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# In Order to Have Water: Legal, Economic and Institutional Barriers to Water Reuse in Northern New England

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*The maintenance of adequate water supplies to meet increasing demand upon residential and industrial users in New England is now an urgent concern. Encouragement of water reuse is one of the ways in which water conservation can be implemented. This Article, synthesized by the authors from their technical report, examines current legal and institutional methods of promoting water reuse and conservation. They analyze their effectiveness and argue that legal and political reform is needed to achieve the ends of water conservation.*

## INTRODUCTION

Water of adequate quality is now in short supply in many areas of the United States. Existing water supplies are not always sufficient to meet present needs, and demand is likely to increase in future, due to higher energy generation and residential and industrial growth.

The need to conserve water is now an urgent concern. This was recognized by Congress when it passed the Water Research and Development Act of 1978,[1] and was confirmed, also in 1978, by the

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1. 42 U.S.C. §§ 7801-83 (Supp. III 1979). Congress stressed that its purposes were: "(a) to provide a supply of water sufficient in quantity and quality to meet the Nation's expanding needs ... [and] (c) to promote conservation and efficient use of the Nation's water resources ..." (*id.* §

United States Water Resources Council, which found inadequate surface water supply, overdraft of groundwater, and pollution of both surface and groundwaters in numerous regions across the nation.[2] In addition, the Environmental Protection Agency has recently emphasized that "the need for water conservation is a national problem."[3]

Even in New England, which has historically enjoyed a plentiful water supply, shortages are now increasingly common and create critical problems.[4] Newspaper headlines proclaim critical water supply problems for the region, attributing them to increasing demand, drought, the reduced ability of water supply systems to be replenished, and the contamination of existing supplies. In 1980, for example, the University of Massachusetts was temporarily closed because of water supply shortages,[5] and low water supply led to mandatory use restrictions in 27 Massachusetts communities.[6] Limited water supply also has led to agricultural crop failures in Massachusetts and other states.[7] New efforts are thus being made by industry, agriculture and municipalities to find new supply systems and to design less water-consuming systems.[8]

One obvious strategy to overcome the shortage of water is to introduce methods of water reuse or recycling to reduce demand and consumption from existing and new consumers in all sectors — residential, municipal, industrial and agricultural.

Obviously, not all water conservation strategies involve recycling or reuse, and such methods are not necessarily preferred or even viable in every context. In some circumstances, ample conservation can be ef-

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7802) because it found that "assuring an adequate supply of water of good quality for the production of food, materials, and energy for the Nation's needs, and increasing the efficient use of the Nation's water resources are essential to national economic stability and growth, and to the well-being of our people." *Id.* § 7801.

2. U.S. WATER RESOURCES COUNCIL, SECOND NATIONAL WATER ASSESSMENT (1978).

3. Pierce, *Water Conservation: A National Priority*, 6 E.P.A. J. 16, 18 (1980):

> The growing U.S. population is placing stress on existing water reserves, as in our water-thirsty industrial base. Conservation not only reduces the volume of polluted water ... but also reduces the size of sewage treatment plants.... It helps to extend the available dollars for environmental cleanup.... It reduces the mining of groundwater.... [It reflects] a public acknowledgment of the true value of clean water as a national resource.... In the next decade we will realize a changed attitude, a revolution in how we use water.... [T]he creation of a recycling ethic....

4. For instance, the New England River Basins Commission found that: "Increased water use and contaminated water supplies, combined with the deterioration of water supply systems in the region's older cities and the high cost of constructing new systems have forced ... increasing attention to urban water conservation as a water management technique." [1979] NEW ENGLAND RIVER BASINS COMM'N ANN. REP. 22.

5. *No Water, No Students at U. Mass*, Boston Globe, Sept. 15, 1980, at 1 (closing of the University of Massachusetts, Amherst, because of the inability of the Amherst water supply system to provide sufficient supply).

6. *N.E. facing worst drought in 15 years*, Boston Globe, Sept. 21, 1980, at 29, col. 2.

7. *Id.*

8. *See, e.g.*, *Gasohol Plant Shot Down*, Portsmouth Herald, Oct. 7, 1980, at 1; *Salem Joins Novel Venture to Find New Water*, Boston Globe, Aug. 17, 1980, at 3.

fected without introducing recycling or reuse. In others, recycling and reuse may contribute to only a fraction of the conservation effort. However, water reuse and recycling have been recognized as a principal method of meeting current and future water supply problems.

The technology of reuse and recycling has not been systematically introduced or applied in New England industry, agriculture or municipalities. Rather, its applications to date have been sporadic and fortuitous responses to crises. Nevertheless, the reuse strategy is one that merits the immediate attention of decision-makers at all levels of government and in private industry and agriculture.

A number of studies have pointed to the technical and economic feasibility of water reuse systems.[9] They have identified several functioning reuse efforts that are economically and technically feasible, and demonstrate that, under certain circumstances, various systems for *direct* industrial, agricultural and municipal reuse and *indirect* reuse (usually by recharging groundwater) are now practicable.[10]

However, several major non-engineering and non-economic obstacles have been identified in these studies. These include public attitudes and behavior when faced with the prospect of reusing water for domestic water supply;[11] alleged health hazards from reuse of water for domestic and agricultural purposes; and the conservatism of public health officials and drinking water regulators.[12] In addition, the water delivery infrastructure does not provide for plural water supplies, but insists on providing "a single grade of water for the wide discrepancy of urban uses."[13] Finally, there is no coherent federal, state or local reuse policy or program. This lack leads to an inadequate consideration of reuse options in planning and assessment processes, as well as to conflicting institutional pressures and objectives.[14] As a result, few efforts to en-

9. *See, e.g.*, J.X. & R.E. KASPERSON, WATER RE-USE & THE CITIES 208 (1977):

> Economically efficient water re-use systems, particularly those which optimize capital investment over time to meet peaking needs by employing reuse as a standby or emergency system or which provide reclaimed water by direct piping to large-volume users, can be designed. Los Angeles County ... Colorado Springs ... and the national re-use program in Israel provide convincing prototype models.

10. These include the Bethlehem Steel Company's Sparrow's Point plant in Maryland; the Cosden Oil and Chemical Company facility in Big Spring, Texas; the Texas Company's Amarillo refinery, copper plants at Hurley and Santa Rita, New Mexico, and several agricultural and municipal reuse systems across the nation, (*e.g.*, Los Angeles County) but particularly in arid western regions. *See* W. ECKENFELDER, WATER QUALITY FOR PRACTICING ENGINEERS (1970). Frequently cited international examples include the city of Windhoek in Namibia (Southwest Africa), the Dan project south of Tel Aviv in Israel, and the artificial groundwater recharge system in the Ruhr region of West Germany. Telcaff, *An International Comparison of Trends in Water Resources Management*, 7 ECOLOGY L.Q. 881, 902-03 (1979).

11. J.X. & R.E. KASPERSON, note 9 *supra*. *See also* 2 PROCEEDINGS OF THE WATER REUSE SYMPOSIUM 1058 (Washington, D.C., Mar. 25-30, 1979) [hereinafter PROCEEDINGS].

12. J.X. & R.E. KASPERSON, *supra* note 9, at 79 *passim*. *See generally* W. ECKENFELDER, note 10 *supra*.

13. J.X. & R.E. KASPERSON, note 9 *supra*.

14. *Id.* at 42, 208. *See also* PROCEEDINGS, note 11 *supra*.

courage reuse in the United States, in an attempt to overcome these legal and institutional obstacles, are visible to date.[15]

These obstacles are found in New England, as much as or more than elsewhere, and must be addressed if water reuse is to become an effective strategy for the region. They are imbedded in the institutions, policies and legal system which govern water reuse activities. Thus, the legal framework in water reuse decisions provides a convenient context for identifying and assessing major obstacles that have emerged and been legitimized by legislative, regulatory and judicial action; and for recommending needed action to ensure that the concept of water reuse is put into practice.[16]

This article will focus on several key elements of the legal framework applicable to water reuse in Northern New England, including the states of Massachusetts, New Hampshire, Vermont and Maine. Part I will discuss the common law doctrines and their influence on water reuse development. Part II will describe the promotion of water reuse by the U.S. Environmental Protection Agency (EPA), the scope of EPA's authority, and the various technological standards in setting effluent discharge limitations. Part III will analyze public ratemaking authority in the New England states, and the extent to which applicable law shapes the use of ratemaking to induce water reuse.

## I. COMMON LAW AND ITS INFLUENCE ON WATER

### *A. Reuse Development*

The impact of common law doctrines that define property rights to water must be evaluated by any user, public or private, considering the development of a water reuse system. In New England, "riparian"[17] law doctrines govern water rights in flowing streams, and related doctrines govern rights to groundwater and other water supply sources.[18]

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15. As ... demand for water steadily grows, it is increasingly important that the legal rules governing the management and utilization of water resources actively promote, rather than impede, efficiency in the use of water. Historically, the development of water law has not always been in accordance with such principles, except where compelled by climate or extreme water scarcity.

Telcaff, *supra* note 10, at 881. *See also* notes 9, 10 & 14 *supra*.

16. Newspaper accounts of local government and other initiatives are scattered, but indicate the responsiveness of authorities on a short-term basis to crises. *See, e.g., California Town a Symbol of Hope in New Jersey Drought*, New York Times, Oct. 15, 1980, at 20, col. 3 (about Marin County, California). The EPA, the President's Council on Environmental Quality, the U.S. Water Resources Council and the U.S. Department of the Interior's OWRT research program have started to address legal issues in water reuse. The EPA has also made available for public information and voluntary use, various items such as its "Water Wheel" guide to "home water conservation," and a film entitled "Water Passages."

17. The term "riparian" has been defined to mean "belonging or relating to the bank of a river." BLACK'S LAW DICTIONARY 1904 (4th ed. 1968).

18. For example, doctrines similar to those of riparian law govern the rights of littoral owners — those whose land abuts the sea or a lake. Indeed, the word "riparian" has occasionally been

This section focuses on the major features of common law that may affect the reuse plans of a municipal, agricultural or industrial user of water. The impact of the common law doctrines on two reuse scenarios is considered: (1) where a water user seeks to reuse his own effluent; and (2) where a water user seeks to reuse the effluent of another user.

The riparian doctrines of the New England states (and indeed of most states east of the Mississippi River) were adapted by state courts from English rules. In New England, the doctrines historically were applied under rural conditions of water abundance. Thus, riparian rights doctrines do not properly account for modern problems of water scarcity, industrial needs and utilization. Indeed, in the states west of the Mississippi where water scarcity always has been the prevailing condition, the riparian approach to property rights repeatedly has been rejected.

Common law doctrines apply whenever, pursuant to a property interest in land, water is taken from a natural source, such as a river, lake or aquifer, or discharged into such a body after its reuse. However, there are exceptions to the application of the doctrines. The purchase of water from public water supplies is not governed by these common law doctrines, nor is a public water authority subject to such doctrines when it takes and distributes water pursuant to state sovereignty powers and ownership. Finally, the doctrines do not apply to discharges made into publicly owned sewage systems. Despite the significant areas where riparian and other common law doctrines do not apply, there remain a number of important contexts where these will govern.

As noted, the common law applicable in New England reflects the region's historically abundant water supply and rural life style. Where water is uniformly plentiful and residential or small farm uses dominate, only the most egregious misuses of water need be of legal concern. This explains the common law's preoccupation with reasonable water uses and its failure to stipulate priorities or measure the right to water use in quantitative terms.[19] It also explains why the existing system of water rights is structured so as not to come into play except to resolve conflicts.

The fact is, however, that the body of common law in each state has proven to be inadequate even for resolving conflicts among water users. When water reusers enter the conflict, the issues presented for resolution are simply more complex than can be readily resolved at common law. Such issues include the extent to which "reasonableness" is affected by the adequacy of the overall available water resource and

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used by Massachusetts courts coextensively with "littoral." *See, e.g.*, Commonwealth v. Alger, 61 Mass. (7 Cush.) 53, 94 (1851).

19. *See* Hanks, *The Law of Water in New Jersey*, 22 RUTGERS L. REV. 621, 627 (1968).

whether incomplete or delayed return of water to the source because of reuse is "unreasonable."

The issue of the reasonableness of a particular water use is generally resolved by using artificial distinctions largely irrelevant to the promotion of reuse options and conservation. Whether water is navigable or not, or whether it is in the form of percolating groundwater or an underground watercourse, can be determinative factors in resolving conflicts between those with property interests in it, but may have no bearing on the promotion of the public interest through conservation and reuse.

The common law is less developed as to groundwater issues than with respect to other water sources. So few recent groundwater cases have come before the courts of the New England states that no meaningful contemporary basis for resolving conflicts that may arise between users of the goundwater resource can be discussed.

The common law has developed no systems or plans to prescribe or order water use. Riparian and related doctrines therefore are not designed to support water use planning or management, and certainly do not provide a sufficient framework for allocating water among users and reusers.[20]

Thus, the common law cannot adequately protect the public interest and ensure an adequate water supply. Further, certain critical issues for those contemplating reuse systems are left unaddressed. Perhaps those issues can be properly and fully resolved by legislative action, but there is, of course, no guarantee that the political arena will be able to solve what the judiciary could not.

### *B. Groundwater Sources*

In New England, users of water increasingly rely on groundwater for their supplies through the use of sophisticated well systems. Goundwater is generally treated in a different manner from other waters. For example, in contrast to navigable waters, which cannot be owned by private landowners, groundwater in three of the New England states — Massachusetts,[21] Vermont,[22] and (apparently) Maine[23] — is subject to

20. *See, e.g.*, Lowe, Ruedisili & Graham, *Beyond Section 858: A Proposed Ground-water Liability and Management System for the Eastern United States*, 8 ECOLOGY L.Q. 131 (1979). *See also* text accompanying notes 28-39 *infra*.

21. Greenleaf v. Francis, 35 Mass. (18 Pick.) 117, 122 (1836).

22. Chatfield v. Wilson, 28 Vt. 49 (1855).

23. No reported Maine decision has dealt with the issue of groundwater ownership or use. Maine, however, is the only one of the four northern New England states to retain the English Rule of property rights to flowing surface water. *See* City of Auburn v. Union Water-Power Co., 90 Me. 576, 38 A. 561 (1897). It is reasonable to assume, in light of the state's continued adherence to the English Rule for surface water, that it would also adhere to the English "absolute ownership" rule for groundwater.

the "absolute ownership rule." This rule was first established in this country in *Greenleaf v. Francis*, an 1836 decision of the Massachusetts Supreme Judicial Court.[24] New Hampshire, however, follows the majority of eastern states in applying a "reasonable use" rule, which restricts a landowner's groundwater rights by permitting only reasonable withdrawals.[25]

The "absolute ownership" rule gives a landowner the unqualified right to withdraw unlimited amounts of groundwater from his land without liability to anyone, even to neighbors whose wells are exhausted as a result.[26] In contrast, the New Hampshire rule restricts withdrawals to those reasonably related to the beneficial use or enjoyment of land.[27]

The two rules impact differently. The impact on water reuse is most striking when water is removed off-site for a second use by a different landowner. Such a use may be actionable under the reasonable use rule, if adjacent landowners are harmed by the withdrawals. The use will likely not be actionable under the absolute ownership rule.

These conclusions, however, are not entirely free from doubt, since no reported decision in any American jurisdiction has apparently considered the situation where groundwater is first used on the premises and then reused elsewhere.[28] Indeed, given the lack of case law on groundwater rights, courts that are faced with conflicting interests in groundwater because of reuse or other use, are relatively free to fashion doctrines to meet the respective needs of the parties and of the general public.

Most eastern states either explicitly or impliedly followed the absolute ownership rule, until they were forced to modify that rule to accommodate particular facts presented to them.[29] The need to accommodate modern understanding of groundwater hydrology, the need for conser-

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24. Greenleaf v. Francis, 35 Mass. (18 Pick.) 117 (1836).

25. Bassett v. Salisbury Mfg. Co., 43 N.H. 569 (1862). For a listing of other states that follow the reasonable use rule, see Lowe, Ruedisili & Graham, *supra* note 20, at 133-34 n.14.

26. The rule require[s] that groundwater be perceived as a part of the soil, which . . . entitle[s] a landowner to do what he please[s] with groundwater. The owner [can] take out whatever groundwater [is] under his property or which seep[s] into his bore hole and his neighbor [can] do likewise. Any interference with the other's supply [is] . . . a non-actionable injury.

*Id.* at 133 n.13.

27. [A]n overlying landowner's use of ground water is "reasonable" if it is beneficial to use or enjoyment of the land. If the landowner's use is reasonable (beneficial), he is not liable to adjacent landowners for injury caused by the use. Liability is imposed, however, upon a landowner who transports groundwater from his land — no matter how reasonable and beneficial the use of the land might be — if harm results to other overlying users. Thus, . . . the landowner who takes groundwater for use on the overlying surface is effectively insulated from liability unless his use is wasteful. If he removes water from the land, however, he is liable for harm which results to other well owners sharing the same aquifer regardless of the benefits to himself or others.

*Id.* at 137-38 (footnotes omitted).

28. *But see* text accompanying notes 53-60 *infra*.

29. See cases collected in Lowe, Ruedisili & Graham, *supra* note 20, at 133-34 n.14.

vation, and the public benefit to be derived from reuse, seem likely to force further modifications in the future.

Indeed, the *Restatement (Second) of Torts* has already adopted a new formulation,[30] which differs from the "reasonable use" rule because it incorporates a consideration of all of the circumstances of a particular withdrawal of groundwater into the concept of reasonableness.[31] Under this rule, reasonableness is not explicitly tied to use on the overlying land, but is judged according to the circumstances of each case, and the problem of the off-site second user is thus eliminated. The *Restatement* formula, however, has been adopted in only one state,[32] and it is impossible to predict whether any New England state will follow it.

### C. *Flowing Surface Water Sources*

Property rights to flowing surface water are subject to two different rules in New England. In Maine, the "English Rule" of natural flow applies. This rule holds that each landowner adjacent to a natural stream (each riparian) is entitled to have the *natural flow* of the stream come to his land for use.[33] This rule provides further that this natural

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30. A proprietor of land or his grantee who withdraws groundwater from the land and uses it for a beneficial purpose is not subject to liability for interference with the use of water by another, unless
    (a) the withdrawal of ground water unreasonably causes harm to a proprietor of neighboring land through lowering the water table or reducing artesian pressure,
    (b) the withdrawal of groundwater exceeds the proprietor's reasonable share of the annual supply or total store of groundwater, or
    (c) the withdrawal of the groundwater has a direct and substantial effect upon a watercourse or lake and unreasonably causes harm to a person entitled to the use of its water.

RESTATEMENT (SECOND) OF TORTS § 858(1) (1977). Although the Restatement is prepared by the American Law Institute as a compilation of existing law, it frequently directs or motivates changes in common law where case law has been slow to develop or modernize. Thus, for example, § 858(1) was adopted by the Institute without significant case law support.

31. The RESTATEMENT (SECOND) OF TORTS § 850A (1977) relied on the following factors to determine the reasonableness of a use of water:

(a) The purpose of the use,
(b) the suitability of the use of the watercourse or lake,
(c) the economic value of the use,
(d) the social value of the use,
(e) the extent and amount of the harm it causes,
(f) the practicality of avoiding the harm by adjusting the use or method of use of one proprietor or the other,
(g) the practicality of adjusting the quantity of water used by each proprietor,
(h) the protection of existing values of water uses, land, investments and enterprises, and
(i) the justice of requiring the user causing harm to bear the loss.

*Id.* This list is not intended to be exhaustive.

32. *See* State v. Michels Pipeline Constr., Inc., 63 Wis.2d 278, 217 N.W.2d 339, *modified*, 63 Wis.2d 278, 219 N.W.2d 308 (1974).

33. City of Auburn v. Union Water-Power Co., 90 Me. 576, 579, 38 A. 561, 565 (1897).

flow is to be unchanged in quantity and quality, except, however, that the reasonable riparian uses of other riparians are permissible.[34]

The "English Rule," therefore, focuses on a specific right and carves out a "reasonableness" exception. In contrast, Massachusetts, New Hampshire and Vermont apply the "American Rule" of reasonable use, which initially defines the right itself in terms of the impact of each use on the rights of others. Thus, in these three states, a riparian is entitled to a just and reasonable use and enjoyment of the waters of a stream.[35] However, this right is correlative with the identical rights of upper and lower riparians also to make reasonable uses of these same waters, and further provides the holders of the right with the corresponding obligation to permit water to pass away from their riparian lands unaffected except by the consequences that attend such reasonable and just uses.[36]

The practical distinction between these two rules may be very small. Indeed, under the English Rule, the exception has been described by the courts in terms which make it very similar to the American Rule. Thus, both rules hold, in effect, that each riparian owner must conduct his operations reasonably in view of like rights and obligations in the owners above and below him.[37]

Unlike other property rights, the definition of which can be relatively absolute, the rights of riparians are frequently qualified. It is impossible to list unequivocally all the specific uses that can be made of water in the exercise of riparian rights under either the English or the American rules. Instead, the law provides only the general formulation that each riparian's right to use water is defined with "a just regard to the like reasonable use by all others who may be affected by his acts."[38]

Despite the similarities between the English and American rules, they may produce different results when applied to a particular reuse case.

34. Stanton v. Trustees of St. Joseph's College, 254 A.2d 597 (Me. 1969). Without such an exception, the English Rule is "completely unworkable" in the view of one commentator. Hanks, note 19 *supra*.

35. This right is frequently described as "usufructuary" since it is the right to enjoy something in which the owner has no property interest. Stratton v. Mt. Hermon Boys' School, 216 Mass. 83, 103 N.E. 87 (1913).

36. "The use of the water flowing in a stream is common to all riparian owners and each must exercise this common right so as not essentially to interfere with an equally beneficial enjoyment of the common right by his fellow riparian owners." *Id.* at 85, 103 N.E. at 88. The United States Supreme Court has been somewhat more poetic: "A river is more than an amenity, it is a treasure. It offers a necessity of life that must be rationed among those who have power over it." New Jersey v. New York, 283 U.S. 336, 342 (1931).

37. As the Supreme Judicial Court of Maine has stated, "[R]easonable use by *both the upper and lower riparian proprietors* is the underlying principle which determines their correlative rights." Kennebunk, Kennebunkport & Wells Water Dists. v. Maine Turnpike Auth., 145 Me. 35, 43, 71 A.2d 520, 526 (1950). *Compare* Stratton v. Mt. Hermon Boys' School, 216 Mass. 83, 103 N.E. 87 (1913).

38. Lockwood Co. v. Lawrence, 77 Me. 297, 316 (1885).

For example, if a riparian intends to introduce a new system for reusing water along a stream, such as a manufacturing process involving water reuse, the reasonableness of that use may become an issue. The American Rule provides that reasonableness is to be evaluated *exclusively* in light of the use's impact on upstream and downstream riparians,[39] and a reuse of water will be found reasonable if, on the evidence presented, it does not unreasonably prejudice the rights of such others.[40]

In contrast, under the English Rule, such a water use or reuse could be regarded as so extraordinary or unreasonable per se that it would be disapproved of as a matter of law.[41] On the other hand, there may be some circumstances under the English Rule where a use or reuse of water by a riparian is deemed inherently reasonable, despite its injurious effects on the quality or quantity of the water in the stream, so that a court will not hesitate to approve it as a matter of law.[42] Any harms that are caused by such a use could conceivably be permitted under this rule.[43] For the most part, however, only "natural" uses of water have generally been regarded as inherently reasonable under the English Rule.[44]

Water reuse is not necessarily a natural use of water. It is also not necessarily unreasonable in and of itself. However, it could be regarded as unreasonable in fact under the English Rule on approximately the same basis as under the American Rule[45] — for example, where it is

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39. Howe v. Di Pierro Mfg. Co., 1 Mass. App. Ct. 81, 294 N.E.2d 495 (1973). *Cf.* Fraser v. Nerney, 89 Vt. 257, 95 A. 501 (1915).

40. Rindge v. Sargent, 64 N.H. 294, 294, 9 A. 723, 724 (1887).

41. *Cf.* Kennebunk, Kennebunkport & Wells Water Dists. v. Maine Turnpike Auth., 145 Me. 35, 40, 71 A.2d 520, 525 (1950).

42. *Id.*

43. In legal terms such harms are *damnum absque injuria* (damage without legal injury). *Id.* at 41, 71 A.2d at 526.

44. Such uses including drinking, bathing, cooking and washing. *See* Hanks, *supra* note 19, at 625.

45. Under either rule, the issue of whether a riparian is within his rights in undertaking multiple uses of the water of a stream will depend on the impact of such uses on the rights of other riparians. In Lockwood Co. v. Lawrence, 77 Me. 297 (1885), the Maine court, applying the English Rule, observed:

> In determining what is reasonable use, regard must be had to the subject matter of the use; the occasion and manner of its application; the object, extent, necessity and duration of use, the nature and size of the stream; the kind of business to which it is subservient; the importance and necessity of the use claimed by one party, and the extent of the injury to the other party; the state of improvement of the country in regard to mills and machinery, and the use of water as a propelling power; the general and established usages of the country in similar cases; and all the other and ever varying circumstances of each particular case, bearing upon the question of the fitness and propriety of the use of the water under consideration.

*Id.* at 317 *citing* Red River Roller Mills v. Wright, 30 Minn. 249, 253 (1883). The court in Stratton v. Mt. Hermon Boys' School, 216 Mass. 83, 103 N.E. 87 (1913), was applying the American Rule but essentially agreed: "What is a reasonable and just use of flowing water is dependent upon the state of civilization, the development of the mechanical and engineering art, climatic conditions,

conducted in a manner negligent "with respect to the legal rights of others to whom the one exercising the use owes a duty of care."[46] Therefore, water reuse that is perfectly reasonable in a rural area (for example, along the upper Connecticut River) may be found unreasonable in a metropolitan area (for example, along the Charles River) where pollution concerns are more acute or where water users are more numerous and shortages are a problem.

As this brief analysis indicates, clear formulations of property rights to flowing surface waters have not been accomplished for normal use cases, and certainly not yet for cases involving water reuse.

### *D. Important Effects of Common Law Doctrines on Water Reuse*

#### 1. Consumption of Water in Reuse Systems

One of the key consequences of a number of closed-cycle reuse systems is that the water used is eventually consumed entirely, through evaporation or other processes. Closed-cycle cooling in power plants and industrial processes offers a prime example. In such systems, water is taken from the ground or stream and never returned. This poses a problem under the "English Rule" of riparian law since, under that rule, downstream users are entitled to a full and free flow of the stream's water.[47] Even under the American Rule, a downstream riparian's water rights cannot be "diminished or impeded" except by an upper riparian's reasonable use.[48] Under either rule, the factual question arises as to whether such consumptive reuse is reasonable.[49]

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the customs of the neighborhood and the other varying circumstances of each case." *Id.* at 85, 103 N.E. at 88.

46. Kennebunk, Kennebunkport & Wells Water Dists. v. Maine Turnpike Auth., 145 Me. 35, 71 A.2d 520 (1950).

> [W]hether or not the use is a reasonable one depends not only upon the nature and manner of the use by the upper proprietor but also upon the use that is being made by the lower proprietor of his land and of the waters of the stream passing through the same .... This question of reasonableness is usually one of fact to be determined in each case according to the circumstances, such, for instance, as the size and character of the stream, the purposes for which it is or can be applied, the nature and importance of the use claimed and exercised by one party, and the inconvenience and injury to the other.

*Id.* at 42, 44, 71 A.2d at 524-26 (quoting 56 AM. JUR. *Waters* § 406 (1956)). *See also* J. KENDALL, WATER LAW: STREAMFLOW RIGHTS IN NEW ENGLAND AND NEW YORK STATES 10 (1967): "When an upstream riparian owner's activities cause damage to a downstream riparian, the riparian doctrine usually requires that the reasonableness of both upstream and downstream uses be calculated and considered." *Id.*

47. City of Auburn v. Union Water-Power Co., 90 Me. 576, 38 A. 561 (1897).

48. Peters v. St. Aubin, 355 Mass. 41, 242 N.E.2d 427 (1968).

49. No similar issue arises under either rule of groundwater rights in effect in New England. *But see* RESTATEMENT (SECOND) OF TORTS § 858 under which the question of reasonableness of the consumptive use of water off the premises might be central to a determination of liability for such use.

In this regard, it is clear that the amount of flow in a stream may be reduced somewhat by reasonable riparian use of water.[50] The fact that such reductions may injure downstream riparians would not make them actionable under either rule if they are otherwise reasonable. Both rules concede that reasonable uses of water could result in some diminution in the waters (or natural flow) of the stream. However, except for uses that are inherently unreasonable under the English Rule, diminutions exceeding what would arise from reasonable conduct in light of all the circumstances, having due regard for the exercise of the common rights of other riparians, are actionable.

### 2. Transfer of Water Off Riparian Lands for Reuse

An open-cycle reuse system — for example, one in which used water is passed directly along to a second user — can pose problems under riparian law similar to those that it causes under the law of groundwater rights. Riparians never *own* the waters of a stream but have only the right to *use* that water.[51] Therefore, they cannot transfer title to the water to the second user in an open-cycle reuse system.

As noted above, consumption of water is legally permissible if it is reasonable, either in itself or in light of its effects on downstream riparians. However, under the English Rule, the right of riparian owners to draw water from a stream is limited to riparian uses of the water, to reasonable uses *upon the riparian land.*[52] Under the English Rule, "[a]bstraction for sale to others is not such reasonable use."[53] Thus, even a municipal corporation engaged in public distribution of water cannot obtain such water merely by becoming a riparian,[54] nor even by purchasing all of the water rights of downstream riparians, since those rights do not include the right to transfer water to non-riparians.

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50. Stratton v. Mt. Hermon Boys' School, 216 Mass. at 83, 103 N.E. at 87 (1913).

> A proprietor may make any reasonable use of the water of the stream in connection with his riparian estate and for lawful purposes within the watershed, provided he leaves the current diminished by no more than is reasonable, having regard for the like right to enjoy the common property by other riparian owners.

*Id.* at 88-89, 103 N.E. at 88.

51. "Although the right to flowing water is incident to the title to land, there is no right of property in such water in the sense that it can be the subject of exclusive appropriation and dominion." *Id.* at 84-85, 103 N.E. at 87.

52. Kennebunk, Kennebunkport & Wells Water Dists. v. Maine Turnpike Auth., 145 Me. 35, 71 A.2d 520 (1950).

53. *Id. Cf.* RESTATEMENT (SECOND) OF TORTS § 855 (1977), under which sale to others may or may not be reasonable, depending on the circumstances.

54. Kennebunk, Kennebunkport & Wells Water Dists. v. Maine Turnpike Auth., 145 Me. 35, 71 A.2d 520 (1950). In a second ruling in the same case, Kennebunk, Kennebunkport & Wells Water Dists. v. Maine Turnpike Auth., 147 Me. 149, 84 A.2d 433 (1951), the court stated: "The use of . . . water for public distribution in this State is a non-riparian use. . . ." *Id.* at 160, 84 A.2d at 439.

With respect to the rights of downstream riparians, any upstream transfer of water to second users who are not riparians constitutes a diversion of water under the English Rule, and all diversions of water violate the rights of downstream riparians. The English Rule assumes that a diversion will materially diminish the quantity of water in the stream; will thereby prevent its use for the reasonable and proper purposes of downstream riparians; and therefore will constitute an infringement of their rights.[55] It does not call for a balancing process.

The American Rule is different because the duty to return water to the stream after its use *may* be breached when water is passed to a nonriparian for reuse.[56] Thus, in Massachusetts, diversion or abstraction can be a reasonable use of water. However, even if it is reasonable, it is actionable if it causes any *measurable* harm.[57] Presumably, if there is

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55. Lockwood Co. v. Lawrence, 77 Me. 297, 316 (1885). "Diversion without return, or abstraction of the water for a non-riparian use, as against a lower riparian owner, is an invasion of his riparian rights.... An action lies by a riparian proprietor for the wrongful invasion of his riparian rights even though there be no actual damages." Kennebunk, Kennebunkport & Wells Water Dists. v. Maine Turnpike Auth., 147 Me. 149, 155, 84 A.2d 433, 437 (1951). Note, however, that the same assumption is not made with respect to upper riparians.

> [T]he abstraction of water for a non-riparian use by a lower riparian proprietor does not invade any right of the upper riparian proprietor. His interest in the water after it passes his land ceases. As no right of the upper proprietor is invaded by such use, no right of action therefore exists in his favor.

*Id.* at 156, 84 A.2d at 437.

56. Fraser v. Nerney, 89 Vt. 257, 260, 95 A. 501, 503 (1915). Indeed, if a riparian transfers to a portion of his own property not within the watershed, he may have breached this duty, at least if he fails to return the water to its original bed. Stratton v. Mt. Hermon Boys' School, 216 Mass. 83, 86, 103 N.E. 87, 88 (1913).

> A definite and fixed channel is a part of the conception of a water course. To divert a substantial portion of its flow is the creation of a new and different channel, which to that extent defeats the reasonable and natural expectations of the owners lower down on the old channel. Abstraction for use elsewhere not only diminishes the flow of the parent stream but also increases that which drains the watershed into which the diversion is made, and may injure thereby riparian rights upon it. Damage thus may be occasioned in a double aspect.

*Id.* The court then added: "[D]iversion, if for a use reasonable in itself, must cause actual perceptible damage to the present or potential enjoyment of the property of the lower riparian proprietor before a cause of action arises in his favor." *Id.* at 87, 103 N.E. at 88.

57. *Id.* at 88, 103 N.E. at 89. The court explained:

> The question in such a case is not whether the diversion, being for a legitimate use, is in quantity such as is reasonable, having regard to all the circumstances, as it is in cases of distinctly riparian uses, but only whether it causes actual damage to the person complaining.... [T]here can be no recovery for a diversion of water for a proper use, so small in quantity and of such character that it occasions no injury to the present or future use of the lower riparian land.... [T]here may be recovery even though there is no present actual damage, provided an injurious effect may be produced upon the lower estate by the acquirement of right through lapse of time.... The distinction is between a diversion which causes a present or potential injury to the lower estate for a valuable use and one which cannot produce such a result....
>
> If [a riparian] diverts out of the watershed or upon a disconnected estate the only question is whether there is actual injury to the lower estate for any present or future reasonable use. The diversion alone without evidence of such damage does not warrant a recovery even of nominal damages.

*Id.* at 83, 103 N.E. at 89.

damage, but it is satisfactorily compensated by contractual agreement, the diversion may proceed.

Therefore, diversions or abstractions of water may be actionable under either the American or English rule. Since the American Rule requires a showing of actual harm it will become easier to maintain an action as water shortages become more commonplace. Thus, the practical impact of either rule will be to discourage off-site transfers of water, and any reuse system involving such transfers will be correspondingly discouraged.

### 3. Water Pollution

Included among the rights of riparian owners is entitlement to water that is unchanged in quality by upstream owners, except by reasonable riparian uses.[58] Thus, to the extent that riparian owners must return the water they use to the stream from which it came, they must also return it in substantially the same condition of purity as they withdrew it. This rule may pose significant difficulties to riparians engaged in water reuse where the consequence of multiple uses of the water ultimately discharged is its super-pollution. If the impact of water reuse is to impair the purity of the stream's water so as to prevent its use for the reasonable and proper purposes to which it is usually applied, such reuse will be deemed to infringe the rights of downstream riparians.[59]

It should be noted that, as an incident to the reasonable use and enjoyment of the waters of a stream, riparians may necessarily impair, to some extent, the purity of that water. Indeed, riparian law, developed long before the Clean Water Act[60] was implemented, mandates pollution control technology at a time when it was assumed to be impossible to use a stream for manufacturing or other commercial purposes without some impairment of its original purity.[61] Thus, at common law such impairment was a necessary result of permitted use, with the sole limitation that the impairment could not be so substantial as to deny other riparians their reasonable uses of the stream.[62]

Today, common law riparian doctrines typically do not dictate the conduct of riparians with respect to water pollution as much as they did in the past, primarily because of the great expansion of federal regulation under the Clean Water Act.[63] The Act imposes restrictive and ex-

58. Lockwood Co. v. Lawrence, 77 Me. 297 (1885).

59. *Id.* at 317. *See also* Merrifield v. Lombard, 95 Mass. (13 Allen) 16, 17 (1866).

60. 33 U.S.C. §§ 1251-1376 (1976 & Supp. III 1979).

61. The common law virtually ignored groundwater pollution, since the hydrology of recharge was unknown at the time of its development and the right to withdraw groundwater did not assume a corresponding obligation to return water to the ground.

62. *See* Stratton v. Mt. Hermon Boys' School, 216 Mass. at 85, 103 N.E. at 88 (1913).

63. 33 U.S.C. §§ 1251-1376 (1976 & Supp. III 1979). *See* Note, *Evaluation of a National Water Quality Policy*, 9 B.C. L. REV. 669 (1968).

pensive treatment standards before water can be discharged into a stream, and provides for tort liability for harms caused by violations of the Act's water quality standards and corresponding state standards.[64] The Act also prohibits discharges without a permit and establishes a permitting system that limits the amount of pollutants that each permit holder may discharge.[65] Expansions of the level of discharge are generally prohibited without new permits.[66]

### *E. The Impact of the Common Law on Water: Conservation and Reuse*

There is little evidence that the common law doctrines affect private or public decisions on water conservation, recycling or reuse implementation.[67] Many decision makers are unfamiliar with the applicable common law doctrines. Second, the belief of decision makers in relative water abundance may mute significantly the force of these doctrines.[68]

Indeed, as water shortages become more common, it becomes apparent that existing common law doctrines will be inadequate, even to resolve conflict. A doctrine that assumes an abundance of water may not be workable when applied to disputes resulting from water shortages. Since most water rights disputes in New England involve conflicting and excessive demands on a single supply, the disputes become more numerous as water becomes less plentiful. But the existing doctrines generally do not focus on the overall policy merit of any particular use, such as the water conservation benefit to be derived from a user's plan to develop a water reuse program. Instead, they focus on the narrower method of balancing the rights of the specific parties placing their conflicting demands on water, and on the "reasonableness" of such demands in each case.[69]

The most telling criticism of existing doctrines, however, is their ineffectiveness as tools for water use planning. In the context of water abundance, probably no more planning is needed than a general directive permitting all reasonable uses. However, when multiple reasonable water uses, in the aggregate, constitute a total demand for water that approximates the supply, a more precise formulation of water rights is needed. If explicit definition of each user's water rights were provided, it would clarify the need for users to turn to alternative supplies such as those provided by reuse systems, because each user would know in ad-

64. 33 U.S.C. § 1313 (1976).

65. 33 U.S.C. § 1342(a) (Supp. III 1979).

66. 33 U.S.C. § 1319 (Supp. III 1979).

67. This information was derived in the course of case studies and interviews. *See* M. BARAM, LEGAL, ECONOMIC AND INSTITUTIONAL BARRIERS TO WATER REUSE IN NORTHERN NEW ENGLAND, REP. TO THE U.S. DEP'T OF THE INTERIOR AND OFFICE OF WATER RESEARCH AND TECHNOLOGY (OWRT/14-34-0001-9424) (1980).

68. *Id.*

69. *See, e.g.*, Stratton v. Mt. Hermon Boys' School, 216 Mass. 83, 103 N.E. 87 (1913).

vance the extent to which he could rely on natural sources to fill his water needs.

Moreover, if such explicit definitions were reached by the state's exercise of its power to protect the public interest in water resources, an additional water use planning objective would be served. No longer would the principles of state water law focus primarily on the private rights of landowners. Rather, they would provide a means for ensuring that the public interest would be considered when balancing the private rights.

## II. EFFLUENT DISCHARGE RESTRICTIONS AND THE PROMOTION OF WATER REUSE BY THE EPA

This section deals with EPA authority to promote water reuse in its implementation of those provisions of the Clean Water Act[70] which direct the Agency to control effluent discharges from point sources. It addresses the issue of the extent to which the Act affords the Agency discretion to consider water reuse in setting its effluent standards;[71] and its new source performance standards,[72] and in carrying out its National Pollution Discharge Elimination System (NPDES) Permit Program.[73] In addition, the section considers the key legal obstables facing the agency if it decides to promote reuse in the implementation of its authority to control point-source discharges. These inquiries are based on the assumption that it makes good sense to bring water reuse considerations into the enforceable discharge control aspects of the Clean Water Act program, to the extent that this is legally permissible and technically consistent with the pollution control objectives of the Act.

### *A. Use of Recycling and Reuse Technology to Meet EPA's Effluent Limitation Standards*

Although the Clean Water Act and its legislative history suggest that recycling and reuse are favored water pollution control technologies,[74] the Act itself is singularly concerned with EPA's developing "effluent limitations," and gives no guidance as to how reuse technology is to be incorporated into those limitations. Effluent limitations are defined as any restriction imposed "by the [EPA Administrator or state water pollution control agency head] on quantities, discharge rates, and concentrations of 'pollutants' which are 'discharged' from 'point sources' into 'waters' ... the waters of the 'contiguous zone,' or the ocean.'"[75]

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70. 33 U.S.C. §§ 1251-1376 (1976 & Supp. III 1979).
71. *Id.* § 1311 (1976 & Supp. III 1979).
72. *Id.* § 1316 (1976).
73. *Id.* § 1342 (1976 & Supp. III 1979).
74. *See id.* § 1294 (Supp. III 1979) (continuing program of public information and education on recycling and reuse of wastewater). *See also* [1972] U.S. CODE CONG. & AD. NEWS 3668, 3711.
75. 40 C.F.R. § 122.3 (1981).

In fixing effluent limitations for municipal and industrial point sources, the Act requires EPA to force the adoption of several levels of effluent control technology:

1. "Best practicable control technology currently available" (BPT)[76]

The Federal Water Pollution Control Act of 1972[77] required EPA to set effluent limitations for all point sources, other than publicly owned treatment works (POTWs), discharging wastes into United States waters. Limitations based on BPT controls were to be required by July 1, 1977.[78] BPT was defined as the average of the best existing performance by plants of various sizes, ages, and unit processes within each industrial category.[79]

2. "Best available technology economically achievable" (BAT)[80]

The 1972 Act also established more stringent limitations, based on BAT, to be required of all point sources other than POTWs by July 1, 1983.[81] In 1977, Congress enacted the Clean Water Act of 1977, which extended the 1983 deadline by one year and distinguished for the first time between conventional[82] and toxic pollutants.[83] Effluent limitations based on BAT were to be required only for toxic pollutants by July 1, 1983 under this amendment.[84] The range of acceptable limitations at this level of technology is, at a minimum, referenced to the best performer in any industrial category.[85]

3. "Best conventional pollutant control technology" (BCT)[86]

The 1977 Act also specified that effluent limitations for conventional pollutants from point sources other than POTWs are to be based on

76. 33 U.S.C. § 1311(b)(1)(A) (1976).

77. *Id.*

78. *Id.* Because of the ambitious goals of the Act, the EPA is still in the process of developing BPT for some industrial categories.

79. S. REP. NO. 414, 92d Cong., 2d Sess., *reprinted in* [1972] U.S. CODE CONG. & AD. NEWS 3668, 3716.

80. 33 U.S.C. § 1311(b)(2)(A) (Supp. III 1979).

81. *Id.*

82. EPA defines "conventional" pollutants as: "1. Biochemical oxygen demand (BOD) 2. Total suspended solids (nonfilterable) (TSS) 3. pH 4. Fecal coliform 5. Oil and grease." 40 C.F.R. § 401.16 (1980).

83. EPA's definition of toxic pollutants includes 65 separate substances. 40 C.F.R. § 401.15 (1980).

84. 33 U.S.C. § 1311(b)(2)(A) (Supp. III 1979).

85. S. REP. NO. 414, 92d Cong. 2d Sess., *reprinted in* [1972] U.S. CODE CONG. & AD. NEWS 3668, 3717.

86. 33 U.S.C. § 1314(b)(4) (Supp. III 1979).

BCT. The Act requires the EPA to review existing BAT controls for conventional pollutants and incorporate any revisions into new BCT controls. The new BCT controls were to be at least as stringent as the earlier BPT controls, but any additional controls were to be set by taking cost considerations into account.

4. "Best available demonstrated control technology" (BADCT)[87]

A settlement agreement in the case of *National Resources Defense Council v. Train*[88] required EPA to set new source performance standards (NSPS) for point sources other than POTWs based on the statutorily mandated BADCT. These standards further restrict the effluent discharges of *new* sources of water pollution, beyond the limits of the BAT, BCT, or BPT effluent limitations. They are based on the assumption that new sources can adopt control technology during construction that would be impractical for existing sources to utilize.[89] The NSPS are to reflect the greatest degree of effluent reduction that the Administrator of the EPA determines to be achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants.[90]

5. "Best practicable waste treatment technology" (BPWTT)[91]

The 1972 Act imposed on virtually all POTWs effluent limitations based upon "secondary treatment" by July 1, 1977.[92] The Act further requires POTWs to employ BPWTT by July 1, 1983.[93] However, in effect, BPWTT is required today in many cases, since all POTWs constructed with EPA grant funds are presently required to apply BPWTT over the life of the works.[94] BPWTT is defined by statute as "including reclaiming and recycling of water."[95] While EPA has established by regulation "the minimum level of effluent quality attainable by second-

87. 33 U.S.C. § 1316(a) (1976).
88. 8 ENV'T REP. CAS. (BNA) 2120 (1976).
89. The settlement concluded four separate actions seeking to compel EPA to promulgate pretreatment standards and regulations for toxic pollutants under § 307 of the Clean Water Act, 33 U.S.C. § 1317 (Supp. III 1979). The agreement compelled the EPA to issue regulations under §§ 301, 304 and 306 (new source performance standards), 33 U.S.C. §§ 1311, 1314 and 1316, which were considered superior to § 307 because they allowed regulated parties three years to comply rather than one. 8 ENV'T REP. CAS. (BNA) 2120, 2121 (1976).
90. 33 U.S.C. § 1316(a)(1) (1976).
91. 33 U.S.C. § 1311(b)(2)(B) (Supp. III 1979).
92. 33 U.S.C. § 1311(b)(1)(B) (1976).
93. 33 U.S.C. § 1311(b)(2)(B) (Supp. III 1979).
94. *Id.* § 1281(g)(1) (Supp. III 1979).
95. 33 U.S.C. § 1281(b) (1976).

ary treatment"[96] the Act does not mandate EPA to set effluent limitations based on BPWTT, but rather directly requires BPWTT.[97]

In determining what effluent limitations are achievable through BPT, BAT, or BCT for a particular industry, the Act requires EPA to be guided by an assessment of typical effluent characteristics for that industry, as well as by specific common plant characteristics. The Act directs the Administrator to: identify, in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants, the degree of effluent reduction attainable through the application of [BPT, BAT, or BCT] the best practicable control technology currently available for classes and categories of point sources (other than publicly owned treatment works).[98] However, the Act does not require, once BPT, BAT, BCT, or BADCT has been specified for a particular category, that every source within that category adopt that technology. Rather, the Act directs the Administrator to require performance in compliance with the effluent limitations designed to be achievable by application of BPT, BAT, BCT, or BADCT.[99] The Act thus contemplates that an individual point source may, by exploiting its own unique circumstances, be able to comply with the applicable effluent limitations without implementing BPT, BAT, BCT, or BADCT.[100]

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96. 40 C.F.R. § 133.102 (1980).

97. 33 U.S.C. § 1281(g)(2)(A) (1976).

98. 33 U.S.C. §§ 1314(b)(1)(A), (b)(2)(A) and (b)(4)(A) (1976 & Supp. III 1979).

99. For BPT and BAT, the Act specifies:

> Factors relating to the assessment of [BPT or BAT] . . . shall include consideration of the total cost of application of technology in relationship to the effluent reduction benefits to be achieved from such application, . . . the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, non-water quality environmental impact (including energy requirements), and such other factors as the Administrator deems appropriate.

33 U.S.C. §§ 1314(b)(1)(B) and (b)(2)(B) (1976). *See also* American Iron & Steel Inst. v. EPA, 568 F.2d 284 (3d Cir. 1977) and Appalachian Power Co. v. Train, 545 F.2d 1351 (4th Cir. 1976) for the courts' inclusion of water scarcity and water conservation as "non-water quality" impacts that EPA must consider in promulgating effluent regulations.

For BCT, the Act's language is similar:

> Factors relating to the assessment of [BCT] shall include consideration of the reasonableness of the relationship between the costs of attaining a reduction in effluents and the effluent reduction benefits derived, and the comparison of the cost and level of reduction of such pollutants from the discharge from publicly owned treatment works to the cost and level of reduction of such pollutants from a class or category of industrial sources, and shall take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, non-water quality environmental impact (include energy requirements), and such other factors as the Administrator deems appropriate.

33 U.S.C. § 1314(b)(4)(B) (Supp. III 1979).

For BADCT, the Act states: "[T]he Administrator shall take into consideration the cost of achieving such effluent reduction, and any non-water quality, environmental impact and energy requirements." 33 U.S.C. § 1316(b)(1)(B) (1976).

100. Once [the EPA Administrator] has evaluated what can be accomplished, the Administrator must set the standard at a particular volume of effluent or a particular

In contrast, the Act specifically does require certain POTWs to employ BPWTT. However, the EPA is not instructed to define BPWTT either in gereral or for particular categories of POTWs.[101] Thus, each POTW is free to adopt what is "best" under the circumstances. Of course, all POTWs must comply with the regulatory effluent limitations based on secondary treatment, but may meet those limitations with whatever technology they choose.[102]

In general, the EPA begins its industrial effluent regulatory process by identifying a particular industry or industrial subcategory, and then employing both its own staff and consulting firms to gather the statutorily required data. Once the data is collected, EPA weighs the "factors" noted above in determining which technologies constitute BPT, BAT, BCT, or BADCT. The EPA can theoretically specify recycling or reuse in designating BPT, BAT, BCT, or BADCT, but most often does not. Whatever technologies are identified, they in turn, determine the maximum permissible quantities of pollutants which may be discharged by plants performing a designated process.[103] It is these quantities of pollutants (effluent limitations) that an NPDES permit *must* specify.[104]

The regulations contain no provision that specific control measures are to be adhered to as a matter of law. Rather, BPT, BAT, and BCT measures are included in the accompanying "guidelines"[105] in order to advise point source applicants of technologies capable of meeting NPDES limits, and to legitimize the EPA rulemaking process in the face

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> percentage of effluent reduction. The Committee believes that the greatest public benefit can be achieved when each company in an industrial group is free to make its own, innovative engineering decisions on how to meet that standard. The Administrator should not attempt to dictate the use of specific processes or other methods of control to implement the standard of performance.

S. REP. NO. 414, 92d Cong., 2d Sess. *reprinted in* [1972] U.S. CODE CONG. & AD. NEWS 3668, 3725-26. In order to foster reliance on innovative engineering methods, the Act directs the EPA to issue "information" periodically on operating methods which result in the elimination or reduction of the discharge of pollutants. This information is to include "technical and other data, including costs, as are available on alternative methods." 33 U.S.C. § 1314(c) (1976).

101. 33 U.S.C. § 1281(g)(2)(A) (Supp. III 1979).

102. 33 U.S.C. § 1311(b)(1)(B) (1976).

103. *See* American Iron & Steel Inst. v. EPA, 568 F.2d 284 (3d Cir. 1977) *and* American Petroleum Inst. v. EPA, 540 F.2d 1023 (10th Cir. 1976). The EPA may fix a single, maximum effluent level, and is not required under the Clean Water Act to set a range of allowable pollutant levels.

104. The regulations provide that each permit shall specify

> [a]verage and maximum daily quantitative limitations for the level of pollutants in the authorized discharge in terms of weight (except pH, temperature radiation, and any other pollutants not appropriately expressed by weight). The Director may in his discretion ... specify other limitations, such as the average or maximum concentration limits, for the level of pollutants in the authorized discharge.

40 C.F.R. § 124.43 (1981).

105. Provided for in 33 U.S.C. § 1314(b) (1976).

of "arbitrary and capricious" challenges by industry under the Administrative Procedure Act.[106]

Thus, regardless of whether reuse of recycling technology is specified in setting BPT, BAT, BCT, or BADCT for a particular industry category, particular sources within that category remain free to employ reuse or recycling technology if they choose. Nothing in the Act compels point sources to utilize the precise technology designated by EPA. Nor has the Act defined BPT, BAT, BCT, or BADCT in such a way that, as a practical matter, effluent limitations are achievable only through their application. Rather, effluent limitations are typically achievable in a number of ways, all equally satisfactory under the Act. Thus, if recycling or reuse technology can be utilized to achieve the applicable effluent limitations, such utilization is entirely permitted, even when it is not specified by EPA.

By the same token, the fact that reuse or recycling technology is specified as BPT or BAT in no way compels its use. In *American Iron & Steel Institute v. EPA*,[107] for example, the court reviewed EPA's effluent limitations applicable to certain manufacturing processes within the iron and steel industry. The EPA had determined that recycling and alteration technologies constituted BPT for these processes. Industry challenged the named control measures, asserting that the EPA acted improperly in calculating average waste loads first, and then "visualizing" a control technology. The Third Circuit upheld the two technologies as BPT, but was careful to emphasize that the industry "is free to employ any treatment technology it chooses, as long as this technology enables the industry to attain the prescribed level of effluent load."[108]

Similarly, a federal district court has concluded that BPWTT is not a single, static concept, and does not necessarily mandate recycling or reuse.[109] The EPA's regulations confirm this view. For example, in limiting the discharges of operators in the mineral mining and process-

106. 5 U.S.C. § 706(2)(4) (1976).

107. 568 F.2d 284 (3d Cir. 1977).

108. *Id.* at 300.

109. [W]e find that the term 'practicable' itself suggests an approach to water treatment and disposal which is reasonable and prudent under all of the surrounding circumstances. 'Practicable' does not call for a wooden interpretation as if Congress had mandated a particular method of wastewater treatment and disposal for all situations at all times.... In section 201(g)(2)(A) the grant applicant in order to obtain federal funding is required to have studied and evaluated [*sic*] alternative techniques and demonstrate that its choice incorporates the BPWTT. If the statute required reclaiming and recycling of water by every public treatment work, there would be little need to examine alternative management techniques.

EDF v. Costle, 439 F. Supp. 980, 1002 (E.D.N.Y. 1977). In that case, the plaintiff asserted that a proposed sewage treatment plant was held to be required to incorporate reclaiming and recycling of wastewater by recharge, and therefore could not use ocean outfall disposal of treated effluent, as proposed.

ing category, the EPA's regulations stipulate that BPT for these wastewater pollutants includes the recycling of process water.[110] In the support data accompanying these regulations, however, the EPA cautioned that its "discussion does not preclude the selection of other wastewater treatment alternatives which provide equivalent or better levels of treatment."[111]

Thus, it is clear that the EPA can only encourage, rather than compel the use of reuse and recycling technology by specifying it in its BPT, BAT, BCT, or BADCT designations. Conversely, industry is also free to utilize reuse and recycling systems even when they are not specified as BPT, BAT, BCT, or BADCT.

### *B. Consideration of Reuse and Recycling Technology in Setting Effluent Limitation Standards*

#### 1. Municipal Point Source Operators

An analysis of the EPA's authority to consider recycling and reuse measures in arriving at national effluent limitation standards is facilitated by noting the basic distinction described above between BPWTT for POTWs, and BPT, BAT, BCT, and BADCT for all other point source operators. Of these standards, the Clean Water Act requires only that municipal facilities give specific consideration to recycling and reuse methods.[112] This requirement is reinforced by provisions relating to EPA grants for the construction of publicly owned wastewater treatment facilities that condition awards on the municipal applicant's demonstrating that: "as appropriate, the works proposed for grant assistance will take into account and allow to the extent practicable the application of technology at a later date which will provide for the reclaiming or recycling of water or otherwise eliminate the discharge of pollutants."[113] However, BPWTT is the only one of the technological standards that requires no regulatory definition or implementation. Nor are there generally applicable effluent limitations based on BPWTT. Instead, BPWTT is to be determined on a case-by-case basis for each POTW.[114] While the Act requires consideration of recycling in determining what constitutes BPWTT in each instance, it does not compel its use.

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110. *See* National Crushed Stone Ass'n v. EPA, 601 F.2d 111 (4th Cir. 1979), *rev'd on other grounds*, 449 U.S. 64 (1980).

111. 40 C.F.R. § 436 (Appendix A) (1980) (emphasis added).

112. 33 U.S.C. § 1281(b) (1976).

113. 33 U.S.C. § 1281(g)(2) (1976). The construction grants regulations (40 C.F.R. pt. 35) require all grant applicants to undertake a cost-effectiveness analysis for the proposed treatment works. They also include a provision requiring BPWTT that includes, among other alternatives, systems employing the reuse of wastewater and recycling of pollutants. 40 C.F.R. § 35.917-1(d)(5)(ii) (1979).

114. 33 U.S.C. § 1311(2)(B) (1976).

### 2. Industrial and Other Dischargers

#### a. Best Practicable Control Technology Currently Available (BPT)

In *American Iron & Steel Institute v. EPA*[115] the Third Circuit Court of Appeals rejected industry's contention that recycling may not be considered BPT even though this standard is usually associated with more simple "end of the pipe" controls.[116] Thus, EPA may consider recycling or reuse whenever these techniques are "common" control measures within a category, regardless of their in-process nature.

#### b. Best Available Technology Economically Achievable (BAT)

In arriving at BAT for each industry, EPA is encouraged to look beyond technologies used by the best existing performers to control techniques that have not been applied, provided that there is reasonable basis to believe that these technologies will be available by 1983.[117] As noted above, the Senate Report specifies that the acceptable BAT range of allowable pollutants should "at a minimum be referenced to the best performer in any industrial category."[118] The Senate also commented on the increasingly strict controls required to meet the 1983 "swimable water" goal and the 1985 "no discharge" goal.[119] One clear implication of the commentary is the Congressional expectation that industry give

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115. 568 F.2d 284 (3d Cir. 1977).

116. We also reject the Companies' assertion that recycle of effluent cannot be BPCTCA because it requires facilities to make extensive internal alterations. The legislative history of the 1972 amendments to the Water Pollution Control Act shows that Congress expected the EPA to base BPCTCA standards chiefly upon end-of-manufacturing treatment of wastewater, though courts which have considered the problem have concluded that Congress did not intend to preclude the EPA from basing its BPCTCA standards on in-process control measures, at least when these measures are "considered normal practice within the industry."

*Id.* at 306 (quoting FMC Corp. v. Train, 539 F.2d 973, 981 (4th Cir. 1976)). In that case, the Fourth Circuit did not explain the quoted term, but instead rested its holding on the general "factors" provision of 33 U.S.C. § 1314(b)(1)(B) (1976). This subsection requires the EPA, in fixing BPT for a particular industrial category, to consider such plant specifics as "the engineering aspects of the application of various types of control techniques."

117. *See* 42 Fed. Reg. 35,844 (1977) (interim final regulations for mineral mining and processing point source category impose a non-discharge limitation based on the grounds that "large numbers" of operations currently recycle all water used in processing).

118. *See* note 71 and accompanying text *supra*.

119. Many industries will be able to anticipate the requirements in Phase II [1983, 1985]....

In [some cases] corporate managers will know that closed cycle systems, recycling, and waste reclamation techniques are available to their plants and can be applied as required in Phase II. In those instances, plans can be made during Phase I and industries can begin immediately to work toward that objective by 1981.

In [some] other cases, there will be uncertainty as to the economic impact of closed cycle systems necessary to meet the no-discharge standard or, in fact, as to the availability of such technology. In those cases the corporate managers will be required to make a showing of the Administrator of the facts on which they base a

increased consideration to recycling and reuse processes in meeting the BAT standards, geared to the 1983 and 1985 goals. Of course, EPA in fixing BAT effluent levels is still bound by the statutory list of "factors," and may impose a recycling or reuse-based BAT standard only where there has been adequate consideration of the cost of achieving the prescribed effluent reduction and "non-water quality environmental impact."[120]

Despite the "factors" parameters in the EPA's development of BAT, the central goal of the Clean Water Act is pollution-free waters. In light of the no-discharge or limited discharge characteristic of some recycling and reuse techniques, the EPA *a fortiori* has substantially more discretion to consider these technologies in setting BAT standards.

c. Best Conventional Pollutant Control Technology (BCT)

BCT was apparently intended as an intermediate level of technology between BPT and BAT. The Act specifically requires BCT to be at least as stringent as BPT, but allows comparison of the costs and benefits of additional control in setting more stringent limitations. Thus, in formulating BCT, EPA presumably may consider recycling and reuse technology to at least the same extent that it may in setting BPT.

d. Best Available Demonstrated Control Technology (BADCT)

The relative stringencies of BADCT and BAT are not explicit in the Act. Presumably, however, BADCT is at least the equivalent of BAT. One commentator contends that the new source standard should "reach further, require more in the way of extending the frontiers of technology, [and] accord less sympathy to cost considerations."[121]

The term "best available demonstrated control technology," suggests very broad discretion for the EPA to find the most effective technologies in setting NSPS, irrespective of their cost or their current use by industry, and then to determine the amount of effluent reduction possible through their application. If recycling or reuse is such a technology, there seems to be little question that EPA may peg its NSPS to one or both.

Therefore, EPA's discretionary authority to consider recycling or reuse increases as it moves from promulgating the least stringent ef-

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determination that the no-discharge requirement of the Act cannot be attained at a reasonable cost.

S. REP. NO. 414, 92d Cong., 2d Sess., *reprinted in* [1972] U.S. CODE CONG. & AD. NEWS 3668, 3711.

120. 33 U.S.C. § 1314(b)(2)(B) (1976).

121. W. ROGERS, ENVIRONMENTAL LAW 468 (West 1977).

fluent limitations (those based on BPT) to the most stringent ones (those based on BAT and BADCT). For POTWs subject to BPWTT, recycling and reuse are always to be considered on a case-by-case basis.

### C. *EPA Authority to Consider or Require Reuse or Recycling Technology in Granting Variances from Effluent Limitations*

Several statutory and regulatory provisions allow EPA to authorize departures from established effluent limitations in individual cases. Some of these "variances" can apparently be utilized to account for or force implementation of recycling and reuse technologies.

#### 1. Variances from Effluent Limitations Applicable to Industrial Discharges

##### a. BPT and BCT Limitations

No explicit statutory authorization for any variances from BPT effluent limitations exists. Nevertheless, in *E.I. du Pont de Nemours v. Train*,[122] the Supreme Court ruled that a variance provision was a necessary aspect of BPT limitations.[123] The provision that EPA has promulgated allows for a case-by-case adjustment of national limits, either more or less stringent, where data specific to a discharger indicates it presents factors "fundamentally different" from those considered by EPA in developing the limitation at issue.[124]

The most common use of this regulatory procedure is to allow the relaxation of an established effluent limitation for a point source operator. If the operator can show that its situation with respect to the six enumerated factors[125] is not "within the range of circumstances considered" by the EPA in setting the limitation in the first place, then it is entitled to a variance.[126] Thus, if the EPA specified recycling or reuse as

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122. 430 U.S. 112 (1977).

123. *Id.* at 128.

124. 40 C.F.R. § 125.30(b) (1980). Note that these regulations apply to BPT, BAT and BCT effluent limitations. The regulations list six factors which may be considered:

> (1) The nature or quality of pollutants contained in the raw waste load of the applicant's process wastewater;
> (2) The volume of the discharger's process wastewater and effluent discharged;
> (3) Non-water quality environmental impact of control and treatment of the discharger's raw waste load;
> (4) Energy requirements of the application of control and treatment technology;
> (5) Age, size, land availability, and configuration as they relate to the discharger's equipment or facilities; processes employed; process changes; and engineering aspects of the application of control technology;
> (6) Cost of compliance with required control technology.

40 C.F.R. § 125.31(d) (1980). *See* Appalachian Power Co. v. Train, 545 F.2d 1351 (4th Cir. 1976) (adds cost as a variance factor).

125. *See* note 124 *supra*.

126. *See* EPA v. National Crushed Stone Ass'n, 449 U.S. 64 (1980).

BPT or BCT for an industry, the operator is entitled to a variance if recycling or reuse would be uniquely unsuitable for the plant because of its peculiar characteristics, and no more suitable technology exists for achieving the BPT effluent limitations. Conversely, if the EPA has failed to take into account the possibility of recycling or reuse technology in setting BPT or BCT and, because a point source utilizes such technology, it would be uniquely unsuitable for it to adopt the designated BPT or BCT or an alternative that would allow achievement of the corresponding effluent limitations, the point source may receive a variance.[127]

The regulatory variance procedure may also be used to tighten an effluent limitation. In those situations where a single operator in a class or category stands out from all the others, with respect to the listed factors, the regulations permit EPA (or the state) to require more stringent limitations if:

> (1) The alternative effluent limitation or standard requested is no more stringent than justified by the fundamental difference; and
> (2) Compliance with the alternative effluent limitation or standard would not result in:
> (i) A removal cost wholly out of proportion to the removal cost considered during development of the national limits; or
> (ii) A non-water quality environmental impact (including energy requirements) fundamentally more adverse than the impact considered during development of the national limits.[128]

Note that whatever strengthening or relaxation results from the variance procedures affects only the effluent limitation applicable to the point source involved. The regulations do not empower EPA to fix a single type of technology and exclude all others from use at a source, although a particular technology may, of course, effectively be forbidden if it is incapable of achieving the required level of effluent control. Thus, it cannot be said that the EPA may use its variance authority under the regulations to require an individual operator with "fundamentally different" plant specifics to employ recycling or reuse techniques. Nevertheless, where the EPA finds sufficiently different factors to warrant imposition of particularly tight effluent limitations, the net effect may be the same if recycling or reuse is the only control measure that will keep the discharge within the NPDES permit restriction.

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127. Note that it is insufficient to demonstrate that the operator cannot afford to achieve a specified technology. A variance is permitted only if the cost of a plant's complying with the BPT effluent limitations exceeds what was contemplated by the EPA in setting BPT, and is permitted merely because the cost exceeds the operator's resources. *Id.* at 1211.

128. 40 C.F.R. § 125.31(c) (1980).

b. BAT Limitations

While no statutory variance procedure is provided for BPT and BCT effluent limitations, the Clean Water Act explicitly authorizes the EPA to grant a variance from BAT limitations where a point source operator can establish to the Administrator's satisfaction that less stringent limitations will (a) represent the maximum use of technology within the economic capability of the owner or operator; and (b) result in reasonable further progress toward the elimination of the discharge of pollutants.[129]

The regulatory variance procedure described above does not purport to implement this provision, although it does explicitly apply to variances from BAT limitations. Nevertheless, the existence of this statutory provision affects the manner in which BAT variances will be granted under the regulatory procedure when the statutory deadline for BAT arrives. In the case of variance applications seeking relaxation of BAT limitations, a "fundamental difference" in one of the six enumerated factors[130] seems no longer to be essential to obtaining a variance. Even if no fundamental difference exists, a variance from BAT limitations based on recycling or reuse technology can be obtained upon a showing that the operator is without the resources to achieve that technology or an equivalent. Similarly, if an operator is employing reuse or recycling and the specified BAT would dictate its abandonment, the operator may obtain a variance upon a showing that it lacks the resources to make the change. Of course, additional variances, based on "fundamentally different" factors may also be obtained.

The statutory provision also affects the regulatory provision for variances tightening applicable effluent limitations. The Act restricts somewhat the degree of tightening possible under the regulatory procedure, since effluent limitations beyond the economic resources of the operator will not be imposed even if they are justified by a fundamental difference in the enumerated factors.

2. Effluent Limitations From Which Variances Are Not Available

Variances from BADCT limitations for individual plants are not permitted under the Act.[131] Similarly, no variances from effluent limitations applicable to POTWs are permitted.[132] Nor does the regulatory

129. 33 U.S.C. § 1311(c) (1976).
130. *See* note 124 *supra*.
131. E.I. du Pont de Nemours & Co. v. Train, 430 U.S. 112 (1977).
132. Virginia Water Control Bd. v. Train, 559 F.2d 921 (4th Cir. 1977).

variance procedure described above apply to either new source performance standards based on BADCT or BPWTT or secondary treatment effluent limitations. Rather, these standards are intended to be absolute prohibitions, and are not to be strengthened or weakened because of individual plant design characteristics such as the utilization or nonutilization of recycling or reuse technology.

### *D. The Promotion of Water Reuse by Means of Effluent Discharge Restrictions*

The foregoing sections illustrate that EPA has ample authority to rely on recycling and reuse technology considerations in setting its effluent standards and in passing on applications for variances from those standards. Agency efforts under the Clean Water Act have influenced the conduct of point source operators somewhat and have occasionally promoted the reuse and recycling of water.[133]

Certainly there are a number of instances where water reuse considerations were a key element in EPA's decision-making leading to the promulgation of an effluent standard. On the other hand, EPA does not appear to have incorporated such considerations into its decision process in every instance.[134] Nor is its variance process sufficiently systematic to lead to the conclusion that water reuse and recycling considerations are always given ample weight. Thus, the incentive for water reuse and recycling technologies derived from EPA's water program could be amplified under existing authority by fine tuning the present decision making process to anticipate the effect of decisions on such technologies.

## III. RATEMAKING AUTHORITY AND ITS POTENTIAL INFLUENCE ON WATER REUSE

Supplies of water to users are widely perceived to be unlimited and of low cost. As a result, firms are clearly not being encouraged to consider implementation of water reuse.[135] Indeed, effluent discharge regulation seems to be a more important factor motivating user consideration of water reuse today.[136] However, if water supply rates were to be substantially increased due to a water shortage or other circumstance, operational changes would likely be made to reuse water or otherwise to curtail water use substantially. Therefore, the cost of water supply and the rates to be charged can be seen as a potentially useful mechanism to induce conservation and reuse.

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133. *See* M. BARAM, note 67 *supra*.
134. *Id.*
135. *Id.*
136. *Id.*

Rates applicable to the water user other than those imposed directly on water use may also be relevant when considering reuse. The EPA's construction grants program includes a requirement that industrial users of POTWs (dischargers) be charged a user fee.[137] Since this fee is typically set according to the metered volume of water user intake — or water usage — rather than the unmetered volume of user discharge, it operates, in effect, as a rate increase on water consumption.[138]

The user charges imposed under the construction grants program are computed according to the proportionate share each firm uses of the total capacity of the treatment works. The charges are "flat" — that is, the same unit price is charged to low and high volume dischargers. Thus, when these charges are added to existing water supply rate structures, they do not alter the character of that structure. If the underlying water rate structure is a "decreasing block,"[139] as it is in most parts of the New England states,[140] then it will continue to be a decreasing block after the user charge is added.

The higher total rate that then becomes effective obviously has some effect on water usage. The question remains, however, whether that effect on use can be enhanced by altering the structure of the underlying water consumption rate. Two aspects of the question are considered here: Whether a rate structure change pertaining to water consumption can be expected to lead to new and substantial water reuse developments; and whether a rate structure change designed to promote water conservation (including reuse) can be implemented legally.

Each of the northern New England states has a commission with the power to regulate the rates of privately-owned water utilities.[141] While the precise scope of the powers of these commissions varies slightly from state to state, each possesses virtually identical authority to approve or disapprove of the use rates charged by privately-owned utilities. Each also uniformly lacks authority over the rates charged by municipal water suppliers, who typically are responsible for setting their own rates, without state interference.[142]

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137. 40 C.F.R. § 35.925-11 (1980).

138. In the Town of Greenfield, Massachusetts, imposition of this charge on POTW users is widely perceived to have altered the water use patterns of the town's industry and to have spurred the investigation of industrial recycling, or in some instances to industrial shifting to new technologies which need less water, as means of cutting water costs and thereby effecting water conservation. *See* M. BARAM, note 67 *supra*.

139. In a decreasing block rate structure, the price of water is highest for the first units and lower for subsequent units. For a discussion of the use of rate structures in demand management, *see* 1 NEW ENGLAND RIVER BASINS COMM'NS, BEFORE THE WELL RUNS DRY: LITERATURE SURVEY AND ANALYSIS OF WATER CONSERVATION 66-69 (1980) [hereinafter SURVEY AND ANALYSIS].

140. *See* M. BARAM, note 67 *supra*.

141. *See* ME. REV. STAT. ANN. tit. 35, § 51 (1964); MASS. GEN. LAWS ANN. ch. 165, § 2 (West 1976); N.H. REV. STAT. ANN. § 378:10 (1966); VT. STAT. ANN. tit. 30, § 218 (1970).

142. *See* ME. REV. STAT. ANN. tit. 30, § 4253 (1964); MASS. GEN. LAWS ANN. ch. 92, § 27 (West 1976); N.H. REV. STAT. ANN. § 38:12 (1970) (granting the Public Utilities Commission

In general, the rules and ratemaking procedures of the four state commissions are quite similar. First, the private water utility applies to the commission for approval of its proposed rate, or for a change in its rate.[143] After a hearing, if one is requested, the commission approves or determines: (1) the revenue of the utility; and (2) how the responsibility for these revenues will be allocated among the utility's customers.[144] The level of revenues is set to cover the operating costs[145] of the utility and allow a reasonable return on the value of the utility's investments (its "rate base").[146] The various state commissions are compelled by statute to set the level of revenues "fairly," and this presumably means that it should be neither too high nor too low. The standard of fairness is stated quite similarly in each state, with emphasis on just and reasonable rate setting.[147]

In contrast, municipal ratemaking authority and procedures vary widely in the four-state region. Only in Maine are municipal water rates required to be "reasonable [and] just" by statute.[148] In the other states, since municipalities are not required to set rates to provide any particular level of revenues, local practices often reflect local political considerations. Thus, a few municipalities have water rates in excess of their water department's revenue requirements as a means of supplementing general revenues. On the other hand, many charge too little to cover costs and provide a reasonable return, reflecting their reluctance to impose the higher rate because of political and other local factors (*e.g.*, pro-growth and industrial development forces).[149]

After the level of private utility revenues has been set, the responsibility for providing these revenues is allocated among the utility's customers through the design of the rate structure, but subject to several legal constraints. For example, the commissions are required to approve or apportion revenues among customers so as to avoid undue

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jurisdiction over the sales of a municipal water supplier outside the municipality's boundaries); VT. STAT. ANN. tit. 24, § 3311 (1975).

143. The importance of the "passive" nature of utility regulation is emphasized in Joskow, *Inflation and Environmental Concern: Structural Change in the Process of Public Utility Price Regulation*, 17 J. L. & ECON. 291 (1974). In Massachusetts, the Department of Public Utilities "upon its own motion, may investigate the propriety of any rate, price or charge." MASS. GEN. LAWS ANN. ch. 164, § 94 (West 1976).

144. C. PHILLIPS, THE ECONOMICS OF REGULATION 129-32 (1969).

145. Operating costs include operating expenses, such as wages, salaries, well or dam maintenance, plus annual depreciation and operating taxes. *See id.* at 129, 178-215.

146. *Id.* at 129.

147. "The rate ... shall be just and reasonable." ME. REV. STAT. ANN. tit. 35, § 51 (1964). "[T]he Department ... shall make an investigation as to the propriety of ... proposed charges...." MASS. GEN. LAWS ANN. ch. 164, § 94 (West 1976); "[R]ates ... shall be reasonable and just." N.H. REV. STAT. ANN. § 378:11 (1966); "[T]he board may order ... rates ... found by it to be just and reasonable." VT. STAT. ANN. tit. 30, § 218 (1970).

148. ME. REV. STAT. ANN. tit. 30, § 4253 (1964).

149. *See* M. BARAM, note 67 *supra*.

discrimination.[150] Similar restrictions are placed on Maine municipalities when they are designing their own rate structures.[151] However, in Massachusetts and Vermont, municipalities are explicitly left on their own.[152] Nevertheless, it can be presumed that unreasonably discriminatory rates would be challenged and held unconstitutional.[153]

In apportioning costs, most utilities begin by dividing their customers into various classes — residential, commercial and industrial, for example. Each class is then assigned a responsibility for the utility's costs.[154] In the northern New England states, this allocation has rarely been the result of rigorous analysis since, overall, water rates have been set quite low to reflect relatively plentiful supply, and thus have rarely been challenged.[155]

In theory, however, allocation to various user classes can be based on an analysis of the utility's customer,[156] water,[157] demand[158] and overhead[159] costs. Of these, the most difficult to allocate is demand costs — the costs of investment in new and existing water supply capacity. In order to understand how demand costs should be allocated, it is necessary first to examine the nature of the demands of each user class on the water supply system.[160]

It is obvious that the total demand for water by a utility's customers is not constant over time. Summer demand, for example, is substantial-

150. Maine: The rate is "to apply with substantial equality to all receiving similar service." City of Rockland v. Camden & Rockland Water Co., 134 Me. 95, 95, 181 A. 818, 818 (1936). Massachusetts: "[D]ifferent treatment for different classes of customers, *reasonably classified*, is not unlawful discrimination." Boston Real Estate Bd. v. DPU, 334 Mass. 477, 495, 136 N.E.2d 243, 254 (1956) (emphasis added). New Hampshire: "It is the Commission's duty to see that ... no class of service is discriminated against or receives preferential treatment." Granite State Alarm, Inc. v. New England Tel. & Tel. Co., 111 N.H. 235, 240, 279 A.2d 595, 599 (1971). Vermont: The Public Service Board must "prevent unjust discrimination in rates...." *In re* Petition Milton Water Corp., 125 Vt. 487, 490, 218 A.2d 710, 713 (1966).

151. ME. REV. STAT. ANN. tit. 30, § 4253 (1964) requires municipal rates to be "equitable."

152. Massachusetts: The municipality "shall determine the rate...." MASS. GEN. LAWS ANN. ch. 92, § 37 (West 1976). Vermont: A "municipal corporation may establish rates ... in such a manner as such municipal corporation shall determine." VT. STAT. ANN. tit. 24, § 3311 (1970). The New Hampshire statutes appear to be silent on this point.

153. *See* Permian Basin Area Rate Cases, 390 U.S. 747, 800 (1968).

154. Note, *Energy Conservation through the State Public Utility Commissions*, 3 HARV. ENVT'L L. REV. 160, 164 (1979).

155. *See* M. BARAM, note 67 *supra*.

156. Customer costs include accounting, billing, metering and service connection costs. These are generally allocated according to the number of customers in each class. *Id. See also* Note, *supra* note 154, at 164-65.

157. Water costs include pumping, labor, materials and maintenance expenses and are proportional to the amount of water produced. They are allocated on the basis of each customer class' usage. *Cf. id.* at 165.

158. Demand costs include capital expenditures in the physical plant, property taxes and interest charges in long-term debt. *Id.*

159. Overhead costs include administrative, marketing, public relations and purchasing expenses. They are generally allocated arbitrarily in proportion to other costs. *Id.*

160. M. FARRIS & R. SAMPSON, PUBLIC UTILITIES: REGULATION, MANAGEMENT AND OWNERSHIP 18-45 (1973).

ly greater than demand in the winter. Daytime demand is greater than demand at night. If a utility is to meet the demand placed on it at all times during a given period, then it will have to have sufficient capacity to meet the greatest demand during that period. At other times, when demand is less than peak, the water supply system may be partially idle. If the peak demand on the system is substantially greater than average demand, then a significant amount of equipment — purchased as a major capital expense — is frequently unused.[161] Thus, a customer who adds to the peak demand is more costly to service than one who adds to off-peak demand.[162]

Among the three classes of users suggested above — residential, commercial and industrial — residential users are most often pointed to as highest contributors to peak demand. Residential users wash cars and water lawns during the summer months and not during the winter. In contrast, industrial users have more nearly uniform demand for process water throughout the year. Thus, traditionally, a relatively high portion of demand costs are allocated to residential users when cost analysis of this type is used to design water rates.[163]

Once a share of costs has been determined for each user class, the next step is to design the structure for rates for each class. In the decreasing block structure noted above, the rates for the first blocks are typically set high enough to ensure that demand and customer costs are recovered, despite possible variations in use.[164] In this regard, the decreasing block does reflect the marginal cost of service at each level of demand, and has repeatedly been defended on this ground.[165] However, at least in those circumstances where water is supplied by privately owned utilities, the total revenues of which are limited by the state commission, the decreasing block does little to encourage water conservation and consequently little to encourage water reuse.

Rate structures designed to promote conservation may have, as their goal, either reduction of peak demand or reduction of average demand, or both. Depending on the goal selected, the strategy employed may differ. While the goal of peak demand reduction is attractive to utilities and regulators as a matter of operational efficiency, where water conservation is desired, reduction of average demand appears to be the proper goal.

The most obvious mechanism for effecting such a reduction is merely to raise rates across the board.[166] However, rate increases may not be

161. *Id.* at 230-31.
162. Note, *supra* note 154, at 165.
163. *Id.*
164. *Id.* at 166.
165. *Id.*
166. *See, e.g.*, SURVEY AND ANALYSIS, *supra* note 139, at 78.

possible for privately owned utilities, since their total revenue needs are monitored by the state commissions and only rates yielding an approved rate of return are allowed. Nevertheless, municipal water suppliers generally are free to set rates without strict regard for revenue requirements,[167] and such suppliers could do worse in promoting conservation than merely to raise their rates.

Where a general rate increase is legally or politically impossible, some type of rate structure change may be attempted. Two alternative types are frequently suggested: flat or increasing block rates and seasonal rates.[168] Unfortunately, there is little empirical evidence that either of these rate structures significantly reduces total demand in every case.[169] Unlike a general price increase which effectively raises every user's bill and thus encourages conservation, a rate structure change does not necessarily alter the total cost paid for water by all users combined. Thus, some users will pay more for their water, while others will pay less and most will probably pay about the same. Average consumption will decline only if those who are paying more can conserve to a greater degree than those who pay less can increase their demand to take advantage of their bargain.[170]

With respect to the two rate structure alternatives noted above, the users who will pay significantly more in the case of flat or increasing block rates are the large volume users. Typically, these are industries which may be able to implement reuse as a means of conservation. If the rate structure is effective in promoting reuse, average consumption will decline. In the case of seasonal rates, in contrast, the users who will pay significantly more are likely to be residential customers who are using the water for lawns, car washing and the like. These users will effect conservation by curtailing or abandoning such activities and thus primarily reduce peak demand (although, incidentally, average demand will also decline).

Clearly, then, the increasing block structure is preferred as a means of promoting conservation through reuse. Its usefulness would be enhanced, however, if it were applied to a carefully defined class of users capable of implementing reuse. In this regard, it should be noted that the traditional rate classes — residential, commercial and industrial — have been used because they reflect cost-of-service differences among users.[171] If other differences — such as the ability to conserve

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167. *Id.* at 77-78.

168. *See* Spring Valley Water Co. — Phase II (Case 27567) Opinion No. 80-22 (N.Y. Pub. Serv. Comm'n, May 30, 1980).

169. SURVEY AND ANALYSIS, *supra* note 139, at 110.

170. Note, *Conservation, Lifeline Rates and Public Utility Regulatory Commissions*, 19 NAT. RES. J. 411, 412-13 (1979).

171. *Id.* at 414.

through reuse — are to become central to rate structure design, different rate classes may be appropriate.

There remains the question of whether either increasing block or seasonal rates may legally be imposed as an inducement to conservation. It can be argued in support of these rate structures that, as a matter of public policy, conservation is to be encouraged and these rate structures thus serve an important public policy goal. Alternatively, it can be argued that the costs of producing additional units of service are now so great and increasing so fast that water supply is effectively an increasing marginal cost service.

The first argument was flatly rejected in *Central Maine Power Co. v. Public Utilities Commission*,[172] where conservation was held not to be a justification for rate discrimination.[173] Moreover, at least one commentator has concluded that there has not been one rate design for any type of public utility anywhere in the country that has been legally upheld based on considerations other than economic ones, except where express statutory authority for such a basis is given.[174]

No such express statutory authority exists in any of the northern New England states. However, the Massachusetts and New Hampshire courts have hinted that they might not require such authority in a proper case.[175] Moreover, since municipal water suppliers are not subject to the restrictions in rate setting that apply to privately-owned utilities, there is reason to believe that their rate structures based on conservation goals can more readily withstand challenge under present authority.

The second justification, that a conservation rate structure reflects actual marginal costs, is more readily accepted if it can be factually supported. The New York Public Service Commission has found the necessary factual support for seasonal rates that have the effect of reducing peak demand and thereby improving operational efficiency,[176] but

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172. 405 A.2d 153 (Me. 1979).

173. "While conservation ... is an undisputed goal, it cannot be the justification for [rate] discrimination...." 405 A.2d at 190. The court did concede, however, that utility rates need not be based solely on cost factors. *See also* New England Tel. & Tel. Co. v. Public Util. Comm'n, 290 A.2d 617 (R.I. 1978).

174. *See* Note, *supra* note 170, at 420.

175. Massachusetts: The Department of Public Utilities may, in a rate proceeding, take into account "factors which reduce the need as well as those which increase it." Boston Edison Co. v. DPU, 375 Mass. 1, 22, 375 N.E.2d 305, 320, *cert. denied*, 439 U.S. 921 (1978) (quoting Alabama-Tennessee Nat. Gas Co. v. Federal Power Comm'n, 203 F.2d 494, 498 (3d Cir. 1953)). New Hampshire: The principle that each customer pay no more nor less than his fair share of the utility's cost "need not be the sole, nor even the main, factor in determining rate increases." Granite State Alarm, Inc. v. New England Tel. & Tel. Co., 111 N.H. 235, 279 A.2d 595 (1971). *But see* Hastings v. Village of Stowe, 125 Vt. 227, 232, 214 A.2d 56, 60 (1964) ("justness and reasonableness" inquiry involves only four factors: gross revenues, operating expenses, rate base and rate of return).

176. Spring Valley Water Co. — Phase II (Case 27567) Opinion No. 80-22 (N.Y. Pub. Serv. Comm'n, May 30, 1980).

similar factual support for increasing block structures may be more difficult to produce. However, since all northern New England state commissions routinely base their decisions on the type and cost of services provided to members of each class,[177] such factual support is the shortest path to approval of conservation rate structures.

From the foregoing, it can be concluded that municipal water suppliers have the legal authority and discretion and therefore are in a uniquely suitable position to use their rate-setting authority to induce water conservation generally, to reduce peak demand or to reduce average demand through such mechanisms as industrial reuse. The available evidence indicates that raising water rates has a significant impact on water conservation — beyond what seems possible from rate structure manipulation — and that moving from a decreasing block rate structure to an increasing block rate structure, or to a flat rate structure, tends to promote conservation and reuse.[178]

Privately operated utilities have more restrictions and fewer powers than their municipal counterparts and thus are less well equipped to use their rates to foster conservation. To the extent that they can factually support increasing block rate structures, and apply them to a class of high volume users with the capacity to conserve through water reuse and related measures, they will maximize the impact of their efforts. Finally, in both cases, the rate structure should be based on a rational and factually-based analysis to support any differential rates for the different classes of users, to avoid legal challenges that the rates are discriminatory or arbitrary.

## CONCLUSION

Future management of water supplies in northern New England must incorporate conservation principles and water reuse or recycling strategies if sufficient water is to be available to meet demand. However, many legal and institutional factors obstruct the adoption of reuse or recycling as a conservation strategy. The water shortages that currently exist in Massachusetts, New Hampshire, Maine and Vermont will not be solved, nor will the necessary steps be taken for adopting conservation measures in future management of water supply, until certain legal and institutional reforms have been carried out.

The reforms that are needed must be carried out at federal, state and local levels of government. For example, Congress and the Federal Environmental Protection Agency should build into effluent discharge restrictions and variances more effective incentives for reuse and recycling systems. State and local officials should take steps to reform water

177. *See* note 150 *supra*.
178. *See* notes 164-70 and accompanying text *supra*.

rate structures and eliminate further use of the "decreasing block" rate structure.

Other reforms may be carried out by the various users of water — industrial, agricultural, residential, municipal — on a private voluntary basis. For example, private compacts on the cooperative use of a river or aquifer can be reached to assure that all users are incorporated in a network of water use and reuse which meets their needs. This would diminish the persistent threat to recycling posed by common law doctrines.