EFFLUENT CHARGES: A METHOD OF ENFORCING STREAM STANDARDS

By Orlando E. Delogu *

Introduction

In spite of a growing population[1] with increased leisure and a rapidly expanding industrial economy, both of which are demanding more and more water for an infinitely wider range of uses,[2] the critical problem in the field of water management is not quantity but quality.[3] With the possible exception of some remote arid areas in the western part of the United States, there appears to be enough water in a physical sense, but often the quality of this water is such that a wide range of uses is impossible.

Pollution control, the maintenance of as high a quality as possible in each successive reuse of water, then becomes the central task of water management since this control alone allows subsequent users of water to have the widest range of alternative use possibilities.

The question of how high a quality of water is desirable or necessary and thus should be maintained in a particular lake, stream, or reach of river is not a technological problem but a political and economic problem. The technical ability to remove most if not all pollutants from our

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[1] Since the turn of the century the population of the United States has more than doubled. The census indicates that the population at the end of each decade and in 1963 was as follows: 1900, 75,994,575; 1910, 91,972,266; 1920, 105,710,620; 1930, 122,775,046; 1940, 131,669,275; 1950, 150,697,361; 1960, 178,464,236; 1963, 189,417,000. U. S. DEP'T OF COMMERCE, BUREAU OF CENSUS, STATISTICAL ABSTRACT OF THE UNITED STATES, 1965 at 5 (86th ed. 1965).

[2] The billions of gallons of water used daily by the public for domestic and industrial purposes was estimated, at the end of each decade and in 1963, to be as follows: 1900, 40.19; 1910, 66.44; 1920, 91.54; 1930, 110.54; 1940, 136.43; 1950, 202.70; 1960, 322.90; 1963, 352.18. *Supra* note 1, at 173. Utilizing the figures in footnotes 1 and 2 the number of gallons of water used daily per capita for the respective years shown can also be determined: 1900, 529 gal.; 1910, 708 gal.; 1920, 864 gal.; 1930, 899 gal.; 1940, 1003 gal.; 1950, 1340 gal.; 1960, 1780 gal.; 1963, 1806 gal. Clearly water consumption his risen sharply not only in a total sense but each individual is using considerably more water in 1963 than he was in 1900.

[3] KNEESE, THE ECONOMICS OF REGIONAL WATER QUALITY MANAGEMENT 206 (1964). *See* LANDSBERG, FISCHMAN & FISHER, RESOURCES IN AMERICA'S FUTURE ch. 19 (1963); WOLLMAN, WATER SUPPLY AND DEMAND (1960).

water exists[4]—what has traditionally been lacking is the will and the financial support necessary to do so. This void has produced the water quality problems which we now face.

The Role of the Federal Government

The federal government has not only recognized these problems but in 1961[5] and again in 1965[6] has enacted major legislation dealing with water pollution. The avowed congressional policy and purpose is "to enhance the quality and value of our water resources and to establish a national policy for the prevention, control, and abatement of water pollution."[7]

Federal legislation has attempted to promote wide ranging programs of federal inter-agency cooperation in the field of water resources,[8] state-federal cooperation,[9] and meaningful intrastate water management and pollution control programs.[10] Money and technical assistance have been made available for basic research in the technology of water management,[11] waste treatment,[12] and waste removal;[13] for comprehensive watershed planning purposes;[14] and for the actual construction of water control facilities and water and sewerage treatment plants.[15]

Perhaps of greater significance for our purposes, however, is the federal requirement that water quality standards be established by each state for all interstate waters[16] by June 30, 1967. States which have not acted effectively before this date will be subject to federally imposed water quality standards.[17] In setting these standards, express provision is made for taking into account public health and welfare and the value of the particular stream "for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and

[4] KNEESE, *supra* note 3, at 20-24; U. S. PUBLIC HEALTH SERVICE, ADVANCED WASTE TREATMENT RESEARCH (1962).

[5] Water Pollution Control Act, ch. 87-88, § 1(a) (1961).

[6] Water Pollution Control Act, 33 U.S.C. § 466 (Supp. 1965).

[7] Water Pollution Control Act, 33 U.S.C. § 466(a) (Supp. 1965).

[8] Water Pollution Control Act, 33 U.S.C. §§ 466a, 466h, 466i(b) (Supp 1965).

[9] Water Pollution Control Act, 33 U.S.C. § 466a (Supp. 1965).

[10] Water Pollution Control Act, 33 U.S.C. §§ 466b, 466c(a) (Supp. 1965).

[11] Water Pollution Control Act, 33 U.S.C. §§ 466c(a)(4), (b), (d)(1)-(2), 466d (Supp. 1965).

[12] Water Pollution Control Act, 33 U.S.C. § 466c-1(a) (Supp. 1965).

[13] *Ibid.*

[14] Water Pollution Control Act, 33 U.S.C. § 466d (Supp. 1965).

[15] Water Pollution Control Act, 33 U.S.C. § 466e(a)-(b) (Supp. 1965).

[16] Water Pollution Control Act, 33 U.S.C. § 466g(c)(1) (Supp. 1965). Interstate waters are defined as waters forming the boundary between or flowing across the border of two or more states, including coastal waters. Water Pollution Control Act, 33 U.S.C. § 466j(e) (Supp. 1965).

[17] Water Pollution Control Act, 33 U.S.C. § 466g(c)(2) (Supp. 1965).

other legitimate uses." [18] Obviously, the standards which the federal government contemplates are not meant to be uniform but are to reflect viable public welfare, aesthetic, and economic alternatives as between different interstate waters and along any one stream.

Pollution Control in Maine

The modern era of pollution control in Maine began with the creation of the Sanitary Water Board in 1941.[19] This board was given the duty

> to study, investigate, and from time to time recommend to the persons responsible for the conditions, ways and means of eliminating from the streams and waters of the state, so far as practicable, all substances and materials which pollute or tend to pollute the same . . . .[20]

Obviously this legislation, though born in response to an emergency pollution problem which existed on the Androscoggin River,[21] provided no real pollution control machinery; the board was to study and recommend only. Furthermore, the board's ability to carry out even these limited pollution control responsibilities was made practically impossible by the legislature's failure to provide any staff and by its less than generous annual appropriation of 400 dollars.[22]

In 1945 the legislature added to the board's duties.[23] One new provision stated that

> no person, firm or corporation shall hereafter discharge into any stream, river, pond, lake or other body of water, or water course, or any tidal waters any waste, refuse or effluent from any manufacturing, processing or industrial plant or establishment so as to constitute a *new source of pollution* to said waters without first obtaining a license therefor from the sanitary water board; provided, however, that no application for a license shall be required hereunder for any manufacturing, processing or industrial plant or establishment, now or heretofore operated, for any such discharge at its present general location, such license being hereby granted.[24]

Nothing in the above passage or in other sections of the 1945 legislation can be construed as effectively controlling pollution. Regardless of the effect upon a receiving lake, river, stream, or tidal water, existing waste dischargers (polluters) were not forced to abate, minimize, or even

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[18] Water Pollution Control Act, 33 U.S.C. § 466g(c)(3) (Supp. 1965).
[19] Me. Pub. Laws 1941, ch. 209, § 1.
[20] *Ibid.*
[21] Me. Pub. Laws 1941, ch. 209, preamble.
[22] Me. Pub. Laws 1941, ch. 209, § 1.
[23] Me. Pub. Laws 1945, ch. 345. (Emphasis supplied.)
[24] Me. Pub. Laws 1945, ch. 345, § 3.

license their discharge. The only requirement was that new waste dischargers obtain a license.[25]

The board had authority, after a hearing, if it determined that the new discharge would cause or increase pollution in a manner "inconsistent with the public interest," to deny a license.[26] However, the legislature did not define the public's interest as it related to water quality. It offered no guidelines to the board as to the degree of pollution control or quality of water that should obtain in any particular watercourse. Left to its own devices, without staff, and largely without funds, the board found it all too easy to equate the public interest as it related to water quality with whatever private interest was applying for a license to discharge its wastes into the state's waters. Consequently, the board's power to deny a license was not an effective pollution control tool—in fact, it was seldom used. The 1945 licensing statute was little more than a means of cataloging new sources of pollution.

In 1951 the legislature abolished the Sanitary Water Board replacing it with the Water Improvement Commission. This body exists today as the leading pollution control agency of state government.[27] Though the powers of the new commission were not enlarged beyond those held by the old board, the new name at least seemed to connote a new vigor towards the task of abating pollution in the state's waters. In addition one significant change was included in the legislation: the commission was now authorized to employ a staff and to "prescribe the powers and duties of such employees and consultants as may be necessary to carry out the provisions of this chapter."[28] However, once again the legislature failed to implement meaningfully its actions: the annual appropriation for 1952 and 1953 was set at only 15,000 dollars.[29]

In 1953 the legislature made significant strengthening changes in the powers and duties of the Water Improvement Commission.[30] For the first time the legislature undertook to define the concept of public interest as it related to water quality. This definition was attained by establishing standards within four broad water classifications[31] and by

[25] Me. Pub. Laws 1945, ch. 345, § 4. From this provision, one might have argued that, to the extent that one is either exempt from this licensing requirement or subsequently obtains, under the provisions of the statute, a license to discharge wastes into the state's waters, he had a right to pollute.

[26] *Ibid.*

[27] Me. Pub. Laws 1945, ch. 383, § 1.

[28] *Ibid.*

[29] Me. Private & Special Laws 1951, ch. 192.

[30] Me. Pub. Laws 1953, ch. 403.

[31] Me. Pub. Laws 1953, ch. 403, § 1-A. Class B was subdivided in 1955. Me. Pub. Laws 1955, ch. 425, § 5. Tidal water quality standards and categories were developed in 1963. Me. Pub. Laws 1963, ch. 274, § 2. Other minor textual changes took place from time to time. Me. Pub. Laws 1959, ch. 295, § 2 (fresh

water); Me. Pub. Laws 1961, ch. 305, § 3 (fresh waters); Me. Pub. Laws 1963, ch. 274, § 1 (fresh waters). The present Maine water classification statutes read:

§ 363. STANDARD OF CLASSIFICATION OF FRESH WATERS. The commission shall have 4 standards for the classification of fresh surface waters.

Class A shall be the highest classification and shall be of such quality that it can be used for bathing and for public water supplies after disinfection, and the dissolved oxygen content of such waters shall not be less than 75% saturation and contain not more than 100 coliform bacteria per 100 milliliters.

There shall be no discharge of sewage or other wastes into water of this classification and no deposits of such material on the banks of such waters in such a manner that transfer of the material into the waters is likely. Such waters may be used for log driving or other commercial purposes which will not lower its classification.

Class B, the 2nd highest classification, shall be divided into 2 designated groups as B-1 and B-2.

B-1. Waters of this class shall be considered the higher quality of the Class B group and shall be acceptable for recreational purposes and after adequate treatment for use as a potable water supply. The dissolved oxygen of such waters shall be not less than 75% of saturation and contain no more than 300 coliform bacteria per 100 milliliters.

B-2. Waters of this class shall be acceptable for recreational boating, fishing, industrial and potable water supplies after adequate treatment. The dissolved oxygen of such waters shall not be less than 60% of saturation and contain no more than 1,000 coliform bacteria per 100 milliliters.

There shall be no disposal of sewage or industrial waste in such waters to lower its classification nor shall such disposal of sewage or waste be injurious to aquatic life or dangerous for human consumption.

Class C, the 3rd highest classification, shall be of such a quality as to be satisfactory for recreational boating, fishing and other uses except potable water supplies and swimming, unless adequately treated to meet standards.

Waters of this classification shall be free from scums, slicks, odors and objectionable floating solids, and shall be free from chemicals and other conditions inimical to aquatic life. The dissolved oxygen content of such waters shall not be less than 5 parts per million for trout and salmon waters and not less than 4 parts per million for non-trout and non-salmon waters.

The commission may take such action as may be appropriate for the best interests of the public when it finds that a "C" classification is temporarily lowered due to abnormal conditions of temperature and stream flow for that season involved.

Class D waters, the lowest classification, shall be considered as primarily devoted to the transportation of sewage and industrial wastes without causing a public nuisance as defined in Title 17, section 2802, by the creation of odor-producing sludge banks and deposits or other nuisance condition and such waters shall contain dissolved oxygen at all times.

During a period of temporary reduction in the dissolved oxygen con-

tent in this class water, due to abnormal conditions of temperature or stream flow for the particular season involved, the commission, provided a nuisance condition has not then been created in such water and in the opinion of the commission is not likely to be created during such season, shall take no action to reduce the amount of pollution from any source which is allowed in such class water under normal conditions.

With respect to "C" and "D" classifications, the number of coliform bacteria or amounts of toxic wastes or chemicals discharged into said waters shall be only those amounts which will not, in the determination of the commission, be harmful to the public health.

§ 364. -TIDAL OR MARINE WATERS.

The commission shall have 4 standards for the classification of tidal or marine waters as follows:

Marine waters shall include the waters of the Atlantic Ocean, its bays, inlets, etc. to mean high tide within 3 nautical miles from the coast line and all other tidal waters within the State except that in the case of tidal effect estuaries the upstream limits of tidal waters shall be that point where a mean high tide the average of 3 samples taken at the bed, at mid-depth and at the surface shall show a salinity of 5,000 parts per million or greater, or where the tidal limit for purposes of pollution control statutes is specifically defined.

The commission shall have 4 standards for classification of waters in the tidal area.

Class SA, all clean water usages; There shall be no floating solids, oil or sludge deposits attributable to sewage, industrial wastes or other wastes and no deposit of garbage, cinders, ashes, oils, sludge or other refuse. There shall be no discharge of sewage which has not received a minimum of primary treatment and effective disinfection.

Waters of the SA classification shall contain not less than 6.0 parts per million of dissolved oxygen at all times. There shall be no toxic wastes, deleterious substances, colored or other wastes or heated liquids discharged to waters of this classification either singly or in combination with other substances or wastes in such amounts or at such temperatures as to be injurious to edible fish or shellfish or to the culture or propagation thereof, or which in any manner shall adversely affect the flavor, color, odor or sanitary condition thereof or impair the waters for any other best usage as determined for the specific waters assigned to this class.

The median MPN value in any series of samples representtive of waters in the shellfish growing area shall not be in excess of 70 per 100 milliliters or the approximate equivalent by other methods of expression.

Class SB-1, best usage; bathing and other clean water usages. There shall be no floating solids, settleable solids, oil or sludge deposits attributable to sewage, industrial wastes or other wastes and no deposit of garbage, cinders, ashes, oils, sludge or other refuse. There shall be no discharge of sewage which has not received a minimum of primary treatment and disinfection.

Waters of the SB classification shall contain not less than 6.0 parts per million of dissolved oxygen at all times. There shall be no toxic wastes, deleterious substances, colored or other wastes or heated liquids discharged to waters of this classification either singly or in combination

with other substances or wastes in such amounts or at such temperatures as to be injurious to edible fish or shellfish or to the culture or propagation thereof, or which in any manner shall adversely affect the flavor, color, odor or sanitary condition thereof; and otherwise none in sufficient amounts to make the waters unsafe or unsuitable for bathing or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.

The median MPN value in any series of samples representative of waters in the shellfish growing area shall not be in excess of 240 per 100 milliliters or the equivalent by other methods of expression.

Class SB-2, best usage; recreational usages, except bathing; and fisheries. There shall be no floating solids, settleable solids, oil or sludge deposits attributable to sewage, industrial wastes or other wastes and no deposit of garbage, cinders, ashes, oil, sludge or other refuse. There shall be no discharge of sewage which has not received a minimum of primary treatment and disinfection.

Waters of the SB-2 classification shall contain not less than 6.0 parts per million of dissolved oxygen at all times. There shall be no toxic wastes deleterious substances, colored or other wastes or heated liquids discharged to waters of this classification either singly or in combination with other substances or wastes in such amounts or at such temperatures as to be injurious to edible fish or to the culture or propagation thereof, or which in any manner shall adversely affect the flavor, color, or odor thereof; and otherwise none in sufficient amounts to make the waters unsafe or unsuitable for any other best usage as determined for the specific waters which are assigned to this class.

The median MPN value in any series of samples representative of waters in this classification shall not be in excess of 1,000 per 100 milliliters or the equivalent by other methods of expression.

Class SC, the 3rd highest classification, shall be of such quality as to be satisfactory for recreational boating, fishing and other similar uses except bathing.

Waters of this classification shall be free from scums, slicks, odors and objectionable floating solids, and shall be free from chemicals and other conditions inimical to aquatic life. The dissolved oxygen content of such waters shall not be less than 5 parts per million.

The commission may take such action as may be appropriate for the best interests of the public when it finds that an "SC" classification is temporarily lowered due to abnormal conditions of temperature and flow for that season involved.

Class SD waters, the lowest classification, shall be considered as primarily devoted to the disposal of sewage and industrial wastes without causing a public nuisance as defined in Title 17, section 2802, by the creation of odor producing sludge banks and deposits or other nuisance condition and such waters shall contain dissolved oxygen at all times. During a period of temporary reduction in the dissolved oxygen content in this class water, due to abnormal conditions of temperatures or flow for the particular season involved, the commission, provided a nuisance condition has not then been created in such water and in the opinion of the commission is not likely to be created during such season, shall take no action to reduce the amount of pollution from any source which is allowed in such class water under normal conditions.

authorizing the commission to recommend to the legislature the appropriate classification to be applied to each lake, river, stream, and tidewater area within the state. The legislation further provided that

> after adoption of any classification, by the legislature, for surface waters or tidal flats, or sections thereof, it shall be unlawful for any person, corporation, municipality[32] or other legal entity to dispose of any sewage, industrial or other waste, either alone or in conjunction with another or others, in such manner as will lower the quality of the said waters, tidal flats, or sections thereof, below the minimum requirements of such classification, and notwithstanding any licenses which may have been granted or issued under sections 3, 4, and 5 thereof.
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> The commission shall enforce the provisions of this section by appropriate orders, and in the event such orders are not complied with within such time as the commission shall stipulate, appropriate legal action shall be instituted by the commission to enforce compliance or to punish violators. . . .[33]

The result of the 1953 legislation coupled with past enactments was at last to create a framework within which effective pollution control activities could be carried out. Since 1953, the legislature has expanded this framework in a number of useful but essentially minor respects.[34] Furthermore, the legislature has approved commission recommended classifications for almost all of the state's waters. In short, potentially effective pollution control machinery now exists in Maine. There is not only a basis for denying licenses to new activities whose discharge of wastes into a particular body of water would reduce the quality of that water below the standard inherent in the legislatively established classification selected for that particular body of water, but all existing licensees can also be made to alter their discharge of wastes into the

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> With respect to "SC" and "SD" classifications, the number of coliform bacteria, or amounts of toxic wastes or chemicals discharged into said waters shall be only those amounts which will not, in the determination of the commission, be harmful to the public health.

ME. REV. STAT. ANN. tit. 38, §§ 363, 364 (1964).

[32] This is the first formal recognition of municipalities as sources of pollution. Another section of the 1953 legislation provided that

> municipalities shall file, not more than once annually, with the Commission information relative to the present method of sewage collection and disposal in such municipality . . . .

Me. Pub. Laws 1953, ch. 403, § 1-D.

[33] Me. Pub. Laws 1953, ch. 403, § 1-c.

[34] Me. Pub. Laws 1957, ch. 365 ("The Commission shall consult with and advise the authorities of municipalities, persons and businesses having or about to have systems of drainage or sewage . . . as to the best methods of disposing of the drainage or sewage . . . ."); Me. Pub. Laws 1961, ch. 305 (authorized the commission to be the state level approving authority with regard to proposed municipal and private drainage, sewage disposal, or sewage treatment facility plants). For further changes see *supra* note 31.

state's waters so that the legislatively selected standard for any body of water can be achieved.

But creating potentially effective pollution control machinery is not the same as actually cleaning up the state's waters, although it is certainly an essential first step. The really difficult jobs are mustering the political will to enforce pollution control measures and allocating the funds necessary to enable the Water Improvement Commission, other state agencies, and local units of government to carry out their assigned tasks as they relate to pollution control and abatement.

In neither of these enforcing respects has the legislature of Maine particularly distinguished itself. Consequently, real pollution control and abatement languishes in the state. The absence of political will is evidenced by the low water quality classifications set on many of the state's waters which are now being widely used or are susceptible of being widely used;[35] by the unwillingness, for a variety of political and economic reasons, to classify at all some waters within the state;[36] and, where classifications are set, by an almost ludicrous unwillingness to use meaningfully the order issuing power of the commission and the legal machinery of the state to insure that continuing and future discharges of wastes (effluent) into a particular body of water do not reduce the quality of that water below the classification set.[37]

With regard to the allocation of funds for pollution control, it has already been shown that the annual outlays before 1953 were trifling; since then, although the annual appropriation has increased each year,

[35] All too often the classifications set do little more than reflect existing or immediately prospective economic activities and the quality of water that these activities have brought or will bring about. Until quite recently no serious effort was made to upgrade or reclaim many state waters to a higher or wider range of uses. The similarity between setting stream standards and zoning is immediately apparent. Both require a prior planning process, an evaluation of the present quality of the land or water, a taking into account of the legitimate competing interests of all present and foreseeable land or water users (including the public's interest), and lastly placing the particular piece of land or water in the land use or water quality category to which it is best suited. The setting of stream standards in Maine simply has not proceeded on this broad and objective planning basis. More often than not it proceeds on the basis of what is and what the traffic will bear.

[36] As yet the main stem of the Androscoggin River, the Presumpscot River from Westbrook to the tidewater, and the Little Androscoggin River from Mechanic Falls to the main stem are unclassified.

[37] The simple fact is that the commission to date has relied almost completely on voluntary cooperation, discussion, persuasion, and general public sympathy in its efforts to attain the stream standards which have been set. Thus literally years (in some instances a decade or more) have gone by and will continue to go by between the setting of a standard for a particular body of water and any tangible improvement in the quality of that water.

it remains totally inadequate when measured by the dimensions of the problem. Over the entire fourteen year period from 1954 to 1967 the Water Improvement Commission has had approximately 1.4 million dollars appropriated to it.[38] Another 1.8 million dollars was appropriated by the Maine Legislature between 1960 and 1964[39] pursuant to legislation enacted in 1957 authorizing the state to pay up to 20 percent[40] (later increased to 30 percent[41]) of the total cost of newly constructed municipal sewage treatment facilities. In addition, between 1965 and 1967 another 4.5 million dollars[42] has been allocated for municipal sewage treatment facility construction costs from a 25 million dollar bond authorization passed by the legislature in 1964[43] and subsequently approved in referendum. The total of these various appropriations and allocations spanning fourteen years, 1954 to 1967, is 7.7 million dollars. Compare this total with a recently estimated figure of approximately 30 million dollars to construct needed sewers and sewage treatment facilities for the city of Portland alone (facilities which will only raise the tidal waters in the Portland area to class SC)[44] and the long run inadequacy of the state's financial commitment to enforce and give meaning to its pollution control program is apparent.

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[38] The appropriations for the period were as follows: 1954 ($27,293), 1955 ($28,559), Me. Private & Special Laws 1953 ch. 145; 1956 ($39,532), 1957 ($40,558), Me. Private & Special Laws 1955, ch. 181; 1958 ($66,838), 1959 ($68,698), Me. Private & Special Laws 1957, ch. 182; 1960 ($92,437), 1961 ($93,582), Me. Private & Special Laws 1959, ch. 161; 1962 ($135,182), 1963 ($136,336), Me. Private & Special Laws 1961, chs. 164, 200; 1964 ($138,429), 1965 ($143,172), Me. Private & Special Laws 1963, ch. 168; 1966 ($179,270), 1967 ($181,042), Me. Private & Special Laws 1965, chs. 78, 159.

[39] The appropriations for the period were as follows: 1960 ($310,000), 1961 ($310,000), Me. Private & Special Laws 1959, ch. 161; 1962 ($315,000), 1963 ($315,000), Me. Private & Special Laws 1961, chs. 164, 200; 1964 ($565,000), Me. Private & Special Laws 1963, ch. 168.

[40] Me. Pub. Laws 1957, ch. 429, § 75. This legislation, passed in special session, was designed to compliment federal assistance toward municipal sewage treatment plant construction costs. Water Pollution Control Act., 33 U.S.C. § 466e (1957).

[41] Me. Pub. Laws 1961, ch. 298.

[42] The appropriations for the period were as follows: 1965 ($700,000), 1966 ($1,300,000), 1967 ($2,500,000), Me. Private & Special Laws 1965, ch. 129.

[43] Me. Private & Special Laws 1963, ch. 235 (special session, Sept., 1964).

[44] Portland Evening Express, Dec. 6, 1966, p. 1. An earlier report prepared for the City of Portland by Metcalf and Eddy, Boston, Mass. (H & HFA Project No. P-Me.-3087) estimated that primary sewage treatment facilities would cost nearly $20 million to construct and would require approximately $243,500 annually to maintain and operate. These facilities in all probability would not raise the quality of water in the Portland harbor area above its present SD classification.

Some Conclusions and an Introduction to the Concept of Effluent Charge

Before defining the concept of effluent charge and showing how a system of effluent charges can be used to enforce and actually to achieve legislatively determined stream standards, some conclusions may usefully be drawn:

1. The quality of water and not its availability (quantity) is the most pressing water resource problem of today and the immediate future.
2. The federal government and, to an increasing extent, state governments are becoming aware of their responsibilities in the areas of pollution control and abatement.
3. The State of Maine through a series of legislative enactments beginning in 1941 has created potentially effective pollution control machinery. But this machinery has not been fully implemented; thus the quality of many of the state's waters has not only failed to improve but has continued to deteriorate.
4. The attainment of water quality (stream) standards in Maine and elsewhere requires public and political will and a substantial financial commitment. The financial commitment necessary, however, has been so large that states have simply been unwilling or unable to meet it.

In this last respect a modified application of the concept of effluent charges can be most useful. Put quite simply, an effluent charge system would shift the cost burden of the presently employed method of waste disposal (simply dumping wastes into the state's waters) from the state as a whole and from would-be downstream water users to the economic unit[45] actually creating the waste product and disposing of it in the manner described.

The Economics Underlying Effluent Charge

There are some economic factors underlying our free market system and the concept of effluent charge which should be reviewed briefly at this point. All of the factors of production (resources) are to some degree scarce. A free market economy bids scarce resources to their most productive use by establishing prices which reflect the demand for various items. The more valuable a particular end product is esteemed to be in the market (as reflected by its price), the more its producer will be willing to pay for the constituent resources he requires The producer will thus bid the use of these resources away from producers of less valuable end products who would use the same constitu-

[45] The term economic unit as used here and throughout the text includes commercial, industrial, municipal, and private (residential) waste producing entities.

ent resources but who, because their end product is less valuable, cannot afford to pay the market price of these resources. To an individual producer the price he must pay for the resources he uses are costs. To allow him a profit, the sum of his costs on a per unit basis must obviously be less than the prevailing per unit market price of his end product. When this is the case for all producers, the market is in equilibrium—the aggregate supply of scarce resources will be most productively allocated in accordance with the relative prices established by the aggregate demands of the total economy.[46]

An underlying assumption of the above system, necessary to its operation, is that each producer will bear all of the costs associated with the production of his end product. The ideal is distorted if a producer is able to shift one of his costs to another economic unit. His total costs are reduced for no economically justifiable reason. He may then lower the price of his end product so that more than an equilibrium quantity will be sold, or he can bid more for the constituent resources which he desires, taking them away from otherwise more valuable uses.

An economic unit which must bear an unnecessary production cost will see its total costs rise. It must then raise the price of its end product, thus reducing the quantity sold below that which would be taken in equilibrium. It cannot bid less for the constituent resources it requires, or it will not obtain their use. In fact, it may have to bid more for the resources it requires if it is forced to bid against a producer who shifted one of his costs and who, as noted, can now bid more for resources than he otherwise could have. If this latter situation developed, the economic unit which had an unnecessary cost shifted to it would see its total costs rise a second time leading to a further rise in the price of its end product and a further decline in the quantity sold.

In the economy as a whole, resources would no longer be allocated in the most socially desirable manner. Aggregate demand would no longer reflect the foremost desires of the total economy. There would be an overproduction and overconsumption of some items and an underproduction and underconsumption of other items. Although the total supply of resources would still be allocated via the price mechanism in accordance with total demand, this new aggregation of demand would be biased by a force extraneous to the market, *i.e.*, the ability of one economic unit to shift one of its costs to another economic unit.

These economic considerations provide a necessary framework within which to view the problem of waste disposal and water quality. It is an uncontroverted fact that a large part of all domestic, municipal, agricultural, and industrial wastes (pollutant material) passes as effluent into the state's waters where the cost of it disposal is not borne by the pro-

[46] SAMUELSON, ECONOMICS ch. 4 (6th ed. 1964).

ducer of the waste product as a part of his total production cost but rather is shifted to: (1) the state as a whole with an accompanying loss to the state of aesthetic and amenity values as well as industrial and recreational interests which but for the lowered quality of the water could be induced to settle or expand within the state, and (2) downstream water users who must either treat the water before using it or forego their use of the water. Both alternatives involve additional costs to this would-be downstream water user.

At this point then, it can clearly be seen that the existing state of affairs in Maine prevents the market from being able to allocate all resources most productively. Some few economic units receive a windfall benefit by being able to shift their waste disposal costs in the manner described. A much larger number of economic units are disadvantaged, to say nothing of the intangible amenity and aesthetic losses to the public as a whole which accompany water pollution. Finally, the whole demand pattern of water related economic interests in the state is obviously distorted.

An economist not concerned with water quality but only interested in correcting the economic distortions described would solve the problem by imposing a so-called "effluent charge" (the source of funds for a corrective system of transfer payments) on those economic units which shift part of their costs by disposing of their wastes in the state's waters. The charge would be equal to and in lieu of the cost factor these economic units are able to avoid. The total production costs of these economic units would increase as if they were paying for the cost of their own waste disposal.[47]

The fund of money created by such a system of charges would then be distributed to those economic units which had an unnecessary cost burden shifted to them as a consequence of someone else's waste disposal in the state's waters. The amount received by each of these economic units would be equal to and would fully offset the shifted cost they are forced to bear. The total production costs of these unnecessarily burdened economic units would decrease as if they had received water of a quality completely sufficient to their needs and thus had incurred no additional costs.

Although such a system would correct the market distortions which the present system of waste disposal creates, it would leave the public's interest in water quality unattended. The state's waters would not in any

[47] Effluent charges must necessarily vary as between individual economic units in accordance with the quantity and quality of their effluent. Thus there would be an incentive for each unit to make those technological changes in the handling of their wastes which would reduce their effluent charge by an amount larger than the cost of the change.

way be improved. However, the economist points us in the right direction when he proposes by means of the effluent charge to shift the cost of pollution back onto the pollutor. The remaining discussion will show how this desirable facet of the economist's system of transfer payments may be combined with and actually serve as an enforcement device to achieve those improved water quality levels embodied in a system of stream standards (classification).

Effluent Charges Can Achieve Stream Standards

The key to using effluent charges as a means of achieving improved water quality is simply to disregard the transfer payment aspect of the economist's system. Instead the total amount of money collected by the charges would be equal to and measured by the total amount of money required to build and operate the treatment facilities necessary to maintain the quality of water which legislatively imposed standards require.[48]

Inasmuch as the standards for various bodies of water would be different and the total effluent load received by each of the water bodies would also be different, the planning of treatment facilities and the establishing of appropriate charges for each individual economic unit would be handled on a stream by stream or watershed by watershed basis. Some hypothetical situations may be helpful in visualizing the proposal.

A receiving stream or small watershed having a high water quality standard (for example, class A) might presently be receiving an effluent load which is below or only slightly above the normal dilution capacity[49] of that stream to maintain the desired quality of water. Thus, no, or only minimal, treatment facilities would be necessary. No effluent charge, or at most only a small charge would be required of the economic units discharging effluent into this water body.

Another stream or watershed having only a moderate water quality standard (for example, class C) might nonetheless be receiving an effluent load well above the stream's normal dilution capacity to maintain the desired quality standard. Thus, treatment facilities would be necessary to obtain the water quality desired. Let us estimate the total cost of

[48] In the economist's system the economic units that had a cost shifted to them were made whole by receiving a transfer payment. In the proposed system the economic units that bear the burden of polluted waters are made whole or nearly so by having at least that quality of water called for by the stream standard made available to them.

[49] Every body of water has, to some extent, a natural ability to absorb, break down, and neutralize waste materials which are introduced into that body of water without significantly changing the quality of the water. This ability is referred to as the waterbody's dilution capacity.

such facilities at 500,000 dollars. This cost would be borne in the form of an effluent charge levied on all of the economic units whose discharge of effluent into this water body contributes to the need for the treatment facility. The charge levied against any one economic unit would be a percentage of 500,000 dollars measured by the ratio of its contribution to the total of that volume of effluent over the dilution capacity of the stream which requires and is to receive treatment.[50] Additional hypothetical situations which may facilitate a fuller understanding of the proposals being made are presented at the end of the text.

Effluent Charges Viewed as a Tax

An argument almost certain to be raised in opposition to the proposed system of effluent charges is that such a system would be an unconstitutional tax. Anticipating this argument within the Maine framework particularly Article IX, sec. 8 of the state's constitution, it does not appear that such a system of charges would be an illegal tax since they do not fall into the category of an ad valorem tax on real or personal property. The proposed charges are in the nature of an excise or privilege tax and therefore are not bound by constitutional rules of uniformity.

The Justices of the Maine Supreme Judicial Court have defined an excise tax as "a tax imposed upon the performance of an act, the engaging in an occupation, or the enjoyment of a privilege."[51]

The privilege being levied upon by the proposed system of effluent charges is that of being able to dispose of one's wastes by passing them as effluent into the state's waters. Clearly, there is no inherent right to pollute these waters. Addressing itself to the question of uniformity, in *State v. F. H. Vahlsing, Inc.*[52] and more recently in *State v. Stinson Canning Co.*,[53] the Maine Supreme Judicial Court has stated that the requirement that taxes be apportioned and assessed equally applies only to property taxes and does not control the imposition of excise taxes. Quoting from *Stinson,*

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[50] The question of who should build and maintain the proposed treatment facilities does not seem relevant at this point. Any number of possibilities seem open to the legislature. The state itself could build and operate such facilities pursuant to the carrying out of a statewide program of pollution control and abatement. Individual or groups of municipalities could be ordered to construct whatever treatment facilities were deemed necessary by the Water Improvement Commission. Legislation capable of accomplishing this end already exists; ME. REV. STAT. ANN. tit. 38, § 1062.

[51] Opinions of the Justices, 123 Me. 573, 121 Atl. 902 (1923).

[52] 47 Me. 417, 88 A.2d 144 (1952).

[53] 161 Me. 320, 211 A.2d 553 (1965). See also ME. CONST. art. IX, § 8.

> it is generally held that a constitutional provision requiring taxation to be equal and uniform applies only to taxes on polls and property and has no reference whatever to excises.[54]

The legislature of the state of Maine is well within its powers in levying such an excise: "In this State the full power of taxation is vested in the Legislature and is measured not by grant but by limitation." [55] If a tax is not plainly forbidden by the state constitution, it is constitutional.[56] There is nothing prohibiting the proposed system of effluent charges. Thus a classification of the state's waters as to the quality of water to be maintained in each water body and the application of an excise, privilege tax, or user charge sufficient only to raise that sum of money required in each individual watercourse to build the treatment facilities necessary to maintain the desired quality of water in that watercourse seems entirely possible.

That these charges will be different in total as between different water bodies is clearly recognized because of differences in the standards imposed, differences in the normal dilution capabilities of various waters, and differences in the degree to which various economic units will exercise the privilege of disposing of their wastes in the manner described. However, economic units similarly situated, *i.e.*, within the same stream or watershed basin, will be similarly taxed in that their share of necessary treatment costs will in all cases be proportionate to their share of the effluent load beyond the dilution capacity of the stream which makes the treatment costs necessary.[57] Whatever requirements may exist as to the equal application of excises to groups similarly situated are therefore capable of being met by the proposed effluent charge system.

Summary of Benefits to be Derived from the Proposed System of Effluent Charges.

A number of benefits would result from implementation of a system of effluent charges. The most important and the central aspect of the modified system of effluent charges proposed is that once the water quality standard for a particular body of water is established by the legislature—once a commitment, if you will, is made to the public con-

[54] 161 Me. 320, 325-26, 211 A.2d 553, 556 (1965).

[55] Opinions of the Justices, 123 Me. 573, 577, 121 Atl. 902, 904 (1923); State v. Telegraph, 73 Me. 518, 531 (1882).

[56] Opinions of the Justices, 102 Me. 527, 66 Atl. 726 (1907).

[57] An effluent charge of the type described seems merely to be an enlargement (covering an entire stream or basin) of the familiar user charge concept employed by municipalities to defray sewage disposal costs, so-called waste load surcharges. *Cf.* ME. REV. STAT. ANN. tit. 30, § 4253 (1964); City of Auburn v. Paul, 113 Me. 207, 93 Atl. 289 (1915).

cerning the quality of water in a particular watercourse—a means of achieving and maintaining that quality of water can be automatically set in motion. The charges would begin immediately upon classification, or as soon thereafter as it is determined that there is an amount of effluent in a particular receiving water body in excess of the dilution capacity of that water body which if not treated would reduce the quality of water in that water body below the standard inherent in the classification. The charges would be divided on a pro rata basis among those economic units whose waste discharges into the particular receiving water body contributed to the previously mentioned excess. The charges would be limited in total amount to a sum (and that sum would be earmarked in advance) sufficient to build and maintain those treatment facilities which in each particular receiving water body are necessary to achieve the quality of water inherent in the legislatively established classification for that particular water body.[58]

Market distortions and the misallocation or less productive use of resources occasioned by the ability of some economic units to shift their costs of waste disposal onto the state or other economic units would be corrected to the extent that the effluent charge system causes economic units to bear a large share of the cost of their own waste disposal.

Two different types of incentives would arise. Economic units passing effluent into the state's waters and incurring a charge would scrutinize their waste disposal program carefully and make any technological change which would reduce that charge by an amount greater than the cost of the change. Furthermore, in the long run, there will be a locational incentive. Economic units which need water but are not particularly concerned with quality and economic units whose discharge of effluent is large will tend to locate in those stream basins with low water quality standards. Here the state is still willing to absorb part of their waste disposal cost. On the other hand, economic units which require high quality water or whose effluent load is small will be attracted to stream basins having a high water quality standard.

All of the tools sought to be used are familiar. The legislature, utilizing the research, investigative, and enforcement powers of an agency it has created (the Water Improvement Commission) and the police

[58] The above system of effluent charges in no way precludes the state and the federal government from continuing to assume some of the costs of construction of sewage treatment facilities. Such cost sharing programs, to the extent that they already exist or are enlarged, would simply reduce the total amount required from (and thus the pro-rata share levied upon) those economic units whose discharge of wastes in a particular water body necessitated the construction of treatment facilities to maintain the quality of water in that water body. Just because the proposed system of effluent charges seeks to shift the costs of pollution back onto the polluter, it need not be assumed that all of these costs need be shifted.

power of the state, has undertaken a classification of state waters not unlike zoning. The modified effluent charge proposal combines the state's power to tax privileges with the long used municipal waste load surcharge concept (although on a slightly larger scale) to provide an effective enforcement mechanism to enable achievement of the water quality standards inherent in the classifications; and the public erection of sewage treatment facilities is by no means new.

In summary Maine seems uniquely able at this point to innovate in the area of water pollution control by effectively combining the tools of the economist, planner, water resources engineer, and the state government. This article broadly suggests some steps in this direction. However, the focus has not been on the details of implementing the proposals made. This task, of course, will have to be undertaken and will present some difficult technological and administrative challenges once the broad concept of enforcing stream standards by use of effluent charges (charges which are measured by and allocated to the construction costs of needed waste treatment facilities) has been accepted.

The idea of enforcing water quality standards by imposing an effluent charge should be considered seriously and critically. It cannot simply be rejected out of hand, for it, or some variation of it, must be made to work if the economy and general welfare of our state and nation are to continue to move ahead. We have already deceived ourselves in the area of pollution control and abatement far too long.

TABLE

Presentation of 7 Hypothetical Water Bodies

	Receiving Waters						
	1	2	3	4	5	6	7
(1) Water quality standards A through D (A denoting highest water quality).	A	B 1	B 2	C	C	D	D
(2) Effluent load capable of being absorbed by the normal dilution capacity of the stream without loss of the desired water quality; expressed in a hypothetical unit of effluent which accounts for quantity and quality.	1000	900	1200	1700	2500	3000	5000
(3) Present effluent load actually being received by the stream; expressed in a hypothetical unit of effluent which accounts for quantity and quality.	900	1200	2000	1700	3000	4500	7000
(4) Line (2) subtracted from line (3) is a measure of the excess effluent received by the stream which if not treated would reduce the water quality below the standard listed in (1); expressed in a hypothetical unit of effluent which accounts for quantity and quality.	*	300	800	**	500	1500	2000
(5) Are treatment facilities presently necessary?	NO	YES	YES	NO	YES	YES	YES
(6) Estimated cost of treatment facilities necessary to obtain the desired water quality determines the effluent charge to be levied against economic units contributing to the differences created when (2) is subtracted from (3).	NONE	$100,000	$400,000	NONE	$200,000	$700,000	$900,000

* If line (2) is greater than line (3) the stream may receive additional effluent without loss of the desired water quality.

** If line (2) equals line (3) the stream is receiving the maximum amount of effluent it can handle without treatment facilities and still maintain the desired water quality.