

PRIVATE OWNERSHIP OF GROUND-DISCHARGING SMALL SEWAGE TREATMENT PLANTS: A CASE FOR PREVENTIVE REGULATION

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I. INTRODUCTION

Privately owned and operated small sewage treatment facilities, or package plants,¹ have played an integral role in the development boom of the 1980s in some parts of the country, and may play a role in future development in other parts. Although such plants are relatively unknown in some locales, they are a prominent feature of development in states like Massachusetts, where growth was particularly intense in the last decade, and where congestion has combined with soil conditions to render septic systems unusable.² Private

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¹ Small privately owned sewage treatment plants are known by many names, such as private sewage treatment facilities (PSTFs), private wastewater treatment works (PWTWs), or, commonly, package plants. There is confusion over the proper use of these terms even among some experts. Strictly defined, the term "package plant" refers to a prefabricated treatment facility, whether privately or publicly owned, while an ordinary "small sewage treatment plant" is assumed to be designed for a particular site. In common usage, however, package plant may refer to any small sewage treatment plant, whether prefabricated or site-specific. Lecture on "Small Sewage Treatment Plants (Package Plants)" by Scott Horsley and Jon Witten, Horsley & Witten, Inc., and Harlan Doliner, McGregor, Shea & Doliner, Westboro, Mass. (Feb. 7, 1989). For simplicity's sake, this Comment uses the acronym "PSTF" to refer to privately owned treatment plants, and the term "package plant" to refer generally to small sewage treatment plants, whether prefabricated or site-specific, and whether privately or publicly owned.

² Package plants are more numerous in such high growth areas as Florida; Boston and Cape Cod, Massachusetts; North Carolina; and Los Angeles, California. They have also been utilized in comparatively rural states, such as Ohio. *See generally* K. MANCL, WASTE MANAGEMENT SPECIALIST, AGRICULTURAL ENGINEERING, SMALL SEWAGE FACILITIES SURVEY—RESULTS (1987).

sewage treatment facilities (PSTFs) serve shopping centers, hotels, schools, campgrounds, trailer parks, condominium complexes, and even residential developments.³ But some state and local officials have recognized that unchecked private ownership of package plants can be detrimental to states and communities in a variety of ways.⁴

Package plants are capable of discharging either into a surface water body or into the ground through a leaching field.⁵ While in some locales soil conditions render unsafe any large-scale ground discharges, other regions with permeable soils or without heavy reliance on groundwater as a water source may find that their laws permit large-scale ground discharges. Such discharges may threaten the drinking water of those in or outside the jurisdiction that do rely on such water, or may harm local ecology. Federal statutory law does not cover groundwater protection completely, and covers sewage discharge into the ground only tangentially.⁶

Most experts and environmentalists agree that package plants themselves represent an advance in sewage treatment technology, and have many potentially beneficial environmental uses.⁷ Package plants are miniaturized versions of large sewage treatment plants that have traditionally served communities. Technological advances

³ All but one of the small sewage treatment plants now in operation in Massachusetts serve compact communities like condominiums, hotels, and shopping centers. McNamara, *Proposed Ban On Treatment Plants Has Anti-Growth Roots, Builders Say*, BANKER & TRADESMAN, July 10, 1988, reprinted in HORSLEY & WITTEN, INC., SMALL SEWAGE TREATMENT PLANTS (PACKAGE PLANTS) 147 (1989). A survey taken in Ohio revealed that package plants not only serve housing developments and shopping centers, but also trailer parks, office and industrial parks, camps and recreational areas, and schools. K. MANCL, *supra* note 2, at 15.

⁴ While this Comment asserts that the proliferation of package plants and the increase in private ownership of treatment plants are interrelated phenomena, it is important to keep the distinctions in mind. Not all package plants are privately owned. Private entities may own and operate larger treatment facilities, some prefabricated and some not. Meanwhile, municipalities may employ a series of strategically located package plants rather than one large treatment facility. Interview with Mark Parè, Engineer, DeFeo, Waite & Assocs., Raynham, Mass. (Nov. 14, 1988). This Comment, however, asserts that the advent of package plants has facilitated the increase in private ownership of treatment facilities, and vice versa.

⁵ A discussion of the environmental effects of surface-discharging package plants, and a discussion of federal and state law relating to surface discharges of treated or untreated sewage are beyond the scope of this Comment. Most of the discussion of package plant technology, *see infra* text accompanying notes 47-88, is equally applicable to surface-discharging package plants. The discussion of private ownership of package plants, *see infra* notes 114-49, and the discussion of land use issues, *see infra* notes 150-83, are equally applicable to surface-discharging plants as well as to ground-discharging plants.

⁶ *See infra* notes 184-98 and accompanying text.

⁷ *See* Letter from Gerard A. Bertrand, President, Massachusetts Audubon Society, to S. Russell Sylva, Commissioner, Massachusetts Department of Environmental Quality Engineering 2 (Aug. 11, 1987) [hereinafter Bertrand Letter], reprinted in MCGREGOR, SHEA & DOLINER, MATERIALS ON STATE AND LOCAL REGULATION OF "PACKAGE" WASTEWATER TREATMENT SYSTEMS (1988).

have enabled engineers to design and build package plants at a cost that makes such plants affordable for single developments. Package plants treat effluent far better than the traditional septic tank systems they are usually asked to replace.⁸ Because they are also less expensive than the large sewage treatment plants, package plants are being widely used in a number of scenarios.⁹ Most commentators agree that, under ideal circumstances, package plants treat wastewater quite effectively.¹⁰

Many of the same commentators, however, believe that package plants, particularly in private hands, are not and will not be utilized ideally. They fear that the misuse of private ownership and misuse of package plant technology may cause wide-ranging negative impacts. The concerns fall into the following categories:¹¹ (1) siting and environmental problems;¹² (2) institutional problems;¹³ and finally, (3) developmental problems.¹⁴

The siting and environmental concern is that the effluent of a PSTF sited within the groundwater zone of contribution to public water sources, local lakes and ponds, and environmentally sensitive areas can have disastrous effects even if the plant functions as well as expected. Experts cite serious environmental consequences where municipalities and state agencies fail to regulate groundwater discharge properly.¹⁵ The possible results range from contamination of municipal water supplies to degradation of sensitive wetlands resource areas.¹⁶

⁸ See HORSLEY & WITTEN, INC., *supra* note 3, at 6.

⁹ Fact Sheet on Package Plants, Massachusetts Senate No. 955, at 1 [hereinafter Fact Sheet], *reprinted in* MCGREGOR, SHEA & DOLINER, *supra* note 7. Costs for package plants serving small residential developments range from \$250,000 to \$600,000. *Id.* Repair and replacement of package plants is relatively easy. *Cf.* CAPE COD PLANNING & ECONOMIC DEV. COMM'N, REVIEWING PRIVATELY OWNED PACKAGE PLANTS 1 [hereinafter CAPE COD] (commission does not directly compare package plants to other treatment facilities, but asserts these qualities as advantages of package plants), *reprinted in* MCGREGOR, SHEA & DOLINER, *supra* note 7. Moreover, the design of even prefabricated package plants can be adjusted to fit local situations and individual needs. *See id.*

¹⁰ *See generally* Bertrand Letter, *supra* note 7, *reprinted in* MCGREGOR, SHEA & DOLINER, *supra* note 7.

¹¹ *See* EXECUTIVE OFFICE OF ENVTL. AFFAIRS, CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS ON THE GENERIC ENVIRONMENTAL IMPACT REPORT 1 (Mar. 11, 1988). The Massachusetts Executive Office of Environmental Affairs so divided the issues in a document setting the scope of a Generic Environmental Impact Report on small, privately owned sewage treatment plants. *See id.*

¹² *See infra* text accompanying notes 89-113.

¹³ *See infra* text accompanying notes 114-49.

¹⁴ *See infra* text accompanying notes 150-83.

¹⁵ *See* HORSLEY & WITTEN, INC., *supra* note 3, at 9.

¹⁶ *Id.*

The institutional criticism has to do with private ownership. Critics charge that some forms of private ownership fail to ensure sufficient legal responsibility for the maintenance of PSTFs.¹⁷ A shortage of funds with which to operate or maintain a plant may result when the obligation of private parties to fund the plant proves legally unenforceable.¹⁸ When PSTFs are improperly maintained, their effluent can contaminate public water supplies in both groundwater and surface water. Thus, when the parties obliged to maintain a plant are fiscally incapable, towns may be forced to take over ownership of a PSTF in order to safeguard public health.¹⁹ Proponents of PSTFs can argue that such criticism is mere speculation. There have been few, if any, instances of private ownership collapse. But PSTF critics can counterargue that to allow unchecked private ownership, given the potential dangers, is not worth the risk.

The developmental criticism stems from fear of the impact of PSTFs on towns' abilities to control growth.²⁰ PSTFs are a boon to development because they treat sewage to a degree that allows the soil to absorb it. Developers welcome PSTFs as a means to permit environmentally sound development.²¹ Critics of PSTFs, however, believe that they will unleash developmental pressures that communities are not prepared to handle.²² PSTFs, and the package plant technology, may remove the justification for certain zoning regulations.²³ Given the fact that municipalities rely on such regulations as growth control mechanisms, PSTFs have added to towns' developmental pressures.²⁴ PSTF proponents can counterargue that PSTFs do not render such zoning regulations irrelevant, and that towns possess a variety of mechanisms for controlling growth, in any case.

This Comment examines the potential beneficial and detrimental effects caused by the introduction of PSTFs to residential development. Section II briefly describes the history of sewage treatment technology, then analyzes how sewage is treated in a package plant.²⁵ Section III examines the criticisms of private ownership and package

¹⁷ See *Willis Hill Trust, Groundwater Discharge Permit Decision*, Application No. 0-343, Massachusetts Dep't of Env'tl. Quality Eng'g, Div. of Water Pollution Control 1 (Apr. 19, 1988) [hereinafter *Willis Hill*].

¹⁸ See *id.* at 3.

¹⁹ See *infra* text accompanying notes 114-43.

²⁰ See *infra* text accompanying notes 150-51.

²¹ See *infra* text accompanying note 153.

²² See *infra* text accompanying notes 150-51.

²³ See *infra* text accompanying notes 154-58.

²⁴ See *infra* text accompanying note 151.

²⁵ See *infra* text accompanying notes 29-88.

plants in three areas: environmental, institutional, and developmental.²⁶ Section IV then surveys current federal and state regulations affecting ground-discharging PSTFs.²⁷ Finally, Section V proposes certain reforms that may help states and municipalities harness the many potential benefits of PSTFs while avoiding most of their pitfalls.²⁸

II. PACKAGE PLANTS

A. Sewage Treatment and Package Plant History

The principal challenge in disposing of human waste has always been to do it in a way that does not threaten the public health. When human waste is disposed of improperly, society runs the risk of contaminating the surface waters, groundwater, and soil from which it will draw its supply of drinking water and food.²⁹

The earliest and most primitive method of disposal was simply to dump the waste into a nearby pit. The only treatment of the waste lay in natural physical, chemical, and biochemical reactions.³⁰ This method of disposal not only produced stench and disease, but it threatened surface water and groundwater sources.³¹ Urbanization, which produced larger amounts of waste to dump within a confined area, complicated the problem of safe disposal.³² The response was to design and construct sewer systems that discharged waste into streams and removed it far from the particular city or town. Such dumping, however, threatened the water supplies of downstream communities.³³

²⁶ See *infra* text accompanying notes 89–183.

²⁷ See *infra* text accompanying notes 184–241.

²⁸ See *infra* text accompanying notes 242–49.

²⁹ D.A. OKUN & G. PONGHIS, COMMUNITY WASTEWATER COLLECTION AND DISPOSAL 1 (1975). Okun and Ponghis assert that the failure in underdeveloped countries to dispose of human waste properly has contributed to the problem of malnutrition and disease in those countries. The authors also conclude that this failure has adversely affected worker productivity and is therefore an important factor contributing to underdevelopment and an inferior standard of living. See *id.* at 1–6.

³⁰ NATIONAL SANITATION FOUND., PACKAGE SEWAGE TREATMENT PLANT CRITERIA DEVELOPMENT—PART II: CONTACT STABILIZATION 1 (1968) [hereinafter NSF, CRITERIA DEVELOPMENT II].

³¹ See D. BARNES & F. WILSON, THE DESIGN AND OPERATION OF SMALL SEWAGE WORKS 1, 50 (1976).

³² *Id.*

³³ NSF, CRITERIA DEVELOPMENT II, *supra* note 30, at 1.

Sewage treatment plants developed in the 1920s³⁴ as planners took account of the serious health problems posed by the inadequate disposal of sewage. Still, much of the sewage removed by sewer systems is dumped into the environment untreated. By the early 1970s, sewer systems served about seventy percent of the American population, while sewage treatment plants processed less than half of this sewage.³⁵ Septic tanks serve the other thirty percent of the population.³⁶

Mass movement to the suburbs presented a unique problem that helped facilitate the development of package plants.³⁷ Septic tanks,³⁸ which do relatively little to treat sewage before releasing it into the ground, are inadequate where a population is too dense and where local soil conditions are unsuitable.³⁹ Further, some suburban communities are situated too far away from existing treatment systems, and cannot afford to build their own.⁴⁰ Where communities are located close to a sewer system, a system might already be at capacity and thus unable to accept additional wastewater.⁴¹ Package plants are perfectly suited to fill the need.⁴²

Some authorities⁴³ attribute the increased use of package plants to the passage of the Federal Water Pollution Control Act (FWPCA)

³⁴ See *Haines v. City of New York*, 41 N.Y.2d 769, 770, 364 N.E.2d 820, 821, 396 N.Y.S.2d 155, 156 (1977). In 1924, the City of New York agreed with two nearby townships to construct a sewage disposal system, including a sewage treatment plant, to serve the towns. *Id.*

³⁵ See Siegel, *Recent Developments in Sewage Treatment*, 22 URB. L. ANN. 370, 372-73 (1981) (citing U.S. CITIZENS' ADVISORY COMM. ON ENVTL. QUALITY, THE SECOND ANNUAL REPORT OF THE COUNCIL ON ENVIRONMENTAL QUALITY 35, 145 (1971)).

³⁶ V. PYE, R. PATRICK & J. QUARLES, *GROUNDWATER CONTAMINATION IN THE UNITED STATES* 54 (1983). Septic tanks were first reported in France around 1870, and were introduced into the United States in 1884. L. CANTER & R. KNOX, *SEPTIC TANK SYSTEM EFFECTS ON GROUND WATER QUALITY* 1 (1985).

³⁷ NSF, *CRITERIA DEVELOPMENT II*, *supra* note 30, at 1. It is unclear when the first "package plant" was designed and built, but one was being utilized in East Palestine, Ohio, as early as 1947. See *id.*; NATIONAL SANITATION FOUND., *PACKAGE SEWAGE TREATMENT PLANT CRITERIA DEVELOPMENT—PART I: EXTENDED AERATION* 1 (1966) [hereinafter NSF, *CRITERIA DEVELOPMENT I*].

³⁸ See *infra* notes 80-86 and accompanying text (describing septic tanks and comparing them with package plants).

³⁹ See U.S. DEP'T OF HOUSING AND URBAN DEV., *A REFERENCE HANDBOOK ON SMALL-SCALE WASTEWATER TECHNOLOGY* 3-1 to 3-2 (1985) [hereinafter HUD, *REFERENCE HANDBOOK*].

⁴⁰ See NSF, *CRITERIA DEVELOPMENT II*, *supra* note 30, at 1.

⁴¹ HUD, *REFERENCE HANDBOOK*, *supra* note 39, at 2-2 to 2-5.

⁴² NSF, *CRITERIA DEVELOPMENT I*, *supra* note 37, at 1; see also NSF, *CRITERIA DEVELOPMENT II*, *supra* note 30, at 1.

⁴³ Fact Sheet, *supra* note 9, at 1, reprinted in MCGREGOR, SHEA & DOLINER, *supra* note 7.

in 1972.⁴⁴ Industries utilized package plant technology to meet the new effluent quality standards established pursuant to the FWPCA.⁴⁵ It is principally in recent years that developers have extended use of the technology to residential development and that plants have discharged effluent into the ground.⁴⁶

B. Treatment Technology

The principal idea of sewage treatment is to replicate and accelerate the natural process of the consumption of human waste material by bacteria.⁴⁷ The purpose of a sewage treatment plant is to reduce the amount of waste in the receiving stream or groundwater to the point where it is within the water body's capacity to absorb and treat it naturally.⁴⁸

All sewage treatment facilities, large and small, follow the same basic design. Wastewater is termed "influent" as it first enters a treatment plant.⁴⁹ The first treatment performed on the influent is called "primary treatment."⁵⁰ Primary treatment simply consists of a filter or screen that weeds out larger objects in order to protect the sensitive secondary biological process equipment from possible damage.⁵¹

After primary treatment, the wastewater is called primary effluent. This wastewater next passes through a "primary settlement"

⁴⁴ 33 U.S.C.A. §§ 1251-1387 (1986 & Supp. 1989).

⁴⁵ Fact Sheet, *supra* note 9, at 1, reprinted in MCGREGOR, SHEA & DOLINER, *supra* note 7.

⁴⁶ *Id.*

⁴⁷ See ENVIREX COMPANY, DESIGN MANUAL FOR ROTATING BIOLOGICAL CONTRACTORS ch. A, at 5 (1978) [hereinafter ENVIREX, DESIGN MANUAL], reprinted in MCGREGOR, SHEA & DOLINER, *supra* note 7.

⁴⁸ *Id.* Streams and groundwater flows are able to process waste naturally within certain limits. The biological cycle, however, is delicate. Dumping too much waste into a river or a stream at one time alters the normal biological pattern. If too much organic material is available, bacteria grow at a greatly increased rate. The proliferation of bacteria leads to a greater consumption of oxygen than a waterway can replace naturally. If this process continues, the stream becomes anaerobic (devoid of oxygen). All animal forms requiring dissolved oxygen will then die, and, in all likelihood, the stream will begin to smell of decay. If the amount of organic material declines, the stream will gradually replenish itself as it picks up oxygen from the air, and the cycle will be reestablished. A properly designed and operated wastewater treatment system removes oxygen-demanding organic matter to a point at which the receiving stream can accommodate the material that is left without adverse effect. *Id.* at 4-5.

⁴⁹ HORSLEY & WITTEN, INC., *supra* note 3, at 2.

⁵⁰ See ENVIREX, DESIGN MANUAL, *supra* note 47, ch. A, at 7, reprinted in MCGREGOR, SHEA & DOLINER, *supra* note 7.

⁵¹ D. BARNES & F. WILSON, *supra* note 31, at 3. Operators must periodically clean out the screen in order to remove and dispose of such objects. *See id.*

stage,⁵² a process that takes place in a large tank.⁵³ As the effluent passes through the tank, solids slowly settle out of the liquid. Operators remove these solids, which are called "primary sludge."⁵⁴ Primary settlement is also accompanied by a flow stabilization system. This process allows the system to absorb the peak flows into the system, which come in the morning and evening, and even out the distribution into the rest of the system.⁵⁵

In the next stage, "secondary treatment," the effluent is biologically treated. Bacteria are introduced at much higher concentrations than exist in a stream or groundwater.⁵⁶ In addition, the system provides enough oxygen to maintain the bacterial population no matter how high the concentration of waste might be.⁵⁷ When the effluent emerges from this second treatment stage, it is not completely clean.⁵⁸ Rather, secondary treatment is only supposed to reduce the concentration of oxygen-demanding organic matter to a level where a receiving body of water might absorb it without adverse effects.⁵⁹

One popular secondary treatment technique utilizes Rotating Biological Contactors, or RBCs.⁶⁰ RBCs are a series of closely spaced

⁵² *Id.* at 4.

⁵³ *Id.*

⁵⁴ *Id.*

⁵⁵ Lecture on "Small Sewage Treatment Plants (Package Plants)" by Scott Horsley, Horsley & Witten, Inc., Westboro, Mass. (Feb. 7, 1989) [hereinafter Horsley Lecture]; see also Horsley & Witten, Inc., *supra* note 3, at 3.

⁵⁶ ENVIREX, DESIGN MANUAL, *supra* note 47, ch. A, at 5, reprinted in MCGREGOR, SHEA & DOLINER, *supra* note 7.

⁵⁷ *Id.*

⁵⁸ Interview with Mark Parè, Engineer, DeFeo, Waite & Assocs., Raynham, Massachusetts (Nov. 14, 1988).

⁵⁹ ENVIREX, DESIGN MANUAL, *supra* note 47, ch. A, at 5, reprinted in MCGREGOR, SHEA & DOLINER, *supra* note 7.

⁶⁰ See *id.* at 7. Another secondary treatment technique, known as "Activated Sludge," has many design variations. In each variation, the wastewater, containing biologically degradable compounds, is aerated. This process creates a suspended mass of bacterial solids in the water, which is enclosed. The bacterial solids, also known as activated sludge, include fungi, protozoa, rotifers, and bacteria. The aeration breaks down the wastes, and the resulting bacterial solids are settled out of the remaining wastewater and separated. A secondary clarifier removes the sludge, and sends it on to a digester where it is processed further. See *id.* at 6-7; see also CAPE COD, *supra* note 9, at 3-4, reprinted in MCGREGOR, SHEA & DOLINER, *supra* note 7.

A third secondary wastewater treatment technique less frequently used is known as the "Trickling Filters" technique. These filters are beds of rocks or plastic surfaces over which wastewater slowly trickles. The rocks or plastic are the surface area on which organisms are attached as they feed on organic materials in the wastewater. A rotary distributor device spreads incoming flow evenly as a thin hydraulic layer over the surface. The assembly is rotated, and the wastewater flows over a filter bed that contains bacteria. In this environment, organisms grow, and form into slime or solids. A secondary clarifier later helps to separate

circular plastic disks called "media."⁶¹ The media are mounted on horizontal shafts and placed in a concrete tank into which the wastewater flows.⁶² The media are slowly and continuously rotated, while approximately forty percent of their surface area is submerged in the wastewater.⁶³ Bacteria and other microorganisms naturally present in the wastewater adhere to the surface of the media and use the organic materials in the wastewater as food, thus breaking them down.⁶⁴ Within a short time, the entire media surface area is covered with up to one-tenth of an inch of layered biomass.⁶⁵ The rotation of the media serves to expose the microorganisms sequentially to their food and to oxygen in the air needed for respiration, shearing off the solids formed by the growing microorganisms. The shearing action keeps the media unclogged.⁶⁶ This procedure results in the suspension of concentrated solids in a less concentrated wastewater. The settlement of these solids out of the wastewater completes the secondary treatment stage. These solids are known as "secondary sludge," and are later removed, further processed, and then disposed of separately.⁶⁷

Biological treatment of wastewater also oxidizes nitrogenous compounds in the wastewater to form nitrate-nitrogen.⁶⁸ Excessively high concentrations of nitrogen compounds can adversely affect health if the effluent reaches groundwater.⁶⁹ A recent variation in the RBC process starves the organisms of oxygen by using airtight vessels. This variation promotes denitrification⁷⁰ by removing ni-

the sludge solids. See ENVIREX, DESIGN MANUAL, *supra* note 47, ch. A, at 5-6, *reprinted in* MCGREGOR, SHEA & DOLINER, *supra* note 7.

⁶¹ CAPE COD, *supra* note 9, at 3, *reprinted in* MCGREGOR, SHEA & DOLINER, *supra* note 7.

⁶² ENVIREX, DESIGN MANUAL, *supra* note 47, ch. B, at 1, *reprinted in* MCGREGOR, SHEA & DOLINER, *supra* note 7; *see also* CAPE COD, *supra* note 9, at 3, *reprinted in* MCGREGOR, SHEA & DOLINER, *supra* note 7.

⁶³ ENVIREX, DESIGN MANUAL, *supra* note 47, ch. B, at 1, *reprinted in* MCGREGOR, SHEA & DOLINER, *supra* note 7.

⁶⁴ CAPE COD, *supra* note 9, at 3, *reprinted in* MCGREGOR, SHEA & DOLINER, *supra* note 7.

⁶⁵ ENVIREX, DESIGN MANUAL, *supra* note 47, ch. B, at 1, *reprinted in* MCGREGOR, SHEA & DOLINER, *supra* note 7.

⁶⁶ *Id.*

⁶⁷ *See* D. BARNES & F. WILSON, *supra* note 31, at 4.

⁶⁸ DIVISION OF WATER POLLUTION CONTROL, DEP'T OF ENVTL. QUALITY ENG'G, MASS. EXECUTIVE OFFICE OF ENVTL. AFFAIRS, RESPONSE TO PUBLIC COMMENTS CONCERNING THE PROPOSED ISSUANCE OF A GROUND WATER DISCHARGE PERMIT TO THE WILLIS HILL TRUST, SUDBURY, MASSACHUSETTS 2 (1987) [hereinafter DEQE RESPONSE], *reprinted in* HORSLEY & WITTEN, INC., *supra* note 3, at 83.

⁶⁹ *See infra* text accompanying notes 102-05 (discussion of environmental effects of PSTFs).

⁷⁰ Denitrification is to be distinguished from nitrification. Nitrification is the chemical process

trate-nitrogen from the wastewater and converting it into nitrogen gas.⁷¹ A specialized bacteria group that functions in anoxic (devoid of oxygen) settings accomplishes the conversion.⁷²

Many package plants employ a disinfection procedure after secondary treatment. The disinfection procedure, using chlorine or ultraviolet radiation, reduces the number of organisms in the effluent.⁷³ Finally, the effluent may pass through a filtering or straining device, perhaps a bed of sand, gravel, pebbles, or soil.⁷⁴ This stage is known as tertiary treatment.⁷⁵

Sewage treatment facilities produce two products: a treated water, or final effluent, and the concentrated material removed from the effluent called sludge.⁷⁶ Because most of the original pollutants in the wastewater are concentrated in this sludge, its safe removal and disposal are doubly important.⁷⁷ The operator of a package plant usually contracts with a specialist to remove the sludge.⁷⁸ The final effluent, if not discharged into surface water, is discharged into the ground by way of a leaching field, or other filtration device.⁷⁹

A sewage treatment plant is not completely unlike a septic tank, the most common⁸⁰ residential treatment device in smaller communities.⁸¹ A septic tank usually consists of two compartments into which domestic wastewater flows. The first of these is a watertight tank in which settlement of solids and a limited anaerobic digestion takes place.⁸² Solids gradually settle to the bottom of the tank and

by which various nitrogenous compounds in the wastewater are transformed into nitrate nitrogen. Nitrification occurs naturally during the biological treatment of sewage. DEQE RESPONSE, *supra* note 68, reprinted in HORSLEY & WITTEN, INC., *supra* note 3, at 83.

⁷¹ *Id.*

⁷² *Id.*

⁷³ *Id.* at 86, 93.

⁷⁴ D. BARNES & F. WILSON, *supra* note 31, at 4.

⁷⁵ *Id.*

⁷⁶ *Id.* at 4-5. The material removed at the primary stage is termed "primary sludge." At the secondary stage, it is called "secondary sludge." *Id.* at 4.

⁷⁷ See *id.* at 4-5. Sludge disposal and the legal issues that it raises are beyond the scope of this Comment.

⁷⁸ *Id.*

⁷⁹ *Id.*

⁸⁰ *Id.* at 1. The septic tank is not, however, the simplest sewage treatment device. Cesspools and privies are wastewater storage facilities that simply allow settlement of solids. They have no biological treatment element, unlike a septic tank.

⁸¹ Septic tank systems and cesspools discharge more wastewater directly to soils overlying groundwater than any other source. They are also the most often cited sources of groundwater contamination. L. CANTER & R. KNOX, *supra* note 36, at 2.

⁸² DEQE RESPONSE, *supra* note 68, reprinted in HORSLEY & WITTEN, INC., *supra* note 3, at 85. The biological activity takes place mainly in the settled sludge. D. BARNES & F. WILSON, *supra* note 31, at 5.

become a sludge, which is partially removed on an annual basis.⁸³ Meanwhile, grease and fat rise to the top of the tank and collect floating solids. In between is a relatively clear liquid which flows into the second chamber and filters into the soil.⁸⁴ A sewage treatment plant differs from a septic tank in that it accomplishes a more complete treatment through the use of multiple and more effective stages.⁸⁵ The advantages of a septic tank are that it produces effluent on a very small scale, and requires little maintenance.⁸⁶

Small sewage treatment plants, particularly package plants, have been maligned due to poor performance.⁸⁷ In most cases, however, inadequate maintenance and operation caused the breakdowns. A report published by the Department of Housing and Urban Development (HUD) states that "properly maintained, [package plants] can provide very reliable service."⁸⁸

III. THE PROBLEMS WITH PSTFs AND PACKAGE PLANTS

A. *Siting and Environmental Issues*

Experts agree that package plant technology itself is environmentally sound.⁸⁹ When properly sited and maintained, ground-discharg-

⁸³ *Id.*

⁸⁴ *Id.* at 53; DEQE RESPONSE, *supra* note 68, reprinted in HORSLEY & WITTEN, INC., *supra* note 3, at 85.

⁸⁵ DEQE RESPONSE, *supra* note 68, reprinted in HORSLEY & WITTEN, INC., *supra* note 3, at 86.

⁸⁶ *Id.* at 87. Septic tanks have no moving parts and require no routine maintenance. Problems primarily result from a failure to clean out the sludge as often as is required. *Id.*

⁸⁷ HUD, REFERENCE HANDBOOK, *supra* note 39, at 4-8.

⁸⁸ *Id.*

⁸⁹ Bertrand Letter, *supra* note 7, at 2, reprinted in MCGREGOR, SHEA & DOLINER, *supra* note 7, at 16. The Massachusetts Audubon Society (MAS) supports the use of package plants to remedy problems in existing residential situations, and as a temporary stop-gap measure. The MAS President, Gerard A. Bertrand, agrees that the technology itself, used under "ideal circumstances," is environmentally sound. *Id.*

Operators of small sewage treatment plants in Massachusetts have reported few technology-related problems. While minor equipment problems are commonplace, there have been only three reported major equipment malfunctions at the 35 Massachusetts plants employing the Rotating Biological Contractors (RBC) process. The Town of Maynard reported a problem with one RBC shaft at its municipal plant. The incident was attributed to improper installation. Media failed at the Wayland-Sudbury municipal facility as a result of unusually heavy biofilm growth. The growth was attributed to the organic strength of the influent, which is not as likely to be a problem with PSTFs treating residential sewage on a smaller scale. A drive problem caused by a faulty bearing occurred at a PSTF near Chelmsford. This problem was attributed to a manufacturing defect which has since been corrected by the manufacturer. DEQE RESPONSE, *supra* note 68, reprinted in HORSLEY & WITTEN, INC., *supra* note 3, at 84.

ing PSTFs can help protect environmental resources. When they are improperly sited or poorly maintained, however, PSTFs can pose a threat to those same resources, especially public and private water supplies drawn from groundwater.

Groundwater is "subsurface water that occurs beneath the water table in soils and geologic forms that are fully saturated."⁹⁰ Groundwater forms as precipitation and surface water "percolate" into the ground.⁹¹ Underground regions that are saturated enough to yield significant amounts of water are known as aquifers.⁹²

Both public and private drinking water supplies draw heavily on groundwater. There is some evidence to suggest that reliance on groundwater as a water source is increasing.⁹³ Forty to fifty percent of the United States population relies on groundwater as its primary source of drinking water, using either public or private wells drawn from aquifers.⁹⁴

Aquifers draw water from a ground area called a "zone of contribution," much in the same way that a river or lake is fed by its watershed.⁹⁵ Groundwater flows "downgradient" to the aquifer, just as surface water flows downstream. Neither aquifers nor zones of contribution know state or municipal boundaries.⁹⁶ Hence, contaminating activity in one jurisdiction can affect water quality in another.

Package plants differ from septic tank systems in two respects that can affect groundwater quality. First, package plants treat

⁹⁰ V. PYE, R. PATRICK & J. QUARLES, *supra* note 36, at 29.

⁹¹ Aquifers may be in hydraulic connection with surface water bodies. Polluted surface water bodies can, under certain circumstances, contaminate related aquifers. *See id.* at 26. Contamination in groundwater can eventually reach surface water. *See id.* at 51-52.

⁹² OFFICE OF GROUND-WATER PROTECTION, UNITED STATES ENVTL. PROTECTION AGENCY, SEPTIC SYSTEMS AND GROUND-WATER PROTECTION, A PROGRAM MANAGER'S GUIDE AND REFERENCE BOOK A-1 (1986) [hereinafter EPA, MANAGER'S GUIDE]. One example of an effort to protect a sensitive and important aquifer is taking place in New Jersey. Federal and state legislation established the New Jersey Pinelands Commission to protect over a million acres of environmentally sensitive land. The Pinelands depend ecologically on the underlying Cohansey aquifer. Further, the aquifer serves as an important regional water supply. Because the waste of some 180,000 residents within the Pinelands is discharged into the ground, the Commission has found it necessary to take steps to protect the local ecology. These steps include the establishment of management districts that set local lot sizes and oversee land uses. *See* Nicholson, *Aquifer Protection: A New Jersey Pinelands Case Study*, PROC. OF A SYMPOSIUM ON INDIVIDUAL ON-SITE WASTEWATER TREATMENT AND DISPOSAL SYSTEMS 52, 52-55 (1985).

⁹³ V. PYE, R. PATRICK & J. QUARLES, *supra* note 36, at 44.

⁹⁴ *Id.* at 38.

⁹⁵ Horsley Lecture, *supra* note 55.

⁹⁶ For example, the Ogallala Aquifer underlies parts of eight midwestern plains states. V. PYE, R. PATRICK & J. QUARLES, *supra* note 36, at 45.

sewage more completely than do septic tanks.⁹⁷ The fact that package plants discharge more effluent at one place, however, may offset the advantage of superior treatment.⁹⁸ Individual septic tanks, by comparison, discharge less clean effluent over a wider area. A PSTF may be more environmentally destructive than septic tanks if it collects sewage from outside a zone of contribution and deposits it within. But a properly sited PSTF can produce more beneficial results than individual septic tank systems.

Whether a PSTF discharges inside or outside a zone of contribution is perhaps the most important environmental consideration. If a package plant discharges within a zone of contribution, its discharge could affect downgradient water quality. Discharge of effluent into the ground causes the formation of a "plume" of contaminated groundwater.⁹⁹ Groundwater does not travel as quickly as surface water, but the rate of dilution of the contaminant is slower in groundwater than in surface water.¹⁰⁰ The plume thus migrates without significant dilution, posing a heightened threat to the water sources serviced by the contaminated aquifer.¹⁰¹

Several particular chemicals in effluent can pose health threats. For example, most household effluent will result in "nitrogen loading."¹⁰² Nitrogen compounds tend not to break down, or "attenuate," much as they travel through groundwater.¹⁰³ Nitrogen at excessive levels is teratogenic¹⁰⁴ as well as carcinogenic.¹⁰⁵

The spread of phosphorus can also have damaging environmental effects. Phosphorus, unlike nitrogen compounds, becomes attenuated rather easily. It oxidizes and reacts with iron in an aquifer, and is unlikely to seep for very long in pure form.¹⁰⁶ This reaction

⁹⁷ See *supra* notes 80-86 and accompanying text.

⁹⁸ Horsley Lecture, *supra* note 55.

⁹⁹ HORSLEY & WITTEN, INC., *supra* note 3, at 6.

¹⁰⁰ Horsley Lecture, *supra* note 55.

¹⁰¹ HORSLEY & WITTEN, INC., *supra* note 3, at 6.

¹⁰² Horsley Lecture, *supra* note 55; see also HORSLEY & WITTEN, INC., *supra* note 3, at 15.

¹⁰³ Attenuation is the process by which a compound is reduced in concentration over time, through absorption, degradation, dilution, and/or transformation. EPA, PROGRAM MANAGER, *supra* note 92, at A-1.

¹⁰⁴ Teratogenic is defined as "tending to cause developmental malformations and monstrosities." WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY OF THE ENGLISH LANGUAGE 2358 (1981) [hereinafter WEBSTER'S].

¹⁰⁵ Nitrogen consumption may be one cause of infant hemoglobinemia, or the "blue baby" syndrome. Horsley Lecture, *supra* note 55. It may also cause methemoglobinemia, a type of poisoning with effects similar to those of cyanide poisoning. EPA, PROGRAM MANAGER, *supra* note 92, at A-3.

¹⁰⁶ See HORSLEY & WITTEN, INC., *supra* note 3, at 23.

does not remove the risk of contamination, however, for as easily as phosphorus attenuates, it can re-form. The presence of phosphorus does not contaminate drinking water supplies, but promotes substantial weed and algae growth in downgradient ponds or lakes. This process, known as "eutrophication,"¹⁰⁷ can take place very rapidly. A lake that supports sporting activities such as sailing, boating, swimming, and fishing can become overgrown in very short order.¹⁰⁸ In some instances, such changes are beneficial, for an overvegetated pond or lake can make a fine wildlife habitat. Planners, nonetheless, should be aware of the effects of such a change before they allow it to take place.¹⁰⁹

Even if the effluent does not contaminate, it can have adverse effects. One problem is that an influx of relatively clean effluent can add to the natural "recharge" rate of an area, creating a "mounding" effect that can alter the amount and flow of groundwater in a way that affects downgradient water areas.¹¹⁰ Predicting the effects of any discharge depends in large part on monitoring groundwater quality and flow.¹¹¹

Another fear not related to the quality of the effluent is that the use of PSTFs will lead to a "sewer mentality" among residents of a development. The presence of a PSTF might mislead residents into believing that the system can process anything they dump into it. The introduction of toxics into a PSTF could not only severely damage the plant's secondary biological treatment process, but it could also contaminate the groundwater into which the effluent leaches.¹¹² Such common household products as pesticides, paint strippers and thinners, household cleaners, and automobile fluids all contain toxics.¹¹³

Consequently, there are clear environmental hazards presented when a PSTF is sited and built without regard to potential effects on water supplies, lakes and ponds, or environmentally sensitive areas.

¹⁰⁷ "Eutrophic" is a term meaning "rich in dissolved nutrients but . . . with seasonal oxygen deficiency." WEBSTER'S, *supra* note 104, at 786. Eutrophication of a lake causes an increase in biological activity. Horsley Lecture, *supra* note 55.

¹⁰⁸ Horsley Lecture, *supra* note 55.

¹⁰⁹ HORSLEY & WITTEN, INC., *supra* note 3, at 7-9.

¹¹⁰ Horsley Lecture, *supra* note 55.

¹¹¹ V. PYE, R. PATRICK & J. QUARLES, *supra* note 36, at 9.

¹¹² Bertrand Letter, *supra* note 7, at 3, reprinted in MCGREGOR, SHEA & DOLINER, *supra* note 7.

¹¹³ See *id.*; see also HORSLEY & WITTEN, INC., *supra* note 3, at 25-27.

B. Concerns About Private Ownership

Some authorities see legal responsibility as the most pressing issue raised by private ownership of sewage treatment facilities.¹¹⁴ State and local authorities fear that some forms of private ownership are not financially secure enough to assure continuous operation and do not contain suitable mechanisms for enforcement.¹¹⁵ In time, critics fear, such ownership will fail to maintain a plant, leaving municipalities to pick up operational costs in order to safeguard the health of the public at large.

Critics of PSTFs believe that developers are using and will use PSTFs as a means of skirting state and local sewage restrictions,¹¹⁶ and thus may take little care when designing the operating entity to ensure its long-term fiscal stability. They believe that shoddy construction and maintenance of the plants are also likely under private ownership. Developers may choose engineers and design solely on the basis of cost rather than on the basis of environmental soundness.¹¹⁷ Private owners with limited resources may also tend, if left unregulated, to choose the least costly maintenance arrangements.¹¹⁸

State and local authorities in Massachusetts have received a deluge of permit applications from developers seeking to vest title and control over sewage treatment facilities in various private entities.¹¹⁹ These forms range from homeowners' or condominium owners' associations to trusts created by developers for the benefit of individual unit owners.¹²⁰

In an important Massachusetts agency decision in 1988, the Division of Water Pollution Control for the Department of Environmental Quality Engineering, now the Department of Environmental Protection, denied the discharge permit application submitted by James

¹¹⁴ See *Willis Hill*, *supra* note 17, at 3. An MAS official observed in a letter to a state environmental official that "[t]he greatest concern [with privately owned treatment plants] is with ensuring the continuous operation, preventive maintenance, repair and replacement of such facilities." Bertrand Letter, *supra* note 7, at 2 (quoting letter from McMahon to Quateman (May 29, 1986)), reprinted in MCGREGOR, SHEA & DOLINER, *supra* note 7.

¹¹⁵ See, e.g., *Willis Hill*, *supra* note 17, at 3.

¹¹⁶ See HORSLEY & WITTEN, INC., *supra* note 3, at 60.

¹¹⁷ See Bertrand Letter, *supra* note 7, at 3, reprinted in MCGREGOR, SHEA & DOLINER, *supra* note 7.

¹¹⁸ *Id.*

¹¹⁹ By July, 1988, some 35 developers had proposed single-family subdivisions to be serviced by package plants. McNamara, *supra* note 3, reprinted in HORSLEY & WITTEN, INC., *supra* note 3, at 145.

¹²⁰ See *Willis Hill*, *supra* note 17, at 1.

M. Slattery on behalf of the Willis Hill Trust.¹²¹ The critical factor in the decision was the nature of the private entity proposing to operate the facility. In reaching its decision to deny a groundwater discharge permit, the Division compared the legal status of a trust with that of a condominium owners' association under Massachusetts law.¹²²

The Division's Director cited six objectives as crucial in the evaluation of a private entity's ability to own and operate a PSTF responsibly. The six criteria are that: (1) the operating party be a single entity fundamentally identical to the facility's users and fully responsible for the plant's operation, maintenance, repair, and replacement; (2) the financial and operational responsibilities must be enforceable on all users; (3) the authority to install a user-charge system to generate adequate revenues and to enforce such fees in a manner similar to municipal assessments must exist; (4) there must be a source of immediate emergency funding; (5) changes in the organizational arrangements are prohibited; and (6) the entity must own the land on which the facilities are located.¹²³ The Director found that condominium owners' associations established pursuant to Chapter 183A of the Massachusetts General Laws satisfy these requirements.¹²⁴

In Massachusetts, condominium units are specifically authorized and regulated by Chapter 183A.¹²⁵ Chapter 183A implicitly requires every condominium unit owner to be a member of an "organization of unit owners," which may be a corporation, trust or association, as provided for in the master deed.¹²⁶ The chosen entity is responsible for the management and regulation of the common areas and facilities.¹²⁷ Usually the association, rather than the individual unit owners, holds title to all common facilities, as well as all of the underlying land.¹²⁸ An individual unit owner's membership in the association and proportional interest in the common areas and facilities cannot be separated from ownership of the unit.¹²⁹ Membership

¹²¹ *Id.*

¹²² *Id.*

¹²³ *Id.* at 2.

¹²⁴ *Id.*

¹²⁵ MASS. GEN. L. ch. 183A (1988).

¹²⁶ See *id.* §§ 1 (definition of "organization of unit owners"), 10.

¹²⁷ *Id.* §§ 5, 11.

¹²⁸ See *Willis Hill*, *supra* note 17, at 2 (citing MASS. GEN. L. ch. 183A §§ 3, 5, 7).

¹²⁹ See MASS. GEN. L. ch. 183A §§ 5(b), 10(a).

is automatically conveyed with the unit in all subsequent transfers of ownership.¹³⁰

A unit owner can also be made liable for his or her percentage interest share in the common expenses. This liability can be enforced on the individual by means of a lien placed on the individual unit by the association for the unpaid amount. Liens for unpaid common expenses have priority over all other liens, except municipal liens and first mortgages of record.¹³¹ Thus, under Massachusetts law, condominium owners are obligated to pay for the association's operation of a sewage treatment plant, and that obligation can be enforced.

The Willis Hill development, however, was not a condominium.¹³² The developer proposed a simple real estate trust with the individual lot owners as beneficiaries.¹³³ He planned to include as part of the trust property the treatment facility itself, an actual and reserve disposal area, and easements for the sewer lines. He proposed a system of reciprocal easements and equitable servitudes, with all of the lots being conveyed out of the trust. This proposal, supposedly, would ensure that the lots' beneficial interest in the trust would be inseparable from the individual properties. In addition, all of the specific provisions of approvable condominium documents were recited in the trust.¹³⁴

The Division, taking note of significant public comments,¹³⁵ found the Willis Hill Trust ownership arrangement insufficient. Although the trust recited similar obligations to those of a condominium owners' association, McMahon observed that the trust remained outside the scope of the statutory provisions for the enforceability of obligations on the members of condominium associations.¹³⁶ This lack of statutorily guaranteed legal responsibility worried the Division.

¹³⁰ See *id.*

¹³¹ See *id.* § 6(c).

¹³² See *Willis Hill*, *supra* note 17, at 3.

¹³³ *Id.*

¹³⁴ *Id.*

¹³⁵ *Id.* The "significant public comments" included, for example, the Bertrand letter. See *supra* note 7.

¹³⁶ *Willis Hill*, *supra* note 17, at 4; see also MASS. GEN. L. ch. 183A §§ 5, 6 (1988). Another statute, in fact, restricts the length of time in which mutual obligations between individual owners on subdivided land can be enforced to 30 years. MASS. GEN. L. ch. 184, § 25. As the Director noted, 30 years is approximately the point in time when the plant would reach the end of its useful life, and thus, the point when enforcement provisions would be most critical. See *Willis Hill*, *supra* note 17, at 4.

"The trust format," the Division concluded, "does not provide the same level of confidence [as the condominium form of ownership], based on the express statutory provisions."¹³⁷ The Division questioned the trust's willingness and ability to enforce obligations on individual unit owners.¹³⁸

The Division's confidence in the statutorily prescribed ownership arrangements was based in part on factors related to the subjective expectations of condominium owners. The decision refers to the expectation of unit purchasers that "they are assuming a proportionate share of the common obligations."¹³⁹ The Division announced that it would henceforth deny applications for permits submitted by residential ownership entities other than condominium owners' associations.¹⁴⁰

Subsequently, in 1988, two Massachusetts legislators¹⁴¹ introduced legislation, House Bill No. 5426, that would impose a moratorium on the construction of all privately owned sewage treatment plants pending the completion of a Generic Environmental Impact Report by various state agencies.¹⁴² The moratorium would have given towns a chance to reassess their zoning laws while the agencies studied the potential impacts of PSTFs.¹⁴³ The bill died, however, in the House Ways and Means Committee.

¹³⁷ *Willis Hill*, *supra* note 17, at 5.

¹³⁸ DEQE RESPONSE, *supra* note 68, reprinted in HORSLEY & WITTEN, INC., *supra* note 3, at 98.

¹³⁹ *Willis Hill*, *supra* note 17, at 3.

¹⁴⁰ See *id.* at 5. Although there were at the time over 100 small, privately owned sewage treatment facilities permitted for use in Massachusetts, the Willis Hill application was one of the first to propose serving a residential subdivision that was governed by a neighborhood association and organized under a trust. DEQE RESPONSE, *supra* note 68, reprinted in HORSLEY & WITTEN, INC., *supra* note 3, at 89.

¹⁴¹ The legislators were Representative Louise Hicks and Senator William Golden. See McNamara, *supra* note 3, reprinted in HORSLEY & WITTEN, INC., *supra* note 3, at 144.

¹⁴² See *id.* For a discussion of the goals set for the Generic Environmental Impact Report (GEIR) see EXECUTIVE OFFICE OF ENVTL. AFFAIRS, CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS ON THE FINAL SCOPE FOR THE GENERIC ENVIRONMENTAL IMPACT REPORT (1987). The GEIR is still in the process of being prepared by the various sponsors of the project: the Executive Office of Environmental Affairs (EOEA), with the Department of Environmental Protection (DEP) (formerly the Department of Environmental Quality Engineering) acting as lead agency, the Executive Office of Communities and Development, the Executive Office of Human Services through the Department of Public Health, the Governor's Office of Economic Development, the Massachusetts Industrial Finance Agency, and the Massachusetts Government Land Bank. *Id.* At this printing, a draft GEIR is expected to be ready by March, 1990. After a period for public review, the EOEA expects that the final GEIR will be released in August or September, 1990. Telephone interview with Elizabeth Kline, Assistant Secretary of Environmental Affairs for the Commonwealth of Massachusetts (Feb. 15, 1990).

¹⁴³ McNamara, *supra* note 3, reprinted in HORSLEY & WITTEN, INC., *supra* note 3, at 144.

The proposed moratorium particularly infuriated PSTF proponents, who maintained that the ban would have eliminated many forms of private ownership, such as commercial, industrial and condominium association entities, that have worked well.¹⁴⁴ Some PSTF proponents also oppose the less severe measures restricting forms of private ownership implemented in the *Willis Hill* decision and currently being considered in the preparation of the GEIR.¹⁴⁵ After all, there have been few, if any, incidents of collapse by any form of private ownership. Further, such measures interfere with an owner's right to do as he or she pleases with his or her property, and could be challenged as an unconstitutional taking,¹⁴⁶ or as a violation of a landowner's due process or equal protection rights.¹⁴⁷

In short, PSTF proponents maintain that there is no strong public policy reason, and possibly no legal basis, to restrict the forms of ownership allowed to operate package plants.¹⁴⁸ Proponents believe that the issue of private ownership has become a magnet for "anti-growthers."¹⁴⁹ In effect, they are arguing that land use and developmental concerns are the primary factor motivating PSTF opponents.

C. Land Use and Developmental Concerns

Private ownership of package plants has also caused some parties to worry about the potential impact on development.¹⁵⁰ Town plan-

¹⁴⁴ See *id.* This opinion was voiced by Mark Parè, former engineer for the Department of Environmental Quality Engineering (now the Department of Environmental Protection). See *id.*

¹⁴⁵ *Id.*

¹⁴⁶ One court suggested that the denial of an application to operate a package plant could be a taking where no other treatment mechanism is available. A permit denial, in such a case, denies the landowner all beneficial use of his land. See *Fischer v. Board of County Comm'rs*, 462 So. 2d 480, 481 (Fla. Dist. Ct. App. 1985). The Massachusetts Division of Water Pollution Control, however, rejected the argument that the denial of a permit to a homeowners' association as in *Willis Hill* could constitute a taking. The Division reasoned that a denial does not "take" the property, but merely narrows the choice of acceptable forms of ownership. DEQE RESPONSE, *supra* note 68, reprinted in HORSLEY & WITTEN, INC., *supra* note 3, at 103.

¹⁴⁷ The Division of Water Pollution Control also rejects the argument that a permit applicant proposing ownership by a homeowners' association would have an equal protection claim when his application was denied. The difference in enforceability of obligations between a homeowners' association and a condominium owners' association justifies the difference in treatment. See *id.* at 104.

¹⁴⁸ See *supra* notes 144-47 and accompanying text.

¹⁴⁹ McNamara, *supra* note 3 (quoting Monica Staaf, attorney for the Home Builders Association of Massachusetts), reprinted in HORSLEY & WITTEN, INC., *supra* note 3, at 144.

¹⁵⁰ The United States Department of Housing and Urban Development endorses "small scale

ners and environmentalists fear that PSTFs will have a can-opener effect on development by opening up many areas previously unsuitable for development because of soil conditions.¹⁵¹ PSTF proponents respond by arguing that PSTFs actually add little to already existing development pressures.¹⁵² Growth is inevitable, they assert, and creative use of PSTFs will help to enhance the quality of that growth.¹⁵³

Planners and environmentalists principally fear that PSTFs will render obsolete some zoning mechanisms, such as minimum lot sizing.¹⁵⁴ Minimum lot sizing, also known as large-lot zoning, refers to zoning regulations which mandate a minimum lot size for every residence. Minimum lot sizing is one of the most popular and effective tools used by a community to manage its growth both qualitatively and quantitatively.¹⁵⁵

One of the reasons advanced by towns to justify minimum lot sizing is the need to prevent groundwater pollution due to an abundance or inadequate spacing of septic tanks.¹⁵⁶ Minimum lot sizing helps to ensure that the amount of effluent disposed through septic tanks in a given area does not exceed the capacity of the soil to absorb it without contaminating groundwater.¹⁵⁷ Courts have upheld lot-sizing restrictions where soil conditions warranted protective measures, waste disposal by sewer system was not available, and the minimum lot size imposed was not excessively high.¹⁵⁸

wastewater systems" as a way to spur economic growth by making housing more widely available and, therefore, more affordable. See HUD, REFERENCE HANDBOOK, *supra* note 39, at 1-1.

¹⁵¹ See McNamara, *supra* note 3 (quoting Randall Arendt, Assistant Director of the Center for Rural Massachusetts, Amherst, Mass.), reprinted in HORSLEY & WITTEN, INC., *supra* note 3, at 146.

¹⁵² *Id.* at 147 (quoting Hopkinton, Mass., town planner Nelda Hoxie).

¹⁵³ See *infra* text accompanying notes 174-80 (discussion of cluster development).

¹⁵⁴ See McNamara, *supra* note 3, reprinted in HORSLEY & WITTEN, INC., *supra* note 3, at 145.

¹⁵⁵ P. ROHAN, 2 ZONING AND LAND USE CONTROLS § 3.01[1], at 3-3 (1988).

¹⁵⁶ *E.g.*, *Salamar Builders Corp. v. Tuttle*, 29 N.Y.2d 221, 227, 275 N.E.2d 585, 589, 325 N.Y.S.2d 933, 938-39 (1971).

¹⁵⁷ See *supra* text accompanying notes 89-111 (discussion of package plant siting and impacts on groundwater).

¹⁵⁸ See, *e.g.*, *Steel Hill Dev., Inc. v. Town of Sanbornton*, 469 F.2d 956, 963 (1st Cir. 1972); *Sturges v. Town of Chilmark*, 380 Mass. 246, 259, 402 N.E.2d 1346, 1354 (1980); *Wilson v. Town of Sherborn*, 3 Mass. App. Ct. 237, 245, 326 N.E.2d 922, 927 (1975); *Salamar Builders*, 29 N.Y.2d at 228, 275 N.E.2d at 590, 325 N.Y.S.2d at 940; *Obermeier v. Amelkin*, 65 A.D.2d 574, 575, 409 N.Y.S.2d 28, 29 (1978), *aff'd*, 49 N.Y.2d 807, 808, 403 N.E.2d 964, 964, 426 N.Y.S.2d 980, 980 (1980).

Communities, however, may employ many other reasons to justify minimum lot sizing. Suburban communities have used the following facially valid justifications:¹⁵⁹ preservation of neighborhood stability, as with preserving the characteristics of a neighborhood;¹⁶⁰ maintenance of property values;¹⁶¹ certainty of adequate municipal services and of funding;¹⁶² protection of public health;¹⁶³ and promotion of an environment that is aesthetically pleasing.¹⁶⁴

Many successful challenges to minimum lot-sizing ordinances were based on the exclusionary intent or effect of the ordinances.¹⁶⁵ Courts have been particularly unwilling to allow particular suburban municipalities to avoid accepting their "fair share" of development in the face of present and prospective regional growth.¹⁶⁶ They may be

¹⁵⁹ See P. ROHAN, *supra* note 155, § 3.01[1], at 3-4 to 3-12.

¹⁶⁰ See, e.g., *Marcus Assocs. v. Town of Huntington*, 45 N.Y.2d 501, 507, 382 N.E.2d 1323, 1325, 410 N.Y.S.2d 546, 548 (1978).

¹⁶¹ See, e.g., *Commons v. Zoning Bd. of Adjustment*, 81 N.J. 597, 610, 410 A.2d 1138, 1145 (1980).

¹⁶² Communities have tried to justify minimum lot sizing provisions by arguing that the provisions prevent development that would necessitate expansion of municipal services (such as schools, police, fire, water, and roads) beyond a community's ability, or willingness, to pay. See, e.g., *County Comm'rs v. Miles*, 246 Md. 355, 365, 228 A.2d 450, 455 (1967) (argument successful in part because lot sizing imposed only on small area of county); *Schere v. Township of Freehold*, 119 N.J. Super. 433, 436, 292 A.2d 35, 37 (App. Div.) (argument unsuccessful), *certif. denied*, 62 N.J. 69, 299 A.2d 67 (1972), *cert. denied*, 410 U.S. 931 (1973); *National Land & Inv. Co. v. Kohn*, 419 Pa. 504, 526-28, 215 A.2d 597, 609-10 (1965) (argument unsuccessful). At least one commentator has attacked this attempted justification: "Exclusions resulting from decisions not to build or expand infrastructure facilities take on a 'catch-22' character when the town subsequently cites the absence of these facilities as the basis for . . . refusing to modify the provisions of a zoning ordinance to permit . . . increased densities." Delogu, *The Misuse of Land Use Control Powers Must End: Suggestions for Legislative and Judicial Responses*, 32 ME. L. REV. 29, 54 (1980). Ironically, minimum lot sizing may increase costs in some instances by spreading out residents who require municipal services and reducing the number of residents who will pay for them. It may also encourage the grid-type development that the community may be seeking to prevent. *Id.* at 36.

¹⁶³ See *Hamer v. Town of Ross*, 59 Cal. 2d 776, 790, 382 P.2d 375, 384, 31 Cal. Rptr. 335, 344 (1963) (minimum lot sizes "tend to ensure adequate light and air and relieve congestion").

¹⁶⁴ See *Agins v. City of Tiburon*, 447 U.S. 255, 261 & n.8 (1980).

¹⁶⁵ See, e.g., *Southern Burlington County NAACP v. Township of Mount Laurel*, 67 N.J. 151, 186, 336 A.2d 713, 731, *appeal dismissed and cert. denied*, 423 U.S. 808 (1975); *National Land & Inv. Co. v. Kohn*, 419 Pa. 504, 532, 215 A.2d 597, 612 (1965); *Board of County Supervisors v. Carper*, 200 Va. 653, 662, 107 S.E.2d 390, 395-96 (1959).

¹⁶⁶ *Southern Burlington County NAACP v. Township of Mount Laurel*, 67 N.J. 151, 174, 336 A.2d 713, 724, *appeal dismissed and cert. denied*, 423 U.S. 808 (1975); *Township of Williston v. Chesterfield Farms, Inc.*, 462 Pa. 445, 448-49, 341 A.2d 466, 467-68 (1975); *Concord Township Appeal*, 439 Pa. 466, 474-75, 268 A.2d 765, 768-69 (1970); *National Land & Inv. Co. v. Kohn*, 419 Pa. 504, 532, 215 A.2d 597, 612 (1965). Rural communities removed from urban centers have been more successful in defending lot sizing provisions despite similar exclusionary effects. See, e.g., *Sturges v. Town of Chilmark*, 380 Mass. 246, 254-55, 402

more willing to uphold minimum lot sizing when used as part of a plan to manage growth "in an orderly and rational manner"¹⁶⁷ rather than when used to prevent growth.

Officials in towns that have relied on minimum lot sizing and on the limits of sewage treatment technology as de facto growth control mechanisms fear that, with the advent of package plants and PSTFs, they will have no legal defenses against pressures for what they consider unwise or undesirable growth.¹⁶⁸ By proposing a PSTF, town officials maintain, a developer can represent that a subdivision of a large parcel of land into smaller lots would not pose a threat of contamination to soil or groundwater. If the town attempted to enforce a lot-sizing ordinance, the developer could argue the absence of any police power justification to protect the "public health, safety, morals, or general welfare"¹⁶⁹ of the community, and thus render the ordinance vulnerable to a takings challenge.¹⁷⁰ But PSTF proponents can argue that few minimum lot-sizing ordinances will be overturned given the traditional deference to towns in zoning matters,¹⁷¹ and given the other valid purposes supporting minimum lot sizing.¹⁷²

Even if minimum lot sizing is no longer available as a means of growth control, PSTF proponents point out, towns can use PSTFs to promote ordered development. Just as towns might condition building permits on developer investment in such projects as widening highways or expanding the capacity of water and sewer pipes, they may condition PSTF permits on contributions toward groundwater monitoring equipment or water purification systems. The condition must serve the same purpose as a ban on such building, however, in order not to be held a taking.¹⁷³ In other words, the permit condition must advance the end justifying it.¹⁷⁴

N.E.2d 1346, 1351-52 (1980) (noting differences in regional needs between suburban and rural areas); *In re Appeal of M.A. Kravitz Co.*, 501 Pa. 200, 213-14, 460 A.2d 1075, 1082-83 (1983).

¹⁶⁷ *National Land & Inv. Co. v. Kohn*, 419 Pa. 504, 532, 215 A.2d 597, 612 (1965) (finding no such purpose in a community's minimum lot sizing ordinance).

¹⁶⁸ *McNamara*, *supra* note 3, reprinted in *HORSLEY & WITTEN, INC.*, *supra* note 3, at 144. Massachusetts has relied on minimum lot sizing, based on "varied soil conditions," to operate as a "passive open space protection tool." See *CAPE COD*, *supra* note 9, at 1, reprinted in *MCGREGOR, SHEA & DOLINER*, *supra* note 7. The central and western portions of the state consist in large part of dense or marshy soil which cannot accommodate septic systems. *McNamara*, *supra* note 3, reprinted in *HORSLEY & WITTEN, INC.*, *supra* note 3, at 144.

¹⁶⁹ *Village of Euclid v. Ambler Realty Co.*, 272 U.S. 359 (1926).

¹⁷⁰ See, e.g., *Southern Burlington County NAACP v. Township of Mount Laurel*, 67 N.J. 151, 336 A.2d 713, *appeal dismissed and cert. denied*, 423 U.S. 808 (1975); *National Land & Inv. Co. v. Kohn*, 419 Pa. 504, 215 A.2d 597 (1965).

¹⁷¹ This proposition, nearly universal, was perhaps stated first in *Euclid*, 272 U.S. at 388.

¹⁷² See *supra* text accompanying notes 159-64.

¹⁷³ See *Nollan v. California Coastal Comm'n*, 483 U.S. 825, 836-37 (1987).

¹⁷⁴ See *id.* at 837.

PSTF advocates also suggest that PSTFs facilitate the use of land use mechanisms such as "cluster zoning."¹⁷⁵ Cluster zoning provides for the dense grouping of buildings on one portion of a development area in order to open the space for recreational or other purposes.¹⁷⁶ Cluster development is considered advantageous to society in that: (1) it promotes the preservation of open spaces; (2) it lowers development costs; and (3) it provides broader housing opportunities.¹⁷⁷ It may also promote the preservation of wetlands and farmlands.¹⁷⁸ PSTF proponents point out that PSTFs enable the treatment of sewage well away from the residential area of a cluster development.¹⁷⁹ But PSTF opponents can argue that cluster zoning often exempts the developer from other zoning regulations such as frontage, minimum area, and setback requirements.¹⁸⁰

Developers and package plant advocates also argue for the use of PSTFs on the basis that package plants will not necessarily alter growth patterns significantly.¹⁸¹ A study of impacts on one Massachusetts town showed that package plants would not contribute to circumstances already fostering growth.¹⁸² Proponents also argue that PSTF opponents unfairly compare the anticipated level of development using PSTFs to the present level of development without them. The only fair way to measure the impact of PSTFs, they say, is to measure future growth with PSTFs against future growth anticipated without them.¹⁸³ Since growth is inevitable, PSTFs should not be blamed for causing it.

IV. CURRENT REGULATION OF GROUND-DISCHARGING PSTFS

A. Federal Law

Federal law does practically nothing to address the issue of private ownership of sewage treatment plants, and little to address the issue

¹⁷⁵ See McNamara, *supra* note 3, reprinted in HORSLEY & WITTEN, INC., *supra* note 3, at 146.

¹⁷⁶ P. ROHAN, *supra* note 155, § 12.01[1], at 12-1 (1988).

¹⁷⁷ *Id.* § 12.01[2], at 12-7 to 12-12. Cluster developments are considered cost-effective because the length of roads and sewers need not be as great when dwelling units are clustered. See *id.* § 12.01[2][b], at 12-10.

¹⁷⁸ D. KMEC, ZONING & PLANNING DESKBOOK § 5.07[3], at 5-82 (1988).

¹⁷⁹ See McNamara, *supra* note 3, reprinted in HORSLEY & WITTEN, INC., *supra* note 3, at 146.

¹⁸⁰ See D. KMEC, *supra* note 178, § 5.07[3], at 5-82.

¹⁸¹ METROPOLITAN AREA PLANNING COUNCIL, HOPKINTON BUILD-OUT ANALYSIS: IMPACTS OF PRIVATELY OWNED SEWAGE TREATMENT FACILITIES (June 1988), reprinted in HORSLEY & WITTEN, INC., *supra* note 3, at 153.

¹⁸² See generally *id.*

¹⁸³ See generally *id.*

of subsurface discharge of sewage. No federal statute is specifically and solely designed to address the issue of groundwater pollution. Several statutes, however, affect groundwater indirectly.

The Federal Water Pollution Control Act (FWPCA)¹⁸⁴ prohibits "the discharge of any pollutant"¹⁸⁵ into "navigable waters"¹⁸⁶ except as authorized under the statute.¹⁸⁷ "Navigable waters" is defined broadly in the FWPCA to mean "waters of the United States, including the territorial seas."¹⁸⁸ Groundwater pollution is not specifically excluded from the reach of the statute, but is only mentioned in the sections of the statute that mandate future study and development of standards in very general terms.¹⁸⁹ The legislative history of the FWPCA also suggests that Congress intended to exclude subsurface discharge from the reach of the regulatory portion of the statute.¹⁹⁰ Bills proposing to include groundwater within the regulatory scope of the FWPCA were defeated.¹⁹¹ The Environmental Protection Agency (EPA)¹⁹² and several courts¹⁹³ have likewise con-

¹⁸⁴ 33 U.S.C.A. §§ 1251-1387 (West 1986 & Supp. 1989).

¹⁸⁵ 33 U.S.C. § 1311(a) (1982).

¹⁸⁶ *Id.* § 1362(12).

¹⁸⁷ *Id.* § 1311(a). The primary authorization in the statute for the discharge of pollutants is the permitting process outlined in the National Pollutant Discharge Elimination System (NPDES). *Id.* § 1342 (1982 & Supp. V 1987).

¹⁸⁸ *Id.* § 1362(7) (1982).

¹⁸⁹ The statute directs the EPA Administrator to cooperate with the states in establishing a national groundwater surveillance system, *see id.* § 1254(a)(5); to condition future grants to any state on the establishment of groundwater quality monitoring procedures, *see id.* § 1254(e)(1); and to develop and periodically publish the latest scientific criteria for groundwater quality, and the effect of contamination. *See id.* § 1314(a)(1).

¹⁹⁰ *See, e.g.,* S. REP. NO. 414, 92d Cong., 1st Sess. 73 (1971), *reprinted in* 1972 U.S. CODE CONG. & ADMIN. NEWS 3735, 3739.

¹⁹¹ The Senate Committee on Public Works rejected several bills proposing to regulate groundwater in the manner of surface water. *See id.* On the floor of the House, Representative Les Aspin proposed to amend H.R. 11896 to bring groundwater within the permit provisions of the bill. *See* 118 CONG. REC. 10,666 (Mar. 28, 1972). A heated debate followed. Representative Robert McClory spoke in support of the amendment: "[T]o consider that we are providing for the protection of the surface waters—which we can see—and omitting from the strong provisions of this measure vast ground-water supplies—is to my mind unthinkable." *Id.* at 10,668. After pointing out that the bill provided for the study of groundwater contamination, Representative B.F. Sisk rose in opposition to the proposed amendment: "I recognize the possibility of pollution of ground water, but this whole matter at this point in time, with no more knowledge than we have, bringing this ground water under this type of control, is improper, and I think is a very dangerous thing to do." *Id.* at 10,669.

¹⁹² *Exxon Corp. v. Train*, 554 F.2d 1310, 1321 n.21 (5th Cir. 1977) (quoting Op. Off. Gen. Counsel (Dec. 13, 1973)).

¹⁹³ *See Exxon*, 554 F.2d at 1329; *McClellan Ecological Seepage Situation (MESS) v. Weinberger*, 707 F. Supp. 1182, 1193-94 (E.D. Cal. 1988); *Michigan v. United States*, 618 F. Supp. 1103, 1107 (W.D. Mich. 1985).

cluded that the FWPCA does not purport to regulate groundwater pollution, except perhaps in limited circumstances.¹⁹⁴

Two years after the passage of the FWPCA, Congress enacted the Safe Drinking Water Act (SDWA).¹⁹⁵ The SDWA, in addition to setting national drinking water standards, regulates underground injections through the Underground Injection Control (UIC) Program.¹⁹⁶ The current statutory and regulatory definition of "underground injection," however, does not explicitly include the leaching field discharge that a ground-discharging package plant produces.¹⁹⁷

No other federal environmental statute covers the discharge of wastewater into the ground by sewage treatment plants.¹⁹⁸ While surface-discharging facilities may be subject to the provisions of the

¹⁹⁴ EPA has, however, promulgated regulations under the FWPCA which require EPA Regional Administrators to apply permit conditions to prevent the pollution of both surface and underground water whenever "disposal into wells is contemplated . . . in connection with discharges into navigable waters." *Exxon*, 554 F.2d at 1321 n.21 (quoting Op. Off. Gen. Counsel (Dec. 13, 1973)); see also 40 C.F.R. § 125.26(a). At least one federal district court has held that underground discharges can fall under the regulatory provisions of the FWPCA if the discharges are shown to indirectly affect surface waters due to a hydrogeological connection between the surface water body and the groundwater beneath the discharge site. See *McClellan Ecological Seepage Situation (MESS) v. Weinberger*, 707 F. Supp. 1182, 1196 (E.D. Cal. 1988). The Court of Appeals for the Fifth Circuit in *Exxon*, in dictum, declined to express an opinion as to the applicability of the FWPCA under that set of facts. 554 F.2d at 1312 n.1. Another district court, interpreting the FWPCA and *Exxon*, reached the opposite conclusion from *MESS*. See *Michigan v. United States*, 618 F.2d at 1107.

¹⁹⁵ 42 U.S.C.A. §§ 300f to 300j-26 (West 1982 & Supp. 1989).

¹⁹⁶ 42 U.S.C. §§ 300h to 300h-7 (1982 & Supp. V 1987).

¹⁹⁷ The statute defines "underground injection" as "the subsurface emplacement of fluids by well injection." *Id.* § 300h(d)(1) (1982). The regulations define "well injection" as injection "through a bored, drilled, or driven 'well;' or through a dug well where the depth of the dug well is greater than the largest surface dimension." 40 C.F.R. § 144.3 (1989).

Ground-discharging package plants, however, may fall within the scope of the UIC as Class V injection wells. Injections into Class V wells are currently authorized without restriction under the UIC Program, see 40 C.F.R. § 144.24 (1989), though EPA is developing rules to govern Class V wells. Telephone interview with Randy Hill, Office of General Counsel, Environmental Protection Agency (Feb. 20, 1990). The current definition of Class V injection well is any "[i]njection well not included in Classes I, II, III, or IV." 40 C.F.R. § 144.6(e). Among the sources specifically listed as Class V injection wells are multiple dwelling, community or regional cesspools, see *id.* § 146.5(e)(2), and "[s]eptic system wells used to inject the waste or effluent from a multiple dwelling, business establishment, community or regional septic tank." See *id.* § 146.5(e)(9).

¹⁹⁸ The Resource Conservation and Recovery Act (RCRA), 42 U.S.C.A. §§ 6901-6992k (West 1983 & Supp. 1989), covers solid waste disposal, including "discharge[s] into any waters, including ground waters." 42 U.S.C. § 6903(3) (1982). The definition of solid waste excludes, however, "solids or dissolved material in domestic sewage." *Id.* § 6903(27). The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §§ 9601-9675 (1982 & Supp. V 1987) and other federal statutes similarly focus on particular areas, leaving out sewage treatment.

FWPCA, the regulation of ground-discharging plants is left to the states.

B. State Law

States employ a variety of different approaches to groundwater protection and the regulation of sewage treatment, all of which affect PSTFs. Some states regulate treatment plants indirectly by classifying groundwater into categories of protection, and severely restricting discharges into those groundwater sources that are most important to human use. A few states explicitly forbid the private ownership of treatment plants.¹⁹⁹ Many states regulate treatment plants directly by placing design and operational conditions on the issuance of a permit.²⁰⁰ Most states use a combination of these general approaches,²⁰¹ but others have little, if any, regulatory framework in place.²⁰²

Some states protect groundwater by classifying known groundwater basins in order of importance to human use.²⁰³ Discharge into the most vital sources is severely restricted.²⁰⁴ Groundwater classification systems establish quality standards for every known groundwater basin, just like surface water classification systems.²⁰⁵ Groundwater that serves as a source of private or municipal water supplies is usually protected by the most stringent discharge restrictions.²⁰⁶ State regulation of groundwater discharge may mirror the scheme set out in the National Pollution Discharge Elimination System

¹⁹⁹ Georgia prohibits small privately owned sewage treatment plants. Kansas, Louisiana, and Rhode Island discourage the use of PSTFs by policy. METROPOLITAN AREA PLANNING COUNCIL, NATIONAL SURVEY OF STATE REGULATIONS ON PRIVATE SEWAGE TREATMENT FACILITIES iii (June 1988) (a draft prepared by the Metropolitan Area Planning Council for a Generic Environmental Impact Statement) [hereinafter MAPC, NATIONAL SURVEY].

²⁰⁰ See generally *id.*

²⁰¹ See generally *id.*

²⁰² Arkansas, Colorado, Delaware, Illinois, Indiana, Kentucky, North Dakota, Texas, Virginia, Washington, and West Virginia have no standards governing small wastewater treatment facilities. See *id.* at 1-20. But having regulations in place does not guarantee effective enforcement of the laws. For example, Ohio has a fairly strong statutory scheme in place concerning the regulation of PSTFs, but neither state nor local authorities have the resources to enforce the standards against the thousands of PSTF operators in Ohio. Telephone interview with Karen Mancl, Waste Management Specialist, Agricultural Engineering, The Ohio State University (Feb. 9, 1989).

²⁰³ See, e.g., FLA. ADMIN. CODE ANN. rs. 17-3.403, 17-3.501 (1989).

²⁰⁴ MAPC, NATIONAL SURVEY, *supra* note 199, at ii.

²⁰⁵ *Id.*

²⁰⁶ See *id.*

(NPDES).²⁰⁷ A scheme patterned after the NPDES may consider groundwater discharge as analogous to a "point source."²⁰⁸

Direct state permitting of treatment plants may entail approval of design, construction, and siting plans.²⁰⁹ Many states require developers to use a plant design approved by the National Sanitation Foundation (NSF).²¹⁰ Other state regulations place certain requirements on the operation of plants. Such conditions may include a requirement that operators be licensed engineers.²¹¹ They may also prescribe methods of monitoring effluent and groundwater that a plant affects, using specified sampling and analysis procedures, recordkeeping, and filing of periodic reports.²¹²

Florida, North Carolina, and Massachusetts currently have or are developing relatively progressive approaches. These policies are well developed relative to groundwater protection schemes in other states, but still lack provisions necessary for adequate regulation of private ownership.

Florida relies heavily on groundwater as a source of drinking water,²¹³ and uses a combination of the approaches described above. Florida's groundwater policy mirrors its non-degradation policy with respect to surface water.²¹⁴ The state Department of Environmental

²⁰⁷ 33 U.S.C. § 1342 (1982 & Supp. V 1987). Michigan, Nebraska, and New York are among these states. MAPC, NATIONAL SURVEY, *supra* note 199, at 6, 10, 11.

²⁰⁸ MAPC, NATIONAL SURVEY, *supra* note 199, at 10-11. The New York Department of Environmental Conservation regulates groundwater discharge through a State Pollutant Discharge Elimination System (SPDES) modeled after NPDES. Among the requirements and restrictions are prohibited discharges, effluent limitations, water quality standards, compliance schedules, inspections, and the monitoring of flow and pollutants. Data analysis is required and operational records inspected. SPDES permits last for a maximum of five years, at which point an operator must reapply for a new permit. *Id.*

²⁰⁹ *Id.* at ii.

²¹⁰ Alabama, North Carolina, Ohio, and Pennsylvania explicitly require plant designs to comply with NSF standards. *Id.* at 1, 12, 15. Arizona requires new facilities to use "best available technology" in the construction of new plants. *Id.* at 1.

²¹¹ *Id.* at ii.

²¹² See *id.* California's Environmental Health Service requires daily sampling, operational reports, a list of system problems, emergency storage and disposal, emergency procedures, and monthly summaries. Regional boards, set up by the State Water Resources Control Board, also promulgate their own plans. The plans include beneficial water uses, objectives, and surveillance and monitoring programs. *Id.* at 2.

²¹³ Over 91% of Florida's population relies on groundwater as a source of its drinking water. V. PYE, R. PATRICK & J. QUARLES, *supra* note 36, at 276. Given this reliance and the high rate of development, Florida should have sophisticated regulations on sewage treatment and disposal. But one author characterized Florida's law in this area as "remarkably weak." *Septic Tanks in the Sunshine State*, CLEAN WATER, Sept. 1983, at 8.

²¹⁴ See FLA. ADMIN. CODE ANN. r. 17-3.081(1) (1987) (Florida's regulations for surface water classification).

Regulation (DER) assigns groundwater sources to one of five classes ranging from G1, the most sensitive and important groundwater sources, to G4 and F1, the least sensitive and important sources.²¹⁵ Discharges into G1 sources are effectively prohibited.²¹⁶

Other regulations apply directly to discharges. DER requires that all systems discharging more than two thousand gallons per day first obtain discharge permits.²¹⁷ In order to obtain a permit, the applicant must provide hydrogeological, physical, and chemical data, including groundwater flow and soil information.²¹⁸ DER also encourages a conservative, uncomplicated plant design,²¹⁹ and requires a certified operator and a sixty-day abandonment notice.²²⁰ A permittee must also pledge to implement a monitoring program and submit operational records.²²¹ The state takes no steps, however, to regulate private ownership.

North Carolina, unlike Florida, has no groundwater classification scheme. The state Department of Human Resources (DHR) regulates discharges, however, by reviewing plans for any plant that will discharge more than three thousand gallons per day.²²² The review requires a site evaluation, soil characterization, soil drainage, depth of restrictive horizons, space, siting, absorption, flow rates, and design and maintenance plans.²²³ System designs must meet NSF standards.²²⁴ A different state agency, the Department of Natural Resources, sets out operating requirements that include special monitoring rules for groundwater.²²⁵

North Carolina authorities have expressed concern over the possible negative impacts of PSTFs.²²⁶ DHR asserts in its regulations that the

²¹⁵ See *id.* rs. 17-3.403, 17-3.501 (1989).

²¹⁶ Green & Preston, *Florida's New Groundwater Regulations*, 57 FLA. BAR J. 345 (1983).

²¹⁷ FLA. ADMIN. CODE ANN. r. 17-28.700(2)(a) (1988).

²¹⁸ *Id.* r. 17.28.700(6)(d)(1).

²¹⁹ *Id.* Florida uses NSF standards in evaluating proposed designs. Telephone interview with Enix Poole, Florida Dep't of Health and Rehabilitation Services (Feb. 3, 1989).

²²⁰ MAPC, NATIONAL SURVEY, *supra* note 199, at 4. The Department of Environmental Regulation evaluates sewage system design and performance using EPA standards. *Id.*

²²¹ *Id.* at 3.

²²² *Id.* at 11.

²²³ *Id.*

²²⁴ *Id.* at 12.

²²⁵ See *id.* at 11.

²²⁶ One North Carolina official has commented that North Carolina has a long history of state/local cooperation on environmental matters. There is an effective sharing of responsibilities and resources. State authorities also actively pursue the development of alternative technologies in coordination with local authorities and with the university system. North

continued installation, at a rapidly and constantly accelerating rate, of septic tank systems and other types of sanitary sewage systems in a faulty or improper manner and in areas where unsuitable soil and population density adversely affect the efficiency and functioning of these systems, has a detrimental effect on the public health and environment through contamination of land, groundwater and surface water.²²⁷

Further, the state Department of Health Services (DHS) published and distributed a memorandum²²⁸ citing the major problems with treatment plants resulting from homeowner negligence and the failure of soil hydraulics. Because a management entity exists to target with responsibility, DHS issues plant permits to condominiums and associations more readily than to other private entities.²²⁹

Like North Carolina and unlike Florida, Massachusetts uses no classification scheme to protect groundwater. With regard to direct regulation of sewage disposal, Massachusetts divides responsibility between state agencies and local boards of health. Under one state statute, local boards of health are empowered to "make reasonable health regulations."²³⁰ Another statute, however, gives the Executive Office of Environmental Affairs (EOEA) the specific power to regulate sewage disposal and, in fact, requires EOEA to do so.²³¹

Pursuant to Chapter 21A of the Massachusetts General Laws, EOEA's Department of Environmental Quality Engineering, now called the Department of Environmental Protection (DEP), promulgated regulations concerning subsurface septic systems known as "Title V."²³² Under Title V, "no individual sewage disposal system or other means of disposal" may be "located, constructed, altered, repaired or installed" without first obtaining a Disposal Works Construction Permit from the local board of health.²³³ The term "other

Carolina does not rely as heavily as some states on waste disposal regulation as the principal tool guiding development. See Osborne, *Policy Overview: Three-State On-Site Waste Management Programs*, 1982 SOUTHEASTERN ON-SITE TREATMENT CONFERENCE PROC. 131, 134.

²²⁷ MAPC, NATIONAL SURVEY, *supra* note 199, at 11 (citing Announcement in "Statement of Purpose" before "Laws and Rules for Sanitary Sewage Collection, Treatment and Disposal").

²²⁸ MAPC, NATIONAL SURVEY, *supra* note 199, at 12 (citing "Home Package Plants as Pretreatment for Ground Absorption Sewage Treatment and Disposal Systems").

²²⁹ *Id.* Significantly, the DNR also requires, for facilities that are jointly owned, a copy of an operational agreement or evidence of designation as a public utility. This requirement allows for a sum of money to be gathered and for an insurance agreement. *Id.* at 11.

²³⁰ MASS. GEN. L. ch. 111, § 31 (1988).

²³¹ *Id.* ch. 21A, § 2(13).

²³² See MASS. REGS. CODE tit. 310, § 15.00 (1986).

²³³ See *id.* § 15.02(1).

means of sewage disposal" extends the requirement to both PSTFs and septic tanks.²³⁴

When a system will dispose of more than 15,000 gallons of sewage per day, Title V forbids a local board of health to issue a Disposal Works Construction Permit unless the applicant has already obtained a Ground Water Discharge Permit from DEP's Division of Water Pollution Control.²³⁵ If a system disposes of less than 15,000 gallons of sewage per day, DEP reviews that system under a different Title V procedure.²³⁶ This procedure is much more informal than the Ground Water Discharge Permit application process. Thus, in Massachusetts, package plants are treated quite differently depending on their size.

DEP takes the position that it has a general responsibility to review the design of sewage disposal systems, while local boards of health are responsible for reviewing plans for discharge areas.²³⁷ The preamble to Title V allows local boards of health to apply more stringent plant design standards only when justified by specific local conditions.²³⁸

Even before the Division of Water Pollution Control decided to refuse to issue any more Ground Water Discharge Permits in non-condominium residential situations, state agencies had begun to address issues posed by PSTFs that were not addressed adequately by existing law. In response to these concerns, EOEPA ordered the preparation of a Generic Environmental Impact Report to explore issues relating to small privately owned wastewater treatment plants.²³⁹

As Massachusetts is finding out about its own regulatory and statutory scheme, the environmental laws in most states, however complex, do not address adequately all of the issues raised by PSTFs. The schemes in some states tend to focus on groundwater classification schemes, and in others on specific design and siting requirements.²⁴⁰ No state's statutory or regulatory scheme focuses

²³⁴ Lecture on "Small Sewage Treatment Plants (Package Plants)" by Harlan Doliner, McGregor, Shea & Doliner, Westboro, Mass. (Feb. 7, 1989).

²³⁵ See MASS. REGS. CODE tit. 310, § 15.02(1) (1986).

²³⁶ See *id.* §§ 15.02(1), 15.18(1).

²³⁷ Thus, the board of health can impose some design requirements, but only those that apply to the general disposal area, like more stringent property-line setbacks, distances from wells, depths to groundwater, and gallons of sewage per foot of leaching field allowed.

²³⁸ See MASS. REGS. CODE tit. 310, § 15.00, preamble.

²³⁹ See *supra* note 142 and accompanying text.

²⁴⁰ See *supra* text accompanying notes 199-238.

on the private ownership issues that the Division of Water Pollution Control found most compelling in its *Willis Hill* decision.²⁴¹

V. PROPOSED REFORMS

As experts have recognized, "[p]ackage treatment plants are a mixed blessing."²⁴² Blanket prohibitions on private ownership like that imposed by Georgia²⁴³ are impractical where growth pressures, poor soil conditions, and overuse or improper use of septic tanks have made PSTFs vital. Most critics of PSTFs do not call for their abolition. Instead, the debate over PSTFs centers around the question of how to regulate their use in a way that best utilizes their benefits, while minimizing their dangers.

It is uncertain whether or when Congress will enact a statute that regulates groundwater discharges in the manner that the FWPCA regulates surface discharges. There is far less of a chance that Congress or EPA will take action regarding private ownership of package plants, or on any land use problems caused by PSTFs. These issues are properly left for states and municipalities to resolve.

Absent federal action on groundwater protection, states should start by enacting a comprehensive statute that regulates the use of ground-discharging PSTFs. State statutes fall into two broad categories: groundwater protection statutes and discharge regulation statutes. An effective and truly comprehensive statutory scheme would utilize both methods.

One approach to designing a groundwater protection statute would be to include surface and underground water within the same statute, and to protect each with the same vigor. Such a scheme would reflect the fact that aquifers may replenish surface water bodies, and vice versa.²⁴⁴ States should classify groundwater by importance to human use, as Florida does, and should severely restrict discharges into the most vital aquifers. States should construct the scheme, moreover, to protect aquifers that service sensitive environmental areas like wetlands.

The state statutory scheme could also regulate specific types of discharges directly. The scheme should govern not only discharges of hazardous materials, but also sewage discharges of all magnitudes,

²⁴¹ See *supra* text accompanying notes 121-40 (discussion of *Willis Hill*).

²⁴² McNamara, *supra* note 3 (quoting Kelly McClintock, director of the Massachusetts Environmental Lobby), reprinted in HORSLEY & WITTEN, INC., *supra* note 3, at 144.

²⁴³ See *supra* note 199.

²⁴⁴ See *supra* note 91.

including septic tanks. While the statute might categorize individual septic tank discharges separately, subject to a lower level of scrutiny, it should, nevertheless, take account of the cumulative effect of septic tank discharge.²⁴⁵ Too many current state statutes target only plants with high discharges in terms of gallons per day, outdated standards that no longer make sense in light of the fact that PSTFs can be made at very small capacities now. The level of scrutiny given to small and medium-sized plants with discharge levels below the statutory standard is far lower. PSTFs of almost any size can have a significant environmental impact if not sited and operated properly, and thus should be regulated.

Besides a state groundwater protection scheme, which is indispensable, another way to ensure the safety and protection of important aquifers is by setting up regional groundwater protection authorities. Regional authorities might be intrastate, covering several municipalities, or interstate, between different states. Such authorities could help alleviate problems caused when contamination in one state or town with weaker laws causes harm to water supplies in another.

States and municipalities can also mandate the study of groundwater impacts on a project-by-project basis by requiring that groundwater impact studies be submitted before the issuance of any permit. Studies should take into account all possible consequences to local groundwater sources stemming from the proper or improper operation of a plant. Application fees paid by would-be dischargers could fund the study, saving municipalities a financial burden. The fee should be of a sufficient amount to ensure adequate study. The study should include input from local conservation commissions and zoning boards, in order to make sure that all concerns are taken into account before a state or local authority makes a decision to issue a permit.

States should also take charge of the issue of ownership, a question that should not be settled on a town-by-town basis. Current state approaches to the question of what type of entity should be allowed to own or operate a PSTF vary widely. The current position in Massachusetts, as expressed in the *Willis Hill* decision,²⁴⁶ is to approve ownership by only those private entities—condominium owners' associations—whose obligations are enforceable by lien. The position of the *Willis Hill* developer—that private entities which are

²⁴⁵ See *supra* note 81.

²⁴⁶ See *supra* text accompanying notes 121–40 (discussion of *Willis Hill*).

the "functional equivalent" of condominium owners' associations should be allowed—is satisfactory only if those other entities carry the same or similar enforcement mechanisms. This may vary from state to state.

If a residential homeowners' association is to operate a PSTF, it must be a legal entity subject to the jurisdiction of state courts, and one whose membership can be made liable for failure to operate a facility properly. A state statute might accomplish this result by mandating a provision in every deed to residential property served by a PSTF that allowed state or local governments to place a lien to be placed on the unit of a resident who has been delinquent in paying assessments. The package plant permit could also prohibit conveyance of the package plant facility to a third party.

Another mechanism to ensure institutional responsibility in the event of a plant malfunction is to require an owner or operator to pay a bond to cover maintenance or operating costs in case the entity running the PSTF fails. While the amount of the bond should be enough to cover costs of operation and cleanup during any potential emergency, it should not be excessive. A permit applicant could challenge an excessively high bond amount as arbitrary and capricious, and thus violative of the applicant's due process or equal protection rights.

Another issue properly addressed at the state level is the design of the plant. States should consider requiring site-specific small sewage treatment plants, or a demonstration that a prefabricated plant is not unsuited to the soil conditions at the site. A statute should also take account of maximum anticipated flow volumes, perhaps by requiring a flow equalization component.

The state statute should also address plant operating procedure. Perhaps the most crucial operational concern is expert supervision. Some package plant manufacturers actually advertise their product as requiring little maintenance.²⁴⁷ The statute should mandate that the permit require daily visits by a qualified sanitary engineer. The problem is that it is prohibitively expensive for any PSTF to have its own full-time engineer. One possible solution is an engineer-sharing program.²⁴⁸ One engineer could be assigned to several plant

²⁴⁷ See ENVIREX, DESIGN MANUAL, *supra* note 47, ch. B, at 9.

²⁴⁸ Two experts advocate circuit-riding by certified operators as an affordable way to assure adequate supervision for systems owned and operated by small communities. See Mancl & Duffalo, *Circuit Riding for Managing Small Community Sewage Systems*, 11 ENVTL. MGMT. 203, 203-08 (1987). The Indiana County (Pennsylvania) Municipal Services Authority has successfully employed such a program, assigning qualified operators to serve eight plants

sites in one area, and would conduct periodic tests and reports, to be reviewed by local health officials. Other operational requirements could include contingency plans, backup systems, and safety precautions.

Another important operational requirement is to educate the residents served by a PSTF as to the dangers of introducing toxics into the system. It is feared that without specific instructions to the contrary, residents may develop a "sewer mentality,"²⁴⁹ and dump household cleaners, paints, thinners, and other toxics into the treatment system with the expectation that the plant will somehow treat the toxics. Not only is this not the case, but the toxics can harm the PSTF's biological treatment component. State law could require owners and operators of PSTFs to prominently post notices prohibiting such dumping, and periodically instruct residents about why such a prohibition is necessary.

The greatest responsibility that towns themselves should take with regard to PSTFs is to draw up a municipal growth plan, or to revise old ones, to take account of PSTFs. Restrictions on land use that have no rational basis other than to stop development will be subject to constitutional challenge. Restrictions based on the need for rational, ordered growth, to protect groundwater or other resources, or to conserve environmentally sensitive or important regions, are, in contrast, much more likely to withstand judicial scrutiny. If pressure to use PSTFs is already intense, a state or town might consider temporary restrictions or a moratorium on permitting PSTFs pending the development of growth plans.

VI. CONCLUSION

Some municipalities have already begun to feel pressures from developers seeking to utilize PSTFs, and many of those that have not likely soon will. Improvements in technology have increased the cost-efficiency and availability of package plants. Given cyclical pressures to build out, many communities may find themselves face-to-face with developers who seek to utilize PSTFs in building new residential subdivisions.

This possibility is especially troublesome in states like Massachusetts where there are strong surface water protections, and soils are

each. *Id.* at 204. The service fees range from \$12.60 to \$18 per month for residential users, and from \$25 to \$150 per month for commercial users. *Id.*

²⁴⁹ See *supra* text accompanying notes 112-13.

accommodating to ground discharge. Federal law regarding groundwater protection is piecemeal, and state laws vary in sophistication and strength. States and municipalities without laws should take advantage of the opportunity to anticipate PSTFs and have appropriate schemes in place.

Some wonder whether the responsibility of multi-residence sewage treatment and disposal should ever be entrusted to private entities, given the importance to public health and safety. The fact is, however, that PSTFs, properly regulated and utilized, have many potential benefits. PSTFs can be used to remedy existing septic tank failures by diverting effluent outside the zone of contribution for a sensitive aquifer. PSTFs, properly regulated, can help render growth and development, inevitable as it is, safe and ordered. Finally, PSTFs, properly regulated, can allow municipalities to assure sewage treatment to a growing number of residents without assuming significant costs and without the fear that they will ever have to pick up the bill for operation of the plant and cleanup of contamination.

States and municipalities will enjoy the benefits of PSTFs only through a comprehensive statutory and regulatory scheme. PSTF critics are correct in asserting that unchecked private ownership encourages PSTF operation with profit motives, not public interest, foremost in the minds of the operators. When properly regulated, however, most of the potential dangers posed by PSTFs and private ownership can be avoided.