All components of the surface facilities that may come in contact with the effluent, including pumps, lines, tanks, filters, etc., shall be fabricated of corrosion resistant material or shall be coated to provide corrosion resistance to the effluent.

(4) A secondary facility shall be maintained in the event of a temporary well failure. Such facility may consist of a lined, impermeable retention pond or storage tanks, or a treatment process that will prepare the effluent to a suitable degree for temporary surface storage or disposal.

Statute: 81-1504(2)(10)(11)(12)(20)
81-1505(1)(2)(3)(4)(9)(15)(19)
81-1506(2)(e)
Legal Citation: Rule 4, CDW, Neb. Dept. of Environmental Control

Rule 5. MONITORING

The quality of the effluent shall be monitored by the applicant as specified by the Department, and the result of this analysis shall be transmitted to the Department as directed.

The quality and rate of injection shall be metered and this information shall be transmitted to the Department on a form prescribed. The injection pressure and the pressure in the casing-tubing annulus shall be monitored, and the information submitted as directed.

The injection pressure at the wellhead plus the hydrostatic pressure shall not exceed the fracture pressure of the injection zone which shall be determined from core samples by a qualified laboratory.

The operating permit may be suspended or revoked at any time by the Department if it determines that the injection well is being operated in violation of law, order, regulation or conditions of the operating permit. The Department shall have the right to make periodic visits to the installation for the purpose of inspecting the injection system.

Statute: 81-1504 (2)(11)(12)(15)(21)(24)
81-1505 (9)(15)
81-1506 (2)(e)
Legal Citation: Rule 5, CDW, Nebraska Department of Environmental Control

Rule 6. ABANDONMENT

An injection hole or well that is to be abandoned shall have the injection tubing removed and the entire length of the well and injection zone filled with cement from the bottom to top. The cementing operation shall be performed by an experienced well servicing company. The cement shall have expansive properties and shall conform to American Petroleum Institute specifications and shall be placed in the well under pressure.

Any well being drilled as an injection well or monitoring well that for some reason is abandoned, must be filled with cement from the bottom of the well to the top. The cement shall be placed in the well under pressure by an experienced well servicing company.

An affidavit, setting forth in detail the significant data in connection with the well and the procedure used in plugging, signed by a qualified witness to the plugging and duly notarized, shall be filed in duplicate with the Department, within fifteen (15) days after plugging is completed. The Department reserves the right to require the operator to replug any well where it can be determined that the plugging was not effective due to failure of cement or other difficulty.

Statute: 81-1504 (1)(2)(11)(12)(13)
81 1505 (9)(15)
Legal Citation: Rule 6, CDW, Nebraska Department of Environmental Control

Rule 7. EXCEPTIONS

The Department may within its discretion and for good cause shown and in technical consultation with the Conservation and Survey Division, University of Nebraska, and the Oil and Gas Conservation Commission grant exceptions to these regulations when the policy objectives of the regulations are otherwise met. The holder of the permit shall state, in writing, the reason for requesting such exception or exceptions which shall be incorporated as part of the permanent record of the Department.

Statute: 81-1504 (2)(3)(5)(11)(13)(16)
81-1505 (9)(15)
Legal Citation: Rule 7, CDW, Nebraska Department of Environmental Control

Rule 8. CONTESTED CASES

In the event of a "contested case" hearing before the Department, held in compliance with Chapter 81, Article 15, Reissue Revised Statutes of Nebraska, 1943, As Amended, section 81-1507 to 81-1510 inclusive and Rules 23 to 61 of the Rules of Practice and Procedure of the Department of Environmental Control, shall be applicable.

Statute: 81-1507
81-1508
81-1509
81-1510
Legal Citation: Rule 8, CDW, Nebraska Department of Environmental Control

Rule 9, FAILURE TO COMPLY

Failure to comply with the requirements of these regulations shall be considered a direct violation of the Rules and Regulations of the Department of Environmental Control and action for such violation or violations shall be processed pursuant to Sections 81-1507 and 81-1508 of the Environmental Protection Act.

Statute: 81-1507
81-1508
Legal Citation: Rule 9, CDW, Nebraska Department of Environmental Control

Rule 10. EFFECTIVE DATE AND REPEAL OF EARLIER RULES

These regulations shall become effective five days after filing with the Revisor of Statutes and the Secretary of State. Upon adoption of these rules and regulations, the prior, inconsistant rules and regulations adopted on 8-30-72 shall be repealed.

Statute: 84-907
81-1505 (17)
Legal Citation: Rule 10, CDW, Nebraska Department of Environmental Control

CHAPTER ELEVEN

WELL INJECTION OF RESIDUAL WASTES

FOOTNOTES*

1. E. Donaldson, "Subsurface Disposal of Industrial Wastes in the United States" (U.S. Bureau of Mines Information Circular 8212, 1964).

2. D. Warner, Deep Wells for Industrial Waste Injection in the United States--Summary of Data (Dep't of Interior Federal Water Pollution Control Admin. 1967).

3. U.S. EPA, Compilation of Industrial and Municipal Injection Wells in the United States, 2 vols. (1964).

4. See, e.g., Mo. Ann. Stat. § 564.025 (Vernon); N.C. Gen. Stat. § 143-214.2; Wis. Nat. Res. Admin. Code § 712.12.

5. See, e.g., New York State Dep't of Environmental Conservation, "Industrial Wastewater Deep Well Injection," Policies and Procedures Manual ch. 9200.

6. See e.g., Idaho Code § 42-3901 et seq.

7. > While natural processes such as filtration and dilution can in some cases help to reduce the seriousness of groundwater pollution, many wastes remain essentially unchanged in composition after they enter a groundwater body, and relentlessly travel through the earth until they enter someone's water well or are discharged into a stream or river.

   Geraghty and Miller, Inc., Ground-Water Contamination, An Explanation of its Causes and Effects (1972).

8. For a more complete description of these two accidents, see E. Cleary and D. Warner, "Some Considerations in Underground Wastewater Disposal," 62 J. Am. Water Works Ass'n 489.

9. "There is little evidence to suggest that conditions underground are conducive to the degradation or dilution of most pollutants to the point where they might be regarded as becoming innocuous." Id. at 490.

10. 42 U.S.C. § 2011 et seq.

11. Id. § 300h et seq.

12. 33 U.S.C. § 407.

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*In order to conserve space, publication information pertaining to works included in the suggested readings for this chapter has been omitted from the footnotes.

13. Id. § 1151 et seq.

14. 10 C.F.R. § 20.1 et seq.

15. The situation that gave rise to use of the Refuse Act was a suit brought by the United States to enjoin Armco Steel Corporation from discharging toxic wastes into the Houston Ship Channel. United States v. Armco Steel Corp., 333 F. Supp. 1073 (S.D. Tex. 1971). The United States relied upon the act as authority for the injunction. The steel company proposed, and the state of Texas authorized, disposal of the waste by well injection, causing the United States to amend its complaint to seek an additional injunction against the use of the injection well system. The U.S. District Court for the Southern District of Texas decided to hear the amended complaint based on pendant jurisdiction, but qualified its decision by stating:

> The statutory basis for this suit arises strictly from constitutional federal authority over the nation's navigable rivers and waterways. The phenomenon of subsurface disposal for industrial waste might well give rise to Congressional legislative control under the federal commerce power or other designated federal Constitutional powers. In the present posture of legislation on the subject, both as to territorial and subject matter jurisdiction, it is now primarily the responsibility of the several states. Id. at 1079.

16. 41 Fed. Reg. 36730 (1976).

17. For further discussion of the Safe Drinking Water Act, see J. Hemphill, "Section 1424(e) of the Safe Drinking Water Act: An Effective Measure Against Groundwater Pollution?" 6 ELR 50121 (1976).

18. 41 Fed. Reg. 36737 (Aug. 31, 1976), § 146.2(r).

19. 41 Fed. Reg. 36731 (Aug. 31, 1976).

20. Federal Water Pollution Control Act Amendments of 1972, Pub. L. No. 92-500, § 402 [hereinafter cited as FWPCA].

21. The report from the House Committee on Interstate and Foreign Commerce Accompanying H.R. 13002 (The Safe Drinking Water Act) states:

> [W]hile it appears that EPA may prescribe its own program to control the disposal of pollutants into wells if it disapproves a State's permit authority application, this conclusion has not yet been reached in any judicial decision. Moreover, the Federal Water Pollution Control Act's restrictive definition

> of pollutant may prevent any Federal control system from adequately protecting underground drinking water sources. Finally, it appears that the Federal Water Pollution Control Act may not authorize any regulation of deep well injection of wastes which is not carried out in conjunction with a discharge into navigable waters.

This suggestion has been fortified by a decision by the U.S. District Court for the Southern District of Texas which held that groundwater was not included in the definition of waters of the United States covered by the Federal Water Pollution Control Act Amendments of 1972. U.S. v. GAF Corp., 389 F. Supp. 1379, ELR 20581 (S.D. Tex. 1975).

22. 40 C.F.R. § 125.26(a)(1).

23. FWPCA, § 402(b)(1)(D).

24. 40 C.F.R. § 124.81.

25. Tex. Water Code Ann. § 22.001 et seq. (Vernon).

26. Mich. Stat. Ann. § 13.141(1) et seq.

27. Ohio Rev. Code Ann. § 1509.01 et seq. (Page).

28. Haw. Rev. Stat. § 178-1, 178-5.

29. Or. Rev. Stat. § 468.740(2).

30. Id. § 468.700(1).

31. Cal. Water Code § 13050(1) (West).

32. Id. § 13540.

33. R. Burchell and D. Listokin, The Environmental Impact Handbook 8 (Rutgers Univ. Center for Urban Policy Research, 1975).

34. Del. Code tit. 7, § 7001 et seq.

35. Ark. Stat. Ann. § 73-276.4(5).

36. Conn. Gen. Stat. § 22a-1c.

37. Ind. Code Ann. § 13-1-10-6 (Burns).

38. Cal. Pub. Res. Code § 21065(c)(West).

39. National Environmental Policy Act of 1969, Pub. L. No. 91-190, § 102 [hereinafter cited as NEPA].

40. See CEQ Guidelines, 40 C.F.R. § 1500, § 1500.5(a)(2).

> The interim guidelines assume inverse importance for state acts because they were adopted prior to the enactment of any of the state laws. The definitions in the federal act and in these regulations became part of the legislative history of the state laws and must be considered in interpreting them.

N. Yost, "NEPA's Progeny: State Environmental Protection Acts," 3 ELR 50090, 50094 (1973) [hereinafter cited as Yost].

41. Minn. Stat. Ann. § 116D.04 (West).

42. The Environmental Impact Handbook, supra note 33, at 10.

43. This has been done in Hawaii County. Haw. County Ordinance 1002.

44. This has been done in Blain County. Idaho Ordinance No. 71, § 15.

45. N.C. Gen. Stat. § 113A-1 et seq.

46. Mont. Rev. Codes Ann. § 11-3861 et seq.

47. Mo. Ann. Stat. § 564.025 (Vernon).

48. N.C. Gen. Stat. § 143-214.2(b).

49. Administrator's Decision Statement No. 5, "Policy and Program Guidance," § 2(a).

50. NEPA, § 102(2)(c).

51. Yost, supra note 40, at 50094.

52. For a more detailed discussion of the technical aspects of well injection, see Office of Air and Water Programs, U.S. EPA, Ground Water Pollution from Subsurface Excavations (1976); and D. Warner, Monitoring Disposal Well Systems (Las Vegas: U.S. EPA Office of Research and Development, 1975).

53. Section 304(e)(2)(D) requires that the administrator of EPA provide information including processes and procedures and methods to control pollution resulting from the disposal of pollutants into wells or in subsurface excavations.

54. Office of Air and Water Programs, Water Quality and Non-Point Source Control Division, U.S. EPA, Ground Water Pollution from Subsurface Excavations 40-49 (1973).

55. Idaho Code § 42-3904.

56. Colo. Dep't of Health, "Rules for Subsurface Disposal Systems," § 7.2.4(11) (1974).

57. See W. Walker and W. Cox, Deep Well Injection of Industrial Wastes: Government Controls and Legal Constraints 57 (Blacksburg, Va.: Virginia Water Research Center, 1976).

58. Tex. Water Code Ann. § 22.055 (Vernon); Tex. Water Quality Board, "Subsurface Waste Disposal in Texas" (agency publication 72-05), at 21-22.

59. Neb. Environmental Control Council, "Rules and Regulations for the Control of Disposal Wells to Protect Groundwater and Other Subsurface Resources of the State of Nebraska," Rule 4 (June 25, 1975) [hereinafter cited as Nebraska Rules]. (See Appendix).

60. Mich. Dep't of Natural Resources, "General Rules Governing Mineral Well Operations," R229.2216 (1972) [hereinafter cited as Michigan Rules].

61. 41 Fed. Reg. 36740 (Aug. 31, 1976), § 146.24(i)(8).

62. Michigan Rules, R299.2216.

63. See Monitoring Disposal Well Systems, supra note 52, at 75-84.

64. Id. at 85.

65. Section 146.32 of EPA's proposed rules under the Safe Drinking Water Act requires that state procedures insure that the terms and conditions of a permit contain provisions for such authority. 41 Fed. Reg. 36742 (1976).

66. Idaho Code § 42.3910.

67. Mich. Stat. Ann. § 13.141(17)(2).

68. Okla. Water Resources Board, "Industrial Waste Disposal Well Rules and Regulations" (Technical Release 200-1), § 12-1 through 12-14 [hereinafter cited as Oklahoma Rules].

69. Nebraska Rules, Rule 6. (See Appendix).

70. Michigan Rules, R299.2282(3).

71. Oklahoma Rules, § 12.13.

72. Ohio River Valley Water Sanitation Commission, "Registry of Wells for Use in Underground Injection of Wastewater in the Ohio Valley Region" (1974).

73. Ohio River Valley Water Sanitation Commission, "Underground Injection of Wastewaters in the Ohio Valley Region" (1973).

74. W. Va. Code § 20-5A-1 et seq.

75. Id. § 20-5A-7(b).

76. A clause may be used such as that in the Connecticut Environmental Policy Act requiring that all impact statements be "submitted for comment and review to the council on environmental quality, the department of environmental protection and other appropriate agencies." Conn. Gen. Stat. § 22a-1d.

77. Ohio Rev. Code Ann. § 1509.08.1 (Page).

78. Dep't of Interior, Geological Survey Circular 631 (1969).

79. Idaho Code § 42-3901.

80. United States v. Causby, 328 U.S. 256 (1946); Hinman v. Pacific Air Transport, 84 F.2d 755 (1936).

81. F.C. Henderson Inc. v. R.R. Comm'n of Texas, 56 F.2d 218 (D.C. Tex. 1932), appeal dismissed, 287 U.S. 672; Danciger Oil & Refining Co. v. R.R. Comm'n, 49 S.W.2d 837 (Tex. 1932).

82. Lindsley v. Natural Carbonic Gas Co., Elam, 91 P. 811 (Cal. 1907); Hathorn v. Natural Carbonic Gas Co., 87 N.E. 504 (N.Y. 1909).

83. See Annot., 24 A.L.R. 312; 78 A.L.R. 842.

84. Ohio Oil v. Indiana, 177 U.S. 190 (1899).

85. Ex parte Elam, 91 P. 811 (Cal. 1907).

86. 366 F.2d 915, 919 (1966).

87. For a more extensive treatment of the legal and institutional issues discussed in this chapter, see Deep Well Injection of Industrial Wastes: Government Controls and Legal Constraints, supra note 57 from which much of the background information used in writing this chapter was drawn. For a general discussion of control of groundwater pollution, see J. Lehr, W. Pettyjohn, J. Hanson, and L. Sturtz, A Manual of Laws, Regulations and Institutions for Control of Groundwater Pollution (U.S. EPA 1976).

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