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Pollution Control by Effluent Charges: It Works in the Federal Republic of Germany, Why Not in the U.S.

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Pollution Control by Effluent Charges: It Works in the Federal Republic of Germany, Why Not in the U.S.

INTRODUCTION

This article describes the recent Federal Republic of Germany effluent charge law and the political and legal background that permitted this law to be enacted. The impact of that law is assessed, although the assessment is necessarily tentative in view of the short experience with the law to date.

The economic and legal implications of enacting an effluent charge law in the United States also are analyzed. Included in this discussion are the advantages and disadvantages of state vs. federal enactment, the constitutional objections that might be raised to such a law, and how it might be coordinated with existing water pollution control laws in the United States.


Water management historically has been controlled locally in the Federal Republic of Germany (FRG). Even after the 1871 unification of the nation's water management, as well as many other areas of domestic policy, water management remained under local control. In 1937, the...
National Socialist Government tried to centralize governmental power at the national level, including water management. This trend, however, was reversed in 1949 with adoption of the postwar Basic Law which encouraged decentralization again. The long tradition of local control over water management in the FRG played a critical role in shaping the debates on the 1976 Federal Water Act and Effluent Charge Law.¹

By the start of the last decade environmental quality in the FRG was badly in need of improvement. Rapid industrialization had placed excessive demands on the self-purifying capabilities of receiving waters. In many regions traditional uses of water bodies, for example as a source of drinking water, had been precluded by the deterioration of water quality. The need for new water legislation in particular and new environmental law in general was recognized widely.

The heightened concern for environmental quality led to the creation of a Cabinet Committee for Environmental Problems to coordinate environmental actions of all federal ministries.² This Committee produced a document entitled “A Program for the Protection of the Human Environment” (PPHE), published in 1971, which strongly advocated a market-oriented approach to environmental control. The report also recommended a constitutional amendment to give the federal government preemptive power over the Länder³ to enact appropriate environmental legislation. Constitutional amendments were proposed in 1973, 1974, and 1975 but failed to pass. Failure of these proposed amendments meant that the federal government would have to share legal authority over this subject with the Länder, as required by the 1949 Basic Law. Under the Basic Law the federal government could only enact framework legislation, leaving all implementation and enforcement to the Länder.⁴

３. “Länder” are the states in the Federal Republic of Germany.

The PPHE recommended expansion of federal legislative competence in the environmental field in view of the limitations placed on those powers in the Basic Law of 1949. The FRG’s constitution, the Basic Law (Grundgesetz), apportions legislative competence between the federal and Länder governments on the basis of four classifications. In the first category, the federal government has exclusive competence regarding foreign affairs, national citizenship, commerce with foreign nations, postal affairs, the national railroads and air transportation, currency. In the second category, the federal government and the Länder have concurrent legislative competence over civil, criminal, and
Internal and external pressures built and forced the improvement of water quality. Switzerland and the Netherlands, downstream from the FRG, expressed increased concern about the deterioration of water quality in mutually shared water bodies, such as Lake Constance and the Rhine. International organizations, such as the Organization for Economic Cooperation and Development (OECD) and the European Community, called for stronger environmental and water pollution control laws, as did the 1972 World Environmental Conference held under United Nations auspices in Stockholm, Sweden. These international organizations urged adoption of the market-oriented “polluter pays” principle as the best means for implementing environmental and water pollution control programs.5

Political support in the FRG increased for a market approach to environmental management during the early 1970s. Initial proposals for water pollution control legislation looked very much like the “ideal” systems urged by economists. Charges would be levied on waste dischargers in direct proportion to the damage caused by their use of public waters.6 Some Länder, however, especially Bavaria and Baden-Wuerttemberg in the south, opposed these radical innovations and recommended a more moderate charge system which would operate in tandem with the traditional standards/regulatory system.7 By 1976, the idea of a combined
system of regulations plus charges had become dominant. This system would levy charges high enough to create market-like incentives to abate pollution but, at the same time, would continue an administrative management regime for pollution control.

Industry initially opposed the idea of any effluent charge system. As political support for the system gained momentum, however, opposition shifted to implementation issues, such as the criteria for setting charges, the level of charges, and the dates when the system would go into effect.8

Some industries actually supported the effluent charge concept. The two main sources of support were the newer plants with new waste-saving production processes and the latest pollution control technology, and those older plants with recently installed new pollution control equipment. They believed their charges would be relatively smaller thus giving them a competitive edge over industrial facilities with less up-to-date equipment. A few other industries supported the idea because they believed that the levying of charges would even out the serious inequities caused by variations in the water quality regulatory systems among the Länder.9

THE 1976 FEDERAL WATER ACT, WASSERHAUSHALTSGESETZ

The Federal Water Act (FWA) continues the operation of the permit systems that were in effect in the Länder under the 1957 law.10 The FWA sets forth the conditions governing the granting of permits to use public waters for the discharge of effluents. The FWA empowers the federal government to establish uniform discharge standards for certain major pollutants and to determine the level of technology that must be achieved by municipalities and industries. In addition, the FWA grants the federal government authority to establish a minimum national water quality goal for receiving waters, and it did so by setting this goal at quality level II (Gütezustand II).11 Quality level II is moderately polluted water with a

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8. There is a feeling in the FRO that once a consensus on the need for legislation is achieved, the various parties are more inclined to work in cooperation toward the common goal in contrast to the United States where a more adversarial philosophy seems to operate. Interview with Drs. Uppenbrink, Luhr, and Kanowski, supra note 6.

9. Interview with Dr. W. Kitschler, Ministerialrat, Dr. H. Roth, Ministerialrat, and Dr. J. Gilles, Ministerialrat, Ministry of Interior, in Bonn (Mar. 15, 1983); interview with J. Salzwedel, Director, Institut für das Recht der Wasserwirtschaft an der Universität Bonn, in Bonn (Mar. 15, 1983).


11. GOVERNMENT OF THE FEDERAL REPUBLIC OF GERMANY, GEWÄSSERGÜTE KARTE DER BUNDESREPUBLIK DEUTSCHLAND, AUSGABE 1976 (Water Quality Map of the Federal Republic of Germany, 1976 Edition). There are four classes of water. Class I is oxygen saturated, low in nutrients, and supports high quality fish; Class II is defined in the text; Class III is heavily polluted; Class IV is excessively polluted. The FRG uses a method of classifying water quality developed by Kolkwitz and Marssond and revised by Liebman. See H. Liebmann, Die Notwendigkeit
good oxygen supply capable of supporting a large variety of algae, crayfish and insect larvae, and fish.\textsuperscript{12}

The FWA made an important change in existing law by banning future issuance of any "licenses" by the Länder.\textsuperscript{13} Licenses, which were used extensively by some Länder, created vested rights for 20 years or longer and required compensation when revoked. Now all waste dischargers must operate under permits which are issued for shorter periods of time and are subject to change and even revocation as water quality demands change over time.\textsuperscript{14} The FWA also subjects present license holders to reasonable regulations to conform the licensed discharges with the federal minimum standards under Art. 7a(2). More importantly, the effluent charge law subjects license holders to the same charges as permit holders.\textsuperscript{15} While the federal government establishes the overall national water quality level (i.e., Level II), the Länder establish definite water quality targets and programs for achieving those targets.

The most important provision in the FWA is article 7(a), which authorizes the federal government to establish technology-based standards (allgemein anerkannte Regeln der Technik) such as \textit{best practicable}, or \textit{commonly accepted} technology. These standards form one of the basic measurements used in the Effluent Charge Law, discussed later. The standards vary depending on whether the waste water originates with a municipality or industry and, if the latter, the standards vary by industry. The federal government appointed some 50 task forces to establish these technological standards for different industries and for cities. In addition to the basic regulatory system provided for in the FWA the law provides that dischargers causing harm or injury to others are liable for damages.\textsuperscript{16} Those who violate the provisions of the Act are also liable for fines of as much as $100,000 Deutschemark (DM).\textsuperscript{17}

**THE EFFLUENT CHARGE LAW, ABWASSERABGABEGESETZ**

After years of extensive public discussion, the Effluent Charge Law (ECL) passed overwhelmingly in September 1976.\textsuperscript{18} It calls for the Länder

\begin{itemize}
  \item \textit{einer Revision des Saprobiensystems und deren Bedeutung für die Wasserbeurteilung}, GESUNDHEITS-INGENIEUR 68 (1947) (The Necessity of a Revision of the Saprob Systems and Its Importance to the Classification of Waters).
  \item \textsuperscript{12} FWA, art. 2(1).
  \item \textsuperscript{13} FWA, art. 8(2).
  \item \textsuperscript{14} FWA, art. 4(1), (2); art. 18.
  \item \textsuperscript{15} ECL, art. 4(1).
  \item \textsuperscript{16} ECL, art. 4(1).
  \item \textsuperscript{17} FWA, art. 41.
  \item \textsuperscript{18} Menke-Glueckert reports that there were only seven dissenting votes in the Bundestag and they wanted a more strict effluent charge law. See Menke-Glueckert, \textit{Stand der Vorbereitungen zum Inkrafttreten des Abwasserabgabegesetzes}, BERICHTE DER ABWASSERTECHNISCHEN VEREINIGUNG E.V. (Status of the Preparations for the Implementation of the Effluent Charge Law);
to levy charges (Article I) on direct dischargers for specified effluents into public waters. Firms and households discharging into municipal sewerage facilities are not charged directly. The effluent charge policy reflects the polluter-pays principle, which broadly states that the parties discharging waste should pay for the abatement costs actually or implicitly imposed on society.

The discharge permit issued by the Länder is divided into two parts. The first, a legal part, establishes the discharge right, and contains all the physical, chemical and biological data and monitoring procedures pertaining to waste water quality (pH, temperature, biochemical oxygen demand (BOD$_5$), other concentrations) and establishes the maximum amount of waste water in specified time periods. The specified waste water quality levels must be equal or higher in quality than the minimum requirements of the federal administrative regulation. This part of the discharge permit is subject to the water laws of the FRG and the Länder.

The second part of the discharge permit contains all the data necessary to calculate the waste water discharge bill. The pollutants considered for purposes of the effluent charge are settleable solids, chemical oxygen demand (COD), cadmium (Cd), mercury (Hg) and toxicity for fish. The permits also specify the annual volume of water that can be discharged. The standard may be specified in terms of concentration per cubic meter of discharge volume or per ton of product produced.

The permit specifies a maximum concentration of each pollutant and volume of waste water a discharger expects to produce (Höchstwert). The average (standard) amount of the waste to be discharged and the expected concentrations (Regelwert) are provided by each discharger and are reflected in the permit. Under normal circumstances the figure or reference value (Bezugswert) on which the charge is based is the volume and concentration the entity expects to discharge. Notice that the charge normally is based on the expected rather than the actual level of discharge.

Table 1 illustrates these ideas. The hypothetical firm discharges only settleable solids and COD whose reference (expected average) and maximum values have been specified. Under normal circumstances, the waste discharge bill is calculated easily. The data in Table 1 are converted to damage units using the coefficients provided in an appendix to the ECL and exhibited in Table 2 below.

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19. ECL, art. 3(1).
20. ECL, art. 4(4).
21. Table reproduced from B. BOWER, R. BARRE, J. KUCHNER & C. RUSSELL, INCENTIVES IN WATER QUALITY MANAGEMENT: FRANCE AND THE RUHR AREA 301 (1981) [hereinafter cited as BOWER]. Other pollutants for which minimum requirements may be established for some industries include: biological oxygen demand (BOD), hydrocarbons, phenols, cyanide,
TABLE 1

SELECTED POLLUTION PARAMETER VALUES
FOR A HYPOTHETICAL FIRM

<table>
<thead>
<tr>
<th>Component</th>
<th>WATER LAW Values</th>
<th>WATER CHARGE Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Discharge (cubic meter/yr)</td>
<td>12,000,000</td>
<td>10,755,000</td>
</tr>
<tr>
<td>Specific Amount of Waste Water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per Ton of Product (cubic meter/ton)</td>
<td>190</td>
<td>160</td>
</tr>
<tr>
<td>Settleable Substances (ml/l)</td>
<td>.18</td>
<td>.15 (Ref. Val.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.30 (Max. Val.)</td>
</tr>
<tr>
<td>COD (O₂-kg/ton of product)</td>
<td>140</td>
<td>112 (Ref. Val.)</td>
</tr>
<tr>
<td>COD (O₂ mg/liter)</td>
<td>740</td>
<td>700 (Max. Val.)</td>
</tr>
</tbody>
</table>

The total damage units of pollution, based on the data in Table 1, and the conversion factors in Table 2 are summarized as follows:

<table>
<thead>
<tr>
<th>Damage Units (DU)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Settleable Solids</td>
<td>1,600</td>
</tr>
<tr>
<td>COD</td>
<td>165,600</td>
</tr>
<tr>
<td></td>
<td>167,200</td>
</tr>
</tbody>
</table>

The charge per damage unit is 12 DM in 1981 and rises to 40 DM per damage unit in 1986. Thus the initial bill for this hypothetical firm in 1981 is 2,006,400 DM (about $722,300—1 DM is about $.36 in round numbers, as of May 1984).

The ECL contains an economic incentive for polluters to meet the federal minimum standards. Dischargers in compliance with the federal minimum standards will have the charge liability halved by the unit charge. In the event that the Länder have imposed stricter standards than heavy metals, halogenated hydrocarbons, sulfide, ammonia, fluoride, phosphorus, and total suspended solids. See Hornf & Kanowski, New Federal Waste Water Discharge Standards in Germany, 1981 EFFLUENT AND WATER TREATMENT JOURNAL 513 (Nov. 1981) [hereinafter cited as Hornf & Kanowski].

22. For settleable solids:
    10,755,000 cubic meter/yr × .15 ml/liter (.1 damage unit/cubic meter = 1613 damage units.

For COD:
    10,755,000 cubic meter/yr × (700 mg/l) × 2.2 damage units/100 kg = 165,627 damage units.

Help in understanding the computations was obtained during an interview with Dr. W. Dorau, Umweltbundesamt (EPA for FRG), in Berlin (Sept. 30, 1982), and in a letter from Dr. Dorau to the authors (Dec. 15, 1982).

23. ECL, art. 9(4).
TABLE 2
CRITERIA TO BE USED FOR ASSESSMENT OF DAMAGE OF DISCHARGES, NATIONAL EFFLUENT CHARGE SYSTEM OF THE FEDERAL REPUBLIC OF GERMANY

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Unit of Measurement, Quantity/Yr.</th>
<th>Damage Units Per Unit of Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Settleable Substances for Which</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organic Content ≥10%</td>
<td>1 cubic meter settled</td>
<td>1.0</td>
</tr>
<tr>
<td>Settleable Substance for Which Organic Content ≥10%</td>
<td>1 cubic meter settled</td>
<td>0.1</td>
</tr>
<tr>
<td>Oxidizable Substance, as Measured by CODb</td>
<td>100 kg</td>
<td>2.2</td>
</tr>
<tr>
<td>Mercury &amp; Compoundsc</td>
<td>100 g Hg</td>
<td>5.0</td>
</tr>
<tr>
<td>Cadmium &amp; Compoundsd</td>
<td>100 g Cd</td>
<td>1.0</td>
</tr>
<tr>
<td>Toxicity Toward Fish</td>
<td>1000 cubic meter wastewater</td>
<td>0.3 Gf&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup> Measurement procedure: reduce amount by 0.1 ml/liter waste water beforehand.
<sup>b</sup> Measurement procedure: reduce amount by 16 mg per liter waste water beforehand. Silver sulfate is the catalyst in the dichromate method specified.
<sup>c</sup> Measurement procedure for Hg and Cd: atomic absorption spectrometer.
<sup>d</sup> Gf is the dilution factor, e.g., down or up to nontoxicity. If waste water is discharged in coastal waters, toxicity is not considered for those substances whose content is based on salts which are comparable to those in ocean water.

those set by the federal government, the standard of the Länder must be met in order to qualify for the 50 percent discount.<sup>24</sup>

The normal (expected) value will ordinarily not exceed the federal minimum standard. In the example above, the bill would be halved to 1,003,200 DM (about $361,150) if the firm met the federal minimum. If actual waste discharge is above the federal minimum, using the average (monitor value) of the last five observations, the polluter faces legal consequences under the FWA<sup>25</sup> and loses the 50 percent reduction in the charge obligation.<sup>26</sup>

The ECL and FWA are keyed primarily to expected performance. Seasonal and other variations in discharge, however, are important considerations. Damage generally is a function of actual, not average, discharge. In recognition of this, maximum concentration values and volume are defined and the maximum cannot be more than twice the expected values stipulated by the discharger. The physical basis for the charge

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24. ECL, art. 9(5).
25. FWA, art. 12 (withdrawal of license).
26. ECL, art. 9(5).
therefore is at least one-half the maximum value. If the maximum value is exceeded more than once, then the value on which the charge typically is computed (Regelwert) is increased. Thereafter the new basis for the charge increases by the amount the maximum actually is exceeded.\textsuperscript{27}

The Hardship Clause

The ECL contains a hardship clause that permits temporary exemptions where imposition of the effluent charge would result in significant, detrimental economic consequences.\textsuperscript{28} An exemption may be for the whole charge or a part of it. Eleven industries, several counties, and a number of cities have petitioned the Minister of the Interior to date for exemptions. Although the hardship clause has yet to be used, many who were interviewed thought the clause was important in gaining political acceptance of the legislation.\textsuperscript{29}

Magnitude of the Charge and the Minimum Standard

Because few revenues have been collected and too little time has elapsed to make a representative study of actual impacts, it is not possible to report the actual economic effect of the new water quality laws on municipalities and industries. One study, however, appraised the likely impact of an effluent charge on 26 of the major water polluting industries in the country. The cost of the charge and avoidance measures was less than two percent of sales for the most serious polluters except in the pulp, yeast, and leather industrial branches.\textsuperscript{30} Sales for the last two industries rank in the lowest twenty percent of the group surveyed.\textsuperscript{31} Only in the pulp sector does the charge component loom large. Should the new water quality laws put some of the pulp plants out of business, it would be seen as a modest advancement of the anticipated date of demise of old,\textsuperscript{32}

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{27} The new standard value is the old level increased by one-half the amount by which the maximum exceeded the old minimum. See ECL, art. 4(4). The basis for computing the charge is reduced if the discharger anticipates that his actual volume and concentration will be below his previously stipulated expected value (or standard value) by at least 25 percent for at least one-fourth of a year. See ECL, art. 4(5). In this case, the charge is based either on the actual performance or on the downward revised expected value.
\item \textsuperscript{28} ECL, art. 9(6).
\item \textsuperscript{29} Interviews with Dr. W. Kitschler, Ministerialrat, Ministry of Interior, in Bonn (Mar. 15, 1983); Dr. Martin Uppenbrink, Director, Department of Environmental Planning, Umweltbundesamt (EPA for FRG) in Berlin (Mar. 17, 1983); Dr. Hans-Peter Luhr, Umweltbundesamt (EPA for FRG), in Berlin (Mar. 17, 1983); Dr. Herbert Massing, \textit{supra} note 6; Dr. Jurgen Salzwedel, \textit{supra} note 9; Dr. E. Rehbinder, Professor, School of Law, J. W. Goethe University in Frankfurt/Main (Mar. 14, 1983); Dr. F. Schröder, Department of Interior in Munich, Bavaria (Mar. 18, 1983).
\item \textsuperscript{30} G. RINCKE, \textsc{Untersuchung über wirtschaftliche Auswirkungen der vorgesehenen Abwasserabgabe auf abwasserintensive Produktionsszweige} (Study of the Economic Effects of the Expected Effluent Charge on Effluent Intensive Branches of Production) (Feb. 1976).
\item \textsuperscript{31} \textit{Id.}
\end{itemize}
\end{footnotesize}
technologically dated plants. Short of a full-scale study of each sector’s
domestic and international competitive position, a one or two percent
increase in the cost of products is not necessarily innocuous. This increase,
however, is small compared to variations in advertising budgets and
annual changes in interest and wage rates, and probably is small compared
to annual changes in raw material costs.

The charge for waste treatment by municipalities depends on the size
of the municipality, desired level of waste treatment, and the age of
equipment.\(^3\) It is high when new facilities are built and tapers off as the
financing obligations are met because the charge varies with financial
costs rather than real costs.\(^3\) One study found that sewerage charge rates
varied from .60 DM per cubic meter to 3 DM per cubic meter, but the
charge in large municipalities did not exceed 1 DM per cubic meter.\(^3\)

The effluent charge component of the new laws increased the unit cost
by .03 DM per cubic meter in 1981. The increase will amount to .11
DM per cubic meter in 1986. The effluent charge component in 1986 will
amount to about 3.26 DM or $1.30 per year per inhabitant. The cost of
adding facilities to meet the minimum standards expressed on a volume
basis was estimated to be about .33 DM per cubic meter for the munic-
ipalities surveyed or perhaps 10 DM ($4.00) per year if per capita annual
consumption is 30 cubic meters. Adding together the cost of the charge
(about $1.30) and the necessary new facilities (about $4.00) the estimated
total cost is under about $6 per year per inhabitant to meet the requirements
of the new water quality laws.

**TASK FORCE GROUPS TO ESTABLISH
MINIMUM REQUIREMENTS**

The Federal Ministry of Interior initially established 60 task forces,
one for each major polluting activity. The Minister of the Interior ap-
pointed the task forces and the members were drawn from the federal
and Länder governments and representatives from the relevant industries.
Technical expertise was brought in from universities, technical institutes,
and consulting firms. The purpose of the task force was to establish
minimum standards compatible with generally accepted standards of tech-

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33. *See* Ewringmann, Hansmeyer, Hoffmann, & Kibat, *Auswirkungen des Abwasserabgaben-
gesetzes auf Industrielle Indirektleiter* (Effects of the Effluent Charge Law on Industrial Indirect
Dischargers), 2/81 UMWELTBUNDESAMT BERICHTE 14 (Feb. 1981) [hereinafter cited as
Ewringmann].
34. *Id.*
TABLE 3
FEDERAL MINIMUM STANDARDS FOR MUNICIPALITIES

<table>
<thead>
<tr>
<th>Samples According to Load Category of Discharger</th>
<th>Settleable Solids (ml/l)</th>
<th>Chemical Oxygen Demand (COD) (mg/l)</th>
<th>Biochemical Oxygen Demand After 5 Days (BPD₅) (mg/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Cat. 1: Less than 60 kg per day BOD₅ (Untreated)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grab Sample</td>
<td>0.2</td>
<td>180</td>
<td>45</td>
</tr>
<tr>
<td>2-Hr. Mixed Sample</td>
<td></td>
<td>120</td>
<td>30</td>
</tr>
<tr>
<td>24-Hr. Mixed Sample</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load Cat. 2: 60–600 kg per day BOD₅ (Untreated)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grab Sample</td>
<td>0.3</td>
<td>160</td>
<td>35</td>
</tr>
<tr>
<td>2-Hr. Mixed Sample</td>
<td></td>
<td>110</td>
<td>25</td>
</tr>
<tr>
<td>24-Hr. Mixed Sample</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load Cat. 3: More than 600 kg per day BOD₅ (Untreated)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grab Sample</td>
<td>0.3</td>
<td>140</td>
<td>30</td>
</tr>
<tr>
<td>2-Hr. Mixed Sample</td>
<td></td>
<td>100</td>
<td>20</td>
</tr>
</tbody>
</table>

Technology. Volumes and concentrations regularly issued with new effluent discharge permits and standards, acceptable to a majority of experts in the field, describe the minimum standard level desired. Table 3 illustrates the standards for municipalities of three different sizes.

The idea of a task force to establish minimum standards and the com-

35. INSTITUTE FÜR WASSER-BODEN-UND LUFTHYGIENE DES BUNDESGESUNDHEITSAMTES, HINWEISE ZUR ERARBEITUNG DER MINDESTANFORDERUNGEN NACH ARTIKEL 7aWHG DURCH DIE ARBEITGRUPPEN FÜR EINZELNE INDUSTRIEBEREICHE (Berlin, Sept. 9, 1977) (Suggestions for the Establishment of Minimum Standards Under the FWA, art. 7(a) Through the Task Forces for Specific Industries).

36. The minimum standards for municipalities are found in the relevant task force report, SCHMUTZWASSER VWV, ERSTE ALLGEMEINE VERWALTUNGSVORSCHRIFT ÜBER MINDESTANFORDERUNGEN AN DAS EINLEITEN VON SCHMUTZWASSER AUS GEMEINDEN IN GEWÄSSER-1 (January 24, 1979) (First Comprehensive Administrative Regulations on the Flow of Polluted Waters of Our Municipalities in Flood Area-1). It was reported that these standards are equivalent to 93 percent removal of BOD₅ for small communities and 94.5 percent for large cities. Interview with F. Schafhausen, Umweltbundesamt (EPA for FRG), in Berlin (Nov. 25, 1982).
position of that task force form the crucial ingredients of the new laws in the FRG and in the laws' implementation. The Länder, by voting for the new FWA, gave up their control to set minimum water quality standards before they knew what the new minimum effluent standards were. Basically, they were being asked to give up an unspecified amount of power.

An effective safeguard against too much loss of control is to provide a role for the Länder and the polluters in the standard-setting process. The task force provided the institutional vehicle for this protection. However strong the appetite for improving water quality the Ministry of Interior may have had, the appointment process had to recognize the bare fact that each state had to enact implementing legislation and carry out the attendant enforcement responsibilities. Moreover, the Bundesrat must pass the regulations recommended by each task force. The task force created the practical means for postponing the debate over technical minutia which would have mired the legislative process and extended the date of enactment further into the future.

THE POLLUTER-PAYS PRINCIPLE AND EFFLUENT CHARGES

A first step in evaluating the actual effluent charge system is to consider the characteristics of an ideally efficient system. From this comparison, it will be seen that the actual effluent charge system bears little resemblance to an idealized one. This unsurprising finding means, however, that the search for merit and deficiencies must be made in the murky realm of second-best analysis where judgment and partial analysis play a more prominent role than rigorous proofs in a general equilibrium context.

37. An effluent charge is a financial obligation that must be borne by some entity discharging waste, treated or untreated, into a natural water course. The entity can be a firm or municipality or even an individual household. The size of the bill for the effluent discharge varies with the amount of pollution produced, at least in principle. The effluent charge is imposed even if the authority does not treat the particular effluent. JOHNSON & BROWN, supra note 7, at 14.

Under an effluent charge system the person who benefits from depositing wastes into public waters is charged in proportion to the benefits received. This tends to induce polluters to reduce the amount of wastes discharged, and promotes economic efficiency.

For example, a polluter who is charged $25 for each ton of suspended solids discharged will pay only if that is the cheapest way for the enterprise to dispose of the waste. If $25 reflects the cost of treatment others would willingly spend to remove each ton of suspended solids, the value of resources used by one party to remove waste is just balanced by the value other parties gain by producing the waste. In contrast, if the polluter does not pay an effluent charge for disposing of his waste, there is no reason for him to economize on waste production. The polluter understandably will act as though his cost of discharging waste is zero, but society will bear an expenditure of $25 to treat or endure the waste. This is inefficient, as the additional expenditure of resources to treat waste is not matched by a corresponding positive value derived from discharging the waste.
No significant differences exist between an idealized effluent charge system and an idealized standards system. For each, public managers, blessed with adequate information, calculate just that level of water quality in a river for which the benefits of extra quality are matched by the cost society necessarily must bear to preserve that extra quality. Discovering this magic point (or vector with multiple qualitative characteristics) requires enough knowledge to permit the rule maker to calculate what each polluter would be willing to pay to discharge an extra unit of waste. The water quality manager can achieve the desired outcome either by posting a common effluent charge or by issuing individual (optimum) standards to each “consumer” of water quality. The charges or the standards change through time in keeping with changing circumstances.

Although the idealized system is of little practical interest its attributes have considerable merit. First, under these circumstances each polluter places the same value on an extra unit of pollution. Thus no discharger pays any more than another for an additional unit of effluent discharge. Veiled behind the single characterization, yet nevertheless of crucial significance, is the second attribute. There is no cheaper way to achieve the desired quality level because the least cost technology has been adopted by all. Those who can treat their effluent cheaply will trade this service for a price to others whose cost of treatment is high. Of course, the incentive to discover low cost measures to reduce effluent discharge diminishes as the level of the effluent charge decreases.

The third attribute, which is less important for the present study, is the marginal cost to dischargers which is just matched by the benefits to those from marginally improved water quality. If this condition is not met there is economic waste. A charge or standard set too high results in polluters paying more than the beneficiaries gain from the last bit of water quality achieved. For many reasons, not the least of which is the difficulty of measuring the benefits of water quality improvement, no one seriously

Following any absolute interpretation of the beneficiary-pays principle, polluters should pay the full cost of the pollution as measured by opportunity cost. In this instance, opportunity cost means either the cost of restoring the water quality to its desired level or the value (to members of society) given up because water quality is now less than the desired level, whichever is less. The extra costs of treatment borne by downstream users of water (to achieve the previous level of quality) or the value of foregone days of swimming and fishing on a particular stream (as measured pragmatically, perhaps by the extra cost of obtaining the same quality of recreation elsewhere) are illustrative opportunity costs.

JOHNSON & BROWN, supra note 7, at 10.


39. Strategies for avoiding effluent charges include better waste treatment technologies, different production techniques, different inputs and an altered output mix or level.
has argued that the federal minimum requirements or effluent charges in the FRG will result in this condition. When the three conditions are met, there are no further gains from trade among polluters, among beneficiaries or between polluters and beneficiaries of clean water.\textsuperscript{40}

These three attributes fall within the realm of efficiency. In addition, when an effluent charge is adopted it satisfies the equity criterion known as the polluter-pays principle in the case of water quality. Those who pollute are those who pay. Standards fall short of this equity goal because they permit the free discharge of a given amount of pollution.

The ECL and the FWA at the federal level do not satisfy the efficiency criteria set for the above ideals because each producer of a given product faces the same minimum standard and each must meet the same discharge concentration levels whether the cost of treatment is high or low. Even by paying a charge the uniform minimum standard cannot be avoided. The marginal cost of treatment in one branch of industry is not equal to the marginal cost in another, except fortuitously, because the task force groups were not charged with that responsibility. The next two sections discuss the degree to which a policy of minimum standards leads to resource inefficiency in the municipal and industrial sectors.

**UNIFORM STANDARDS ARE COSTLY UNLESS REQUIRED WASTE TREATMENT LEVELS ARE HIGH**

Economists have long argued strenuously that uniform standards are inefficient. A uniform standard refers to a policy in which all dischargers of a type, such as municipalities, are required to achieve the same level of purification or waste removal or to adopt the same technology. Whatever its practical or equitable merits, the policy is costly and inefficient whenever individual waste dischargers differ in ways substantially affecting the cost of waste treatment, for example, when there are economies of size in waste treatment costs.

According to the Council of Experts for Environmental Questions, the effluent charge policy is about one-third cheaper than a uniform standards policy.\textsuperscript{41} A charge level of 40 DM (1974 prices) would have achieved a 73 percent removal for a cost of 1.2 billion DM per year whereas a uniform standard achieving the same level of purification would have cost just under 1.8 billion DM per year.\textsuperscript{42} Inflation and technical progress

\textsuperscript{40} Additionally, the marginal value of a given water quality characteristic is equated across all beneficiaries when the quality characteristic is not a collective good.


\textsuperscript{42} Interview with Professor Dr. G. Rincke, formerly of the Technische Hochschule, in Darmstadt (Sept. 23, 1982).
have occurred since 1974 when these data were assembled. Increasing the DM values by 50 percent or more would produce estimates more appropriate for the present. By 1986, the expected value of the 40 DM charge will be around 22 DM. It would be over 80 DM per damage unit if the charge was indexed for inflation.

The potential economic advantages of an effluent charge over a uniform standard apply to the industrial sector as well. Using data from one widely quoted study, at a uniform standard of 80 percent removal of chemical oxygen demand, some pollution-intensive industries, such as chemicals, have (marginal) treatment costs more than twice as high as other pollution-intensive industries, such as food processing.

The potential cost savings from eschewing uniform standard policies are greatest when there is a big difference in treatment cost opportunities among polluters. As required levels of treatment or the effluent charge increase, opportunities for substituting low cost for high cost treatment diminish, and the economic advantage of the effluent charge over uniform standards is eroded. A charge high enough to achieve 100 percent removal for all is the same as a uniform standard. At the required levels of purification cited above, the efficiency gains of a charge over a uniform standard are modest.

LOW EFFLUENT CHARGE LEVELS REDUCE BUT DO NOT ELIMINATE INCENTIVES TO ECONOMIZE

A charge of 12 DM in 1981 rising to 40 DM per damage unit in 1986 was, and is, too small to achieve the desired water quality objectives for the country and it cannot be a very great incentive to discover low cost abatement strategies. But there are important exceptions worth citing even if the frequency is unknown.

In response to the new water quality legislation, a giant chemical firm, BASF, has made a serious effort to manage water quality. BASF treats

43. Interview with L. Wicke, Scientific Director, Umweltbundesamt (EPA for FRG), in Berlin (Sept. 29, 1982); and interview with Dr. Klaus Zimmermann, International Institute for Environment and Society, in Berlin (Sept. 29, 1982). The 1986 estimate was provided in a letter from Dr. Zimmermann to the authors (Dec. 3, 1982).
45. See comparison of charges and standards in A. KNEESE & B. BOWER, supra note 38, at 131–42.
46. See lecture by Dr. Lutz Wicke, The Experience with the German Effluent Charge System in the Light of Irish Considerations in That Field, Dublin University (Apr. 15, 1983).
47. This view was held almost universally by those interviewed: e.g., interviews with J. Salzwedel, supra note 9, H. Massing, supra note 6, M. Uppenbrink, supra note 9, M. Faber, Professor, University of Heidelberg, L. Wicke, supra note 43. See also M. FABER & H. NIEMES, DAS ABWASSERABGABENGESETZ: RICHTUNGSWEISEND FÜR DIE UMWELTPOLITIK, 1982 UMWELT 1 (1982) (The ECL: A New Direction for Environmental Policy).
its own waste as well as the waste of two large municipalities and three smaller ones with populations of over 300,000, and achieves low unit abatement costs by large-scale integrated treatment processes. BASF achieves purification levels greater than what is required presumably because it is cheaper than paying the effluent charge. There are numerous other large industries with comparable performance records.

The second feature of the BASF system is of substantial economic interest. BASF has practiced the polluter-pays principle within its plant since 1975. Individual branches basically face shadow or implicit prices for the volume and concentration of COD. The response to the introduction of an internal liability system has been a 20 percent decrease in discharge. Rather than mandate physical decreases the intra-firm charge elicited a "voluntary" decrease in effluent discharge achieved through process change, recycling of solvents, improved pretreatment facilities, and replacement of old facilities. Even if the charge is modest, it induces cost savings.

The charge also provides an incentive for municipalities and industries to operate treatment plants and operate them efficiently. Inefficient treatment is incompatible with minimum requirements and inefficient operation will prevent qualification for the 50 percent discount on the effluent charge. The charge, by encouraging increased operating and maintenance expenditures, partially offsets the efficiency distortion created by existing subsidy programs where only capital costs are subsidized.

One consequence of the ECL (and the FWA) is the remarkable level of investment in waste treatment plants and equipment during the announcement phase, generally, 1974–1979. One study reported the industrial responses to the new water laws while another investigated the response to the new laws by municipalities. Slightly more than one-third of the towns or cities interviewed cited the effluent charge law as the primary reason for undertaking more extensive waste treatment mea-

48. In a letter from Blair Bower to the authors (Apr. 9, 1983), Bower stated that Dow Chemical Co. began an intra-firm effluent charge policy in the U.S. in 1958.
49. BASF calculates the effluent charge bill for each branch of the company. The bill is based on an accounting price per unit of effluent and the amount of effluent for that branch.
50. Letter from W. Haltrich Prokurist, BASF, Ludwigshafen, to the authors (Dec. 7, 1982).
51. A. GIWER, WAS DARF AUS DER ABGABE FINANZIERT WERDEN? (What May Be Financed with the Effluent Charges?) (1980).
53. See supra, note 33.
asures, while an additional 14 percent declared that the minimum requirements alone were responsible for increased expenditures. Another 20 percent stated that they had accelerated their construction plans due to the effluent charge law. When the planned construction phase of their sample municipalities is completed, 80 percent of the inhabitants will receive full secondary treatment. This is compared to a national goal of 90 percent in 1985 established in 1971 and estimated levels of under 40 percent and 53 percent in 1963 and in 1978, respectively. As a result of dedicated efforts to manage waste discharge more efficiently in 1981, more than one-half the waste dischargers met the minimum requirements and qualified for the halving of the charge in general and, in Baden-Württemberg, 90 percent qualified for the charge reduction.

The new laws necessarily improved ambient water quality. No quantitative estimate of the change in water quality has been made but there has been an improvement in the biological quality, judging from a comparison of water quality maps between 1975–1980. Other actual or likely consequences, some of them good and others not beneficial, are discussed below. The subsequent evaluation is largely qualitative because the laws are so new. There has been too little time to have practical experience with administering or enforcing the law, or spending the revenues collected.

EFFLUENT CHARGE REVENUES: A POTENTIAL SUBSTITUTE SOURCE OF SUBSIDIES

The effluent charge amassed revenue amounting to about 350 million DM in 1981. The Länder use the revenues for water quality management administration expenses associated with the ECL, and for projects or purposes which maintain or improve water quality, including industrial production processes which are pollution-saving. The fraction devoted
to administration varies among the Länder. One Länder used about 50 percent in the first year but this is expected to fall to 20 to 25 percent in future years.61 Effluent charge revenues are an obvious and important source of subsidies for waste-treatment investments. This inevitably raises concern that the new source of subsidy may be substituted for the old source, general fund moneys.62 At the present time, Länder governments offer investment subsidies in the neighborhood of 40 percent or more.63

It takes little political acumen to imagine that the Länder government will decrease subsidies for waste treatment from the general fund once effluent charge revenues roll in. This would be a particularly attractive substitution in times of fiscal conservancy. The polluter-pays principle can be invoked in defense of the reallocation. It will be hard to argue against the proposition that the dischargers who benefit from waste treatment facilities (which meet the minimum standards or reduce the bill for discharge) ought to pay for the facilities. Those who approve of shifting fiscal responsibilities from higher to lower echelons in the political hierarchy can see the merit of effluent charge as a new source of subsidies.

MORE POLICY INSTRUMENTS ARE BETTER THAN LESS

Some have argued that an effluent charge is a more flexible policy tool because it can be changed more readily than an effluent standard.64 Others have argued just the opposite. For example, "one serious practical liability" of the effluent charge is the inability to change it as quickly as may be desired.65 The truth probably rests between the two extremes.

The benefit of having both a system of standards and charges is that the water quality regulations can each be adjusted through time to produce a result more harmonious with the desired water quality objectives. The objectives will change through time as a result of changing environmental and economic conditions.66

62. Interview with H. Massing, Deputy of President, Head of Department of Water Resources in Düsseldorf (Sept. 21, 1983).
63. JOHNSON & BROWN, supra note 7, at 126–27; BOWER, supra note 21, at 237–40, 270–71; and interview with P. Michaelis, Justitiar, Ruhrverband, in Essen (Sept. 22, 1982); interview with F. Schröder, Department of Interior, in Munich, Bavaria (Sept. 28, 1982). In extraordinary circumstances, the subsidy for waste treatment plants has been as high as 80 percent. Letter from P. Michaelis, Justitiar, Ruhrverband, in Essen (Dec. 7, 1982).
64. Kneese and Bower, supra note 38.
66. The added flexibility provided by multiple regulatory instruments is a further point in favor of adopting a charge policy in the United States.
A combined charge and standards system is advantageous in a decentralized decisionmaking framework where the control from above is circumscribed. For example, Länder can regulate the aggregate discharge level of a municipality but they are powerless to establish charges for the firms and households in the municipalities. The Länder may charge the municipalities for their waste discharge, but they cannot force municipalities to adopt pricing policies for water quantity or quality which make the indirect dischargers, the customers of the municipalities, see the marginal economic consequences of their waste discharge decisions. Introducing an effluent charge typically increases the costs of a continued average or nonmarginal pricing policy for all customers. Customers who are not the cause of the increased price, because they do not pollute or their pollution is more benign, now have an economic incentive to pressure the municipality to adopt a more rational charge policy.

Evidence of the inducement to change customer pricing policies created by the effluent charge is provided in a survey of 52 municipalities. Nearly one-fourth of the municipalities had decided to change the structure of their water and sewerage fees in response to the effluent charge prior to the policy actually taking effect. More can be expected to change their fee structure with time.

There is a further advantage of a combined charge and standard regime in a decentralized system. It is difficult for an authority like the state to use an effluent charge alone to achieve a desired ambient water quality when the state has no control over the pricing policy of municipalities or other public agencies with their own pricing policies. One reasonable strategy is for the state to set standards to achieve desired water quality goals and then introduce a charge system which satisfies non-water quality efficiency criteria such as equity considerations.

**EFFLUENT CHARGES CHANGE THE COSTS OF ENFORCEMENT**

There is no reason why enforcement costs should be different with an ideal effluent charge compared to an ideal standard.

In the absence of an effluent charge, the reward for violating a standard is the expected gross profit of the actions less the expected costs associated

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68. Id.

69. We can only speculate on the truth of this assertion at present, since it is too soon to obtain qualitative or quantitative evidence on the new German program.
with being caught. If it is reasonable to assume that in a combined charge and standard system those caught accidentally or intentionally exceeding the legal standard would have to pay fines plus charges which vary with the unreported quantities discharged, then the charge system reduces the expected net benefit of violating the standard. Thus, a given level of compliance can be achieved at a lower enforcement cost in the presence of a charge. Alternatively, a higher level of compliance can be achieved (with a standard and charge) than was obtained at the old cost of enforcement, when there only was a standard. In short, noncompliance should decrease when it is less rewarding so enforcement can be cut back accordingly.

Enforcement costs also will be lower if there is some trade-off between "justice" and economic sanctions in the world of practical affairs. Polluters might argue successfully that because they are paying, the frequency of punitive proceedings or level of punishment should be mitigated. This argument is unavailable in a pure standards system because no effluent charges are levied.

The arguments for decreased enforcement costs focus on the (net) benefits of evasion to the evader. The outcome, when viewed from the supply side, is different. Prior to an effluent charge the reward to the Länder water quality management authority for enforcing water quality standards is improved water quality. Because effluent charge revenues cover the Länder's costs of administering the effluent charge law, the water quality management agencies in the Länder will be encouraged to increase enforcement activities. The rewards are improved water quality and a larger agency, with the expansion automatically financed by effluent charge revenues. The net result of these qualitative arguments is: (1) there will be a greater resemblance of actual discharge with legally mandated standards (in this sense, one can say that the quality of water law has improved); (2) the reduction in the discrepancy between the actual result and the certain legal requirement, in effect, reduces the uncertainty about enforcement to polluters; (3) the cost of a given level of compliance has decreased. It is not possible, however, to conclude that total enforcement costs will increase or decrease, unless the agency aggrandizement effect can be assumed to outweigh the diminished value of compliance averting behavior for firms and municipalities.

The new legal and economic instruments are more precisely stated than before. The Länder have had to develop a more precise measurement and

70. For an interesting discussion of compliance averting behavior, see paper presented by D. Lee, Protecting Our Environment: Some Public Choice Considerations, Conference on Market Perspectives in Natural Resources Economics, Political Economy Research Center, Montana State University (Bozeman, June 10–14, 1982). Also of interest is Viscusi & Zeckhauser, Optimal Standards with Incomplete Enforcement, 27 PUBLIC POLICY 437–56 (1979).
monitoring system and to sharpen their enforcement practices. The increased quality of data removes ambiguity and reduces the costs of enforcement. 71

THE COSTS OF INSTITUTIONAL CHANGE

The idea of a nationwide effluent charge was a dramatic new idea. Integrating it with standards and permits made it a complex undertaking. It required education of legislators, Länder officials, and municipal and industrial administrators. As a result of the long gestation period, all parties had ample opportunity to present their interests and it therefore can be argued that the resulting policies accurately reflect the relative weights of all interested parties to the decision. 72

Changes in management and administration at the local level in response to the new policies were costly. On the other hand, the difficulties of implementing a charges system were greatly overestimated. One of three Länder to strongly oppose the effluent charge law was Schleswig-Holstein. As a predominantly rural region, their concern focused on the cost and the ominous task of acquiring sufficient technical capability for administering the new legislation. After a few years of experience, several experts with substantial responsibility for administering the ECL have found it to be a far easier task than they had imagined, to their great surprise. Simple practical ways have been devised to implement the "economic point of view." Illustratively, the need for increased analysis of samples has been handled, in part, by contracting with private labs. These former foes are now staunch supporters of the effluent charge system. 73

All practical and effective water quality management programs require the specification of variables, parameter, and threshold values. An effluent

71. Interviews with Schröder, supra note 63, and Schell, supra note 56.

72. The idea of adequate representation by all parties in the political process contrasts with the manner in which principal water quality legislation in the United States allegedly occurred. In a remarkable and little known piece of public policy analysis, Marc Roberts explains persuasively how environmentalists played a disproportionate role in the passage of the Clean Water Act of 1972. Roberts, The Political Economy of the Clean Water Act of 1972: Why No One Listened to the Economists, UTILIZATION OF SOCIAL SCIENCE IN POLICY MAKING IN THE UNITED STATES (OECD 1974). The U.S. Senate version, calling for a standard of zero discharge by 1983, passed by a vote of 80-0. Only in the final version was the standard compromised to the best available technology standard. Roberts argues that the technical complexity of the issue gave great authority to the subcommittees of the Public Works Committee, which handled the water quality legislation. The ranking members of the committee and the technical staff had a special position and played a substantial role in the final outcome. According to Roberts, a strong environmental influence on the staff was evident: one staff member was married to an environmental lobbyist, some staff members were persuaded that any discharge was hazardous, and the environmental lobby groups were well organized and effective.

charge system has the greatest chance of meeting the criterion of political feasibility if it is kept simple—few pollutants, strictly limited number of threshold values, uncomplicated rate schedules, etc. The bane of naive marginal efficiency is simplicity. Simplifying eventually involves making charges and standards and other debatable components of policy more uniform by aggregating and averaging. It saves transactions and political costs, ultimately at the expense of efficiency.\textsuperscript{74}

One benefit ascribed to a policy, which applies to all, viz. meeting minimum requirements, is that it greatly reduces the incentive of any one firm or industry to curry special favor.\textsuperscript{75} To do so singles one out for public scrutiny much more than if there is a distribution of policies subject to interpretation, adjustment, or reclassification, where the administrator has broad discretion in enforcement. If bargaining for a narrow interest is discouraged by announcements that policies will be uniform, then it can be argued that policy decisions will be made more quickly. The duration of the uncertainty about the date and content of new legislation also is reduced, thus creating a further source of benefit. If these arguments have merit then the resulting benefits must be weighed against the costs of uniformity. Only path-breaking empirical research will tell us when the net benefits of simplifying rules actually are positive.

IMPLEMENTATION PITFALLS

One of the largest stumbling blocks remaining in the way of practical implementation is devising an acceptable and an effective policy for charging indirect discharges. About 90 percent of all firms in the FRG discharge their effluent into the sewerage systems of municipalities and are not directly liable for the effluent charge.\textsuperscript{76} Three elements of the indirect discharger problem warrant discussion. First, how are those dischargers whose waste enters municipal systems to be charged; second, do their costs resemble the costs of direct dischargers; and third, can there be relief for a firm whose economic viability is threatened by charges a municipality levies for that firm's discharge?

\textsuperscript{74} For example: Charges under the ECL are based on measurements of cadmium and mercury discharges. Other heavy metals, such as lead, are not measured or used as the basis for charges. Interview with Dr. H. Luhr, supra note 6, in Berlin (Mar. 17, 1983). Dr. Luhr reported that a "somewhat proportional relationship" seems to exist between the quantities of the two measured heavy metals and others found in industrial effluents, but it is by no means exact. A company whose effluent contains a disproportionately high quantity of lead in relation to cadmium and mercury will have no incentive to remove the lead because the charge is unrelated to it. This reduces the efficiency of the charge system.

\textsuperscript{75} Interview with J. Salzwedel, Director, Institut für das Recht der Wasserwirtschaft an der Universität Bonn, in Bonn (Sept. 22, 1982).

\textsuperscript{76} Ewringmann, supra note 33.
An important criterion for a municipal charge system is administrative simplicity. This feature is sacrificed to the degree that a second desirable characteristic, the polluter-pays principle, is achieved. Ideally, each firm faces a (marginal) charge that reflects the (marginal) cost of discharge imposed on the municipality. For example, firms with high concentrations of cadmium, mercury, COD, settleable solids or toxicity would pay more than those with lower concentrations in their expected waste. In this manner, the polluter-pays principle is passed back to the entity making the marginal pollution decision.

In practice, municipalities in the FRG have charge systems so rudimentary that the cost of waste treatment is embedded in the charge for fresh water withdrawals. Clearly their charge policy is used primarily as a financial instrument by the municipalities and not as an allocative device. Thus, finding a solution to the practical pricing policy problem has wide ramifications in terms of efficiency.

When all firms are homogeneous in their residuals discharge, municipalities can continue to practice undifferentiated charge systems. When individual discharge varies greatly in volume and concentrations, a pricing policy which does not distinguish differences in volume, concentration, or pollutants will greatly favor the big pollution-intensive industries and discriminate against the mild polluters. A uniform pricing policy acts as a wet blanket on incentives to reduce discharge, which would be undertaken by an estimated 80 percent of the firms for a cost lower than the municipalities to which they are hooked up.77

Fairness between the direct and indirect discharger with regard to the federal water quality laws is a consideration which should be raised. Inadequate data, however, preclude reaching definitive conclusions. Even qualitative answers are not possible because of the presence of two major counterforces.

Subsidies to municipalities and non-fee revenues such as ad valorem taxes tend to decrease the cost of effluent treatment to indirect dischargers.78 The advantage will decrease to the extent that subsidies from the effluent charge revenues will be made available to firms. On the other hand, indirect dischargers pay for treatment of storm water runoff which is not of their making but can amount to as much as 50 percent of the total cost in some communities.

The existing U.S. system of water pollution control is dominated by a legalistic approach in two ways. First, it emphasizes as its goal the total ban of discharges of wastes into public waters instead of applying cost-benefit principles which would proscribe only those discharges of waste which are not cost-justified for a particular body of water, considering the alternative uses for those waters and their assimilative capacity. Second, the U.S. system relies heavily on the threat of punishment, i.e., fines and/or imprisonment, rather than on economic incentives to induce industries, municipalities, and other waste dischargers to reduce the pollutants they discharge into public waters.

The first of the above two concepts, the ban-the-discharge approach, was explicitly incorporated into the Federal Water Pollution Control Act Amendments (FWPCA) of 1972. This concept was subjected to heavy criticism by the National Water Commission, the National Commission on Water Quality, and independent economists, who considered the concept to be too costly.

It was not surprising that the 1977 Amendments to the FWPCA altered the emphasis of the federal program in the direction of the receiving water standards approach and away from the no-waste-discharge principle. This change is important to our consideration of effluent charges as a supplement to the existing pollution control system. While effluent charges are consistent with a receiving water standards approach, they tend to conflict with the ban-the-pollution approach. Effluent charges are based on the assumption that some wastes will continue to be deposited into public waters and this use is not, per se, legally wrong or inherently evil. An effluent charge system is a legitimate means of allocating the use-opportunities for this resource among competitors. In addition, this system will create a pool of revenues that can be used for the construction of treatment facilities, research, and pollution control administration.

There are three major options for enacting an effluent charge law. The

79. F. ANDERSON, A. KNEESE, P. REED, R. STEVENSON, & S. TAYLOR, ENVIRONMENTAL IMPROVEMENT THROUGH ECONOMIC INCENTIVES, (1977) [hereinafter cited as F. ANDERSON] contains an excellent analysis of the use of money charges to discourage environmental harm and the practical problems posed in the United States by different implementation strategies. We refer the reader to this work for a fuller analysis of some of the problems discussed here.

80. "[I]t is the national goal that the discharge of pollutants into the ... waters [of the nation] be eliminated by 1985[.]" 33 U.S.C. § 1251(a)(1) (1982).


82. NATIONAL WATER COMMISSION, FINAL REPORT, WATER POLICIES FOR THE FUTURE 69, 74–76 (1976).

83. NATIONAL COMMISSION ON WATER QUALITY, REPORT TO CONGRESS 5 (1976).
advantages and disadvantages of each are noted as follows: (1) the federal
government could enact an effluent charge law for the entire nation and
could collect the charges and disburse them as it saw fit. Under this plan,
Congress might carry forward the same federal-state relationship that is
used in administering the Clean Water Act. Thus a state would be
permitted to implement the charge system under continuing federal su-
pervision, so long as the state met federal standards. Alternatively, if a
state decided not to implement the federal charges program, EPA would
itself carry out the implementation in that state; (2) the states could enact
effluent charge systems of their own choosing, so long as their choices
were not preempted by the Clean Water Act; (3) the federal government
could enact a law that would set minimum requirements for any state
effluent charge law. States could then enact such laws as they saw fit, so
long as those laws met federal standards. If a state chose not to have an
effluent charge law, then none would exist in that state, e.g., EPA would
not implement any federal charge system in that state.

CONGRESS' POWER UNDER THE FEDERAL CONSTITUTION TO
ENACT AN EFFLUENT CHARGE LAW

Congress doubtless has the constitutional power to enact an effluent
charge law applicable throughout the United States if it chooses to do
so. Until the mid 1960s, water pollution control had always been dominated
by state regulation. By then, however, it was apparent that state regulation
was failing to achieve the kind of water pollution control desired by the
public. At first, federal intervention was gradual. In the Water Quality
Act of 1965, Congress sought simply to oversee state regulation and made
no attempt to regulate waste discharges directly. With the rediscovery of
the Rivers and Harbors Act of 1899, the federal government undertook,
in 1969, through the Corps of Engineers permit system to regulate directly
the discharge of wastes into public waters by industries. In 1972, the
federal government changed the rules of the game entirely and took over
the field of water pollution control from the states, essentially reversing

85. Id.
86. See J. NOWAK, R. ROTUNDA, & J. YOUNG, CONSTITUTIONAL LAW 150–56 (1977)
[hereinafter cited as NOWAK]; and F. ANDERSON, supra note 79. See also, e.g., Wickard v.
87. See Comment, Discharging New Wine into Old Wineskins: The Metamorphosis of the Rivers
and Harbors Act of 1899, 33 U. PITT. L. REV. 483 (1972); Barry, The Evolution of the Enforcement
Provisions of the Federal Water Pollution Control Act: A Study of the Difficulty in Developing Effective
the federal/state roles and thereafter allowing state regulation only under strict federal supervision.\textsuperscript{88}

The courts have supported this expansion of the federal government's role in the environmental law field as well as in other areas of social and economic regulation,\textsuperscript{89} and have done so via an increasingly broad interpretation of Article I, Sec. 8(3) of the federal Constitution, the so-called "commerce clause."\textsuperscript{90} This clause says that Congress shall have the power "to regulate commerce with foreign nations, and among the several States. . . ."

While early cases suggested that Congress' legislative power under this clause might be limited to navigable waters because that is where commerce occurs, in recent years, the court has made it clear Congressional power is much broader.\textsuperscript{91} In 1942, the Court said that Congress' power extends to any activity that "affects" interstate commerce. In \textit{Wickard v. Filburn}\textsuperscript{92} the Court held that Congress constitutionally could enact a law regulating the acreage of wheat a farmer could plant even though the wheat was destined solely for use on his own farm. The cumulative effect of private wheat growing by many farmers would affect the price of the grain and would "affect" interstate commerce.

Subsequent cases have established the applicability of this principle to the environmental law field. In \textit{United States v. Ashland Oil & Transportation Co.}\textsuperscript{93} the court held that Congress had the constitutional authority to enact the Federal Water Pollution Control Act Amendments of 1972, by which the federal government took over much of the direct regulation of water pollution. On the impact of water pollution on interstate commerce, the court said:

> Obviously water pollution is a health threat to the water supply of the nation. It endangers our agriculture by rendering water unfit for irrigation. It can end the public use and enjoyment of our magnificent rivers and lakes for fishing, for boating, and for swimming. These health and welfare concerns are, of course, proper subjects for Congressional attention because of their many impacts upon interstate commerce generally. But water pollution is also a direct threat to navigation—the first interstate commerce system in this country's history and still a very important one.\textsuperscript{94}


\textsuperscript{89.} See L. TRIBE, AMERICAN CONSTITUTIONAL LAW 236-38 (1978).


\textsuperscript{92.} 317 U.S. 111 (1942).

\textsuperscript{93.} 504 F.2d 1317 (6th Cir. 1974).

\textsuperscript{94.} Id.
Other potential impacts of water pollution that "affect" interstate commerce easily can be identified, any one of which would justify Congressional legislation on this subject. It seems clear therefore that Congress has the constitutional power under the commerce clause to enact an effluent charge law to control water pollution, if it chooses to do so.

CONSTRAINTS ON CONGRESS' POWER TO LEGISLATE

The Bill of Rights of the United States Constitution contains two concepts that might be the basis for challenges to a federal effluent charge law: the due process and equal protection concepts. Assuming that law is carefully written and reasonably related to the pollution goals to be achieved, however, challenges under either of these two concepts should fail.

The due process clause has two separate aspects, one called "substantive" due process and the other "procedural" due process. Under the substantive due process requirement, private property cannot be taken by the government without payment of just compensation. The courts, however, have held that waste dischargers, even those who have been depositing wastes into public waters for many years, have no vested property right to continue doing so, and cannot demand compensation when their activities are regulated or prohibited.

Procedural due process requires that fair procedures be followed in applying any regulatory scheme, such as notice of hearings and orders, and the opportunity to present one's own arguments before a proper forum. Defects in procedural due process can be corrected ordinarily by modifying the process to one that meets judicially approved tests of fairness.

The principal tenet of the equal protection doctrine is that persons

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Today the due process and equal protection guarantees are not significant restraints on the government's ability to act in matters of economics or social welfare... as long as there is any conceivable basis for finding... a rational relationship [to any legitimate end of government] the law will be upheld. Only when a law is a totally arbitrary deprivation of liberty will it violate the substantive due process guarantee. NOWAK, supra note 86, at 409–10.
similarly situated must be treated alike under the law. Conceivably, an industrial waste discharger might complain that his charges were higher than another who was similarly situated. The courts, however, have almost uniformly rejected those claims, where the classification is "rationally" based, i.e., based "upon a state of facts that reasonably can be conceived to constitute a distinction, or difference in state policy. . . ." The Supreme Court recognizes a strong presumption of constitutionality under the rational basis test. If the differential treatment were to be based on race, gender, or some other suspect classification then the standard of judicial review would be "strict scrutiny," which is usually "fatal" to the legislation. But carefully drafted effluent charge legislation would classify persons and firms on the basis of the amount and quality of effluent they discharged into public waters, not on the basis of any suspect classification, and thus should satisfy the constitutional equal protection requirement.

STATE AUTHORITY TO ENACT EFFLUENT CHARGE LAWS

The states also have the legal power to enact effluent charge laws if they choose to do so. As noted above, states traditionally have enacted most of the legislation in the health and environmental fields. This power generally is referred to as the state's "police power" and is the basis for

97. In applying the rationality requirement, the Court has ordinarily been willing to uphold any classification based "upon a state of facts that reasonably can be conceived to constitute a distinction, or difference in state policy. . . ."


This remarkable deference to state objectives has operated in the sphere of economic regulation quite apart from whether the conceivable "state of facts" (1) actually exists, (2) would convincingly justify the classification if it did exist, or (3) has ever been urged in the classification's defense by those who either promulgated it or have argued in its support. Often only the Court's imagination has limited the allowable purposes ascribed to government.

TRIBE, supra note 89, at 956 (1978).

The first standard of review is the rational relationship test which we saw developed for use in both equal protection and substantive due process issues in the post 1937 decisions of the Court. The Court will not grant any significant review of legislative decisions to classify persons in terms of general economic legislation.

NOWAK, supra note 86, at 524.


101. Such legislation would be upheld as an exercise of the state's "police powers," which encompasses the inherent right of state and local governments to enact legislation protecting the health, safety, morals or general welfare of the people within their jurisdiction. See Charles River Bridge v. Warren Bridge Co., 36 U.S. (11 Pet.) 420 (1847). "Police power" is the name given to one agent of a state's sovereign power of government. The principal limitation on this power, relevant here, arises from the due process and equal protection guarantees. See supra text accompanying notes 95–100.
regulations protecting health, morals, aesthetic appearance, environmental quality, recreation, fish and wildlife, and economic welfare.

The more serious challenge to state effluent charge laws arises from two other sources: (1) the law might violate the federal Constitution's "dormant" commerce clause requirement that guarantees free interstate commerce and (2) the law might be preempted by existing federal statutes in the field of pollution control. Under the first challenge the courts have held that legislation may be suspect if it places a greater burden on out-of-state enterprises than on those operating within the state.\textsuperscript{102} The typical case of an invalid state law under this concept is the law that places special requirements on the length of trains\textsuperscript{103} or requirements on trucks' mud flaps\textsuperscript{104} that pass through the state on interstate travel.

A state-enacted effluent charge system should not violate the "dormant" commerce clause because it should be drawn to apply equally to in-state and out-of-state waste dischargers. The dormant commerce clause is "not important to the charges approach," because "most charges plans can function effectively without unreasonable impacts on interstate commerce."\textsuperscript{105}

The question of federal preemption of state water pollution control laws is more complex. Under the supremacy clause of the federal Constitution,\textsuperscript{106} if Congress enacts a law that conflicts with a state law, or that occupies the field so completely that no room is left for state legislation, or where the congressional intent to preempt the field is manifest, then the state law is preempted and cannot stand.\textsuperscript{107} Clearly Congress could

\begin{footnotesize}
\textsuperscript{102} Although the criteria for determining the validity of state statutes affecting interstate commerce have been variously stated, the general rule that emerges can be phrased as follows: Where the statute regulates even-handedly to effectuate a legitimate local public interest, and its effects on interstate commerce are only incidental, it will be upheld unless the burden imposed on such commerce is clearly excessive in relation to the putative local benefits. If a legitimate local purpose is found, then the question becomes one of degree. And the extent of the burden that will be tolerated will of course depend on the nature of the local interest involved, and on whether it could be promoted as well with a lesser impact on interstate activities. Occasionally the Court has candidly undertaken a balancing approach in resolving these issues, but more frequently it has spoken in terms of "direct" and "indirect" effects and burdens.

Pike v. Bruce Church, Inc. 397 U.S. 137, 142 (1970) (case citations within quotation omitted).


ANDERSON, supra note 79, at 130–31.

U.S. CONST. art. VI, § 2.

The principle to be derived from [the Supreme Court's] decisions is that federal regulation of a field of commerce should not be deemed preemptive of state regulatory power in the absence of persuasive reasons—either that the nature of the regulated subject matter permits no other conclusion, or that the Congress has unmistakably so ordained.

Florida Lime & Avocado Growers v. Paul, 373 U.S. 132, 142 (1963). However, where Congress
enact a comprehensive effluent charge law that would preempt state laws in the field. Most federal legislation in the environmental field provides that state laws on the same subject are not preempted if they are more strict than the federal act. If a provision of this type were included in the federal effluent charge law, then a state could levy charges, if it chose to do so, that would be added on to those levied under the federal law.

A related question is whether existing federal water pollution control laws preempt the field so there is no room left for state effluent charge laws. The Clean Water Act expressly reserves to the states the power to enact water quality control laws with stricter standards than those promulgated under the federal act. In theory, one can argue that after 1985, the states could not possibly have stricter standards, because by then the nation will have achieved the no-discharge goal. The 1977 amendments, however, make it clear that the government intends to perpetuate a technology-based program of pollution control into the foreseeable future. This program allows sufficient leeway for implementation of state effluent charge programs.

A technology-based federal program, however, might raise the question whether state effluent charges could be levied on waste dischargers who were already meeting the federal technology-based standards. An argument of this nature would probably fail, because add-on state effluent charges would necessarily reflect stricter standards than those required by the federal law. In addition they would come within the provision of the federal act allowing stricter state laws. A credible counterargument, however, can be made to the effect that the federal disclaimer allows stricter state standards only in terms of the quantities of chemicals or other substances discharged into public waters and not in terms of charges assessed against polluters. In view of the uncertainty raised by this argument, Congress ought to enact an amendment to the Clean Water Act making it clear that state effluent charge laws would not be preempted by existing federal pollution control laws.

Under an amended Clean Water Act, the states could continue to im-

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legislates "in a field which the States have traditionally occupied . . . we start with the assumption that was the clear and manifest purpose of Congress." Rice v. Santa Fe Elevator Corp., 331 U.S. 218, 230 (1947). See also Huron Cement Co. v. City of Detroit, 362 U.S. 440 (1960) and Askew v. American Waterways Operators, Inc., 411 U.S. 325 (1973).


111. See ANDERSON, supra note 79, at 131 (same conclusion).
plement their own standards-oriented water pollution control systems as they do now, so long as they meet minimum federal standards. (Thirty-six states have met these federal standards and carry out their own programs under the supervision of the Environmental Protection Agency.) Alternatively, the states could add a charge system to their bag of tools for controlling pollution.

As noted above, congressional legislation in this area might take one of two basic approaches. The legislation could provide the states with authority to enact whatever charge systems they deem appropriate and those systems would not be preempted by existing federal water pollution control laws. Secondly, the federal act could set minimum physical standards and minimum charge standards for state effluent charge laws. Obviously a major concern in making the choice between these two, or among other variables, will be to assure that the nation does not return to the era when industries bargained one state’s pollution control laws against another and threatened to move from states with strict laws to those with more lenient programs.

VARIATIONS IN EFFLUENT CHARGE LEVELS BY STATE OR REGION

If Congress enacted an effluent charge law, the question arises whether that law should establish uniform charges for waste dischargers all across the nation, or should it vary those charges by state or region. If the charges are uniform everywhere, then the states or regions with cleaner waters may complain they are being penalized because their charges are higher than necessary to achieve the desired water quality levels.

One important argument in favor of uniform national charges is that, if variations were permitted, some states might set charges low for their less developed regions with less pollution, thus inviting industries to move to those places and discharge their pollution there. This possibility could well raise the ire of both environmentalists who want to keep the clean areas clean and of larger cities and industrialized areas who want to keep jobs.

Probably the most important reason for applying a uniform charge across the nation is the political difficulty of deciding on the level of charges that should be applied in different regions. No acceptable formula

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exists for regionalizing charges without creating great political controversy. Nonetheless some modifications in the uniform charge theme might prove feasible and politically desirable. The modifications include special surcharges on new plants, allowing states some variation but with a federally established minimum charge below which the states cannot go, recognition of assimilative capacity as a basis for modest charge adjustment, and application of a varying time schedule for phasing in charges reflecting the different amortization needs of diverse industries. These approaches, as well as others that might be conceived, would tend to discourage migration of industries from one state or region to another and, at the same time, would speak to the complaints of environmentalists who want to discourage degradation of the more pristine areas.

If states enacted their own effluent charge systems, without the constraint of any federal minimum, then significant variations are likely to exist between the states, and the political problem of threatened industrial migration can be expected.

**COULD AN EFFLUENT CHARGE SYSTEM BE GRAFTED ONTO THE PRESENT TECHNOLOGY-BASED STANDARDS SYSTEM?**

No insurmountable legal problems should arise by enacting an effluent charge system on top of the current standards system. As noted above, the current water pollution control system in the United States, while professing a no-discharge-by-1985 goal, is in fact a technology-based system, applying criteria such as best available technology or best conventional technology. Under this system, the states have set ambient water quality standards for receiving waters. For many bodies of water, these standards are being met, or can be met, by application of the technology-based standards. For other waters, however, these technology-based standards are deemed too lax to assure compliance with existing standards. For these waters, Sec. 303(d) of the CWA requires that they be classed as water quality "limited segments;" special procedures are then established to encourage achievement of the desired ambient water quality level.

Obviously an effluent charge system appropriately could be applied to waste dischargers on the "limited segments" of water where technology-based standards will not achieve the desired ambient water quality stan-

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113. ANDERSON, supra note 79, at 166–72.
115. See Water Quality Standards and Implementation Plans, 33 U.S.C. § 1313 (1982), and 33 U.S.C. § 1342 (1982). All of the state programs that have been approved by the EPA under § 1342 necessarily have met the requirements for setting § 1313's water quality standards. See supra note 112 for states that have complied with federal standards.
standards. An effluent charge system would be an appropriate means to encourage industries and municipalities to improve their technology, or to consider alternative disposal systems.

A different situation arguably could exist regarding those waters where the ambient water quality standards have been achieved. On these waters the waste dischargers might claim that charges are inappropriate because the desired water quality has already been achieved. A somewhat similar argument might be made by an industry on any body of water that is using the legally required level of technology. The answer to these arguments is that both the ambient water quality standards and the technology-based standards are simply waypoints; they are not final resting places. Because of continuing population and industrial growth and the need to dispose of an ever-increasing quantity of waste material, the U.S. needs to continue developing better waste control technology and alternative methods and locations for disposing of wastes. An effluent charge system provides a built-in incentive for encouraging these continuing efforts.

The data presently generated by the National Pollutant Discharge Elimination System (NPDES) make it quite feasible to adopt an effluent charge system with only modest additional effort. The applicant for an NPDES permit must provide EPA or the relevant state agency extensive and precise data on the quantity and content of the wastes to be discharged under the permit. These data include chemical parameters, metal content, physical and biological parameters, and radioactive parameters, and cover a total of some 68 different items. The permits identify the permissible discharges of each of these substances, and require appropriate self-monitoring to assure that the permissible limits are not exceeded or, if exceeded, are reported. EPA and the relevant state agencies have a well established spot-monitoring system of their own to assure the validity of the self-monitoring system. With this body of data already available it would not be technically difficult to graft an effluent charge system onto the present regime. The principal decisions to be made concern the choice of the wastes that would be the basis of the charges.

One of the surprising consequences of the enactment of the FRG charge system was the degree to which more complete and more precise data were developed because money changed hands on the basis of that data. While the United States is further along now than the Germans were when they enacted the effluent charge law—and it has considerably more data than the Germans did then—it nonetheless seems likely that implementation of an effluent charge system here also would generate important new information, for the same reason—money changes hands on the basis of that information.
SYNOPSIS

The Federal Republic of Germany's 1976 Effluent Charge Law was produced at the crest of that nation's environmental movement and against a background of broad support for the application of market economics to resolve the country's water pollution problems. The ECL was designed to operate in tandem with the existing standards/permit system established in a 1957 law and modified by 1976 Amendments.

The federal act established a minimum national water quality goal and authorized federally created task forces to set technology-based standards for all industries and municipalities. The federal act also determined the pollutants on which the charges are to be based and set the annual charges for each pollutant. The Länder carry out all enforcement of the Act, including timing of implementation, collection, and disbursement of charge revenues. The technology-based standards established uniform thresholds for individual discharge levels across the country. The Länder can set higher minimums if they are necessary for achieving particular quality goals in given water bodies.

The effluent charge system enacted in 1976 is tied to five pollutants: settleable solids, COD (chemical oxygen demand), mercury, cadmium, and toxicity for fish. The charge level started at 12 DM (about $5.00) per damage unit in 1981 and rises to 40 DM (about $16.00) per damage unit in 1986. A damage unit is a specified amount of effluent such as 45.45 Kg of COD. The charge per damage unit is uniform across regions and polluters.

Each discharger pays for the expected amount of pollution stipulated in the effluent charge portion of the individual permit. The charge liability is lower under two circumstances. If the expected discharge level meets the federal minimum standards, the unit charge is reduced by one-half (e.g., from 12 DM to 6 DM in the first year). Second, if the actual discharge level is substantially below the expected level, the bill is based on the actual level of discharge. When maximum levels of discharge stipulated in the permits are exceeded, polluters are penalized by having to pay more in the future.

Revenues from the charges can be used by the Länder for the costs of administering the ECL and for supporting pollution abatement activities.

The short experience of the FRG teaches the following lessons about an effluent charge system: it is most likely politically viable and administratively attractive if

1. It covers a small number of pollutants;
2. It is combined with permit systems;
3. The charges begin at some specified level and escalate during a transition period;
(4) The charge levels result from a process involving the participation of interested parties including those benefitted and harmed by waste discharge;

(5) Measures and levels of volumes and pollution concentrations are simplified;

(6) Effluent charge revenues are made available for abatement related expenditures—see below;

(7) Hardship clauses are provided to protect dischargers or industrial sectors under exceptional circumstances;

(8) Care is taken to demonstrate how the effluent charge program actually can be implemented.

If an effluent charge system meeting the above constraints is implemented, then the U.S. can expect the following:

(1) Charges to increase the incentive for firms to find treatment technologies, substitute production processes, and substitute input and output combinations which diminish residuals discharge. The qualitative evidence is that firms whose discharge licenses did not change generally found ways to reduce their charge obligation. An intrafirm effluent charge system resulted in a 20 percent decline in waste discharge in the seven years since its introduction.

(2) Charges increase the incentives for municipalities to adopt customer sewage pricing policies which not only are acceptable financial instruments but also offer incentives for the indirect dischargers to economize on waste production.

(3) Charges encourage, if not require, municipalities to find satisfactory procedures for better monitoring the intake and outflow of effluent. This will help public authorities to reduce the average cost of their sewage services and will aid them in executing an effluent charge policy which better reflects the marginal cost of treating a given customer’s effluent.

(4) The present system of subsidies in the U.S. for waste treatment rewards capital intensive municipal waste treatment technologies by subsidizing capital expenditures. By encouraging municipalities to use more operation and maintenance expenses to reduce waste discharge, the effluent charge system helps to correct the resource allocation distortions the subsidies created.

(5) If revenues generated from charges are made available for ex-
penditures for water quality improvement, some portion of these funds will be available for use by industry. The present subsidy system in the U.S., by excluding firms directly, distorts the marginal cost of waste treatment between private (firms) and public (municipality) dischargers. There may be equity considerations which justify the present policy, but such goals are achieved at the cost of a loss in efficiency. These losses will be mitigated, in part, if firms qualify for subventions. Final discussions prior to the passage of the ECL defined the uses of charge revenues to include the industrial expenditures for effluent conserving production processes, in addition to more straightforward pollution abatement expenditures.123

(6) If a charge system is generating billions of dollars per year in revenues, it is likely that this source increasingly would look attractive as a substitute to the U.S. Treasury for pollution abatement subsidies. Since revenues have yet to be collected in the FRG, there is no evidence to support the concern of several water quality experts interviewed that this substitution would take place. A decreased dependence on the Treasury redistributes the cost of pollution from the general taxpayer to the consumer of pollution intensive products and to the owners of factories specializing in the production of those products. This shift in the source of subsidy would further emphasize the acceptance of the polluter-pays-principle.124

(7) If the cost of administering and enforcing the effluent charge system is covered in part or totally by revenues created, as it is in the FRG, then we can expect greater availability of enforcement services and more compliance compared to the precharge period. There is too little empirical evidence regarding enforcement levels in the U.S. to know whether and to what extent the present situation is optimal. There is the danger of excessive enthusiasm for enforcement when the budget for enforcement comes from charge revenues. Representation of heterogeneous interests on the board in charge of revenue disbursement, is one way to reduce the chance for this resource misallocation—admixtures are effective antidotes for excessive zeal.125

(8) Introducing an actual effluent charge system on top of a standards system, in all likelihood, increases the total cost of managing water quality. The fixed cost of educating legislators and others unfamiliar with such a policy so they can vote intelligently should not be overlooked. In return, water quality is improved and the flexibility, quality, and recision

123. See supra text accompanying notes 76–78.
124. See supra text accompanying notes 58–63.
125. See supra text accompanying notes 69–71.
of the management program is improved when more policy options are available.\textsuperscript{126}

(9) An effluent charge system combined with a permit system creates a more flexible bag of policy tools capable of better responding to changing circumstances than either system alone.\textsuperscript{127}

(10) In recent years residuals producers have been permitted to trade environmental quality permits. The bubble concept introduces greater flexibility into the system by enabling exchange, in effect, to remove constraints on some firms' behavior. Is a charge system unnecessary if a bubble policy is in place? Other things being equal, the introduction of charges results in a loss to polluters because the implicit value of discharge permits is depreciated by the introduction of an effluent charge. In contrast, since introducing the bubble removes some constraints, the value of tradeable permits increases. Thus, the distributive consequences of these two policies is quite different. In practice, the efficiency aspects seem to be different. To date, the number of air pollution offsets consummated is modest and the number of water quality trades is miniscule. This suggests that there are practical impediments to the development of offset markets in water. These may or may not be of a short-run nature. On the other hand, the effluent charge impinges on all municipalities, direct dischargers, and on some indirect dischargers. Thus the effluent charge system generally is superior to a bubble system. The extent of the resource savings created by an effluent charge depends largely on its magnitude. What is clear from this discussion is that in a pollution offset program, effluent charges are complementary, not competitive programs, when the criterion is economic efficiency. Finally, if the experience in the Federal Republic of Germany is a guide, the introduction of an effluent charge will improve water quality.\textsuperscript{128}

In the United States it is clear that Congress has the constitutional power to enact an effluent charge law for the nation as a whole. Alternatively Congress could enact a framework law establishing minimum standards for state effluent charge laws, and then allow the states to enact such laws as they saw fit. Objections might be raised to federal or state effluent charge laws on the basis of constitutional equal protection and due process grounds, but these objections would fail.

States have authority to enact effluent charge laws under their own constitutions, and under the federal constitution; however, state water pollution control laws might be preempted by the existing federal laws in the field. The Clean Water Act (CWA) explicitly provides that state
laws are not preempted by the federal Act if they are " stricter" than the federal law, and state effluent charge laws might conceivably meet this criterion. Sufficient uncertainty, however, surrounds this question that we recommend enactment of federal legislation explicitly authorizing state effluent charge laws.

An effluent charge law could be enacted in the U.S. to operate in tandem with the existing CWA standards/permit system. In spite of the much publicized no-discharge "goal" of the Clean Water Act, the system actually is technology based. It would be quite feasible to coordinate an effluent charge law with the existing NPDES system. The data generated by the NPDES process provides the technical information that would be required for establishing effluent charges. An effluent charge system should not excuse waste dischargers merely because they are meeting the technology-based standards.

Caution should be exercised about considering variations in charge levels if they are initiated by a state or a region. Not only is it exceedingly difficult to determine the technically proper and politically acceptable variance, but those variances might also encourage industries to bargain among states for the lowest charges.