Notes

ECONOMIC INCENTIVES FOR POLLUTION ABATEMENT: APPLYING THEORY TO PRACTICE

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The rapidly accelerating deterioration of our atmosphere and waterways is the focus of major political debates and increased public concern. The problem has been identified. What remains is to find solutions. A plethora of federal legislation has been directed towards this end which, in turn, has encouraged state legislation. Indeed, the rhetoric of legislators, administrators and commentators has been so great that it could be suggested, perhaps not wholly in jest, that the surfeit of legislation and information on pollution has become another dimension of the same problem.

Notwithstanding these efforts to avoid an ecological catastrophe, our society is like the Red Queen who ran faster and faster merely to remain in the same place. The measures which have been undertaken by industry and government have too often been inadequate and have been adopted without a thorough understanding of their consequences. An example is the removal of nonbiodegradable and foam-producing Alkyl Benzene Sulfonate from household detergents. In its place, Linear Alkyl Sulfonate has been substituted. It acts as a nutrient to algae, increases the biochemical oxygen demand, and accelerates the eutrophication, or geological aging, of bodies of water into which it is discharged.[1] Senator William Proxmire has summarized the inadequacies of present efforts to curb water pollution:

> Despite the enactment of three major pieces of legislation, we are losing ground. Despite a loud public outcry, we are in worse shape now than when the first control legislation was enacted. Despite our most vigorous efforts, we have made little progress toward cleaning up our Nation's waterways in the last 10 years. . . .
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> . . . The question which must be asked . . . is how much cleaner is the water? The simple fact is that it is dirtier. Somewhere we have made mistakes in organizing the fight.[2]

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[1] *See generally Hearings on H.R. 4148 and Related Bills Before House Comm. on Public Works,* 91st Cong., 1st Sess., at 591 (1969); *Hearings on Bills Amending the Federal Water Pollution Control Act and Other Pending Legislation Related to Water Pollution Control Before the Subcomm. on Air and Water Pollution of the Senate Comm. on Public Works,* 91st Cong., 2d Sess., pt. 3, at 1083-1194 (1970) [hereinafter cited as *Water Pollution—1970*].

[2] 115 CONG. REC. S. 14971 (daily ed. Nov. 25, 1969). Senator Proxmire

The present regulatory schemes have engendered hope of winning the battle to preserve the environment and indeed have the superficial appearance of providing strict controls. Their efficacy, however, may be much less than appearances would indicate. The Department of Interior's guidelines for state water quality criteria[3] were undermined by the ease with which regulatory agencies granted variances from effluent emission standards.[4] Similarly, when attempts are made to negotiate abatement measures for industrial smoke emissions under a permit system, industry frequently responds with prolonged delays and inaction.[5] Various forms of subsidies and tax relief have also proved inadequate as means of controlling effluence.[6] Reliance upon injunctive relief or the use of criminal sanctions against polluters is unsatisfactory because of the delays inherent in these actions and the inability of the judicial system to enforce a broad abatement program.

Recognizing the failures of the measures which have been undertaken to date and the consequent need for more effective pollution abatement efforts, this note will define pollution in economic terms, identify briefly the major categories of control and finally examine the use of economic incentives as a means of encouraging abatement by industry.[7] In general,

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evaluates the effectiveness of current pollution abatement measures by comparing the present level of effluents with the level prior to the enactment of control legislation. Presumably, the present level is lower than it otherwise would have been without such control measures, but the proper standard for evaluation should be the absolute and not the relative amount of contaminants in our environment.

[3] *Hearings on Water Quality Standards Before the Subcomm. on Air and Water Pollution of the Senate Comm. on Public Works,* 90th Cong., 2d Sess., pt. 1, at 11 (1968) [hereinafter cited as *Water Pollution—1968*].

[4] *See, e.g., Hearings on H.R. 13104 and H.R. 16076 (And Related Bills) Before the House Comm. on Public Works,* 89th Cong., 2d Sess., at 81 (1966) [hereinafter cited as *House Federal Water Pollution Control Act Hearings*].

[5] *See, e.g., Hearings on Problems and Programs Associated with the Control of Air Pollution Before the Subcomm. on Air and Water Pollution of the Senate Comm. on Public Works,* 91st Cong., 1st Sess., at 71 *et seq.* (1969).

[6] For a general criticism of the use of tax incentives as a means of obtaining policy objectives, see Surrey, *Tax Incentives as a Device for Implementing Government Policy: A Comparison with Direct Government Expenditures,* 83 HARV. L. REV. 705 (1970). For a criticism of the use of tax incentives in the field of pollution control, see Address by Douglas B. Wilson, Tax Institute of America Symposium, Princeton, N.J., Nov. 21, 1969 (the proceedings of the Symposium will be published by the Institute). *See also* S. DEGLER & S. BLOOM, FEDERAL POLLUTION CONTROL PROGRAMS: WATER, AIR AND SOLID WASTES 14 (1969); V. PRAKASH & R. MORGAN, JR., ECONOMIC INCENTIVES AND WATER QUALITY MANAGEMENT PROGRAMS ch. 3 (1969); Gerhardt, *Incentives to Air Pollution Control,* 33 LAW & CONTEMP. PROB. 358, 361-63 (1968); Mills, *Economic Incentives in Air-Pollution Control,* in CONTROLLING POLLUTION—THE ECONOMICS OF A CLEANER AMERICA 100, 103-04 (M. Goldman ed. 1967); Note, *Special Problems of Water Pollution: The Private Sector,* 1 U.C.D.L. REV. 105, 133-36 (1969). For favorable views on the use of tax incentives in related areas of environmental improvement, see THE PRESIDENT'S COUNCIL ON RECREATION AND NATURAL BEAUTY, FROM SEA TO SHINING SEA 79, 108, 133, 256 (1968); REPORT OF THE ENVIRONMENTAL STUDY GROUP TO THE ENVIRONMENTAL STUDIES BOARD OF THE NATIONAL ACADEMY OF SCIENCES NATIONAL ACADEMY OF ENGINEERING INSTITUTIONS FOR EFFECTIVE MANAGEMENT OF THE ENVIRONMENT 19 (1970).

[7] Primary emphasis will be placed upon economic incentives and the disposal of effluents and effuvia by stationary emitters. This is not to say, however, that economic incentives may not play an important role in broader questions related to

the analysis presented will apply to incentives for the abatement of both air and water pollution by reductions in the quantity and impurity of wastes. In some instances, however, the incentives will be applicable only to the disposal of solid and liquid wastes which, unlike effluvia, are amenable to offsite treatment.

AN ECONOMIC VIEW OF POLLUTION

To the economist, the damage to the environment caused by disposal of untreated industrial wastes is the result of a breakdown in the market economy. Polluters are able to pass the cost of their waste disposal on to other users of the waterways and atmosphere. So long as the costs associated with this disposal are not included with other production costs, businesses have no persuasive economic reason not to pass this cost on in the form of increased pollution. Indeed, there may be positive economic pressures forcing an emitter to continue its pollution. So long as competition exists among firms within a given market, polluters would place themselves at a competitive disadvantage if they were to undertake costly abatement measures while other firms continue to pollute.[8] Individualized efforts at curtailing waste emissions would be discouraged and some form of collective action would be necessary in order to effect a reduction.

Water and air can no longer be looked upon as free goods.[9] An economic cost must be associated with their use as waste disposal systems.[10] Thus, the magnitude of our present environmental problem is, at least in

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preserving the quality of the environment. Another possible use may be found in the area of pesticide control.

> Among the possibilities to be considered is the use of taxes to encourage a shift in pesticides used. . . . If it were known, for example, that certain uses produce no external effects, they should not be taxed. But if uses were not thought to differ very much in their external effects, a tax on all uses or on the production of the toxicant would achieve a reduction in its use, especially in those areas where effective substitutes are available. O. HERFINDAHL & A. KNEESE, QUALITY OF THE ENVIRONMENT: AN ECONOMIC APPROACH TO SOME PROBLEMS IN USING LAND, WATER, AND AIR 49 (1965).

[8] Within the context of a market-wide system of emission charges based upon the amount of damage caused by waste disposal, such an economic phenomenon would have the effect of eliminating those competitors whose emissions caused the greatest amount of damage. *Cf.* note 30, *infra*, and text following note 51, *infra*. If all competitors are required to internalize the costs of their waste emissions and if production costs are otherwise the same, the product which can be manufactured with the least damaging waste emission will have a price advantage over those products the manufacturing of which causes a greater amount of pollution.

[9] *See* Crocker, *Some Economics of Air Pollution Control*, 8 NAT. RES. J. 236 (1968); Wolozin, *The Economics of Air Pollution: Central Problems*, 33 LAW & CONTEMP. PROB. 227 (1968).

[10] "Water and air are traditionally examples of free goods in economics. But in reality, in developed economies they are common property resources of great and increasing value presenting society with important and difficult allocation problems which exchange in private markets cannot resolve." R. Ayres & A. Kneese, Production, Consumption, and Externalities 283 July, 1969 (Resources for the Future, Inc. Reprint No. 76). If water and air are looked upon as "common property resources," their use as waste disposal systems represents the imposition of a social cost by the emitter.

part, a function of offsite burdens; offsite users are forced to bear the cost of increased pollution rather than having the complete cost of waste disposal placed upon the actual polluters.[11] These offsite costs may be viewed as classic examples of external diseconomies, or simply externalities,[12] because they are production costs not borne by the producer.[13]

If, on the other hand, the costs occasioned by the discharge of effluents and effluvia were internalized—or borne by the emitter in the same manner as he must pay the cost of raw materials, labor and plant operating expenses—there would be a positive incentive to lessen these costs by reducing the quantity and destructiveness of the discharges. Whenever the marginal damage to the environment exceeded the marginal costs of an alternative means of waste disposal, pollution would be reduced incrementally.[14] This internalization of economic activity might be effected in a variety of ways,[15] all of which would be characterized by the consideration of the costs and benefits within the same decision-making unit.

The net gains in resource utilization which can be obtained by internalizing the costs and benefits of pollution abatement can be demonstrated

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[11] "The economist's views on air quality management [are that] . . . [t]he discharge of pollutants into the air imposes on some people costs which are not adequately borne by the sources of the pollution due to the failure of the market mechanism, resulting in more air pollution than would be desirable from the point of view of society as a whole." Hagevik, *Legislating for Air Quality Management: Reducing Theory to Practice*, 33 LAW & CONTEMP. PROB. 369, 371 (1968).

[12] The effects of economic activity are externalized when the benefits or costs arising therefrom are felt offsite and are neither enjoyed nor incurred by the operation giving rise to those effects. "If external effects are present, a misallocation of resources is likely to be the result whether the external effect is beneficial or detrimental to its recipient. The reason for this is that the signals which tell a firm how much it should produce—price and cost—may not work properly in the presence of external effects." O. HERFINDAHL & A. KNEESE, *supra* note 7, at 7. *See also* Goldman, *Pollution: The Mess Around Us*, in CONTROLLING POLLUTION—THE ECONOMICS OF A CLEANER AMERICA 3, 10-11 (M. Goldman ed. 1967).

The presence of external diseconomies does not, however, necessitate the conclusion that it would be economically desirable to abate the pollution. If the cost of an alternative means of waste disposal exceeds the damage caused by the pollution, abatement would be inappropriate even though external diseconomies are present.

[13] *See generally*, O. HERFINDAHL & A. KNEESE, *supra* note 7, at 4-9; Ayres & Kneese, *supra* note 10; A. Kneese & R. d'Arge, Pervasive External Costs and the Response of Society, July, 1969 (Resources for the Future, Inc. Reprint No. 80); Kapp, *Social Costs of Business Enterprise*, in CONTROLLING POLLUTION—THE ECONOMICS OF A CLEANER AMERICA 82 (M. Goldman ed. 1967).

[14] If the costs were to be internalized, the polluter would be forced to weigh the costs of abatement against the benefits to be obtained by the elimination of pollution. Where the marginal costs of abatement measures were less than the marginal gains in the quality of the environment, pollution would be reduced. On the other hand, if the benefits from abatement are less than the costs associated with abatement, there would be no economic justification for curtailing the pollution.

[15] The economic units which generate and those which receive the external effect might, for example, reach an agreement for the payment of costs associated with the externality, or have an agreement imposed upon them by a governmental agency. In this manner, a downstream user might find it less expensive to pay an upstream emitter to reduce its discharges than to treat its intake itself. Alternatively, the size of the economic unit might be structured so that all relevant costs and benefits are considered within the same economic unit. A system of emission fees would characterize this type of economic control.

briefly. Assume that Henry David Thoreau, by increasing the expenditures for his small farm from $14.72 1/2 to $20.00 by the purchase and use of fertilizers, can increase its gross income from $23.44 to $50.00. The use of the fertilizer is not without its side effects, however, and the run off from the rainfall carries it into Walden pond where it acts as a nutrient for algal growth. Assume further that the resultant degradation of water quality has a total economic cost, considering aesthetic, health, and recreational factors, of $10.00 for each user and that the cost of abatement by means of constructing a run off ditch would be $11.00.

Inasmuch as Thoreau's marginal benefit from using the fertilizer exceeds the marginal cost of increased eutrophication, which, in turn, is less than the marginal cost of abatement measures, his optimal solution would be to fertilize the fields and accept the resultant pollution. If Thoreau were the sole user of Walden, all of the costs would be internalized, and there would be neither external diseconomies nor a misallocation of resources. If there are others who use the pond, however, external diseconomies would arise inasmuch as Thoreau would not be bearing the full cost of his farm, and a Pareto suboptimal situation would exist.[16]

The external diseconomies which arise when more than one user must suffer the consequences of the degradation of Walden pond could be alleviated in a variety of ways. The injured parties could, for example, pay Thoreau to induce him to undertake abatement measures. Similarly, Thoreau could be required to pay the costs associated with his pollution either through damages in a nuisance suit or through effluent charges. In either event, the diseconomies would be internalized, abatement would result and a Pareto optimal solution could be obtained. Governmental regulation of pollution discharge should also result in the preservation of Walden, although a Pareto optimum would not necessarily be reached because of a government agency's inability to consider the full range of economic alternatives.

CATEGORIES OF POLLUTION CONTROL

Governmental pollution abatement efforts may take one of three basic forms. First, the emitter could be regulated, in which event he might be required to meet minimum performance standards or comply with directives to treat his wastes in a particular manner. Second, subsidies could be awarded either on the basis of actual reductions in the amount of emissions or for performing acts designed to effect such reductions. Finally, the polluter could be forced to pay the costs occasioned by his waste discharge. Subsidization and regulation comprise the traditional "carrot and stick" approach to abatement. The imposition of emission charges embodies

[16] A Pareto optimum exists where there can be no further gain in the trade of economic goods which is not more than offset by a loss to some party. *See generally* Buchanan & Stubblebine, *Externality*, 29 ECONOMICA 371 (1962).

elements of both reward and penalty because the charge is proportional to the damage caused thereby creating positive incentives for reductions in emissions.

Regulation

The regulation of the emitter has been the method of emission control traditionally embodied in legislation. Regulation includes measures such as licensing, zoning controls, emission standards, criminal sanctions, and equitable suits for abatement of nuisances. The crux of all of these means of control is the establishment of minimum standards which the polluter must meet. At least when standing alone, these various categories have not proved to be effective means of minimizing the damage caused by waste discharge.[17] These are, after all, the methods which Senator Proxmire decried as leading to the current environmental deterioration. Moreover, control by means of regulation offers the polluter only the crudest form of economic incentives not to pollute,[18] and may be economically dysfunctional.[19] Indeed, loosely drawn regulatory statutes and lax enforcement may actually encourage pollution.

Even if it is assumed that the polluter fully complies with standards imposed on him, there would be no incentive to incur the further expenses which would be necessary to obtain additional reductions in the quantity of emissions. As Senator Proxmire has wryly noted, "[without a] clear incentive to stop pollution, you will hire public relations men to show pollution isn't really serious, or is necessary, but you will not cut your pollution."[19a] Similarly, the impetus for research and development of better methods of control would be missing once the minimum standards had been satisfied. Thus, even though the marginal costs of additional control efforts might be less than the total marginal gains which society could reap, the polluter would have no economic incentive to take additional measures.

The regulatory approach to pollution control presents another major drawback. Administrative and legislative bodies inherently have more

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[17] *See generally* Walker, *Laws, Regulations and Ordinances in the Air Pollution Field*, 3 NATURAL RESOURCES LAW. 74 (1970).

[18] Possible exceptions to this statement would exist where the costs of the fines imposed for violations exceeds the costs of compliance or where the loss occasioned by closing down a manufacturing facility because of an injunction would be less than the cost of taking corrective action. Similarly, there would, no doubt, be economic benefits to firms in the form of better public relations if they were to abate their waste discharges. In all of these cases, however, the form of incentive to the polluter is very crude and does not operate so as to reach an optimal solution.

[19] Regulation and strict emission standards may often result in disproportionate and unnecessary rises in production costs without any corresponding benefit in the reduction of emissions. *See* Walker, *supra* note 17, at 75. Thus, a strict application of the rule that "all wastes amenable to treatment will be treated," *Water Pollution—1968*, *supra* note 3, at 11, might result in steep increases in production costs without yielding a corresponding benefit to the environment.

[19a] *Water Pollution—1970*, *supra* note 1, pt. 1, at 196.

limited access to technical information and possible alternative means of production than the businesses they seek to regulate. Even if this information were more readily available, governmental agencies are simply not equipped to digest it sufficiently to formulate the most efficient abatement measures on a factory-by-factory or river-by-river basis. Consequently, they have a narrower range of means at their disposal by which they can reduce the emissions of a particular source.[20]

> [D]irect regulation . . . is too rigid and inflexible, and loses the advantages of decentralized decision-making. For example, a rule that facories limit their discharges of pollutants to certain levels would be less desirable than a system of effluent fees that achieved the same overall reduction in pollution, in that the latter would permit each firm to make the adjustment to the extent and in the manner that best suited its own situation. Direct restrictions are usually cumbersome to administer, and rarely achieve more than the grossest form of control. In spite of the fact that almost all of our present control programs fall into this category, they should be tried only after all others have been found unworkable.[21]

Subsidies

Subsidies in the form of tax incentives to encourage the abatement of pollution are in use at both the state[22] and federal levels.[23] Property tax exemptions are the most commonly used form of tax relief,[24] although fast writeoff depreciation provisions,[25] sales and use tax exemptions,[26] and tax credits are now being used with greater frequency.[27] Although outright payments to encourage the reduction of emissions by industrial polluters have seen some use, they have not as yet been utilized to the full extent possible.[28] Cash payments for pollution abatement measures should be preferred over tax benefits because they may more easily be administered in a manner which gives preferential treatment to economic units less able to undertake large financial expenditures and because they avoid inject-

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20 Hagevik, *supra* note 11, at 372.

21 Mills, *supra* note 6, at 102-03.

22 *See generally* HOUSE COMM. ON GOVERNMENT OPERATIONS, VIEWS OF THE GOVERNORS ON TAX INCENTIVES AND EFFLUENT CHARGES, H.R. No. 1330, 89th Cong., 2d Sess. (1966) [hereinafter cited as VIEWS OF THE GOVERNORS].

23 *See generally*, Wilson, *supra* note 6.

24 *See, e.g.*, CONN. GEN. STAT. ANN. §§ 12-81(51) & -81(52) (Supp. 1970-71); IDAHO CODE ANN. § 63-105T (Supp. 1969) (ad valorem exemption); MICH. STAT. ANN. §§ 7.793(4)(1) & 7.793(54)(1) (Supp. 1970); N.Y. REAL PROP. TAX LAW § 481 (McKinney Supp. 1970-71); S.C. CODE ANN. § 65-1522(45.1) (Supp. 1969) (ad valorem exemption).

25 *See, e.g.*, ARIZ. REV. STAT. ANN. § 43-123.02 (Supp. 1969-70); MASS. ANN. LAWS ch. 63, § 38D (Supp. 1969).

26 *See e.g.*, ME. REV. STAT. ANN. tit. 36, § 1760(29) & (30) (Supp. 1970-71); MO. ANN. STAT. § 144.030.3(13) & (14) (Supp. 1969-70).

27 *See, e.g.*, N.Y. TAX LAW §§ 210(12)(f) & 701(d)(6) (McKinney Supp. 1970-71); WASH. REV. CODE ANN. § 82.34.050(2) (Supp. 1969).

28 *See generally* Working Committee on Economic Incentives, Federal Coordinating Committee on the Economic Impact of Pollution Abatement, Cost Sharing with Industry? Nov. 20, 1967 [hereinafter cited as *Cost Sharing with Industry?*].

ing new preferences into tax codes already overburdened with exceptions.[29]

Although not as economically attractive as a system of effluent charges, government subsidies to industries for pollution abatement may have significant advantages. Subsidies have the potential of acting to internalize the costs of abatement by increasing the size of the economic unit which is undertaking control measures. Moreover, if subsidies were in the form of performance payments for reductions in the amount and impurity of waste discharged, rather than being partial payments for capital expenditures, there would be a continuing incentive to reduce emissions to the Pareto optimum.

One argument frequently advanced in support of tax relief and outright payments to industry is the fact that the assets employed by industry in their abatement programs are economically unproductive.[30] Former Secretary of Interior Stuart Udall, for example, characterized tax incentives for abatement facilities as "sound and wise, because, after all, a pollution control facility is not an economic investment as such; it serves a social purpose."[31] Similarly, in the 1966 Senate hearings on the Federal Water Pollution Control Act amendments, Senator Abraham Ribicoff argued for providing tax relief:

> [Water and air pollution control devices] don't bring any compensation to an industry. Now since the public has an interest in this and since we want clean water and clean air, then we must encourage industry to cooperate. Since the entire community is a beneficiary then I think the tax laws should be used as a weapon, as a social instrument, as an economic instrument, to make successful what we are seeking to achieve because there is no sense of trying to spend hundreds of millions of dollars and still have the dirty streams, when for another $150 mililon [sic] by a tax credit proposal, you can get the

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[29] *See* Surrey, *supra* note 6, *passim.*
See also Cost Sharing with Industry?, *supra* note 28, at 3:
Across-the-board assistance for capital investment such as tax writeoffs (credits or accelerated depreciation) and grants are unnecessary because the burden of pollution abatement is estimated to be only moderate. Also, this form of subsidy is inefficient because such assistance provides an incentive for excessive use of capital and practically excludes similar assistance to process changes that jointly reduce pollution and increase productivity. Moreover, such aid is likely to be an undesirable precedent for using tax writeoffs for other programs . . . .

[30] Even though the assets may be nonproductive, their cost might be passed on to the ultimate consumer without an adverse effect upon corporate profits. Thus, if there is an inelastic market or if there is a high degree of product differentiation, the manufacturer would be able to pass the cost of abatement on to the consumer and any governmental subsidies would be superfluous. *See* Wilson, *supra* note 6, at 5 n.5. If, on the other hand, there is a high degree of cross elasticity between a product for which heavy abatement costs are required and another product without comparable costs, a subsidy would be required so that the firm with the high abatement costs could remain competitive with the other. In this situation, however, the subsidy would be economically dysfunctional because it would lead to the overconsumption of the product subsidized in relation to the total economic cost of its manufacture.

[31] *House Federal Water Pollution Control Act Hearings, supra* note 4, at 56.

active cooperation of industry.[32]

On balance, however, subsidies—whether in the form of tax relief or outright payments—have major drawbacks. The polluter is imposing a cost on the remainder of society by disposing of his wastes in the air and water which everyone must use. To pay the polluter to stop this destruction is nothing less than blackmail. The contamination of the environment is a wrong imposed on all members of society, and it would be egregiously inequitable to pay the polluter to refrain from an act which he has no right to commit.

Another criticism of subsidies is the fact that they are often payments or incentives for inefficient means of waste disposal.[33] Production changes frequently are a more efficient means of reducing the emission of waste than end-of-line abatement facilities.[34] The subsidy programs which have been enacted are nonetheless limited to incentives for capital investment even though this may result in a Pareto suboptimum.[35] Such subsidy payments make capital expenditures artificially inexpensive in relation to process changes with the ultimate result being that what may be the most effective means of abatement is actually discouraged.

An additional deficiency of the subsidy approach is that it simply does not accomplish what it sets out to do. Senator Ribicoff characterized tax relief measures as a means to "get the active cooperation of industry." The magnitude of the present subsidy programs is so insufficient that they do not actually provide an incentive for pollution control, but merely reduce the cost of such measures to the polluter. A fast writeoff may reduce the cost of an abatement facility, but it does not eliminate the fact that industry is being required to invest in assets which will not necessarily produce any economic benefit.

The inadequacies of the use of tax relief as an incentive to investment in abatement facilities may also be attributed to the nature of the cor-

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[32] *Hearings on S. 2947, S. 2987 and Related Bills Before the Subcomm. on Air and Water Pollution of the Senate Comm. on Public Works*, 89th Cong., 2d Sess., at 39 (1966) [hereinafter cited as *Water Pollution Control—1966*]. *See also* S. DEGLER & S. BLOOM, *supra* note 6, at 14.

It should be noted that Senator Ribicoff's argument that pollution abatement devices have no economic function loses its force when emission charges are imposed. In such a situation, the abatement measures serve to avoid the costs imposed by emission charges. Even in this case, however, subsidies might be attractive as a means of lowering the costs of the abatement measures.

[33] *See, e.g.*, Hagevik, *supra* note 11, at 375-76.

[34] For examples of the extent to which technological changes may be utilized to effect reductions in waste discharges, see Bower, *The Economics of Industrial Water Utilization*, in WATER RESEARCH 143 (A. Kneese & S. Smith ed. 1966).

[35] *Hearings Before the Subcomm. on Air and Water Pollution of the Senate Comm. on Public Works*, 90th Cong., 1st Sess., pt. 2, at 584-85 (1967):

> For example, a process change is often, in the long run, the least cost [to the polluter] method for preventing and controlling industrial pollution since it is easier to remove pollutants at each stage in the process than to try to treat industry's effluent at the outfall.
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> Also, the removal and recovery of pollutants at each stage in the process can in many instances be profitable.

porate decision-making process. For a tax incentive to be effective, it must be successful in bringing about the desired behavior by the taxpayer.[36] This would necessarily require that the benefit afforded by the tax relief be considered in the decision-making process. One recent study, however, has indicated that tax incentives might not play as great a role in capital expenditure decisions as might be expected.[37] These incentives tend to be ignored because their dollar amounts are insignificant in comparison to the expenditures involved, the expenditures are necessitated by competitive factors not dependent upon the tax structure, and the nature of such incentives is uncertain in the context of long range planning.[38]

A system of subsidies embodying rewards for reductions in the amount and impurity of wastes might appear to be symmetrical to emission charges. In one case, a subsidy is earned for waste reductions, while in the other, the payment required of the emitter decreases proportionately with the discharges. In both instances, there would be an economic incentive to initiate abatement measures.

Upon analysis, however, the similarity between the two is not as great as might be supposed.[39] Implementing a system of payments for reduc-

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[36] Indeed, this statement is tautological because a "tax incentive [is] a tax expenditure which induces certain activities or behavior in response to the monetary benefit available." Surrey, *supra* note 6, at 711. Whether the traditional type of tax relief even accomplishes this purpose has been questioned. McCarren, *Luring Industry Through Tax Exemption*, in TAX POLICY LEAGUE SYMPOSIUM, TAX EXERPTIONS 39 (1939).

[37] G. Halverson, Attitude of Corporate Executives Toward Use of Tax Devices as Economic Conditioners 133 (1968) (unpublished thesis submitted to Indiana University School of Business). The following schedule from the thesis is based upon interviews with personnel from 66 of the largest firms in the United States selected from the FORTUNE DIRECTORY of October, 1966.

CONSIDERATION GIVEN TO TAX DEVICES DURING INVESTMENT REVIEW

Level of Consideration	*Accelerated Depreciation*	*Investment Credit*
1. *No consideration given during review.*	10[15%]	8[12%]
2. *Some consideration but of minor importance (could be easily ignored).*	22[33%]	24[36%]
3. *Some consideration given because of advantage of cash flow benefits, but not considered critical to review.*	33[50%]	28[43%]
4. *Material consideration given during review (difficult to ignore).*	1[2%]	6[9%]
Total	66[100%]	66[100%]

[38] *Id.* at 134-35. The effect of the tax structure may be greater, however, in industries where capital expenditures are a major element of total production costs. "Thus the impacts of tax policy on investment behavior tended to be larger for the chemicals and allied products than for total manufacturing which was not undergoing the same degree of capital deepening and did not have as high a rate of replacement to apply to the autonomous investment caused by the change in tax policy." J. Pitts, The Impact of Tax Policy on Investment Behavior in the Chemicals and Allied Products Industry 54 (1968) (unpublished thesis submitted to the University of Kentucky).

[39] *See generally* Kamien, Schwartz & Dolbear, *Asymmetry Between Bribes and Charges*, 2 WATER RESOURCES RESEARCH, First Quarter 1966, at 147. *But see* A.

tions in emissions would be extremely burdensome because "[e]stimating the amount that would be discharged in the absence of the payment would become increasingly complex as cost and revenue functions shift through time."[40] In contrast, discharge fees are imposed without consideration of the polluter's cost curve. Moreover, a system providing rewards for waste reduction could prove to be more expensive in the long run than the social cost of the pollution avoided.

> Waste contributors would have an incentive to adopt, or threaten to adopt, processes which generate much waste in order to be able to collect payments for restricting waste discharges. Payments would have to continue to a firm which left the basin as a means of reducing waste discharges. Moreover, payments would have to be made to potential dischargers which would have located in the basin [in] the absence of the payment.[41]

Payments for reductions in emissions nonetheless have a major advantage not found in other forms of subsidies. If the objective of governmental policy is the reduction of pollution, the basis for rewards should be the extent to which this objective is satisfied. Payments for reductions in wastes accomplish this directly. Tax relief determined as a function of capital expenditures, however, is at best an indirect means of measuring progress toward this goal. Indeed, there may be no correlation whatsoever between the tax subsidy and the incremental change in emissions. Thus, while payments for reductions are inferior to discharge fees, they are to be preferred over other forms of subsidies.

Discharge Fees

Waste disposal charges are the economist's most efficient tool for dealing with the problem of pollution abatement.[42] Under a system of emission fees, the polluter is made to bear the costs of his disposal directly and, with the costs internalized, can select the optimal means of abatement.[43] The implementation of a system of discharge fees might take a variety of forms. The private nuisance action, for example, is the oldest form by which the polluter has been forced to internalize the costs of his waste disposal.[44] In essence, the governmental imposition of dis-

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KNEESE, THE ECONOMICS OF REGIONAL WATER QUALITY MANAGEMENT 56-62, 90-98 (1964).

[40] R. Leonard, An Economic Evaluation of Connecticut Water Law: Water Rights, Public Water Supply and Pollution Control 64-65, July 1970 (Institute of Water Resources, University of Connecticut, Report No. 11).

[41] *Id.* at 65.

[42] For examples of theoretical models utilizing emission charges, see Crocker, *supra* note 9; Delogu, *Effluent Charges: A Method of Enforcing Stream Standards*, 19 ME. L. REV. 29 (1967).

[43] For a graphic representation of the means by which a Pareto optimal solution is reached, see Kneese, *Rationalizing Decisions in the Quality Management of Water Supply in Urban-Industrial Areas*, in THE PUBLIC ECONOMY OF URBAN COMMUNITIES 170, 173-74 (J. Margolis ed. 1965).

[44] *See* Comment, *The Role of Private Nuisance Law in the Control of Air Pollution*, 10 ARIZ. L. REV. 107, 108-09 (1968).

charge fees determined as a function of the damage caused is merely an extension of this type of cost internalization.[45] A schedule of emission fees predicated on the amount of damage done to the environment could be applied to wastes discharged into either the water or the atmosphere. The actual quantification of the damage caused is understandably the major difficulty in this approach.

Alternatively, fees could be imposed on the basis of the cost required to treat the discharged waste and return it to its natural condition.[46] Effluvia could not come within such a system because of the inability to treat gaseous wastes centrally in the same manner that sewage, for example, is treated. For effluents, however, this method of cost assessment is promising. It has been used in the highly successful Ruhr basin *Genossenschaften*[47] and by some American municipalities for determining sewage charges for industrial waste.[48] "The evidence indicates that where sewer charges have been levied, they have been effective in stimulating industries to modify either production processes or waste treatment methods or both."[49]

Charges might also be imposed as a purely punitive measure without any necessary correlation to the damages actually caused or to the costs of treatment. While this method would presumably act as a deterrent to further discharge, it would suffer from many of the same maladies that plague regulatory schemes because it would tend to induce manufacturers to undertake abatement measures more expensive than the social costs of the pollution which are thereby avoided.

The use of emission charges as a means of effecting abatement has advantages not found in other categories of control.[49a] The decision-making process is decentralized, resulting in the selection of a more efficient and

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[45] *See, e.g.*, Address by Dr. Fred A. Clarenbach, Industrial Wastes Institute, University of Wisconsin, Mar. 2, 1966, in 112 CONG. REC. 11720 (May 27, 1966). For a consideration of the problems involved in establishing the amount of effluent charge *see generally* Kneese, *supra* note 43, at 179-87.

[46] *See, e.g.*, Delogu, *supra* note 42, at 42.

[47] The *Genossenschaften* are the Ruhr basin river associations. *See generally* authorities collected in note 86 *infra*.

[48] *See, e.g.*, 115 CONG. REC. S 14972-73 (daily ed. Nov. 25, 1969) (Senator Proxmire). *See also Water Pollution—1970, supra* note 1, pt. 1, at 188-90.

[49] Bower, *supra* note 34, at 162.

[49a] Professor Edwin Mills has summarized the distinctive advantages of effluent fees over other methods of control:

> In the first place the effluent fee does not operate the way the tax credit does in the sense that it penalizes discharges of wastes into bodies of water. Therefore, the firm will reduce its fee or charge regardless of the means by which it abates the discharge and, therefore, the charge does not bias their response in one direction or another.
>
> The second important effect of an effluent fee is that it provides continuous abatement incentive. In enforcement actions, . . . a firm is finally asked to take certain actions, such as secondary waste treatment. Having undertaken those actions, it is not necessary [for the firm] to seek additional ways of abating discharges. With an effluent fee, the firm has an incentive to abate dicharges [sic] as long as it is discharging anything. *Water Pollution—1970, supra* note 1, pt. 1, at 369.

more economical means of control from a wider range of alternatives than those available to administrative or legislative bodies.[50] Moreover, the charge system would create a partial exchange of governmental administrative costs for increased compliance costs on the part of the polluter, and would be a revenue source rather than an increased drain on the government budget.[51]

A system of waste discharge fees may also introduce a finer degree of selectivity in decisions affecting pollution abatement than may be available under the regulatory or subsidy methods. If, for example, effluent emission fees were determined, in part, as a function of the flow of the stream into which the wastes are discharged, the polluter would have an inducement to retain his wastes during periods of low flow. Similarly, if the charges imposed for the discharge of gaseous wastes differed between two airsheds, a manufacturer contemplating construction of a new factory would have an incentive to locate in the airshed with the lower fees—an area in which, by definition, the damage to the atmosphere would be less.

In neither of these cases, however, would a system of tax incentives provide a solution leading to the least amount of pollution. Tax exemptions are generally uniform within the jurisdiction imposing the tax. Pollution, however, follows geographical and not political boundaries. A constant emission into the air or water will cause a varying degree of damage depending upon the characteristics of the receiving body. To grant tax relief on the basis of political rather than geographical boundaries is to ignore the fact that a dollar spent to prevent the discharge of waste into a body of air or water incapable of assimilating it yields a much higher reward than the same dollar spent to avoid discharges into more assimilative bodies. A regulatory approach, on the other hand, might be able to reach the same objectives attainable under a charge system, but only if a greater degree of refinement were introduced into regulation than has heretofore been evidenced. To do this effectively, the regulatory scheme would have to operate on a regional basis and would have to have the capacity to assess each emitter's abatement costs and alternatives individually. Plainly, this is beyond the capability of present administrative and regulatory bodies.

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[50] *Cf.* Hagevik, *supra* note 11, at 372; Mills, *supra* note 6, at 102-03.

[51] Letter from Senator William Proxmire to President Richard M. Nixon, Jan. 20, 1970, in 116 CONG. REC. S 1687-88 (daily ed. Feb. 16, 1970). *See also* note 98 *infra.*

In his testimony before the 1970 hearings of the Senate Subcommittee on Air and Water Pollution, Senator Proxmire said,

> The [effluent charge] system would assign responsibility for pollution control to those who are responsible for the pollution, and the polluters would pay for the damages caused by pollution instead of the public at large.
>
> Revenue would be generated which could be utilized to further pollu- control efforts in other sectors of the economy . . . . *Water Pollution—1970, supra* note 1, pt. 1, at 188.

The argument most frequently leveled against the use of emission charges is that they would create a license to pollute.[52] Initially, this argument might appear to be founded upon a misconception of the charge system,[53] because the current regulatory scheme is a more appropriate target of this criticism. Former Secretary of the Interior Stewart Udall has answered this criticism of the charge system saying, "We view the idea not as a license to pollute, but as a system of charges to pay the cost of cleaning up pollution."[54] The fact that this argument is most frequently propounded by the businessmen who would pay the charges—and normally the same businessmen who advocate governmental subsidies of industrial abatement measures—indicates that the real nature of this type of abatement scheme is fully understood by its antagonists.[55]

Senator Edmund E. Muskie has also criticized emission charges because they may work an inequity upon the first polluter to use a particular stream or airshed for waste disposal. If there is only one waste emitter, the dilution capacity of the receiving body may not be exceeded and there would be no need to impose an emission charge. Charges would not be needed until additional sources began using the air or water to dispose of their wastes and the dilution capacity is exceeded. Senator Muskie asks whether "it [is] fair to the first user to allow him to feel that he does not need to incorporate in the design of his plant some capacity to deal with his pollution under some as yet future undefined circumstances?"[55a]

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[52] *See, e.g.*, Goldman, *supra* note 12, at 36-37; Letter from Dr. Ellsworth R. Browneller, Chairman of the Pennsylvania Sanitary Water Board to Senator Jennings Randolph, Feb. 6, 1970, in *Water Pollution—1970, supra* note 1, pt. 5, at 1840.

[53] Senator Ribicoff, for example, looked upon effluent charges as a "financial arrangement whereby the polluters are penalized." *Water Pollution Control—1966, supra* note 32, at 36. He concluded that the effect of such a system would be to give "credence or permissiveness to polluters to continue pollution by an effluent charge instead of encouraging the elimination of pollution and the cooperation of industry along the lines of fast tax writeoffs." *Id.* Such an interpretation grossly overestimates the usefulness of tax relief which merely reduces the cost of unproductive assets and fails to comprehend the effect which effluent charges would have on an industry that utilized cost-benefit analysis. Moreover, Senator Ribicoff's position is anomalous because he would rather pay polluters to curtail socially undesirable behavior rather than penalize them for such behavior.

[54] Letter from Secretary Stewart Udall to Senator Edmund S. Muskie, May 25, 1966, in *Water Pollution Control—1966, supra* note 32, at 138a.

Secretary of the Interior Walter J. Hickel, on the other hand, gives a more limited endorsement to effluent charges:

> We don't disagree with the fact that there should be effluent charges. Where they go into a combined system, say, as some city system, that is. But just to have a fee for the effluent discharged is really giving them a right to pollute if they pay a fee.
>
> . . . .
>
> Though I firmly believe that any industrial plant should pay for the collection system, such as a user charge, we do not believe it is correct to allow them to pay a fee and pollute. We think that is a step in the wrong direction. *Water Pollution—1970, supra* note 1, pt. 1, at 291-92.

[55] *See, e.g.*, Statement of William R. Adams, President, St. Regis Paper Co., in *Water Pollution Control—1966, supra* note 32, at 512 *passim* and in *House Federal Water Pollution Control Act Hearings, supra* note 4, at 148-51; Statement of P.N. Gammelgard, Director, American Petroleum Institute Committee on Air and Water Conservation, in *Water Pollution Control—1966, supra* note 32, at 544.

[55a] *Water Pollution—1970, supra* note 1, pt. 1, at 229. *See also id.* at 230-32.

The criticism advanced by Senator Muskie implicitly assumes an unnecessarily stringent approach to pollution abatement and underestimates the potential effectiveness of emission charges. Pollution abatement measures should only prohibit waste discharges which are injurious to our environment or which are aesthetically offensive.[55b] To the extent that waste emissions do not transgress these standards, no sanctions need be imposed. Moreover, it would seem more inequitable to impose abatement requirements at a time when they were not needed than to wait until such time as they actually become necessary. In any event, if the emitter is apprised that charges will be imposed if the dilution capacity of the stream or airshed is exceeded, he may weigh that possibility against the cost of including treatment facilities in his initial construction and act accordingly.

THE EFFICACY OF TAX INCENTIVES

State Tax Relief

As is shown in Table I, 32 states have extended tax relief to industries installing pollution abatement facilities. The bulk of these measures—some 24 in all—are in the form of exemptions from ad valorem property taxes with the type of property eligible for preferential treatment varying greatly from state to state.[56] Tax credits, sales and use tax exemptions and rapid amortization for abatement facilities are other types of relief. These forms of incentives are similarly far from being uniform.[57]

State legislatures have differed widely in the magnitude of incentives that they were willing to extend to industrial polluters. The Oregon legislature, stating that it was its "policy . . . to assist in the prevention, control and reduction of air and water pollution . . . by providing tax relief,"[58]

Professor Orlando E. Delogu of the University of Maine School of Law answered this question, saying:

> I think he should not proceed naively. I think certainly he should be apprised of the possibility that as new activities move into the area covered by the ambient air standard or the watershed, he may very well need to, at some future date, undertake a pollution control program which will allow the capacity of the stream to not be exceeded. I think it is not fair in the same vein to suggest that he must be prepared the first day he opens his door to deal with pollution problems which are not in existence, which may not ever be in existence, with respect to that particular ambient air mass or watershed system. *Id.*

55b *See id.* at 232 (Prof. Delogu).

56 *Compare, e.g.,* IND. ANN. STAT. § 64-236 (Supp. 1970) (only tangible personal property exempt from ad valorem taxation), *and* MINN. STAT. ANN. § 272.02(15) (Supp. 1970) ("Real and personal property used primarily for the abatement and control of air or water pollution to the extent that it is so used."), *with* WIS. STAT. ANN. § 70.11(21)(c) (Supp. 1970-71) (all property used in governmentally approved abatement program).

57 *Compare* MASS. ANN. LAWS ch. 63, § 38D(*b*)(1) (Supp. 1969) (accelerated amortization allowable only for depreciable property), *and* N.Y. TAX LAW § 208 (9)(g)(2)(A) (McKinney 1966) (same), *with* N.C. GEN. STAT. § 105-122(b) (Supp. 1969) (entire cost, including cost of realty, may be written off in first year).

58 ORE. REV. STAT. § 449.615 (1968).

TABLE I: STATE TAX INCENTIVES FOR POLLUTION ABATEMENT FACILITIES

State	Income or Franchise Tax		Property Tax Exemption	Sales/Use Tax Exemption	Remarks
	Accelerated Depreciation	Tax Credit			
Alabama			ALA. CODE tit. 51, § 2(s) (Supp. 1969).	ALA. CODE tit. 51, §§ 786(34) & 789 (Supp. 1969).	
Alaska					General industrial tax incentives cover pollution abatement facilities' 60-month depreciation.
Arizona	ARIZ. REV. STAT. ANN. § 43-123.02 (Supp. 1969-70).				
Arkansas					Severance tax credit to oil and gas producers who dispose of brine in approved manner. ARK. STAT. ANN. §§ 84-2113 to -2121 (Supp. 1969).
California	CAL. REV. & TAX. CODE §§ 17226 & 17226.5 (West Supp. 1970).				Election between 60-month and 1-year depreciation.
Connecticut		CONN. GEN. STAT. ANN. §§ 12-265b & -265c (Supp. 1970-71).	CONN. GEN. STAT. ANN. §§ 12-81(51) & -81(52) (Supp. 1970-71).	CONN. GEN. STAT. ANN. § 12-412(u), (v) (Supp. 1970-71).	Five percent tax credit.
Florida			FLA. STAT. ANN. § 193.621 (Supp. 1970-71).		Assessment limited to market value as salvage.
Georgia			GA. CODE ANN. § 92-201.1 (Supp. 1969).	GA. CODE ANN. § 92-3403aC.(2) (t.1) (Supp. 1969).	
Idaho			IDAHO CODE ANN. § 63-105T (Supp. 1969).		Assessment proportionate to part of property used for abatement.
Illinois			ILL. ANN. STAT. ch. 120, § 502a-1 (Smith-Hurd 1970).		Assessment based on economic value of productivity to owner.
Indiana			IND. ANN. STAT. § 64-236 (Supp. 1970).		Only tangible personal property exempt.

Louisiana					General ten year ad valorem exemption for new industrial facilities include those for pollution abatement.
Maine			ME. REV. STAT. ANN. tit. 36, § 656(1)(E) (1964).	ME. REV. STAT. ANN. tit. 36, § 1760(29) & (30) (Supp. 1970-71).	
Maryland					Tax exemption legislation failed to pass in 1965 session of legislature.
Massachusetts	MASS. ANN. LAWS ch. 63, § 38D (Supp. 1969).				One-hundred percent deduction may be taken in year of purchase.
Michigan			MICH. STAT. ANN. §§ 7.793(4)(1) & 7.793(54)(1) (Supp. 1970).	MICH. STAT. ANN. §§ 7.793(4)(2) & 7.793(54)(2) (Supp. 1970).	Amount of ad valorem exemption reduced by value of productive use of the property.
Minnesota			MINN. STAT. ANN. § 272.02(15) (Supp. 1970).		
Missouri				MO. ANN. STAT. § 144.030.3 (13), (14) (Supp. 1969-70).	
Montana			MONT. REV. CODES ANN. §§ 69-3923 (Supp. 1969) & 84-302 (1966).		Reduced ad valorem assessment.
New Hampshire			N.H. REV. STAT. ANN. §§ 149:5-a, :5-b (1964).		Ad valorem exemption for 25 years from date of installation.
New Jersey			N.J. REV. STAT. § 54:4-3.56 (Supp. 1969-70).		
New York	N.Y. TAX LAW § 208(9)(g) (McKinney 1966).	N.Y. TAX LAW §§ 210(12)(f) & 701(d)(6) (McKinney Supp. 1970-71).	N.Y. REAL PROP. TAX LAW § 481 (McKinney Supp. 1970-71).		One-hundred percent first year deduction or optional one percent tax credit.
North Carolina	N.C. GEN. STAT. § 105-122(b) (Supp. 1969).		N.C. GEN. STAT. §§ 105-296(11) & -297(16) (Supp. 1969).		60-month depreciation.

Ohio	OHIO REV. CODE ANN. §§ 5709.25(C) & 6111.36 (Page Supp. 1969).		OHIO REV. CODE ANN. §§ 5709.25 (A) & (B) & 6111.34 & .35 (Page Supp. 1969).	OHIO REV. CODE ANN. §§ 5709.25(C) & 6111.37 (Page Supp. 1969).	Pollution abatement equipment exempted in determination of franchise tax.
Oklahoma		OKLA. STAT. ANN. tit. 63, § 2004 (Supp. 1969-70) & tit. 82, § 922 (1970).			Twenty percent tax credit for air pollution control facilities.
Oregon		ORE. REV. STAT. § 316.480 (1968).	ORE. REV. STAT. § 307.405 (1968).		Election between ad valorem exemption and annual tax credit, in lieu of depreciation, of five percent, not to exceed 50 percent of cost.
Rhode Island			R.I. GEN. LAWS ANN. § 44-3-3 (Supp. 1968).		
South Carolina			S.C. CODE ANN. § 65-1522(45.1) (Supp. 1969).		
South Dakota			S.D. CODE § 10-6-35.3 (Supp. 1970).		Reduced ad valorem assessment for two years after installation.
Tennessee			TENN. CODE ANN. § 67-512 (Supp. 1970).		
Texas					Constitutional amendment allowing ad valorem exemption failed in 1968 referendum.
Vermont			VT. STAT. ANN. tit. 10, § 369 (Supp. 1970) & tit. 32, § 3802(12) (1969).		
Virginia	VA. CODE ANN. §58-81.1 (1969).				
Washington		WASH. REV. CODE ANN. § 82.34.050 (2) (Supp. 1969).		WASH. REV. CODE ANN. § 82.34-050(1) (Supp. 1969).	Election between ad valorem exemption and annual tax credit of two percent of purchase price, not to exceed 50 percent.
Wisconsin	WIS. STAT. ANN. § 71.04(2b) (Supp. 1970-71).		WIS. STAT. ANN. § 70.11(21) (Supp. 1970-71).		One-hundred percent first year deduction.
Wyoming			WYO. STAT. ANN. § 35-501 (Supp. 1969).		Reduced ad valorem assessment.

has been the most generous.[59] It has enacted an annual income tax credit in the amount of five percent of the cost of certified abatement facilities.[60] The maximum cumulative credit allowable is 50 percent of the cost of the facilities[61] and the tax credit has a present cash value to the taxpayer of 36.8 percent of the purchase price.[62] The State of Washington has been almost as generous, allowing an annual credit of two percent of the purchase price up to a maximum of 50 percent[63] with the present cash value being 25.6 percent.[64] Both of these provisions are much more generous than that that provided in federal legislation.[65]

Arizona is at the other extreme of generosity. Its relief provision, analogous to that of the *Internal Revenue Code of 1954*,[66] allows the depreciation of pollution control facilities over a 5-year period.[67] The actual amount of this supposed incentive is insignificant, however, for two reasons. The rapid depreciation applies only to "device[s], machinery or equipment,"[68] and thus, no deduction is allowable for any real property which is used in conjunction with the abatement facility. Moreover, the present cash value of the accelerated depreciation deduction is only 6.7 percent of the purchase price of the qualifying assets compared to a present cash value of 5.9 percent if normal amortization methods were used—a difference of only 0.8 percent.[69]

This brief comparison illustrates the vast disparity in the magnitude of the tax relief which states are willing to extend to encourage industry to reduce the damage caused by its waste disposal. Even the relief afforded under the Oregon statute, however, is not sufficient to provide an actual incentive in industrial abatement but merely reduces the overall costs of such efforts. Industry is still being asked to invest in unproductive assets.

To be sure, the various tax relief provisions reduce the polluter's economic cost of abatement, but they fail to satisfy the underlying need for an actual incentive to reduce pollution to a Pareto optimal level. It will

[59] *See also* OKLA. STAT. ANN. tit. 63, § 2004 (Supp. 1969-70) & tit. 82, § 922 (1970) (credit of 20% of annual net investment cost of abatement facilities).

[60] ORE. REV. STAT. § 316.480 (1968). A similar tax credit is provided against the corporate excise tax. *Id.* § 317.072. The use of these tax credits is in lieu of any depreciation or amortization deduction for the facility for which the credit is claimed.

[61] *Id.* § 316.480(4).

[62] The present cash value is the amount of the tax benefits discounted to reflect the fact that they will not be realized until some time in the furure. In the present context, its computation assumes an after tax return on investment of six percent and disregards the federal tax consequences of the use of this incentive.

[63] WASH. REV. CODE ANN. §§ 82.34.050(2) & 82.34.060(2) (Supp. 1969).

[64] *See* note 62 *supra.*

[65] *See* Table II *infra.*

[66] INT. REV. CODE OF 1954, § 169.

[67] ARIZ. REV. STAT. ANN. § 43-123.02 (Supp. 1969-70).

[68] *Id.* (a).

[69] The computation of the present cash value is based on an effective corporate tax rate of eight percent, *id.* § 43-102(b), and assumes an after tax return on investment of six percent. The federal tax consequences are disregarded. Computation of the normal amortization deduction is by the sum of the years digits method.

be difficult to obtain Senator Ribicoff's objective of the "active cooperation of industry" if state legislatures are unwilling to do more than reduce the cost of assets which are economically unproductive. There are, however, more basic deficiencies in the forms of state tax relief which have been enacted to date.

The various tax relief provisions are ill-drafted to accomplish their supposed purpose. Rather than pegging the amount of the tax relief to any reduction in the discharge of pollutants, tax incentives are proportionate to the capital investment in abatement facilities. This approach is misdirected for two reasons. First, actual performance in reducing pollution is totally ignored in the computation of the incentive. Thus, a massive investment in abatement facilities is rewarded irrespective of the efficiency of those facilities. Moreover, the present structure of the incentives creates an unnecessary bias in favor of capital expenditures for end-of-line treatment facilities over more basic process changes. Even though a process change might result in a lesser degree of waste discharge than separate treatment facilities, the incentives encourage utilization of only the latter.

Some states, in what must be classified as an exercise in economic myopia, have encouraged economic inefficiency in attempting to provide incentives for pollution abatement. Indiana's personal property ad valorem tax exemption, for example, applies only to those facilities "employed *exclusively* in the operation of an industrial air purification system designed and used for improvement of public health and welfare in the elimination of air contamination."[70] North Carolina's real property ad valorem exemption is similarly limited to those "used exclusively for air cleaning or waste disposal."[71] The effect of such legislation is to deny the intended tax relief to those facilities which have some degree of economic productivity to their owners in addition to their use for pollution abatement.

The majority of states have adopted a more equitable, but nonetheless inadequate, approach. Georgia, for example, extends its ad valorem property tax exemption to "all property used . . . for the *primary purpose* of eliminating or reducing air or water pollution."[72] Such an exemption is preferable to that afforded under the Indiana and North Carolina statutes, because it allows a manufacturer to realize some economic value from the by-products of its abatement facilities without being penalized. The risk remains, however, that such statutes may be construed to embody an all-or-nothing approach. If a treatment works were primarily installed for the

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[70] IND. ANN. STAT. § 64-236 (Supp. 1970) (emphasis added).
[71] N.C. GEN. STAT. § 105-296(11) (Supp. 1969).
[72] GA. CODE ANN. § 92.201.1 (Supp. 1969) (emphasis added). *See also id.* § 92-3403aC.(2)(t.1) (sales tax exemption); MICH. STAT. ANN. §§ 7.793(1)(a) & 7.793(51)(a) (Supp. 1970); MINN. STAT. ANN. § 272.02(15) (Supp. 1970); N.J. REV. STAT. § 54:4-3.56 (Supp. 1969-70).

purpose of recovering commercially usuable end products, and also significantly reduced waste discharge, the incentive could be denied altogether.[73] While this may be the legislative intent of states such as Georgia, the end result is undesirable because it may have the effect of discouraging the construction of abatement facilities which produce commercially usable by-products.

Illinois takes what appears to be the most reasonable approach to the problem of defining the scope of its exemption. For the purposes of ad valorem taxation, it values "pollution control facilities . . . in relation to the fair cash value of their economic productivity to their owners."[74] This approach allows tax relief to be extended to facilities which not only abate pollution but also yield salable by-products.[75]

Rapid Amortization Under Tax Reform Act

If the various state measures fail to provide significant economic incentives for the construction of abatement facilities, the rapid amortization provision of the Tax Reform Act of 1969[76] is equally inadequate. Identical to the provisions of many state statutes,[77] this provision allows the amortization of the cost of certified pollution control facilities over a period of five years. The Report of the House Ways and Means Committee explaining this section stated,

> In order to deal effectively with the Nation's air and water pollution problem . . . a significant part of the task must be met by private industry. In effect, private industry is being asked to make an investment which in part is for the benefit of the general public. . . .
>
> . . . .
>
> In view of the possible undesired effect on pollution control of repealing the investment credit and the increasing magnitude of the air and water pollution problem facing the Nation today, your committee believes it is appropriate to provide an incentive to private industry for antipollution efforts. . . . The larger deduction provided by allowing recovery of the taxpayer's cost over the shorter 5-year period will provide a greater incentive for the installation of effective pollution control equipment.[78]

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[73] *Cf.* Malat v. Ridell, 383 U.S. 569 (1966) ("primarily" construed to mean "of first importance").

[74] ILL. ANN. STAT. ch. 120, § 502a-1 (Smith-Hurd 1970). Presumably, the Illinois procedure would be to capitalize the annualized benefits obtained from the abatement facilities and then assess the ad valorem tax on the basis of that value.

[75] *See also* FLA. STAT. ANN. § 193.621 (Supp. 1970-71) (ad valorem assessment of abatement facilities no greater than market value as salvage); N.H. REV. STAT. ANN. § 149:5-a (1964) (percentage of valuation used for abatement purposes exempt from ad valorem taxation).

[76] INT. REV. CODE OF 1954, § 169.

[77] *E.g.*, ARIZ. REV. STAT. ANN. § 43-123.02 (Supp. 1969-70); CAL. REV. & TAX CODE §§ 17226 & 17226.5 (West Supp. 1970); VA. CODE ANN. § 58.81.1(a) (1969).

[78] H.R. REP. NO. 413, 91st Cong., 1st Sess., 197 (1969). *See also* S. REP. NO. 552, 91st Cong., 1st Sess., 248-52 (1969).

Notwithstanding this statement of intent to provide an incentive for investment in abatement facilities, the provision which finally emerged from the Conference Committee falls far short of reaching this goal. As is indicated in Table II,[79] the fast writeoff provisions of the Tax Reform Act

TABLE II: COMPARISON OF INDUSTRIAL COSTS FOR POLLUTION ABATEMENT FACILITIES UNDER VARIOUS FEDERAL INCENTIVE PLANS[80]

	Treatment of Qualifying Asset Under Tax Reform Act of 1969	*Treatment of Non-Qualifying Asset with same Useful Life Under Tax Reform Act of 1969*	*Treatment Prior to Tax Reform Act of 1969*	*100% Write Off in Year of Installation*	*100% Write Off in Year of Installation and 7% Investment Tax Credit*	*30% Federal Subsidy and 5-Year Depreciation*	*30% Federal Subsidy and 100% Write Off in Year of Installation*
Purchase Price	$1000	$1000	$1000	$1000	$1000	$700	$700
Investment Tax Credit			70		70		
Present Value of Investment Tax Credit			66		66		
Tax Benefit from Depreciation Before Time Factor	480	480	480	480	480	336	336
Present Value of Depreciation Deduction	404	356	356	453	453	282	317
Total Benefits	404	356	422	453	519	582	617
Net Installation Cost Considering Time Value	496	644	578	547	481	418	383
Difference in Net Cost Compared to Tax Reform Act of 1969	—	-48	+18	+49	+115	+178	+213

[79] For an analogous presentation of data representing different permutations of federal income tax treatment for abatement facilities, see *House Federal Water Pollution Control Act Hearings, supra* note 4, at 151; Wilson, *supra* note 6, at 21. For a compilation of the various federal tax incentive programs which have been introduced in Congress in recent years, see VIEWS OF THE GOVERNORS, *supra* note 22, App. G, 67-75.

[80] This Table assumes the facility has a useful life of 15 years and that the salvage value is less than ten percent of basis so as to take advantage of INT. REV. CODE OF 1954, § 167(f). The tax rate is assumed to be 48 percent and tax surcharges are not considered in any of the computations. Present value of future depreciation deductions is determined on the basis of a six percent after tax return on investment. Additional first year depreciation available under INT. REV. CODE OF 1954, § 179 is disregarded. The asset is assumed to have been placed in service on the first day of the tax year and the time factor assumes that benefits are to be realized one year after installation. Accelerated depreciation, where avail-

provide a 4.8 percent preference over capital expenditures which do not qualify for such treatment. The provisions of the Tax Reform Act, however, are actually 1.8 percent less attractive for investments in abatement facilities than was the case under the earlier law. Incredibly, the same Congress which expressed an intent to "provide a greater incentive for the installation of effective pollution control equipment" has actually made it more expensive for industry to invest in such equipment.

In the face of a multibillion dollar need for industrial pollution abatement measures,[81] and despite repeated arguments in favor of significant tax relief measures, Congress provided only the meagerest degree of relief. In 1970, for example, the amount of revenue losses resulting from this provision amounts to only $15 million.[82]

Tax incentives, as presently instituted at the state and federal levels, are payments for the wrong conduct. They do not adequately serve their potential of internalizing pollution costs. Moreover, they fail to serve their supposed intended purpose of providing industry with an incentive for voluntary pollution abatement. The sole advantage of these types of tax relief is that they lessen the cost to the polluter of measures which regulatory systems would have required them take in any event.[83] If this, indeed, is their only real measure of value, then tax incentives are an improper means of obtaining this goal and outright subsidies should be utilized. Subsidies would have the added advantage of being suited to helping the financially hard pressed polluter—an objective which tax in-

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able, is by the sum of the years digits method. All state tax consequences are ignored.

[81] "The Federal Water Pollution Control Administration . . . recently . . . estimated that the treatment costs for municipal wastes during the five year period from 1968 to 1973 may be around $15.6 billion . . . . The costs for industrial waste treatment during the same period were estimated to be between $5.6 and $8.1 billion . . . ." V. PRAKASH & R. MORGAN, *supra* note 6, at 18.

[82] S. REP. No. 552, 91st Cong., 1st Sess., at A-405 (1969):

REVENUE LOSSES ARISING FROM POLLUTION ABATEMENT INCENTIVES
(in millions of dollars)

	1970	*1971*	*1972*	*1974*	*1979*
House Version	40	130	230	380	400
Senate Version (As Adopted)	15	40	70	115	120

"The revenue loss figures . . . are based on the difference by which the deductions under the 60-month amortization provision would exceed deductions allowable under section 167 of the Internal Revenue Code of 1954. For purposes of computing the revenue effect it was assumed that, in the absence of the rapid amortization provision, the 200 percent declining balance would have been used." Letter from Laurence N. Woodworth, Chief of Staff, Joint Congressional Committee on Internal Revenue Taxation, to author, April 9, 1970.

[83] The proliferation of tax relief measures indicates that this view is not held universally.

> It's hard to tell whether tax relief prompts companies to take steps they wouldn't take otherwise. In Washington State, George Kinnear, revenue director, say it's 'no question' that state enforcement programs are 'a primary influence.' But he says tax incentives are 'a material inducement' for concerns to fall in line, rather than to stall in the courts. He estimated that relief already granted or applied for will cost the state $98 million in tax revenue over the next 25 years. Wall Street Journal, Aug. 26, 1970, at 1, col. 5.

centives are incapable of accomplishing.[84]

SYSTEMS OF EMISSION CHARGES

It has been shown that the traditional "carrot and stick" approach to pollution abatement has largely been ineffective and inefficient. Regulatory schemes are inefficient because they are incapable of achieving optimal reductions in waste discharge at the minimum net cost. Tax relief is inadequate because it fails to provide an actual incentive to abatement and it is misdirected because it may reward the wrong kinds of abatement measures. It is necessary, therefore, to examine the application of discharge fees in greater detail.

The Ruhr Experience

While effluent charge systems are only recently beginning to receive active support in the United States,[85] they have been in use in the Ruhr River basin in Germany for more than half a century. Any discussion of the application of a system of emission charges must, therefore, begin with a brief investigation of this experience.[86]

The Ruhr River begins in the highlands of northwestern Germany and flows 145 miles westward until it joins the Rhine at Duisburg. The Emscher lies to the north of the Ruhr and roughly parallels its flow to the Rhine. In contrast to the Ruhr, the Emscher flows largely through flatlands and, until its development starting in 1904, posed a frequent threat of flooding. The Ruhr and the Emscher are but two of the watersheds comprising the Ruhr District, one of the most heavily industrialized areas in the world.

Misuse of these basins for waste disposal dates back to the seventeenth century. The rapid industrialization of the Emscher Valley in the latter half of the nineteenth century led to its complete deterioration. The severe hygenic threat posed by the condition of the river and the fu-

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[84] *Cf.* Statement of Dr. Spencer M. Smith, Jr., Secretary, Citizens Committee on Natural Resources, in *Water Pollution Control—1966, supra* note 32, at 396.

[85] Senator William Proxmire has recently introduced a bill which would require the establishment of effluent charges on a national scale. S. 3181, 91st Cong., 1st Sess. (1969), in 115 CONG. REC. S 14975 (daily ed. Nov. 25, 1969). Vermont has become the first state to enact a system of effluent charges. Vt. S-165 (Apr. 4, 1970), *amending* VT. STAT. ANN. tit. 10, §§ 901 to 920 (Supp. 1969).

[86] For general treatments of the Ruhr program, see O. HERFINDAHL & A. KNEESE, *supra* note 7, *passim*; A. Kneese, Approaches to Regional Water Quality Management, June, 1967 (Resources for the Future, Inc. Reprint No. 64); A. Kneese, Water Quality Management by Regional Authorities in the Ruhr Area with Special Emphasis on the Role of Cost Assessment, April, 1965 (Resources for the Future, Inc. Reprint No. 52), in *Hearings Before a Special Subcomm. on Air and Water Pollution of the Senate Comm. on Public Works,* 89th Cong., 1st Sess., pt. 3, at 927 (1965); Fair, *Pollution Abatement in the Ruhr District,* in COMPARISONS IN RESOURCE MANAGEMENT 142 (H. Jarrett ed. 1961); Kneese, *Water Quality Management by Regional Authorities in the Ruhr Area,* in CONTROLLING POLLUTION—THE ECONOMICS OF A CLEANER AMERICA 109 (M. Goldman ed. 1967).

tility of piecemeal efforts at improvement led, in 1904, to the establishment of the *Emschergenossenschaft*. Its membership was comprised of the users and polluters of the river and its expenses were apportioned according to the benefits received by its members and the treatment costs necessitated by their activities. This early effort at basin-wide effluent control provided the model for the six additional *Genossenschaften* created in the Ruhr District by 1930.

The Ruhr basin *Genossenschaften*, as presently constituted, offer testimony to the effectiveness of regional water quality management and an effluent discharge system. The Emscher has been rerouted and shortened from 68 to 44 miles. It now serves as an open sewer for the industrial and mining facilities in the eastern portion of the Rhine watershed. At various points before the Emscher flows into the Rhine, the *Emschergenossenschaft* operates treatment facilities to remove the wastes from its waters. The inability to use the Emscher for recreational purposes or as a source of domestic watersupply is more than offset, however, by economic tradeoffs within the broader watershed area. The Emscher, with the smallest catchment area of the Ruhr District streams, carries almost one-half of the total domestic and industrial waste in this area thereby reducing the load on the other streams. Moreover, the concentration of effluents into a single stream results in significant economies of scale in the eventual treatment of these wastes before their discharge into the Rhine.

The facet of the operation of the *Emschergenossenschaft* which has the greatest significance in the consideration of effluent charges is its method of cost assessment. "The method of determining effluent charges used by the Emschergenossenschaft endeavors to distribute the costs of the water quality management system in some reasonable proportion to the quantity and quality of the individual effluents which cause the costs to be incurred."[87] Inasmuch as the fee for discharging wastes is dependent upon costs of treating those wastes, the discharger has an incentive to reduce his emissions to the extent that the net cost[88] of his own treatment is less than the charges imposed on him by the *Genossenschaft*. This incentive has led Ruhr industrialists to reduce the quantity and impurity of their emissions significantly by instituting process changes and by recycling wastes.[89]

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[87] Memorandum from Allen V. Kneese to Senator Edmund S. Muskie, June 25, 1965, in *Hearings Before a Special Subcomm. on Air and Water Pollution of the Senate Comm. on Public Works*, 89th Cong., 1st Sess., pt. 3, at 951 (1965).

[88] The net cost for abatement efforts would be the difference between the expenses incurred in treating wastes less the aggregate of the value of any salable byproducts and any costs avoided by recycling wastes.

[89] A. Kneese, Water Quality Management by Regional Authorities in the Ruhr Area, April, 1965, in *Hearings Before a Special Subcomm. on Air and Water Pollution of the Senate Comm. on Public Works*, 89th Cong., 1st Sess., pt. 3, at 942 n.21 (1965).

The success of the Ruhr area *Genossenschaften* and the soundness of the theoretical economic underpinnings of a system of effluent charges has led to the adoption of such a system in Vermont and the proposal of a national system of effluent charges by Senator Proxmire. The Ruhr system, with fees dependent upon the cost of treating discharged wastes, would only be applicable to the abatement of water pollution. The Vermont system and the one advanced by Senator Proxmire are similarly limited in their application to discharges into waterways, but they embody a method of determining discharge fees which also may be applied to effluvia.

Vermont's Charge System

The imposition of effluent charges by Vermont is an integral part of the state's broader water quality management program. The state Water Resource Board classifies the waters of the state according to their intended uses and the minimum standards of effluence which may be discharged into them.[90] A permit is required for any waste discharge,[91] and "[n]o person [may] . . . discharge into the waters of the state any waste which by itself or in combination with the wastes of other sources reduces the quality of the receiving waters below the classification established"[92] without the express approval of the Board.

As structured, this permit system is designed to guarantee the nondegradation of Vermont's water supply. If a discharger is unable to meet the standards required for the issuance of a permit, however, the Water Resources Board is empowered to issue a temporary permit.[93] This allows

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[90] VT. STAT. ANN. tit. 10, § 903 (Supp. 1969), *as amended* S-165 (Apr. 4, 1970). For a discussion of the Vermont enactment, see *Water Pollution—1970, supra* note 1, pt. 1, at 346-65.

[91] VT. STAT. ANN. tit. 10, § 909(b) (Supp. 1969), *as amended* S-165 (Apr. 4, 1970).

[92] *Id.* § 909(a).

[93] *Id.* § 912a(c):

> [No temporary] permit shall be granted by the department unless it affirmatively finds:
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> (1) the proposed discharge does not qualify for a discharge permit;
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> (2) the applicant is constructing, installing or placing into operation or has submitted plans and reasonable schedules for the construction, installation or operation of an approved pollution abatement facility or alternate waste disposal system, or that the applicant has a waste for which no feasible and acceptable method of treatment or disposal is known or recognized but he is making a bona fide effort through research and other means to discover and implement such a method;
>
> (3) the applicant needs permission to pollute the waters of the state for a period of time after July 1, 1971 necessary to complete research, planning, construction, installation or the operation of an approved and acceptable pollution abatement facility or alternate waste disposal system;
>
> (4) there is no present, reasonable, alternative means of disposing of the waste other than by discharging it into the waters of the state;
>
> (5) the denial of a temporary pollution permit would work an extreme hardship upon the applicant;
>
> (6) the granting of a temporary pollution permit will result in some public benefit;

the discharge of wastes which will reduce water quality but not be "unreasonably destructive to the quality of the receiving waters." In order to qualify for such a permit, the discharger must pay an effluent charge based upon the amount of damage to the water which his discharge causes.[94] The Board is to establish such charges under statutory guidelines:

> A pollution charge is the price to be paid per unit of waste discharged into waters of the state. The charge may vary among different types or classes of wastes to account for variations in the degrading effects of various wastes. The charges may also vary to account for variations in the water quality standards of different classes and the hydrologic conditions of different receiving waters. In establishing the chargers the board shall attempt to approximate in economic terms damage done to other users of the waters, both private users and the general public, caused by the degrading effect of various types of waste in varying volumes and frequencies discharge upon water qualities of the different classes of waters. In determining relative degrading effect the board may employ any scientific or technical criteria or parameters such as biochemical oxygen demand and suspended solids and may express the unit charge in terms of such standards of measurement.[95]

In contrast to the manner of cost assessment utilized in the *Genossenchaften*,[96] the Vermont effluent charge system is based upon the amount of damage done to the environment and, thus, except for its nondegradation features, is closer to the pure economic model.[97] That the Vermont model was designed as an incentive to abatement rather than as a means of financing treatment plants is made clear by the statute. "The imposition of pollution charges shall have the principal purpose of providing the economic incentive for temporary permit holders to reduce the volume and degrading quality of their discharge during the limited period when such discharges are authorized, thereby raising the quality of the waters in the state."[98]

The issuance of a temporary permit allowing the discharge of substandard wastes does not confer immunity upon the discharger from suits for damages or injunctive relief against the abatement of a nuisance.[99]

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(7) the discharge will not be unreasonably destructive to the quality of the receiving waters.

94 *Id.* § 912a(d)(5).

95 *Id.* § 912a(e)(2).

96 *See* Kneese, *supra* note 89, at 941-50.

97 *See, e.g.*, J. DALES, POLLUTION, PROPERTY & PRICES (1968).

98 VT. STAT. ANN. tit. 10, § 912a(e)(1) (Supp. 1969), *as amended* S-165 (Apr. 4, 1970). This subsection goes on to note that the "charges are not imposed for revenue purposes and any income received by the state under this section shall be used solely for purposes of water quality management and pollution control."

99 VT. STAT. ANN. tit. 10, § 919, *added by* S-165 (Apr. 4, 1970).

Vermont has already sought two injunctions against continued waste discharges in violation of this statute. Attorney General James M. Jeffords has indicated that his office is currently preparing cases against 16 additional polluters. *See* Rutland Daily Herald, Sept. 25, 1970, at 1, cols. 1-3 *et seq.*

Because the effluent charges are designed to make the discharger bear the cost of the damage which his waste causes, however, the polluter is allowed to deduct from the effluent charge due the amount of any damages awarded against him for such a nuisance.[100]

The Regional Water Quality Act of 1970

The Vermont effluent charge system is not the pure model of economic incentives advocated by some theoreticians.[101] Rather, primary emphasis is placed upon the traditional permit approach to effluent control. Nonetheless, the Assistant Attorney General of Vermont for Environmental Control and Community Affairs, John D. Hansen, has characterized the measure as "a necessary intermediate step"[102] before a system relying exclusively on emission charges could be implemented. The Regional Water Quality Act of 1970, S. 3181, introduced by Senator Proxmire, comes closer to the theoretical model. Section 4(a) of the proposed bill establishes a system of effluent charges:

> [T]he Secretary [of Interior] and the Secretary of the Treasury shall prescribe such regulations as are necessary to establish and put into effect not later than June 1971, a schedule of national effluent charges for all those substances other than domestic sewage which detract from the quality of the water for municipal, agricultural, industrial, recreational, sport, wildlife and commercial fish uses. In determining such charges the Secretary shall consider the relationship between the quantity and quality of the waste discharged and the resulting damage to the quality of the waterway as the base for specific charges.[103]

Senator Proxmire looks upon his proposal as a complement to the approach currently taken in federal pollution abatement statutes.[104] It would be a means of implementing water quality standards, would provide funds for treatment facilities, and would not preclude criminal or civil sanctions.[105]

While the standards for determining the amount of the discharge fees

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100 *Id.* Although the statute is unclear on this point, the amount of damages which can be credited against the effluent charge should be limited to that amount of damage allocable to the period for which the effluent charge is assessed.

101 *See, e.g.*, authorities collected in note 6 *supra.*

102 Letter from John D. Hansen to author, April 14, 1970.

103 S. 3181 § 4(a), 91st Cong., 1st Sess. (1969), in 115 CONG. REC. S 14975 (daily ed. Nov. 25, 1969).

104 *Water Pollution—1970, supra* note 1, pt. 1, at 191-92.

105 *Id.* at 192:

> Enforcement would remain largely as it is now. Polluters would still be subject to the sanctions of the act, including possible injunction proceedings, if they persist in polluting in such large quantities that the water quality standards cannot be achieved.
>
> . . . [I]t is still very much in the public interest that (a) polluters have a continuing incentive to cut down pollution below the maximum that the law would allow, and (b) that needed funds for facilities are raised, and paid for by those responsible for the pollution. Effluent charges would achieve both ends.

are not as fully set forth in Senator Proxmire's proposal as they are in the Vermont enactment,[106] the basic thrust of the Regional Water Quality Act is unmistakeably clear.[107] A charge is to be levied on the waste disposers in proportion to the damage which they cause. While it may be difficult to assess accurately the total damage done to a water basin,[108] absolute precision is not required. A trial and error approach to determining the amount of the charges may well be acceptable because of the difficulty in placing values on recreational and aesthetic uses of waterways.[109] This type of approach need not reduce the efficiency of the system of effluent charges. For example, a study of the Delaware River estuary determined that a "charge of 8-10 cents per pound of oxygen demanding material discharged appears capable of approaching the highest goals attainable given the physical properties of the basin and total load produced by private dischargers included in the model."[110] Thus, even though the manner of cost assessment may involve an arbitrary determination of the total damage caused, the charge system may still yield significant improvements in water quality.

Unlike the Vermont statute, Senator Proxmire's proposal is intended, in part, as a revenue producing vehicle. "It has been estimated . . . that an average effluent charge of 10-cents per pound of waste applied on a national basis would yield, at present waste production rates, approximately $2 billion in revenue each year."[111] The revenues produced would be earmarked for grants to municipalities for the construction of waste treatment plants and for regional water management associations for the furtherance of their abatement efforts.[112] By providing a source of funds for regional

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[106] In the Hearings before the Senate Subcommittee on Air and Water Pollution, Senator Proxmire recognized this possible deficiency and suggested amendments to his proposal. *Id.* at 193.

[107] "The clear and unambiguous intent of S. 3181 is that the effluent charges be set high enough so that it will be less expensive for industry to treat its wastes and control its discharges than to pay the effluent charge." *Id.* at 192 (Senator Proxmire).

[108] *See* V. PRAKASH & R. MORGAN, *supra* note 6, at 39 *et seq.*

[109] *See* Clarenbach, *supra* note 45, at 11720.

[110] PUBLIC HEALTH SERVICE, DEPARTMENT OF HEALTH, EDUCATION AND WELFARE, REPORT ON EFFLUENT CHARGE STUDY 6 (n.d.).

[111] 115 CONG. REC. S 14973 (daily ed. Nov. 25, 1969) (Senator Proximre). Inasmuch as the imposition of such a charge would result in the reduction of wastes, the actual amount of revenues would be more in the nature of $1.5 billion. *Id.*

[112] S. 3181, §§ 5-7, 91st Cong., 1st Sess. (1969), in 115 CONG. REC. S 14975 (daily ed. Nov. 25, 1969).

The Secretary of the Interior is to allocate the grants "in such manner as to provide for [waste treatment] facilities where the need is greatest." *Id.* § 6. Professor Orlando E. Delogu has criticized this provision, saying

> I disagree with Senator Proxmire's legislation on the point that I don't think the Secretary of the Interior to best able to make the decisions as to how the effluent charge funds ought best to be spent. I think he is too far removed from the scene. I think he doesn't have the resources at his disposal to make these priority judgments in any nationally consistent or coherent fashion. I think the legislation which Senator Proxmire proposes would be much more acceptable if it were tied to a channeling of a large portion of these funds back to the States to allow the States to implement existing programs of waste treatment plant construction. *Water Pollution—1970, supra* note 1, pt. 1, at 238.

water quality associations, Senator Proxmire apparently intends to encourage their more extensive use in the United States and to create basin-wide agencies in the image of the German *Genossenschaften*. The amount of money injected into these programs by the effluent charge revenues would be far in excess of what Congress has previously appropriated for this purpose[113] or what it has extended in the form of tax relief.[114]

One asserted deficiency of the Regional Water Quality Act is that its system of effluent charges is not made applicable to municipal sewage even though it is a major component of the present pollution problem.[115] Economically, effluent charges can be as effective in reducing the discharge of municipal sewage as they are in encouraging the abatement of industrial wastes.[116] To impose such charges upon municipalities would be ill-advised, however. The shortage of funds is one of the major obstacles to the construction of municipal treatment facilities.[117] Charging municipalities to discharge their untreated wastes would only compound this problem. S. 3181, on the other hand, would alleviate this problem by increasing the amount of revenue which is available for such projects.[118]

The most important aspect of Vermont's and Senator Proxmire's systems of effluent charges is that they place the cost of pollution on the responsible parties. If industry must pay to discharge its wastes into the nation's waterways, it will have the incentive necessary to take prompt action to reduce its effluence. Moreover, selection of the method of abatement is placed with the party best able to select the most efficient solution.

CONCLUSION

Clearly, solutions must be found which are more likely to eliminate pollution and prevent the continuing deterioration of the environment than those which have been implemented heretofore in the United States. Given the nature of our capitalistic society, true economic incentives seem to have the greatest chance of achieving this goal. The cost of pollution or its abatement should not have to be borne by society while the polluters are enjoying economic benefits from the continuation of their pollution.

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113 115 CONG. REC. S 14973-74 (daily ed. Nov. 25, 1969).

114 *See* note 82 *supra*.

115 For a criticism of this deficiency, see Statement of Professor Edwin Mills, in *Water Pollution—1970, supra* note 1, pt. 1, at 365 *passim*. Samuel Lenher, Vice President of E.I. du Pont de Nemours & Co., has also criticized this aspect of S. 3181, arguing that all dischargers should be treated equally. *Id.* pt. 5, at 1646-47. *See also id.* at 1718-19.

116 Indeed, the charges imposed by the *Genossenschaften* are applicable to municipalities. *See* authorities collected in note 86 *supra*.

117 *See, e.g.*, Statement of Roy M. Harris, Director of the Washington State Pollution Control Commission, in *Water Pollution Control—1966, supra* note 32, at 227.

118 One argument normally made against the use of subsidies to encourage pollution abatement is that they create a bias in favor of capital expenditures for treatment facilities. *See* text accompanying notes 33-35 *supra*. This argument would be inapplicable in the case of municipal sewage disposal because end-of-line treatment facilities are the only means of abatement.

The schemes already tried simply have not done the job. Regulatory systems are inherently not the most efficient. They are cumbersome and limited and offer no incentive for polluters to go beyond the minimum standards they impose. Indeed, under them polluters face economic pressures to continue to pollute at the same level as their competitors. The most efficient means of abatement at individual pollution sources simply cannot be required by regulations imposed throughout a political jurisdiction by a governmental agency.

The various tax incentives or outright cash payment systems available recognize the nonproductivity of pollution abatement assets and internalize the costs of emission control. It is questionable, however, whether such programs actually provide any incentive. Moreover, when no incentive is even attempted for abatement devices in the form of alternate means of production, the adoption of the most effective means of abatement is often discouraged and the polluter will install a less effective end-of-line treatment method. In any event, the limited magnitude of the incentives presently in effect is such that they only lessen the cost to the polluter of abatement measures he could otherwise be required to take. Another problem is that incentive systems are generally of uniform application within a political jurisdiction and, like the regulatory schemes, do not allow for a selective means of enforcing pollution control. Thus, due to these various disadvantages, under the incentive system society must pay the polluter to stop polluting, and often it does not get its money's worth.

Nonetheless, subsidies, if they are directly related to the reduction of emissions, are preferable to regulatory schemes or the forms of incentives which merely relate to capital investment. Waste disposal charges, however, present the most workable solution.

When emission charges are imposed the basic flaw in the incentive system is corrected and pollution abatement assets, either in the form of equipment required for production changes or end-of-line treatment devices, take on an economic function. An equally significant advantage in the emission charge system is the decentralization of the pollution abatement decision-making process. The decision-makers for individual pollution sources will have very real incentives not only to abate pollution, but to adopt the most efficient means available. Industry will also be given economic inspiration to develop improved means of pollution abatement.

The German experience attests to the effectiveness of the effluent charge system. Vermont and Senator Proxmire are leading the way for the implementation of such systems for the preservation of American waterways. Their approach to pollution control can also, with some modifications, be applied to the presevation of the atmosphere. If the costs of industrial smoke emissions were placed upon the emitters, the same incentives to reduce the quantity and harmfulness of the effluvia would be

created. The problem in the application of such a system to emissions into the atmosphere is one of adequately assessing those costs. Nonetheless, as is true with effluent charge systems, an arbitrary but reasonable trial and error method of assessment would be a beginning.

It is time for a radical departure from those methods of control which have proved ineffective in the past and for the adoption of a system of proven effectiveness which places the burden of action upon the source of the problem—the polluter himself.