THE FEASIBILITY AND DESIRABILITY OF ALTERNATIVE TAX SYSTEMS FOR SUPERFUND CERCLA SECTION 301(a)(1)(G) STUDY

Final Report

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EXECUTIVE SUMMARY

Section 301(a)(1)(G) of CERCLA calls for a study of alternative tax options that could be used to finance the Superfund response program. The study examines the desirability and feasibility of five alternative tax options with regard to six evaluative criteria. The tax options are all designed to raise $1 billion annually. This revenue target was choosen for illustrative purposes only and is used to ensure comparability among options. Of note is that the choice of a revenue target, and specific tax rates, taxable substances and tax exemptions was necessary to conduct the analysis presented in the study and in no way constitutes an EPA recommendation about an appropriate CERCLA tax. The five tax options considered are:

- Feedstock Tax I (Modified Rates) is a feedstock tax that increases the existing CERCLA tax rates on the 43 substances identified in section 221 of CERCLA. The existing tax rates were multiplied by 3.43 to raise the level of revenue over a five year period from $1.6 to $5 billion. This feedstock tax, like the current CERCLA tax, is imposed at the beginning of the chemical production process and is levied on the raw materials and primary petrochemicals believed to be associated with the production of hazardous substances. The tax is collected from a relatively small number of taxpayers.

- Feedstock Tax II (Modified Rates and Substances) is a feedstock tax that is levied on a somewhat different set of substances than are taxed under the current CERCLA tax. Taxable substances were selected by examining EPA data to determine which substances have been found at sites likely to evoke Fund spending. A list of 48 substances were identified for taxation. The tax rates for these substances were calculated to reflect the frequency with which each substance was found at sites. Tax rates were set to reach a revenue target of $5 billion over five years.

- Waste-End Tax (Non-Incentive) is a tax on the generation of all hazardous wastes regulated under the Resource Conservation and Recovery Act (RCRA). Set at a flat rate of $4.73 per ton, this tax is not designed to create strong incentives to reduce waste generation or to alter waste management practices. While the act of waste generation creates a tax liability, the tax would not be collected until the point where the waste

is treated, stored, or disposed in order to minimize the number of taxpayers.

- Combination Tax I (Feedstock Tax and Non-Incentive Waste-End Tax) combines elements of both a feedstock tax and a waste-end tax. The feedstock tax component, designed to raise $500 million per year, is identical to the second modified feedstock tax described above except that the rates have been reduced by one-half. The waste-end tax component, also intended to produce $500 million annually, is based on the waste-end tax described above but has a tax rate of $2.37 per ton. The rationale for combining two taxes is the ability of the resulting tax system to simultaneously obtain the strengths and benefits of each individual component. There may, however, be synergistic effects which are not experienced when using either tax by itself.

- Combination Tax II (Feedstock Tax and Incentive Waste-End Tax) is similar to the tax described above but raises $800 million per year from the feedstock tax component and $200 million per year from the waste-end tax component. There are also significant differences in the structure of the waste-end tax component. The waste-end tax component is to be implemented in two phases. The first phase taxes RCRA-designated hazardous wastes that are land disposed or stored in surface impoundments or waste piles for a long period of time. The second phase, intended to create strong incentives for reduced environmental risk, uses a complex set of tax rates that depend on a number of environmental factors and which rise over time.

Each tax option is analyzed in terms of:

- Economic Impacts. These impacts include price and quantity changes for the taxed substances as well as macroeconomic effects.

- Equity Implications. Equity is considered in terms of both retrospective and prospective equity. The former measures the degree to which a CERCLA tax is levied on those industries and substances responsible for existing Superfund sites while the latter implies that the tax burden faced by a particular firm ought to reflect the likelihood that its activities will provoke Fund spending.

- Economic Incentives. The types of incentives analyzed include incentives created by a CERCLA tax to reduce generated quantities of hazardous wastes, to produce a less hazardous mix of wastes, to modify waste management practices, or to engage in environmentally unsound practices such as tax evasion and illicit disposal.

- Revenue Generating Capacity. For each tax, revenue generation is assessed in terms of the ability of the tax to generate the requisite funds and the predictability of the revenues generated.

- Administrative Feasibility. The administrative burden of each tax is measured in terms of the difficulty associated with the identification of taxable parties, substances, and activities; the overall reporting and recordkeeping burden imposed by the tax; and the ability of government agencies to monitor and enforce compliance with the tax.

- Programmatic Effects. Alternative tax options may affect both federal and state regulatory programs for the management of hazardous wastes. A CERCLA tax may enhance, hinder or be neutral with respect to such programs. Similarly, a CERCLA tax may have implications for state tax revenues and authority.

Each of these criteria is used to evaluate the five tax options included in the study. To reiterate, the study does not recommend a particular tax option; doing so would require a decision about the relative importance of each criterion. Further, there are key issues which were outside the scope of the 301(a)(1)(G) study that clearly will prove critical in the reauthorization of CERCLA. A good example is the balance of trade effect of alternative CERCLA taxes. As the 301(a)(1)(F) study notes, the U.S. trade balance in chemicals has worsened in recent years. Thus, any CERCLA tax (either feedstock or waste-end) that creates a situation where taxed U.S. chemicals compete in world markets with untaxed foreign chemicals potentially exacerbates the erosion of the U.S. trade balance in chemicals. In the context of reauthorizing CERCLA, international trade effects would be an important consideration in the design of alternate CERCLA tax options. Despite these limitations, however, the study contains many key findings.

- Virtually any CERCLA tax designed to raise $1 billion per year has the potential to induce changes in the prices and quantities of the taxed substances. For feedstock taxes, such changes are likely to occur in the markets for primary petrochemicals and inorganic raw materials. For a waste-end tax, these changes may include a reduction in the quantity of wastes disposed or generated, higher costs for on-site waste

management and higher prices for off-site waste management. Careful tax design can ensure that the adverse consequences of these economic effects are minimized and that the changes that do occur will be consistent with overall policy goals.

- The effect of the various taxes on macroeconomic indicators such as employment and interest rates is expected to be negligible because the $1 billion annual tax is only a small fraction of the nation's gross national product (0.028 percent in 1984).

- The equity consequences of a particular CERCLA tax depend in large measure on its basic design:

  -- A feedstock tax, because it is imposed early in the production process, is paid at some point in the manufacture or generation of virtually all hazardous substances.

  -- A waste-end tax may not have been collected in several situations where Superfund spending is involved. The inadvertant spill of a non-waste product or the illegal disposal of a hazardous waste are two cases where the tax would not be paid despite a Fund response.

  -- A firm's tax burden under a feedstock tax does not necessarily reflect the environmental risk associated with its waste management activities. The tax also does not distinguish among the uses to which a taxed substance is put, despite varying degrees of hazard. A waste-end tax that reflects environmental risk may provide a closer connection between a firm's tax burden and the likelihood of provoking fund spending.

- Any CERCLA tax system may create economic incentives for changing the behavior of firms by modifying the relative costs of inputs to the production process and/or the costs of hazardous waste disposal. Feedstock taxes are generally not capable of creating incentives for significant changes in waste management practices. A waste-end tax, depending on its design, may create some incentive for desirable behavior such as reducing the volume of waste generated or encouraging environmentally preferred waste management methods. The tax may also induce undesirable behavior such as failure to report waste activities and illegal disposal of wastes. The significance of such incentives has not been precisely estimated.

- All of the tax systems analyzed in the study appear capable of generating $1 billion per year in revenues. Careful design and implementation of the tax, however, are necessary to ensure full collection of the tax. The current CERCLA tax demonstrates the revenue raising potential of a feedstock tax, although its rates are roughly one-third those necessary for a $1 billion tax. The experience of several states indicates that, in spite of some initial difficulty in estimating revenues, the waste-end tax is also capable of generating significant amounts of revenue. It is unclear how relevant this experience would be to a $1 billion federal waste-end tax.

- The current feedstock tax seems to impose only a small administrative burden on both the taxpayer and the IRS. Depending on the set of substances included in the tax base, an expanded version of the current feedstock tax is not likely to require major changes in the existing tax collection mechanism. A waste-end tax, particularly if it is complex, may impose an added administrative burden both for taxpayers and for the IRS.

1. INTRODUCTION

Section 221 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA or Superfund) establishes the Hazardous Substances Response Trust Fund (Fund) that finances response actions to abate or minimize the threat of hazardous substance releases into the environment.[1/] Approximately 87 percent of the revenues for the Fund have been derived from taxes on chemical raw materials commonly referred to as feedstocks. Section 211 of CERCLA establishes the tax rates and the tax base that comprise the existing CERCLA feedstock tax system.

Congress adopted the feedstock tax approach to finance the Superfund program for a variety of reasons. Generally, the feedstock tax system appeared to be administratively feasible, reasonably equitable, and certain to raise the level of funds needed to finance the response and enforcement actions authorized by CERCLA. Congress did, however, recognize that an alternative tax system may be appropriate for financing a future Superfund program. Consequently, Congress mandated, under Section 301(a)(1)(G) of CERCLA, that alternative tax systems be thoroughly examined near the end of CERCLA's initial five-year authorization period.

Specifically, section 301(a)(1)(G) of CERCLA requires that the President submit a report to Congress that assesses the feasibility and desirability of a schedule of taxes which takes into account one or more of the following:

- the likelihood of a release of a hazardous substance;
- the degree of hazard and risk of harm to public health, welfare, and the environment resulting from any such release;
- incentives to proper handling, recycling, incineration, and neutralization of hazardous wastes, and disincentives to improper or illegal handling or disposal of hazardous materials;
- administrative and reporting burdens on government and industry; and
- the extent to which the tax burden falls on the substances and parties that create the problems addressed by the Act.

1/ Response authority under CERCLA extends to releases of hazardous substances. Hazardous substances are defined in section 101(14) of CERCLA. These substances may be wastes (in the sense that they are by-products of the production process with little economic value), raw materials, petrochemical feedstocks, or final products.

This report has been designed to fulfill the mandate under Section 301(a)(1)(G) of CERCLA. The general goal of this study is to provide Congress with an evaluation of alternative Superfund tax systems to assist lawmakers in reauthorizing that program. Specifically, this study evaluates the feasibility and desirability of three alternative tax systems discussed below.

These tax systems are a modified feedstock tax, a waste-end tax, and a combination feedstock/waste-end tax. A feedstock tax is imposed on raw materials used to make the chemical products associated with hazardous substance generation. A waste-end tax is imposed on the generation, transportation, treatment, or disposal of hazardous wastes, and collected from either generators or managers of hazardous wastes. A combination tax is imposed on both chemical raw materials and hazardous wastes. There are many variations or options that can be developed under each tax system. This report evaluates the following tax options:

- Modified Feedstock Tax Options:
  - -- Feedstock Tax I: A feedstock tax system that adjusts existing CERCLA tax rates.
  - -- Feedstock Tax II: A feedstock tax system that adjusts existing CERCLA tax rates and taxable substances.
- Waste-End Tax Option:
  - -- Waste-End Tax: A non-incentive waste-end tax on the disposal of hazardous substances and wastes.
- Combination Tax Options:
  - -- Combination Tax I: A feedstock tax and non-incentive waste-end tax on specific substances and activities with the general goal of generating revenue.
  - -- Combination Tax II: A feedstock tax and incentive waste-end tax on specific substances and activities with the general goals of generating revenue and providing incentives to improve waste management practices. Phase I is designed to provide revenues and limited incentives; Phase II is designed to provide revenues and strong incentives.

Several criteria are used to evaluate these alternative tax systems. They include: economic impacts, equity, economic incentives, revenue generation capability, administrative feasibility, and programmatic effects. When possible, quantitative analyses are conducted on the effects of specific tax options. Also included is a discussion of the experiences of the States and the Federal Government in imposing and administering similar tax systems.

The above tax systems are not an exhaustive list of available options for funding the Superfund program. This report does briefly discuss other alternatives. These five options have, however, been given extensive evaluation in this report because they have been considered to be the most feasible alternatives or have been most frequently cited as potential sources of revenue for this program. Please note that this report does not recommend a specific tax option for financing a future Superfund program. Rather, it simply provides an objective evaluation of alternative tax options to aid Congress in reauthorizing the Superfund program.

1.1 ORGANIZATION OF THIS REPORT

The remainder of Chapter 1 describes how this report is organized and provides a brief discussion of the major issues of, and the general limitations to, this analysis. Chapters 2 and 3 establish the framework for the analysis of the major CERCLA tax-related issues that are presented in subsequent chapters. Specifically, Chapter 2 provides a general description of the feedstock, waste-end, and combination tax systems. It also briefly discusses other possible tax systems and explains why they are not considered further. Chapter 3 describes the evaluative criteria that the report applies to the alternative CERCLA tax systems. These criteria include those taken directly from the statutory language of section 301(a)(1)(G) and others that are also highly relevant to the evaluation of a tax system to fund CERCLA. As indicated above, six criteria are examined: economic impacts, equity, economic incentives, revenue generation capability, administrative feasibility, and programmatic effects. Chapter 4 describes each of the five tax options identified above. Chapter 5 evaluates each tax option using the criteria developed in Chapter 3.

1.2 MAJOR ISSUES AND LIMITATIONS TO THE ANALYSIS

This section presents two issues that are important to consider when using the information contained in this report to compare the different tax systems for funding the Superfund program. They are the differing goals of the various criteria used for this analysis and the limitations of the data and analytical tools available to support the analysis.

1.2.1 Differing Goals

As discussed in Chapter 3, none of the three tax systems evaluated in this report can fully meet all the criteria, or goals, suggested by Congress in section 301(a)(1)(G). For example, one tax system may provide incentives for firms to use better waste management practices, while another tax system may provide a more reliable source of revenues for the Superfund program. Attempting to achieve several goals with one tax system may, in fact, cause negative results. For instance, a tax collected from only a few firms to achieve administrative simplicity may be relatively inequitable because all those who contribute to the hazardous substance release problems addressed by CERCLA would not be taxed. A tax on disposed wastes that is designed to

provide an incentive for firms to reduce the amount of waste produced may result in less revenue because, if the incentive goals are met, less waste will be disposed. The tradeoff between increasing revenue generating capacity and the creation of incentives that will reduce the tax base must be taken into account when designing a tax system that seeks to maximize the realization of both goals.

Thus, all the criteria listed in Section 301(a)(1)(G) may be very difficult to achieve with only one tax and may require the addition of other types of taxes or regulations to ensure that all goals are met to the greatest degree possible. Before deciding which tax should fund the Superfund program, Congress must decide the relative importance of the criteria. This report only discusses each tax system's ability to achieve the criteria; it does not recommend which tax system should be used to fund the Superfund program.

1.2.2 Limitations of the Analysis

The 301(a)(1)(G) Study does not discuss international trade issues that are associated with a CERCLA tax. The balance-of-trade effects of the current feedstock tax are, however, the subject of the 301(a)(1)(F) report. In the context of reauthorizing CERCLA, international trade effects would be an important consideration in the design of alternate CERCLA tax options.

As reported in the 301(a)(1)(F) report, four factors dominate the current erosion of the U.S. trade balance in chemicals: (1) decontrol of crude oil in the United States in the late 1970s, (2) the emergence of new petrochemical capacity in energy-rich countries such as Canada and Saudi Arabia, (3) the relative strength of the dollar, and (4) the global recession of the early 1980s. However, any CERCLA tax (either feedstock or waste-end) that creates a situation where taxed U.S. chemicals compete in world markets with untaxed foreign chemicals potentially exacerbates the erosion of the U.S. trade balance in chemicals.

Thus, foreign trade issues ultimately need to be considered very carefully in designing alternate CERCLA tax options. However, because the vast majority of domestic chemical production is consumed domestically, it is perhaps most logical to proceed in a fashion that first evaluates tax options according to the criteria established in Section 301(a)(1)(G) and in this report, and then consider international trade issues with respect to a narrower set of tax options. This is the case because economic analysis of all of the world markets potentially affected by feedstock and/or waste-end taxes is a resource- intensive exercise requiring analysis of export trends, import trends, estimates of comparative advantage, and world supply and demand trends. Such analyses are somewhat distant from the issues raised in Section 301(a)(1)(G) and thus are better addressed elsewhere. Suffice it to say that ultimately both feedstock taxes and waste-end taxes need to be analyzed from an international trade perspective because both potentially burden domestic industry relative to its foreign competition; the analysis in the Section 301(a)(1)(F) study provides the point of departure for performing such analyses.

Some of the analysis in this report is of a preliminary nature. Federal and State hazardous waste tax systems have only been in place for a few years and the information needed to evaluate them is only now becoming available in sufficient scope to support meaningful analysis. Furthermore, the quantitative tools necessary to predict accurately the effects of the various tax systems and different tax revenue targets are mostly in the developmental stage. Indeed, even in areas where sophisticated modeling tools are available (e.g., domestic chemical production) there are often subtle or complex factors which, by design, are not included. For example, a sophisticated simulation of the increasing internationalization of the world chemical trade would require both a significant data collection effort and the development of an analytic framework.

Because the necessary data and analytic techniques are not consistently available for each of the tax systems discussed here, it is difficult to provide parallel analyses of the systems. For these reasons, this report includes a comparative analysis that is somewhat uneven and incomplete. Until further research enhances our understanding of the complex behavioral changes that may result from the imposition of environmental taxes, precise conclusions cannot be drawn about the ability of each tax system to meet the criteria and the tradeoffs among the criteria. The report will present the information and insights that are available for the tax systems considered and point out the types of data and analytic tools that are needed to advance our understanding of the various systems.

2. ALTERNATIVE TAX SYSTEMS

The purpose of this chapter is to describe, in general terms, the tax systems that will be evaluated in detail in the remaining chapters of this report. A variety of tax systems have been considered to finance the Hazardous Substances Response Trust Fund. Section 2.1 discusses the major considerations in designing tax systems. Sections 2.2.1, 2.2.2, and 2.2.3, respectively, discuss the three tax systems most frequently considered: feedstock taxes, waste-end taxes, and combination taxes. Section 2.2.4 reviews other alternatives: transfer taxes, sales taxes, value-added taxes, and surcharges on insurance premiums. These latter alternatives are evaluated briefly but are not addressed in subsequent chapters.

2.1 MAJOR CONSIDERATIONS IN DESIGNING TAX SYSTEMS

The construction of a tax system requires policy decisions on:

- The type of tax -- where the tax is levied in the production process;
- A revenue target -- the amount of funds to be collected annually;
- The tax base -- the substances, activities, or parties that are taxed;
- The tax bill -- the annual revenues collected from each substance, activity, or party; and
- The tax rate -- the per unit charge levied upon the substance, activity, or party in the tax base.

A fundamental decision that must be made early in the design of a tax is whether to levy the tax at the beginning or end of the production process. The rationale for levying the tax early in this process is two-fold. First, this approach reduces the number of taxpayers, thereby limiting the administrative burden of tax payment and collection. Second, it theoretically allows the tax burden to be passed through in varying degrees, via the sales price, to a broad base of consumers who may, in turn, generate the hazardous substances through subsequent processing.

The rationale for levying the tax late in the production process is also two-fold. First, because the tax is levied directly upon the substances that create a large part of the problem addressed by CERCLA, this type of levy links the problem to its most proximate cause. That is, it places the costs of cleanup on industries that produce and manage hazardous substances[1/] and

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1/ Section 101(14) of CERCLA delineates those hazardous substances to be cleaned up by the Fund. A significant portion of these are RCRA designated hazardous wastes. Thus, those substances taxed are the substances most likely to be found at cleanup sites.

relates the quantity of hazardous substances produced or disposed to the amount of revenue generated for cleanup. Second, it may create incentives to reduce the volume of substances generated or to induce more desirable management practices.

The selection of a revenue target depends upon such considerations as:

- the size of the problem to be addressed, and
- the speed with which the problem is to be addressed.

A discussion of various aspects of the size of the problem are the subject of other CERCLA Section 301 studies.[2/] Below, for the purposes of illustration, a $1 billion annual Fund size is assumed.

Determining the tax base involves deciding:

- what substances to tax,
- what activities to tax, and
- which parties to tax.

The first decision in setting up a tax is to decide what substances to tax. Substances are, in principle, selected for taxation on environmental grounds (i.e., because they contribute to the problems CERCLA was designed to address). In practice, there may be ambiguities and uncertainties about whether a substance should be included, or it may be administratively difficult to tax a particular substance.

The second decision in delineating the taxable base is to determine which activities to tax. The specification of an activity as taxable does not mean the activity itself is necessarily undesirable; rather, the activity is the point at which tax liability is imposed on a taxable substance. Three issues that may be considered in delineating taxable activities are (a) the extent to which the specified activities capture all or most quantities of a taxable substance; (b) the administrative ease for the taxpayer and tax collector of assessing or collecting a tax on the activities; and (c) the activities' contribution to the problem addressed by CERCLA.

The third decision in choosing a tax base is to determine which parties to tax. Three criteria may be considered here. They are (a) administrative ease; (b) the degree to which the products manufactured by these parties are used in the production of hazardous substances by their own and other industries; and (c) the parties' contribution to the problem addressed by CERCLA.

2/ These studies are authorized under CERCLA sections 301(a)(1)(A) and (C). The "A" Study examines the overall effectiveness of the Superfund program. The "C" Study examines the magnitude of the hazardous substance release problem.

Determining tax bills and tax rates are interdependent decisions. That is, by selecting a tax rate, its corresponding bill may be found by multiplying the rate by the expected quantity of production. Alternatively, by specifying a tax bill, a rate may be determined by simple division.

Tax bills can be an effective tool to achieve equity among taxpaying parties in a tax base. To achieve this equity, substances that are considered to be particularly difficult to clean up could carry a relatively high bill, while substances that are less costly to clean up could have relatively low bills. Rates consistent with these bills could then be found. In some cases, tax rate caps may be used. For example, a tax rate cap expressed as a percentage of a taxed substance's price may serve to limit the adverse economic consequences of the tax. If a rate cap is used, however, it is unlikely that, for particular substance, a tax set at the maximum level will generate revenue sufficient to meet the substance's tax bill.

Tax rates, on the other hand, can be an effective tool to generate incentives to change future use and handling of hazardous materials. Rates may be set, for example, to discourage the use of landfills. Bills consistent with these rates could then be calculated. Unfortunately, there is not necessarily a connection between rates that reflect a firm's likely responsibility for causing fund expenditures and rates that send effective signals to change behavior.

2.2 ALTERNATIVE TAX SYSTEMS

2.2.1 Feedstock Taxes

A feedstock tax is imposed at the beginning of the production process on the raw materials that are the basic building blocks of chemical products. The hazardous substances and wastes involved in the problem addressed by CERCLA are frequently byproducts of the production processes that use these raw materials. The present CERCLA tax is a feedstock tax. Modifications to the CERCLA tax could add or delete substances, change the definition of taxable activities, and as a result, change the number of taxable parties, adjust tax rates, and create or remove exemptions.

Taxable Substances. The present CERCLA tax is a feedstock tax levied on 11 primary petrochemicals, 31 inorganic raw materials, imported petroleum products, and crude oil produced domestically or imported. In 1980, these petrochemicals and inorganic raw materials were chosen because they met two or more of the following criteria: (a) the substance is hazardous in a number of forms (i.e., as raw materials, intermediates, or final products); (b) the substance is hazardous when released; (c) hazardous substances are generated in the production of any form of the substance; (d) the substance is capable of increasing the hazard potential of other materials; and (e) the substance is produced nationally in significant amounts. Crude oil was taxed because of the high incidence of waste oils and petroleum refining wastes found in releases covered by CERCLA.[3/]

3/ Senate Comm. on Environment and Public Works, "Report to Accompany S.1480, Environmental Emergency Response Act, S.REP.NO. 96-848," 96th Cong., 2d Sess. p. 20 (1980).

Any new variation of a feedstock tax could add or delete substances. These additions or deletions could be the result of applying the above criteria to a new data base or the development of new criteria. For example, the Hazard Ranking System (HRS) data base, which did not exist when CERCLA was enacted, is now available.[4/] This data base and other knowledge and experience gained since CERCLA was enacted in 1980 can provide useful information and insights for adjusting the tax base.

Taxable Activities. The current CERCLA tax is levied on chemicals when they are sold, used, or imported; on crude oil when it is received at the refinery; and on petroleum products when imported.[5/] The CERCLA tax is filed and paid using IRS Form 6627 in conjunction with the standard Quarterly Federal Excise tax return IRS Form 720. The records maintained by taxpayers are the standard receipts, invoices, etc. that accompany these business transactions. With respect to opportunities for tax avoidance, the CERCLA tax system eliminates any advantages that might otherwise have been realized by vertically integrated companies by taxing the use as well as the sale of taxable substances. CERCLA section 211 states "if any person manufactures, produces, or imports a taxable chemical and uses such chemicals, then such person shall be liable for tax under section 211 in the same manner as if such chemical were sold by such person."

Modifications to the current CERCLA tax could change or clarify the definition of taxable activities. The Internal Revenue Service, for example, initially found provisions of the existing law difficult to interpret. This was especially the case for substances that are added to gasoline (e.g., benzene, toluene, and xylene). This difficulty in interpretation resulted in a legislative change, the Tax Reform Act of 1984, that removed the ambiguities that existed over whether adding substances to gasoline is a taxable act.

Taxable Parties. The current CERCLA feedstock tax is paid by approximately 496 major producers, importers, and exporters of taxable substances.[6/] The tax is paid by companies involved primarily in the organic and inorganic chemicals, petroleum refining, and heavy metals industries. Almost all hazardous substances are either products of these industries or are generated by using their products. These industries

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4/ The HRS was formulated in response to CERCLA section 105(8), which requires the development of a system to set priorities among sites requiring cleanup. State and regional personnel have evaluated about 1,732 sites using the HRS and information about these sites is contained in the HRS data base.

5/ CERCLA, section 211.

6/ U.S. Congress, Joint Committee on Taxation, "Background and Issues Relating to H.R. 5640, the Superfund Expansion and Protection Act of 1984," JCS-27-84, July 23, 1984.

produced approximately 93 percent of all the hazardous wastes generated in 1981. The chemical and petroleum industries produced 71 percent of the hazardous wastes generated in 1981.[7/]

Modifications to the current CERCLA tax that change the number of substances taxed or the definition of the taxable act could change the number of taxable parties.

Tax Rates. When CERCLA was enacted, there was insufficient information about the composition of hazardous substances at sites where CERCLA responses would occur. Therefore, tax rates under the Act were based on estimates of the chemical composition of wastes being generated by broad industry sectors as a surrogate for the composition of wastes at sites. A determination was made of the percentage share of total revenues to be raised from producers of organic chemicals (65 percent), inorganic raw materials (20 percent), and crude oil (15 percent), with each group's share reflecting the estimated volume of its product in total hazardous waste generation. Next, rates were calculated for each of the three groups of producers that would raise that group's portion of total revenues. These rates were then used to set the tax rate for feedstocks within each group. The rate for an individual substance was adjusted if it exceeded rate limits designed to prevent undesirable economic effects.[8/]

The current feedstock tax may inequitably distribute the tax burden because higher rates are assigned to feedstocks that are used by generators of large amounts of hazardous wastes, regardless of whether the substances are found at sites requiring CERCLA response. A modification to the current feedstock tax could establish rates based on a more direct relationship between the tax burden borne by a particular feedstock and the likelihood that it is used to produce the substances found at such sites.

Exemptions. The current CERCLA tax specifically exempts the following substances from taxation: methane and butane when used as fuel, taxable substances when used in the fertilizer industry, substances derived from coal, and sulfuric acid produced as a byproduct of pollution control equipment.[9/]

7/ WESTAT Research, Inc., "National Survey of Hazardous Waste Generators and Treatment, Storage, and Disposal Facilities Regulated under RCRA in 1981," prepared for the Office of Solid Waste, EPA, April 20, 1984.

8/ Senate Comm. on Environment and Public Works, "Report to Accompany S.1480, Environmental Emergency Response Act, S.REF.NO. 96-848, 96th Cong,. 2d Sess. p. 20 (1980).

9/ CERCLA does not specifically exempt benzene, toluene, and xylene when used as fuels. However, the statute may be interpreted to have intended to exempt these substances for the same reasons as it does methane and butane when used as fuels. This issue was resolved by the Tax_Reform_Act_of_1984 when benzene, toluene, and xylene were specifically exempted.

Other substances are exempted by omission from the specified tax base. Some examples are metals and non-metallic minerals whose production generates hazardous waste or from which hazardous substances are derived, such as lead, zinc, copper, selenium, asbestos, and manganese. Any new variation of a feedstock tax could eliminate exemptions on certain substances. Tax exemptions for copper, lead, zinc, coal-derived substances, and recycled metals are the subjects of studies authorized under sections 301(a)(1)(H) and 301(a)(1)(I) of CERCLA.

2.2.2 Waste-End Taxes

A waste-end tax is a tax levied late in the chain of production on hazardous substances when they are generated, transported, treated, or disposed. The most commonly considered waste-end tax designs are based on volumes of waste generated or, alternatively, volumes disposed. Taxes on volumes generated may be collected either from the generators or from treatment, storage, or disposal facilities, while disposal taxes are collected at the point of disposal.

Taxable Substances. Wastes are, in principle, selected for taxation because they contribute to the hazardous substance release problem. Most States with waste-end taxes use as a base the wastes defined by Federal statutes as hazardous and expand or modify the base depending on the types of wastes at sites in the State. The Resource Conservation and Recovery Act (RCRA), which regulates the handling of hazardous waste from the point of generation through disposal, defines wastes as hazardous by listing substances, listing industrial waste streams, or by virtue of specified characteristics.

Pursuant to section 3001 of RCRA, 40 CFR 261 lists approximately 450 substances designated as hazardous. RCRA waste streams are those industrial process streams that have been identified as containing specific hazardous constituents. EPA has identified approximately 16 hazardous waste streams from nonspecific sources (i.e., an industrial process that involves a certain operation, such as electroplating) and approximately 70 hazardous waste streams from specific sources (e.g., production of organic chemicals, pesticides, explosives, or petroleum refining). Characteristic wastes are those wastes that exhibit any one of four hazardous characteristics: ignitability, corrosivity, reactivity, or extraction procedure (EP) toxicity.[10/] Any waste that exhibits any of these characteristics is considered hazardous, whether or not it is a listed waste.

Taxable Activities. Waste-end tax systems may vary according to the delineation of taxable activities. Wastes may be generated, transported,

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10/ EPA has set up an extraction procedure (EP) test for toxicity. The level of toxicity is measured by the presence of specified toxic materials in concentrations greater than permitted. Specifications and permitted levels are defined in 40 CFR 261.24.

stored, treated, or disposed of permanently in a multitude of ways. There is a justification for imposing a tax at each step in the waste management process. For example, the generation of hazardous wastes may be taxed because all wastes pose a potential threat, regardless of how they are managed. The transportation of hazardous wastes may be taxed because of the potential for releases or spills during transfer or en route. Similarly, temporary storage poses some risk of release because storage facilities are often not designed for maximum security. Taxation of such facilities may remove the incentive to store wastes indefinitely to avoid a tax on final disposal. The treatment of hazardous wastes may be taxed because hazardous substances may be released into the environment during the treatment process. The disposal of hazardous wastes may be taxed because even after disposal, serious adverse environmental consequences may result from the release of hazardous substances from a disposal facility.

Taxable Parties. The issue of who pays the tax is linked to the definition of activities. Generators could pay the tax on the generation of wastes, regardless of the treatment, storage, or disposal method. Another alternative may place the tax on the party receiving the waste for treatment, storage, or disposal. For example, facility operators may pay a tax on all wastes received for disposal in a landfill or other disposal facility. This tax is often passed back to the generator in the form of higher disposal costs. Alternatively, generators may be taxed directly on the wastes they submit for disposal. A few waste-end tax schemes hold the generator responsible for taxes assessed at each step of the management process (e.g., storage, treatment, transportation, disposal), requiring the generator to track the wastes from generation to final disposal and determine the total tax liability on those wastes.

Tax Rates. Waste-end tax rates may be flat or graduated. A flat rate tax is the simplest to implement. It is generally applied to the volume or weight of wastes generated, transported, stored, treated, or disposed. The tax rate may vary for different activities (e.g., $2 per ton of wastes generated, $0.50 per 100 ton-miles transported, $10 per ton disposed) but is the same for all wastes involved in the taxable activity. The current CERCLA Post-Closure Liability Tax Fund tax of $2.13 per dry weight ton of waste received at a disposal facility is an example of a flat rate waste-end tax. A waste-end tax may also be imposed as a percentage surcharge on the price of waste disposal. In any case, the taxpayer may apply one rate to all wastes subject to the tax.

Graduated tax rates are more complex and may vary with a variety of factors. Among existing State waste-end taxes, rates have been graduated based on:

- The physical, chemical, or biological characteristics of the waste;
- The risk involved in the method by which the waste is managed (e.g., land disposal, treatment, incineration, deep-well injection);

- The quality of technology of the facility; and
- The environment in which the waste is managed (e.g., urban or rural, arid regions, over a major ground water aquifer).

Exemptions. In any waste-end tax system, exemptions can be made in order to make the tax system more equitable or easier to administer, or to encourage desirable waste management practices. Exemptions can apply to specific parties, specific substances, or specific activities. Parties exempted from taxation may include small generators and public entities such as publicly operated waste water treatment facilities. Certain substances may be excluded from taxation as well. Many States exempt all substances explicitly exempted under RCRA. Other examples are drilling muds, mining wastes, and wastes from certain production processes (e.g., mining, resource recovery, and energy production). Exemptions or special provisions may be made for specific activities or disposal methods; some examples are recycling, deep-well injection, or discharges from publicly owned treatment works.

2.2.3 Combination Taxes

A combination tax combines a feedstock tax with a waste-end tax to capture the strengths of each system. Specifically, a combination tax combines the superior ability of the waste-end tax to provide incentives for better waste management practices with the success of the feedstock tax as a reliable system for guaranteeing revenues.

Thus, a combination tax will tax two different types of activities. The type of activity taxed with the waste-end portion depends on the type of incentive that is intended. For example, if a primary goal of the tax system is to influence the method of waste disposal, the combination tax could have as one taxable activity the production of a feedstock and as its second taxable activity the disposal of waste. To create an incentive against land disposal, land disposal would bear a higher tax rate than would other disposal practices. On the other hand, if the goal is to influence the amount of hazardous substances produced, the generation of large volumes of substances would be taxed at a higher rate than low volumes as the second taxable activity.

A combination tax can be evaluated using the same criteria as feedstock taxes and waste-end taxes, as discussed above. There are, however, two additional issues that must be considered: synergistic effects and sequential taxation. First, in evaluating a combination tax, it is important to determine whether its effects are less than, greater than, or the same as the summed effects of the components (i.e., feedstock tax and waste-end tax). That is, there is a need to determine if there are synergistic effects. Second, the establishment of a combination tax might subject firms to sequential taxation by requiring affected firms to pay both a feedstock tax and a waste-end tax. These issues are discussed in Chapter 5.

2.2.4 Other Options

This section describes and briefly evaluates several other tax systems that have been proposed or are in place in various States: (1) a transfer tax, (2) sales-based taxes, (3) a value-added tax, and (4) a surcharge on insurance premiums.

Transfer Tax. A transfer tax is a tax on the transfer of designated hazardous substances. The transfer may be between transportation modes (e.g., from a railroad car to a truck), between facilities (e.g., from a manufacturing plant to a storage facility), or between a transportation mode and a facility (e.g., from a ship to a processing facility). A transfer tax taxes the inputs to, not the substances resulting from, a production process. Four States, New Jersey, New Hampshire, Florida, and Maine, have used transfer taxes to fund their hazardous waste programs. The tax is paid directly by owners of the hazardous substances or by owners or operators of transportation modes and facilities that handle taxed substances. When paid by the latter, some portion may be passed on to the users of the hazardous substances. The tax is usually levied on the basis of volume and paid when the substances are first received for storage, refinement, or domestic or foreign transport.

Two disadvantages of a transfer tax are administrative complexity and long start-up periods for tax collection. The administrative difficulties include identifying and tracking the number of transfers, the extensive recordkeeping required to avoid double taxation, and the difficulty of monitoring compliance. Delays in the start-up periods for tax collection result from the difficulty in identifying the taxpayers, which is a problem for most tax systems in their initial years. Largely for these reasons, a transfer tax has not been used for funding CERCLA.

Sales-Based Tax Systems. There are two main types of sales-based tax systems: a tax levied on the revenues from the sale of designated products and a tax levied on the sales revenues of firms in designated industries. The former calls for either a flat rate or ad valorem tax on the sales value of final products of designated substances. The latter tax, generally referred to as a gross receipts tax, would be levied either on "gross receipts" of the firms in industries that contribute to the hazardous substances problem, or alternatively, on all firms above a certain size.

Among the tax options, a flat rate or ad valorem tax on the final products of hazardous substances would be the most complicated to administer because of the large number of products and sales points (every time the product passed a point in the production process, a tax would be due; e.g., from primary manufacturer to transporter to specialty manufacturer to transporter to wholesaler and so on), the problems of distinguishing between taxable and non-taxable items, and the need to determine which products are made from hazardous substances. As with a transfer tax, the administrative complexities would delay implementation and the subsequent collection of tax revenues. One inherent problem with such a tax is that it assumes implicitly that higher-valued products are more hazardous and does not distinguish between products composed of different percentages of hazardous substances.

A gross receipts tax does not present the same administrative complexity as a tax on the sales of designated hazardous substances. Moreover, this type of tax provides a stable tax base and assures a predictable flow of funds. It is difficult to determine the equity of this or any other tax system. A gross receipts tax, broadly construed, would tax the gross receipts of every business (corporate and non-corporate). This inequity is mitigated somewhat by the low tax rates that could result from such a broad base of taxpayers. Therefore, such a tax is not likely to create significant adverse economic effects. Also, a gross receipts tax would be unlikely to generate strong signals to change hazardous waste management practices.

Value-Added Tax. A value-added tax is a tax paid on gross receipts less purchased materials of all domestic producers of intermediate and final products involving hazardous substances. Importers would pay a percentage of the declared commercial value of these products. There are three major drawbacks to a value-added tax relating to both administration and equity. From an administrative viewpoint, a value-added tax would be extremely complex. The large number of products and sales points would present problems identical to those discussed under the sales-based tax systems. A second weakness is that the tax base has no demonstrated relationship to the problems addressed by Superfund in that the tax is levied on the amount of labor, capital, and other self-supplied inputs rather than the sale, use, or consequences of using hazardous substances. Finally, a value-added tax inequitably taxes vertically integrated companies, which add more value than non-integrated companies, but do not necessarily contribute more to the problems addressed by Superfund.

Surcharge on Insurance Premiums. The last alternative examined is a surcharge on the insurance premiums paid by generators and transporters of hazardous substances and by generators, transporters, treaters, storers, and disposers of hazardous wastes. Advocates of this mechanism reason that because insurance premiums are based on the degree of risk or hazard, a surcharge on the premium would result in a funding scheme based on the degree of risk or hazard. While logical on the surface, this alternative has its shortcomings. From an equity point of view, the level of tax paid would depend on whether a firm carried insurance and on the amount and type carried, rather than its degree of contribution to the hazardous substances problem. From an administrative standpoint, it would be difficult for taxpayers to apportion premium payments to hazardous substances in cases where the firms carry all-peril insurance. Finally, a surcharge on insurance premiums may not provide adequate revenues because many companies self-insure and many more would be encouraged to do so if such a system were imposed.

Although these four alternatives have some strengths, and variations of them are effectively used in many States, their advantages appear to be insufficient to overcome their weaknesses as options for funding a Federal response program of the scale anticipated for a reauthorized CERCLA. Consequently, these alternatives are not considered further in this report.

3. CRITERIA FOR EVALUATING ALTERNATIVE TAX OPTIONS

Section 301(a)(1)(G) of CERCLA defines several criteria to be used in the evaluation of alternative tax systems designed to raise revenues for the Hazardous Substance Response Trust Fund. These criteria are used to highlight the advantages and disadvantages of the five tax options considered in Chapters 4 and 5 of this report. This chapter briefly discusses each criterion in the following order: economic impacts, equity, economic incentives, revenue generation, administrative feasibility, and programmatic effects. The final section presents a summary of the key issues discussed in this chapter.

3.1 ECONOMIC IMPACTS

The economic impacts of a CERCLA tax may be significant. To evaluate these impacts, a distinction is made between microeconomic and macroeconomic effects. Each type of effect is discussed in turn.

3.1.1 Microeconomic Impacts

Because it will effectively change the cost of doing business for several types of firms, a CERCLA tax has the potential to cause changes in the prices of goods and services as well as the amounts of goods and services produced and sold. The resulting effects on business revenues and household incomes may cause some entities to fare better and others to be worse off. Analysis of these microeconomic effects is essential to understanding the equity, economic incentives, and revenue generation aspects of alternative CERCLA tax systems.

A quantitative and complete analysis of these effects would require sophisticated econometric tools and highly disaggregated data. The data and analytic tools necessary for a detailed microeconomic impact analysis were generally not available for this study. There are, however, three exceptions. The analyses of the two modified feedstock taxes presented in Sections 5.1.1 and 5.2.1 use an econometric model to project changes in the prices and quantities of certain taxed feedstocks. In Section 5.5.1, a simulation model is used to evaluate the costs of different hazardous waste management options and estimate the effects of a waste-end tax on selected industries. In all cases, however, effects on firms and consumers are not estimated. The level of detail of this analysis does not imply that the latter issues are unimportant or that the effects are expected to be small; rather, it reflects the current inability to perform these analyses given data limitations.

3.1.2 Macroeconomic Impacts

Depending on the amount of revenue raised by a CERCLA tax, it is possible that significant effects could be felt in the macroeconomy. These effects include changes in output, employment, and price levels.

The most precise method of estimating macroeconomic effects involves the use of a large computerized simulation model of the U.S. economy. For the purposes of this analysis, all of the taxes considered here are designed to raise $1 billion annually. This amount, while large, is small when compared with the projected 1984 Gross National Product of approximately $3.6 trillion (0.028 percent). Thus, it is unlikely that such a tax would have a significant measurable effect when simulated in a macroeconomic model of the U.S. economy. Further, if it is assumed that the tax revenues would have been spent by the entities that paid the tax, the tax would not produce a change in total spending in the economy, although some change in investment patterns would probably be observed. Most important, there is no a priori reason to expect that the different taxes would have different macroeconomic effects. Hence, the consequences of particular CERCLA taxes considered here are very likely to be of little macroeconomic significance and are unlikely to differ among tax options.

3.2 EQUITY

A key criterion in evaluating alternative CERCLA tax systems involves an assessment of their relative equity or fairness. For the purposes of this analysis, equity is defined as the extent to which the tax burden falls on the parties and substances that create the problems addressed by CERCLA. Because the distribution of the tax burden will not be the same for each CERCLA tax discussed in this report, equity concerns are an important consideration. Section 3.2.1 considers three generic equity issues: the link between current taxpayers and responsibility for the problems that CERCLA was intended to remedy, a conceptual definition of equity, and the relationship between a CERCLA tax and the CERCLA cost recovery mechanism. Section 3.2.2 discusses what is meant by the problems addressed by CERCLA. Section 3.2.3 examines the determination of the parties responsible for Fund spending, Section 3.2.4 examines the definition of substances responsible for CERCLA spending. Finally, Section 3.2.5 presents specific criteria for evaluating equity considerations under each alternative CERCLA tax option.

3.2.1 Generic Issues

Past Problems and Current Taxpayers. An inherent feature of any tax used to finance the Fund is that revenues are collected from currently operating firms, despite the fact that the Superfund program is aimed primarily at cleaning up sites created by firms operating in the past. To the extent that responsible firms can be identified, they may be persuaded to undertake site cleanup. They may also be subject to legal action under CERCLA's liability provisions so that the costs of cleanup can be recovered.[1/] It is not possible, however, to raise all of the needed revenues from cost recovery alone. Indeed, the inability to identify responsible parties was one of the primary reasons that Congress passed CERCLA. Consequently, some method of raising revenue from currently operating firms is necessary. Further, any attempt to link a firm's tax liability to its previous behavior is likely to

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1/ CERCLA, section 107.

be problematic for two reasons. First, information about past activities needed for tax design (or, for that matter, for cost recovery efforts) is often impossible to obtain. Second, the group of firms potentially responsible for the problem is not necessarily the same as the group of currently operating firms. Each of these two issues is discussed in turn.

First, information about the past activities of responsible parties that is sufficient to operate a tax system is generally not available. Even though legal action has been taken against some firms responsible for CERCLA cleanups, it is virtually impossible to assign responsibility for all Fund activities to specific firms. Further, even if such firms could be identified, a basis for assigning tax liability is similarly unavailable. Experience has shown that many of these firms have not kept records about their waste management activities.. In addition, the problem of gathering such information is exacerbated by the large number of firms involved. In 1981 alone, over 14,000 facilities generated significant quantities of hazardous wastes and well over 4,000 were engaged in the treatment, storage or disposal of wastes.[2/] To ascertain both which of the firms operating these facilities are responsible for past waste generation and the degree to which each should be taxed, is not feasible with the information currently available.

The second difficulty in designing a tax based on a firm's past practices concerns the turnover among potentially responsible firms. If responsiblity refers to firms that generated, transported, disposed, or otherwise handled hazardous substances in the past, there can be little doubt that several thousand firms are potentially responsible. While the largest of the chemical firms have been in business for a substantial length of time, many of the other firms that are somehow involved with hazardous substances are likely to have begun operations recently or have ceased operation at some time after contributing to the problems addressed by CERCLA. Consequently, there cannot be a direct match between all of today's firms and the problems created in the past.

Congress recognized the nature of this problem when it first adopted CERCLA in 1980. Rather than focus on the particular responsibility of individual firms, the legislative debate indicates that Congress determined that the CERCLA tax was generally equitable because it applied to the chemical industry as a whole. The rationale for this approach seems to be that, at a broad industrial level, responsibility for past problems can be assigned and that it is more equitable for the tax burden to fall on these industries and their customers than on the public at large. This implies a policy judgment to tax currently operating firms to pay for the remediation of problems created in the past by the industry of which they are a part. Congress has treated other problems in a similar fashion. For example, under the Black Lung Benefits Revenue Act (Public Law 95-239), all current coal producers are taxed in order to pay benefits to those miners who had contracted black lung disease prior to 1970. Similarly, the Surface Mining Control and Reclamation Act

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2/ Westat, 1984, op. cit.

(Public Law 95-87) taxes today's mining firms in order to clean up abandoned mines. In Section 3.2.5, specific criteria are suggested that can be used to measure the equity of the match between current taxpayers and past problems.

Definition of Equity. In section 301(a)(1)(G) of CERCLA, Congress directed that alternative CERCLA tax systems be evaluated according to the degree to which they take into account:

- The likelihood of a release of a hazardous substance;
- The degree of hazard and risk of harm to public health, welfare, and the environment resulting from any such release; and
- The extent to which the tax burden falls on the substances and parties that create the problems addressed by CERCLA.

The first two criteria relate to the notion of social cost, which represents the effect on society of all environmental and health risks and the dangers associated with hazardous substance sites. The third criterion, however, reflects the actual cost of cleanup activities. The difference between the two types of cost arises because these risks and dangers have a cost that is not reflected in the engineering and construction costs of cleanup. In general, to the extent that a tax option reflects these three criteria, both incentive and equity objectives may be satisfied. Incentive issues are fully discussed in Section 3.3. For the purposes of this discussion, we focus on the equity implications of this statutory language.

The notion of incorporating social costs into a CERCLA tax applies primarily to firms' on-going activities. If a firm is engaged in activities which threaten the environment, it seems equitable that it ought to pay a higher tax than a firm operating in a more environmentally safe manner. A tax reflecting social costs, however, will not necessarily put an appropriate burden on firms whose prior behavior has produced hazardous waste sites. Because the vast majority of the sites to be cleaned up over the next several years were created at some point in the past, the third criteria provides an important link to such firms by calling for the tax burden to fall on those responsible for the problems addressed by CERCLA, regardless of when those problems were created. In short, equity requires both that a firm's tax burden reflect the riskiness of its activities and that firms responsible for the sites to be cleaned up by the Fund pay for the costs of doing so.

Equity of Enforcement Activities. A third generic equity issue arises because, in addition to creating a tax system, CERCLA authorizes EPA to take legal action against responsible parties and make attempts to persuade responsible parties to enter into voluntary clean-up agreements.[3/] When a waste site is located, EPA attempts to identify those firms (which can be

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3/ CERCLA, section 107.

found) that may have generated, disposed, or managed the wastes present at the site. Because of the nature of all of the tax options under consideration in this report, it is likely that some taxpayers may also be subject to a recovery or enforcement action. At first glance, such firms may seem to be inequitably taxed twice under this policy. This may not, however, be a significant equity problem because to the extent that successful enforcement and recoveries provide money for cleanup actions, less revenue will be needed for the cleanup program, and tax rates can be set by Congress at a lower level. The combined effect of the tax system and the enforcement program is to increase the burden on firms subject to successful recovery efforts (those firms that can be demonstrably linked to a specific case of Fund spending), while reducing the cost to firms that are not subjected to a recovery action. Thus, the enforcement provisions of CERCLA enhance the equity of its tax system.

3.2.2 Types of Problems Addressed by CERCLA

To match the firms paying a CERCLA tax to their contribution to the problem, it is necessary to define the problems addressed by CERCLA. Generally, CERCLA authorizes payments for the cleanup of hazardous substances, regardless of how they enter the environment. The substances addressed by CERCLA fall into two categories:

- Substances that have already been released into the environment and that are currently awaiting detection and/or cleanup; and

- Substances that have not yet entered the environment but that will be released at some point in the future.

The distinction between these two types of substances is important because of key equity implications. The most expensive CERCLA activities over the next several years will involve the cleanup of hazardous substances that were both manufactured and disposed of at some point in the past. Thus, the cleanup of existing sites inescapably involves a retrospective solution with current taxpayers paying to solve a problem created in previous years. As such, the tax can have no effect on the behavior that contributed to the problem and, as noted in Section 3.2.1, there is an inevitable mismatch between some of the beneficiaries of cheap and easy waste disposal (i.e., parties responsible for creating existing sites) and some of those parties bearing the current tax. A firm's tax burden will reflect the extent to which it currently engages in the taxed activity and may or may not be directly related to its contribution to existing hazardous substance releases requiring a Fund-financed response.

For substances yet to enter the environment, the equity issues are of a different nature. To the extent that the Fund cleans up these substances, there can be a much better match between the taxpayers and those responsible for Fund spending. First, the identification of responsible parties should prove more successful than in the past because of Federal and State regulatory programs such as RCRA. Second, an individual firm's tax burden can reflect its behavior. If the CERCLA tax is levied on activities likely to provoke

Fund spending, a firm producing hazardous substances or acting in a way that threatens the environment will face a higher tax bill than it would otherwise.

The equity of a particular CERCLA tax thus depends on how well it reaches the parties responsible for CERCLA spending. Thus, careful attention must be paid to the tradeoffs involved in designing a tax so that it will reach those responsible for past problems while simultaneously raising money in an equitable fashion to cover future releases of substances that have not been placed in the ground yet. In particular, it must be noted that for the next several years, the CERCLA program will deal almost exclusively with sites that currently exist. To some extent, a combination tax can be used to mediate this tradeoff by combining a tax that reaches those responsible for past problems with a tax levied on current activities that threaten the environment. Section 3.2.5 presents specific criteria for use in the evaluation of this aspect of the alternative CERCLA tax options.

3.2.3 Parties Responsible for CERCLA Spending

To determine which parties are responsible for CERCLA spending, and thus appropriate taxpayers, a specific definition of the party responsible for expenditures from the Fund is necessary. In this context, the term responsible party does not imply liability under CERCLA's enforcement activities; rather, it refers to the equity of choosing a particular set of firms as CERCLA taxpayers. This definition can be approached from several points of view, including both economic and legal theories. From an economic perspective, the ultimate effects of a firm's profits and losses are not felt by the firm itself; instead, they are passed on to the individuals associated with the firm including its consumers, stockholders, and employees. From this perspective, the distribution, or incidence, of either a tax on the firm or the benefits of cheap waste disposal can be analyzed in terms of the effects felt by the individuals associated with the firm. Legal theory, on the other hand, suggests that a firm is a distinct entity that can be held responsible for its activities. Thus, benefits and liabilities are attributed directly to the firm, regardless of the mix of individuals associated with it. Each perspective is discussed in more detail below.

From the economic perspective, taxes may ultimately be paid by several persons, including those who are not statutorily liable for the tax payment. The economic incidence of a tax is determined by which of three general methods a taxed firm uses to raise the money to pay its tax liabilities:

- The firm may increase the prices of its products beyond what it otherwise would have charged and thus pass part of the tax to its consumers. If the consumer is a firm, it too may shift the burden through the same mechanism.

- The firm may make lower dividend payments to its stockholders than it otherwise would have or it may pay the tax out of retained earnings. In either case, the firm's owners (i.e., its stockholders) bear part of the tax burden.

- The firm may pay lower salaries to its employees (including its managers) than it otherwise would have. It may also hire fewer workers. The firm thus shifts the tax burden to its employees and potential employees in the form of lower incomes.

Economic incidence, therefore, reflects the degree to which all persons are ultimately affected by a tax. This concept does not treat the firm as a single entity; instead, the firm is disaggregated into the individuals connected with its economic activity.

The legal definition of a responsible party manifests itself in tort liability, tax law, and corporate law. The focus of equity in this instance is the business as a responsible entity rather than the individuals who are associated with it. These legal precedents suggest that equity may be served by treating firms in this fashion. The law has traditionally distinguished between firms as unique entities and the individuals associated with them. Under tax law, for example, any effort to assess a corporation's responsibility to pay a tax does not necessarily extend to its consumers, stockholders, or employees. Only if criminal activities are involved does the search for responsible parties extend to particular individuals.

The key difference between the legal and economic perspectives on the equity of tax burdens, therefore, is that the former leads to the conclusion that if a firm undertook a particular activity (e.g., irresponsible waste disposal), it ought to be liable for payment regardless of when the action was committed. In contrast, the economic perspective suggests that a firm is a continually changing collection of individuals, many of whom may not be parties to the consequences of the firm's past actions and who should not necessarily be burdened economically for the actions of their predecessors.

The difference between the legal and economic definitions of responsible parties is important primarily because of the two types of problems addressed by CERCLA (see Section 3.2.2). For existing releases (i.e., those that were created by firms at some point in the past) under the economic perspective, it would be very difficult to match the economic incidence of a CERCLA tax to the incidence of benefits resulting from waste disposal activities because the stockholders, employees, and consumers of firms engaging in such activities are likely to have changed over time. Further, the market conditions that determine how profits and costs are shared among stockholders, consumers, and employees may also have changed. From a legal perspective, however, it doesn't matter that the individuals associated with firms have changed. To the extent that firms that have contributed to existing releases are still in operation, it is appropriate that they bear the burden of cleanup.

The issue is less important when considering the cleanup of releases that are not causing environmental problems at present. This is because the legal and economic perspectives do not diverge on this issue. To the extent that a CERCLA tax or cost recovery mechanism raises revenues from firms that are likely to contribute to future Fund spending, there is a clear connection, from both the economic and legal perspectives, between the taxpayers and their responsibility.

3.2.4 Substances Responsible for CERCLA Spending

An analysis of the particular substances associated with Fund cleanup activities is important for several reasons. First, section 301(a)(1)(G) requires an analysis of the extent to which the tax burden falls on the substances that have created the problems addressed by CERCLA. Further, because a direct link cannot always be established between current taxpayers and responsibility for Fund spending, it may prove useful to analyze hazardous substances rather than the parties responsible for their management. In particular, at sites where identification of responsible parties may be impossible, an analysis of substances may provide the only information available. Finally, because a firm's tax bill and the threat that the firm's releases pose to the environment will reflect the volume and mix of substances it handles, an understanding of the link between substances and taxpayers is important. Note that in many cases, an analysis of substances is simply a proxy for the analysis of the responsibility of particular firms.

3.2.5 Criteria for Evaluation

As noted in Section 3.2.2, the equity of a particular CERCLA tax option depends on the degree to which it reaches both those responsible for existing Superfund sites and those likely to create new sites. The equity evaluation of alternative CERCLA tax options therefore consists of two parts. The first is an evaluation of "retrospective" equity. As defined below, the retrospective equity of a particular tax depends on the degree to which it falls on the industries and substances responsible for existing Superfund sites (i.e., sites where the substances have already entered the environment). The second equity consideration involves "prospective" equity. Prospective equity means the degree to which the tax burden felt by any individual firm reflects the likelihood that its activities will create a site requiring Fund spending in the future.

Retrospective Equity. In computing tax liability, responsibility for existing hazardous substance sites often cannot be assigned to particular firms. Thus, the equity of alternative CERCLA tax options must be evaluated in some other way. This analysis focuses on the degree to which different tax options impose a burden on the broad industrial categories responsible for creating existing sites. Evidence available for 1981 indicates that 93 percent of all hazardous wastes were generated by the chemical, petroleum refining and metal processing industries.[4/] Consequently, one aspect of retrospective equity is the degree to which a tax falls primarily on the industries listed above.

4/ Westat, 1984, op. cit., p. 140. These industries are: Chemicals and Allied Products (SIC 28), Petroleum Refining (SIC 29), Primary Metals (SIC 33), Fabricated Metal Products (SIC 34), Machinery except Electrical (SIC 35), Electrical and Electronic Machinery (SIC 36), and Transportation Equipment (SIC 37). The Westat Survey only covered RCRA regulated waste and thus omits non-waste hazardous substances. Producers of such substances are, however, likely to also be in one of these seven SICs.

A second aspect of retrospective equity focuses on the substances that are involved in Fund spending. CERCLA section 301(a)(1)(G) indicates that the tax on particular substances should represent the contribution of each to the problems at sites requiring Fund expenditures. As noted previously, the analysis of particular substances can serve as a proxy for analyzing the tax burden on particular firms. To that end, a CERCLA tax will be judged retrospectively equitable if it is levied in appropriate proportions on the substances that have caused Fund spending.

There are several ways of categorizing the substances responsible for Superfund spending. To begin with, a choice must be made between basing the desired set of substances on the substances actually found at Superfund sites or on the types of hazardous substances that are currently being generated. In particular, it is quite difficult to determine the appropriate set of substances so that both a waste-end tax and a feedstock tax can compared directly. This is because during the production process, many of the chemical attributes of substances are changed. Furthermore, currently available data about hazardous waste streams are not precise enough to allow the constituent chemicals used in these substances' manufacture to be traced.

For the purposes of this analysis, data are available to classify hazardous substances in two ways. First, substances can be described in terms of broad categories. Based on an analysis of existing Superfund sites described in Section 4.1.1, the chemical constituents of the substances found at these sites are distributed, on the basis of how frequently they have been found at Superfund sites, in the following manner: 38 percent organic chemicals, 59 percent inorganic chemicals, and 3 percent crude oil.[5/] This compares to hazardous wastes generated, which on a weight basis are 31 percent organic; 69 percent inorganic and less than one percent crude oil.[6/] Thus, the distribution of the tax burden among broad chemical categories under each tax will be compared to these data.[7/] To the extent that the distribution

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5/ Absent additional data on volume, concentration, and difficulty of cleanup, the frequency with which substances have been found at Superfund sites does not necessarily reflect these substances' responsibility for Fund spending. However, because frequency data are all that is available for a large number of sites, we have chosen to use them as a rough proxy for "contribution."

6/ ICF Incorporated analysis of data gathered by Westat, Inc. (see Westat, op. cit.).

7/ These data may be somewhat misleading because the figures for crude oil may be underrepresented. In general, the HRS data base does not include information about the presence of crude oil at hazardous waste sites; thus, its contribution to the problem may be somewhat understated. Similarly, crude oil is rarely generated as a hazardous waste and hence does not constitute a major fraction of estimated waste volumes. Finally, because cost recovery efforts are not permitted against generators or disposers of crude oil, it may be equitable to tax crude oil at a higher rate than suggested by the data.

is similar, the tax will be judged to be retrospectively equitable. Second, information on the substances found at Superfund sites was disaggregated to produce a list of the chemical feedstocks that were used in their production. As described in Section 4.1.2, a list of responsible feedstocks was created. Because it has not been possible to trace the mix of hazardous substances generated on a nationwide basis back to their constituent feedstocks and because a waste-end tax is not intended to place a tax burden on feedstocks, the list of responsible feedstocks is used only to evaluate alternative feedstock taxes and is not used to analyze the waste-end tax.

The criteria used to measure retrospective equity are only a surrogate for assessing responsibility for existing releases. The broad categories of industries and substances do not allow refined estimates to be made of the appropriateness of the tax burden felt by individual firms. They do, however, permit an evaluation of the "rough justice" of particular taxes. The absence of information detailed enough to create a perfect match between taxpayers and responsible parties also does not mean that all taxes are equally equitable from a retrospective perspective. The criteria offered above are meant to serve as a proxy for a more accurate, but unavailable, measurement of the degree to which the CERCLA tax burden is felt by the parties responsible for Fund spending at existing sites.

Prospective Equity: The match between the burden of a CERCLA tax and a particular firm's responsibility for releases that have not yet occurred is likely to be much better than the connection between a firm's tax liability and its responsibility for existing releases. This is true for at least two reasons. First, information about a firm's hazardous substance production and management activities is more likely to be available today than in the past as the result of State and Federal regulatory programs. Second, firms' decisions about their future hazardous substance activities, unlike their previous behavior, can still be influenced. Thus, if a firm chooses to engage in a more environmentally risky practice, the opportunity exists to adjust the tax burden accordingly. The prospective equity of alternative CERCLA tax systems will thus be judged in light of how well each creates a tax liability for particular firms that reflects the likelihood of causing future expenditures from the Superfund.

In particular, two types of discrepancies between tax liability and responsibility for Fund spending will be assessed. The first is overinclusiveness. If a tax is overly inclusive, it will be borne (1) by those who are not likely to cause future Fund spending or (2) at a level higher than is commensurate with the risk of provoking such spending. For example, if a tax were placed on a non-hazardous substance that had no connection to the types of sites cleaned up by the Superfund program, the tax would be considered to be overly inclusive. Similarly, two substances might bear an equal tax burden while not constituting an equal threat to the environment. Assuming that the tax burden reflects the threat posed by the more hazardous substance, the less hazardous substance is being overtaxed.

The second potential discrepancy arises if a CERCLA tax excludes more hazardous substances or activities than is warranted. For example, if a

hazardous substance that is likely to provoke Fund spending goes untaxed, the tax base may be inequitably narrow. Likewise, if a the tax on a specific substance or activity is lower than the cost to the Superfund of cleaning it up when released, then the tax may be inequitably low. In short, prospective equity calls for a clear match between the likelihood of causing Fund spending and the tax imposed on specific activities and substances. This match may be hampered if the tax is either too broad (thus creating a tax burden higher than it ought to be) or too narrow (thus producing a tax burden that is too low). Chapter 5 evaluates each alternative CERCLA tax option accordingly.

3.3 ECONOMIC INCENTIVES

Any CERCLA tax system may, if rates are sufficiently high, create incentives for changes in the behavior of firms by modifying either the relative costs of inputs to the production process or the cost of hazardous substance disposal, or both. The strength of the incentives created by the tax system will be determined by the options available to firms (i.e., including the taxed activity and its alternatives), the relative cost of the options, and the tax rates. The ability of a tax system to create economic incentives or disincentives for performing certain activities means that a tax system may be used as a policy tool to induce desirable changes in industry behavior. One use of a tax, discussed in Section 3.3.1, is to create incentives that cause firms to act in a manner that minimizes the burden of hazardous substances on society. A tax system may also unintentionally create incentives for undesirable behavior, as discussed in Section 3.3.2.

3.3.1 Incentives for Environmental Protection

A CERCLA tax designed to produce incentives for firms to act in an environmentally safe manner may have several effects. For example, by shifting the relative production costs in an industry, a CERCLA tax system may induce changes: in the level and mix of final products sold; in the production processes used; in the amount and types of wastes produced; and, in the waste treatment and disposal methods used. If CERCLA tax rates are set with the intent of creating incentives for desirable behavior, these changes may take several forms as discussed below.

First, there may be a shift to better treatment and disposal practices. A tax system can induce behavioral changes by altering the relative cost of waste management practices such as incineration, recycling, treatment, or land disposal. It should be recognized that the strength of the incentive may change over time as technology improvements change the costs of alternate management practices. Of note is the likelihood that the tax itself will spur research and development into new technologies.

Second, there may be a reduction in the total quantity of hazardous substances generated if industry reduces its production or switches to processes that generate fewer such substances. In other words, in order to minimize its tax liability, a firm may modify its production process to limit its use of taxed feedstocks and/or its generation of taxed substances. A firm may also cut its level of production to achieve the same end.

Third, the level of hazard of generated substances may be reduced because of changes in the mix of hazardous substances generated as intermediate products, as final products, and as wastes. For example, a tax rate that is graduated by degree of hazard may lead to a reduction in the overall hazard of the substances generated as products and wastes. On the other hand, if some hazardous substances are exempted from the tax, firms may shift to new production processes that involve these untaxed hazardous substances.

The degree to which tax incentives can induce the types of changes described above depends on a complex interaction between the tax, market conditions, and production processes. While detailed information on this interaction is not available for all of the tax systems under consideration, each CERCLA tax option is evaluated to determine its incentives for:

- A shift to better treatment and disposal practices;
- A reduction in the volume of hazardous substances produced; and
- A reduction in the hazardousness of substances produced.

3.3.2 Incentives for Undesirable Behavior

Because a CERCLA tax will impose a burden on those who pay the tax, it may create incentives for evasion. For example, a firm may seek to reduce its tax liability by failing to report its activities. Similarly, if a tax system were to create incentives for firms to dispose of wastes in an unsafe manner (for example, by unauthorized discharges to sewers or by blending hazardous wastes with non-hazardous substances or wastes), it might lead to a reduction in the quality of waste management and cause an increased threat to public health and the environment. The incentive for evasion is likely to vary with the type of tax and tax rates imposed. Each potential CERCLA tax option is analyzed to determine the degree to which it creates incentives to evade the tax.

3.4 REVENUE GENERATION

Effectiveness in raising revenues is essential to the most fundamental purpose of the Superfund program: to enable the States and the Federal Government to respond to threats to the public health, welfare, or the environment from the release of hazardous substances when private parties fail to respond. In evaluating a CERCLA tax option, two aspects of revenue generation may be considered: the ability of the tax system to generate adequate revenues and the predictability of those revenues over time. If a tax does not generate adequate revenues to fund the Superfund program, then States and the Federal Government may be forced to seek alternate revenue sources or limit their response to releases of hazardous substances. If it is difficult to predict accurately revenues over time, then efficient program operation may be hindered.

3.4.1 Ability to Generate Revenue

The level of revenue raised by a CERCLA tax option depends on the quantity of the taxable substance (i.e., the tax base), the rate at which the substances are taxed, and the interaction between the tax base and the tax rate over time. Once a tax base has been defined and a revenue target set, appropriate tax rates can be calculated. Careful attention must be paid to the interaction between the tax rate and the tax base. As taxes are imposed, the size of the tax base may shrink somewhat as firms attempt to minimize their tax liability. This behavioral response must be reflected in setting the tax rates; otherwise, revenue shortfalls may occur. Similarly, if inflation erodes the value of the revenues generated from a tax imposed on a stable tax base, the rate would have to be increased over time to maintain the real purchasing power of the Fund. Each CERCLA tax option is evaluated to determine its revenue generating capability.

3.4.2 Predictability of Revenue-Generating Capability

The predictability of revenues over time is also a key component of a tax system. To some degree, the use of a trust fund serves to mitigate the effect of fluctuations in revenues. If revenues cannot be reliably predicted, however, effective program planning may be difficult. Given a specific tax rate structure, the predictability of revenues will depend on how well the size of the tax base can be estimated. Changes in the size of the tax base may be motivated by the tax itself or by conditions independent of the tax (e.g., economic cycles, changes in the demand for certain products, and changes in industry structure, processes, and techniques). The variability of the tax base resulting from these factors is an important aspect of the predictability of the tax system's revenue-generating capability. Each CERCLA tax option is assessed in terms of the predictability of the revenues it would generate.

3.5 ADMINISTRATIVE FEASIBILITY

3.5.1 Generic Issues

Each of the alternative CERCLA taxes evaluated in this study will require a system of assessment and collection (i.e., recordkeeping, reporting, payment, and auditing). If it is not possible to establish such a system, the particular tax is not feasible. If, on the other hand, a tax is feasible to administer, then its desirability must be considered. The administrative desirability of a tax can be measured in terms of the time, cost, and reporting burden -- both to the taxpayers and tax collectors -- necessary to establish and operate the system. These burdens are determined by three generic factors: the number of potential taxpayers, the complexity of the tax, and the amount and types of information necessary to collect and enforce the tax. A tax system that is feasible and desirable in terms of other objectives (revenue generation, equity, economic incentives, and economic effects) may not be able to serve the purposes of CERCLA if it cannot be administered efficiently or effectively. The remainder of this section

discusses the factors that are used to evaluate the administrative feasibility and desirability of each alternative CERCLA tax option.

3.5.2 Ability to Identify Taxable Parties

The administrative feasibility of a tax depends in part on the ability to identify the parties subject to the tax. The Internal Revenue Service (IRS) must first inform potential taxpayers of the tax and of their responsibility to report and pay. Second, the IRS must be able to compare those filing tax returns with the universe of potential taxpayers to ensure compliance with the tax. If the tax depends on voluntary filings from taxable parties, potential taxpayers must be able to determine whether they handle a taxable substance or engage in a taxable activity and thus are liable. If such identifications can be made, then the burden of doing so must be considered in assessing the desirability of the tax. The burden of these activities depends in part on the number of potential taxpayers and on the current availability of records.

Each CERCLA tax option is therefore evaluated in terms of:

- The ability to use existing records to identify taxpayers;
- The ability to use existing records or develop new records to verify taxpayer identifications; and
- The number of taxpayers requiring identification.

3.5.3 Ability to Identify Taxable Substances and Activities

The feasibility of administering a tax depends in part on whether taxable substances and activities can be identified and defined. Taxable activities are easier to identify if they involve transfers of either physical control or legal rights between persons or locations because these activities usually require the creation of records for business or other purposes that are separate from the tax system but can be used for tax purposes. The time and burden of implementing the tax, and therefore its desirability, can be affected by whether precise definitions already have been developed for regulatory or other purposes.

Each CERCLA tax option is therefore evaluated in terms of:

- The ability to rely upon existing records or develop new records to identify taxable substances and activities;
- The ability to use terms with established regulatory meanings rather than developing new definitions for purposes of the tax; and
- The number of substances and activities requiring definition.

3.5.4 Reporting and Recordkeeping Burden

Both taxpayers and the IRS must be able to determine when a tax liability has been incurred and the amount of the liability. The IRS must provide methods for calculating and reporting the taxes due and require the creation and preservation of records to support and verify the taxes paid. The burden of computing and reporting the tax liability and verifying the accuracy of the tax returns will vary with the complexity of the tax itself, the number of taxpayers, and the availability of necessary information. The reporting burden, in turn, will depend on whether existing reporting and recordkeeping systems can supply much of the information necessary to administer the tax, whether necessary new reporting and recordkeeping systems can be developed quickly, and whether the administration of the tax imposes substantial new reporting and recordkeeping requirements.

To evaluate reporting and recordkeeping requirements, each CERCLA tax is judged in terms of:

- The ability to rely on existing reporting and recordkeeping systems;
- The time required to establish new reporting systems; and
- The new reporting burden imposed by the tax.

3.5.5 Ability to Monitor and Enforce

The feasibility of a tax depends in part on whether means to monitor and enforce it either exist or can be developed. If these activities can be performed by an existing administrative structure, the tax probably can be administered more quickly and efficiently than a system requiring a new structure. In particular, tax collection procedures and audit techniques will already have been developed and tested.

Monitoring and enforcing a tax are made both more difficult and more costly if the tax includes complicated exemptions or variances, frequent changes in taxed substances or in tax rates, or other special situations requiring extensive verification by the IRS. These special situations can affect both the size and the predictability of tax revenues, and they can be major sources of conflict and litigation.

The ability to monitor and enforce each alternative tax option is evaluated according to:

- The ability to use existing or develop tax administration systems; and
- The number and type of exemptions, variances, and other special situations.

3.6 PROGRAMMATIC EFFECTS

Alternative CERCLA tax options may affect both Federal and State regulatory programs for the management of hazardous substances. A CERCLA tax may enhance the performance of these regulatory programs, act independently of them, or create obstacles to the achievement of regulatory goals. These alternative tax systems also may affect other existing or contemplated tax systems at both the State or Federal levels, either by preempting the legal authority to impose such taxes or by affecting the potential for revenues from the taxes.

The programmatic effects of alternative CERCLA funding mechanisms are evaluated in terms of:

- The burden imposed on existing regulatory programs by a CERCLA tax; and
- The effects of alternative taxes on State tax authority and revenues.

3.7 SUMMARY

This chapter has identified several criteria that can be used to evaluate alternative CERCLA tax options. Ideally, each tax option would be fully evaluated in terms of each criterion. Because this general area of investigation is quite new, both the data and methodology necessary for a full evaluation do not always exist. Unfortunately, because the demands for data and sophisticated methodologies are so great, this evaluation does not answer all questions about every alternative tax option. Thus, this attempt at a full evaluation will prove somewhat uneven. This unevenness is, however, a good indication of what is not yet known and where further work is required.

4. DESIGN OF ALTERNATIVE TAX OPTIONS

This chapter reviews five alternative tax options, each of which, for the purposes of comparison, is designed to raise $1 billion in annual revenues for the Hazardous Substance Response Trust Fund. Of note is that these five tax options have been chosen only to illustrate certain issues inherent in designing a tax. The choice of specific revenue targets, taxable substances, tax rates, and tax exemptions was necessary to conduct the analysis presented in Chapter 5 and does not constitute an EPA recommendation about an appropriate CERCLA tax. Each of the options considered could be varied in several ways. For example, Feedstock Tax II bases tax rates solely on environmental factors; it might also be possible to consider economic concerns in rate design. In short, this study raises several unresolved issues. Other key issues are also raised in other 301(a)(1) studies. For example, balance of trade issues are examined in the 301(a)(1)(F) study. Because these issues are both complex and interdependent, they must be dealt with in the legislative process of reauthorizing CERCLA.

Each alternative is discussed in terms of its tax base, tax rates, and tax exemptions. Sections 4.1 and 4.2 present modified feedstock taxes that adjust CERCLA's existing tax base and tax rates. Section 4.1 presents a feedstock tax levied on the substances currently subject to the CERCLA tax, but at a higher rate. Section 4.2 presents a feedstock tax with a tax base and tax rates that are different than the current tax. Section 4.3 presents a flat-rate waste-end tax. Section 4.4 presents a combination tax that includes both a feedstock tax and a nonincentive waste-end tax. Finally, Section 4.5 presents a two phased approach to a combination tax that combines a feedstock tax with an incentive waste-end tax. Exhibit 4-1 presents a brief summary of each tax.

4.1 FEEDSTOCK TAX I: MODIFIED RATES

The Hazardous Substance Response Trust Fund is currently financed by a tax on chemical feedstocks. Between April 1981 and September 1984, the current tax raised $863 million at an average of $247 million per year.[1/] Under this modified feedstock tax, the rates of the current feedstock tax have been adjusted to raise $1 billion annually. The adjustment was made by leaving the tax base unchanged and increasing all tax rates by an equal proportion. Exhibit 4-2 presents a summary of the tax. This section first discusses the current tax base, and then presents the adjusted rates. Finally, exemptions to the present tax are presented.

1/ U.S. Department of the Treasury. Financial Management Service, Trust Fund Branch, Financial Management Service Monthly Reports, Fiscal Years 1981 through 1984.

EXHIBIT 4-1

FIVE ALTERNATIVE CERCLA TAX OPTIONS
(Each designed to raise $1 billion annually)

Tax Option	Taxable Activities and Substances	Tax Rates
1. Feedstock Tax I: Modified Rates	Sale or use of 43 chemical feedstocks (as specified in CERCLA Section 211)	Depend on substance; range from 17¢ to $16.70 per short ton
2. Feedstock Tax II: Modified Rates and Substances	Sale or use of 48 chemical feedstocks (determined by analysis of HRS data)	Depend on substance; range from 1¢ to $3,050.06 per short ton
3. Waste-End Tax: Non-Incentive	Generation of RCRA-designated hazardous wastes (collected at TSD facility)[1/]	$4.73 per metric ton
4. Combination Tax I: Feedstock Tax and Non-Incentive Waste-End Tax		
- Feedstock Tax ($500 million)	Sale or use of 48 chemical feedstocks (as in Feedstock Tax II)	Depend on substance; range from 1¢ to $1,525.03 per short ton
- Waste-end Tax ($500 million)	Generation of RCRA-designated hazardous wastes (collected at TSD facility)	$2.37 per metric ton
5. Combination Tax II: Feedstock Tax and Incentive Waste-End Tax		
- Feedstock Tax[2/] ($800 million)	Sale or use of 48 chemical feedstocks (as in Feedstock Tax II)	Depend on substance; range from 1¢ to $2,440.05 per short ton
- Waste-end Tax ($200 million) Phase I (limited incentive)	Storage in surface impoundments or waste piles or land disposal of RCRA-designated hazardous wastes (collected at TSD facility)	$5 per metric ton; $15 to $20 per metric ton for land disposal of highly toxic and mobile wastes
Phase II (strong incentive)	Generation of RCRA-designated hazardous waste categorized by waste type, management technology, and management location (collected at TSD facility)	Some wastes banned; rates depend on waste and rise over time; range from $5 to $550 per metric ton

[1/] A TSD facility is a treatment, storage, or disposal facility.

[2/] The incentive-based waste-end tax has two phases. The first would be implemented based on available information. The second would be introduced as more data become available on the risk of particular waste/technology combinations.

EXHIBIT 4-2

FEEDSTOCK TAX I

CERCLA Section 211 Feedstocks	Estimated 1985 Production (thousands of tons) 1/	Current Tax Rate (dollars per ton) 2/	Adjusted Tax Rate (dollars per ton)	Total Revenue (in millions of dollars)
Acetylene	176.0	$4.87	$16.70	2.9
Ammonia	2,211.0	2.64	9.06	20.0
Antimony	33.0	4.45	15.26	0.5
Antimony trioxide	22.0	3.75	12.86	0.3
Arsenic	3/	4.45	15.26	3/
Arsenic trioxide	20.0	3.41	11.70	0.2
Barium sulfide	7.0	2.30	7.89	0.1
Benzene	6,010.0	4.87	16.70	100.4
Bromine	181.0	4.45	15.26	2.8
Butadiene	1,764.0	4.87	16.70	29.5
Butane	2,910.0	4.87	16.70	48.6
Butylene	2,265.0	4.87	16.70	37.2
Cadmium	4.0	4.45	15.26	0.1
Chlorine	12,120.0	2.70	9.26	112.2
Chromite	251.0	1.52	5.21	1.3
Chromium	68.0	4.45	15.26	1.0
Cobalt	9.0	4.45	15.26	0.1
Crude oil	694,595.0	.05	0.17	119.1
Cupric oxide	2.4	3.59	12.31	4/
Cupric sulfate	39.0	1.87	6.41	0.3
Cuprous oxide	3.4	3.97	13.62	4/
Ethylene	15,726.0	4.87	16.70	262.7
Hydrochloric acid	2,791.0	.29	0.99	2.8
Hydrogen fluoride	218.0	4.23	14.51	3.2
Lead oxide	537.0	4.14	14.20	7.6
Mercury	1.5	4.45	15.26	4/
Methane	2,791.0	3.44	11.80	32.9
Naphthalene	56.0	4.87	16.70	0.9
Nickel	263.0	4.45	15.26	4.0
Nitric acid	2,347.0	.24	0.82	1.9
Phosphorous	287.0	4.45	15.26	4.4
Potassium dichromate	0.1	1.69	5.80	4/
Potassium hydroxide	107.0	.22	0.75	0.1
Propylene	7,725.0	4.87	16.70	129.0
Sodium dichromate	194.0	1.87	6.41	1.2
Sodium hydroxide	11,891.0	.28	0.96	11.4
Stannic chloride	0.4	2.12	7.27	4/
Stannous chloride	136.0	2.85	9.78	1.3
Sulfuric acid	2,075.0	.26	0.89	1.9

EXHIBIT 4-2 (continued)

FEEDSTOCK TAX I

CERCLA Section 211 Feedstocks	Estimated 1985 Production (thousands of tons) 1/	Current Tax Rate (dollars per ton) 2/	Adjusted Tax Rate (dollars per ton)	Total Revenue (in millions of dollars)
Toluene	736.0	4.87	16.70	12.3
Xylene	2,727.0	4.87	16.70	45.6
Zinc chloride	1.0	2.22	7.61	4/
Zinc sulfate	2.5	1.90	6.52	4/
TOTAL ANNUAL REVENUE				1,000.0

1/ Quantity estimates do not include fertilizer or fuel uses of taxed feedstocks. Quantity estimates for methane, butylene and toluene have been adjusted downward to reflect the quantity of these substances used to make other CERCLA taxed feedstocks and thus exempted from the tax.

2/ All weight measurements are in short tons (i.e., 2000 lbs.) unless otherwise indicated.

3/ Production estimates were not available for arsenic. Thus, total revenues for arsenic were not computed.

4/ Less than $50,000.

Sources: Estimated production: ICF Incorporated analysis of data provided by Data Sources Incorporated, The Chemical Model.
Tax base and current tax rates: CERCLA Section 211.
Adjusted tax rates: Current rates multiplied by 3.36.

Tax Base (Taxable Substances, Parties and Activities): This modified feedstock tax is levied on the same 43 chemical substances as shown in Exhibit 4-2. These substances include eleven petrochemicals, 31 inorganic chemicals, and crude oil and imported petroleum products. In 1980, these substances were included in the tax base because each met at least two of the following criteria:

- The substance is inherently hazardous or hazardous in a number of forms (intermediates or final products);
- The substance is hazardous in some form if released;
- Hazardous substances are generated in the production of any form of the substance;
- The substance is capable of increasing the hazard potential of other substances; or
- The substance is produced in significant amounts.[2/]

The tax is levied on the sale or use of these substances. Because the tax covers usage, feedstocks that are imported or are produced and used by the same party are also covered by the tax. Approximately 496 companies pay the present CERCLA tax.[3/] Presumably, the same number would pay under this modified version of the CERCLA tax.

Tax Rates: To increase the annual revenue yield of the current CERCLA tax to $1 billion, an adjustment to current tax rates was necessary. First, annual estimated 1985 production levels for each feedstock were obtained.[4/] Total revenue with current rates and 1985 production levels was then calculated to be about $292 million. The target of $1 billion is about 3.43 times higher than $292 million, so each rate was adjusted by multiplying it by 3.43. Exhibit 4-2 presents, for each taxed feedstock, the estimated 1985 production level, the current tax rates specified in section 211 of CERCLA, and the adjusted tax rates which yield annual revenues of $1 billion. Note that by increasing the revenue yield of the tax, the tax rates for several feedstocks exceed the ceilings used in the design of the original CERCLA tax.[5/] However, no downward adjustments were made in the tax rates presented in Exhibit 4-2.

2/ Senate Comm. on Environment and Public Works, "Report to Accompany S.1480, Environmental Emergency Response Act, S.REP.NO. 96-848," 96th Cong., 2d Sess., p. 20 (1980).

3/ U.S. Congress, Joint Committee on Taxation, "Background and Issues Relating to HR 5640, the Superfund Expansion and Protection Act of 1984," JCS-27-84, July 23, 1984.

4/ ICF Incorporated analysis of data provided by Data Resources Incorporated, The Chemical Model.

5/ The original CERCLA tax rates were designed not to exceed the lower of 2 percent of product price or $20 per ton for organics and $10 per ton for inorganics.

Exemptions: CERCLA statutorily exempts the following substances from taxation: methane and butane when used as fuel, taxable substances when used in the fertilizer industry, substances derived from coal, and sulfuric acid produced as a byproduct of pollution control equipment. Changes to the CERCLA tax base were made by the Tax Reform Act of 1984, which specifically exempts benzene, toluene, and xylene when used as fuels. Other substances are exempted simply by omission from the specified tax base. Some examples are metals and non-metallic minerals whose production generates hazardous waste or from which hazardous substances are derived, such as lead, zinc, copper, selenium, asbestos, and manganese.

4.2 FEEDSTOCK TAX II: MODIFIED RATES AND SUBSTANCES

This modified feedstock tax was designed to reflect new data and a better understanding of the problems addressed by CERCLA. The tax adjusts CERCLA's existing tax base and recalculates its tax rates. This section discusses each such adjustment in turn. Exhibit 4-3 presents a summary of the feedstock tax with modified rates and substances.

Tax Base (Taxable Substances, Parties and Activities): A two step process was used in designing the tax base. First, a general rule was developed for choosing which feedstock chemicals should be included in the tax base. This rule specifies that chemical feedstocks ought to pay a tax if they contribute or could contribute significantly to the cost of cleaning up hazardous substances released into the environment.

Second, the above selection rule was combined with the original criteria used to determine taxable substances when CERCLA was enacted in 1980 suggests the possible addition of new inorganic taxable substances and the deletion of some currently taxable substances. While preliminary changes to the list of taxable substances are suggested by this approach, EPA has not yet performed sufficient analyses to recommend how the current list of taxable substances might actually be amended. Prior to such a recommendation, the Agency will be conducting further studies on the development and application of selection criteria for taxing new feedstocks. Consequently, the list of substances presented in Exhibit 4-3 may be modified at a later date.

To determine which substances to include in the tax base of this modified feedstock tax, the substances found at sites likely to be cleaned up were analyzed. EPA has identified about 19,000 sites that potentially could require cleanup. Information on some of these sites is contained in the Hazard Ranking System (HRS) data base.[6/] For the purposes of the analysis

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6/ CERCLA requires the development of a system to set priorities among sites requiring cleanup. The Hazard Ranking System was developed as a method of quantifying the hazard at a particular site. About 1,732 sites have been evaluated by State and regional personnel using the HRS and information about these sites is currently contained in the HRS data base.

EXHIBIT 4-3

FEEDSTOCK TAX II

Feedstocks	Estimated 1985 Production (thousands of tons)	Tax Rate (dollars per ton)	Total Revenue (in millions of dollars)
Acetylene	176.0	42.61	7.5
Aluminum	6,988.0	0.20	1.4
Ammonia	19,585.0	0.65	12.7
Antimony	33.0	9.09	0.3
Antimony trioxide	22.0	13.64	0.3
Arsenic	1/	1/	15.8
Arsenic trioxide	20.0	290.00	5.8
Asbestos	240.0	36.67	8.8
Barium sulfide	7.0	28.57	0.2
Benzene	6,010.0	22.26	133.8
Boron trioxide	692.0	5.78	4.0
Bromine	181.0	19.34	3.5
Butadiene	1,764.0	0.45	0.8
Butane	2,910.0	1.48	4.3
Butylene	2,265.0	2.52	5.7
Cadmium	4.0	687.54	2.8
Calcium oxide	14,955.0	0.32	4.8
Chlorine	12,120.0	20.67	250.1
Chromite	251.0	1.59	0.4
Chromium	68.0	641.18	43.6
Coal coke	18,766.0	1.90	35.7
Cobalt	9.0	400.00	3.6
Copper	2,304.0	4.25	9.8
Crude oil	694,595.0	0.17	120.0
Ethylene	15,726.0	2.67	42.0
Hydrochloric acid	2,791.0	2.83	7.9
Hydrogen fluoride	218.0	27.52	6.0
Iron (pig)	66,394.0	0.10	6.4
Lead	1,341.0	49.14	65.9
Lithium carbonate	14.0	328.57	4.6
Manganese	9.0	233.33	2.1
Mercury	1.5	3,050.06	4.4
Methane	9,700.0	2.74	26.6
Naphthalene	56.0	81.87	4.6
Nickel	263.0	25.48	6.7
Nitric acid	9,389.0	0.01	0.1
Phosphoric acid	9,511.0	0.36	3.4
Phosphorus	287.0	15.68	4.5
Potassium hydroxide	107.0	31.78	3.4
Propylene	7,725.0	2.68	20.7
Selenium	0.7	2,206.33	1.6

EXHIBIT 4-3 (continued)

FEEDSTOCK TAX II

Feedstocks	Estimated 1985 Production (thousands of tons)	Tax Rate (dollars per ton)	Total Revenue (in millions of dollars)
Sodium hydroxide	11,891.0	0.83	9.9
Sulfuric acid	41,505.0	0.35	14.4
Toluene	961.0	46.83	45.0
Uranium oxide	15.0	620.00	9.3
Vanadium oxides	8.0	200.00	1.6
Xylene	2,727.0	7.88	21.5
Zinc	1,054.0	10.82	11.4
TOTAL ANNUAL REVENUE			1,000.0

1/ Production figures were not available for arsenic; thus, it was not possible to compute its tax rate.

Sources: Estimated production: ICF Incorporated analysis of data provided by Data Resources Incorporated; The Chemical Model
Tax base and tax rates: ICF Incorporated analysis of HRS data

described below, data were obtained for 691 sites which, as of May 1983, had been nominated for the National Priorities List (NPL).[7/] More than 400 substances and wastes were identified at these sites. Some of these substances were described in terms too general to permit complete identification of the feedstocks from which they were produced (e.g., hydrocarbons, not elsewhere classified). Consequently, a category named "other" was also used.

Because these 48 feedstocks were used in the manufacture of the hazardous substances found at sites nominated for the NPL, they seem to constitute an appropriate tax base. While there may be other ways of determining what should be included in the tax base, the use of HRS data ensures that only those feedstocks that have contributed to the problem at Superfund sites likely to evoke Fund spending are taxed. In other words, rather than using a more theoretical method of selecting feedstocks for inclusion in the tax base (e.g., analysis of the degree of hazard posed by each substance), an empirical approach has been used (i.e., the substances found at Superfund sites are assumed to cause Fund spending and thus should require taxation). Further, as described in the next section, tax rates for these 48 feedstocks were adjusted to reflect their relative contribution to the problem as indicated by the number of sites at which each of the substances has been found.

Like the existing tax, this modified tax would be levied on the sale or use of the taxed substances and would generally be paid by the producers or users of these substances.

Tax Rates: After selecting a set of substances for taxation, the next task was to calculate what tax rates should be imposed on the 48 feedstocks. In general, rates were calculated to reflect the notion that the tax rate for a particular substance ought to reflect its contribution to Superfund spending. In other words, while all of the 48 feedstocks have contributed to the problem, each has done so to a different degree. While there are several ways of designing a rate structure to reflect a substance's contribution to the problem, it has been assumed that the relative contribution of a particular substance to Fund expenditures is indicated by the number of times it has been found at sites that are candidates for remediation. Ideally, tax rates should be based on the contribution of each feedstock to actual clean-up expenses. Doing so would require information on the volumes of each substance found at HRS sites as well as other characteristics of each substance (e.g., release pathways, concentration, persistence, and the costs of typical response measures) that may also influence cleanup costs. There is

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7/ The National Priorities List (NPL) is a national list of sites that are considered serious enough, based on the HRS, to require remedial action. Under CERCLA, Section 105, the NPL must include at least 400 top priority sites and be updated at least annually.

insufficient information, however, to include additional factors in the estimates of relative contribution at this time.[8/]

The frequency of finding particular substances at Superfund sites is thus used as an indicator of contribution to Fund spending. The HRS data were used to compute frequency scores for each feedstock. This was accomplished by examining data on each of the 691 HRS sites to determine which feedstocks were involved in the production of the hazardous wastes and substances found at the site. A weighted frequency for each feedstock was then calculated. This frequency reflects the number of sites at which a feedstock was found and an adjustment to reflect the presence of other feedstocks at particular sites. For example, lead, when found in the presence of nine other substances, was given a weight one-tenth the weight it was given when found alone.

The result of this process was a frequency score for each feedstock which represented its presence at Superfund sites. The scores were then indexed so that the scores for all feedstocks added to 100. This index provides an apportionment of the responsibility among the feedstocks according to their contribution (as defined here) to the problem. Column 1 of Exhibit 4-4 displays the relative contribution (on a percentage basis) of each feedstock to the substances found at sites likely to undergo Fund-financed cleanup. The indexed feedstock score was then used to allocate the share of revenues to be raised from each feedstock; that is, a tax bill was computed for each feedstock. The tax bill reflected the apportionment of tax collections among feedstocks based on relative frequency as well as two adjustments. The first adjustment reflected the difficulty of taxing "other" feedstocks, while the second adjustment was made to limit tax rates to one-third of product price. Column 2 of Exhibit 4-4 presents the annual tax bill for each substance if an annual revenue of $1 billion were raised. Acetylene, for example, has a .75 percent share, which translates into a tax bill of $7.5 million.

Finally, these tax bills were converted into tax rates. Tax rates were computed by dividing the tax bill for each substance by the projected 1985 annual production of that substance. For some feedstocks, however, the tax rate was a relatively large fraction of the projected 1985 price. As in the design of the original tax system, a rate cap was used to limit tax rates. Feedstocks had their bills and rates reduced if their rates exceeded one-third of their estimated price in 1985. Such reductions in revenue-raising

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8/ As part of the analysis described above, sites with ground-water contamination were compared to those without it. The presence or absence of ground-water contamination is one of the most significant determinants of clean-up costs. No correlation was found between the types of feedstocks responsible for a site and the likelihood of ground-water contamination. Absent more detailed information about the factors contributing to cleanup costs, each feedstock has been treated uniformly and its contribution to the problem determined by simply counting up the number of times it appears at sites nominated for the NPL.

capability were offset by increasing the rates on other feedstocks. No feedstock, however, could have its share (as indicated in Column 1 of Exhibit 4-4) increased by more than one-half of one percent with the exception of crude oil. Crude oil was treated differently because:

- taxes on it are spread out to other feedstocks by the market mechanism; and
- there are petroleum-related hazardous substances that are not routinely in the HRS inventories but could be subject to Superfund cleanup (e.g., benzene, toluene, xylenes, ethylene dibromide and lead in gasoline, or hazardous substances, such as PCBs and dioxin, that have been mixed with waste oil).

Column 3 of Exhibit 4-4 presents one such adjustment of shares, bills, and rates. This modified tax system is the subject of the remaining analysis.

Exemptions: Like the current CERCLA tax, this modified feedstock tax is not intended to tax the fuel uses of chemical substances. Accordingly, methane and butane, when used as a fuel, are exempted. Benzene, toluene and xylene that are added to or resident in gasoline are also exempt.

4.3 WASTE-END TAX: NON-INCENTIVE

This section describes a non-incentive based waste-end tax structured to raise $1 billion annually. Exhibit 4-5 briefly summarizes the tax. This option establishes a flat-rate waste-end tax expected to provide only modest incentives for altering waste management practices because it does not distinguish between wastes or waste management processes. Because of its size ($1 billion in annual revenue), however, the tax may affect the overall volume of wastes produced.

Tax Base (Taxable Substances, Parties and Activities): The tax would be assessed on all RCRA-designated hazardous wastes and would be paid by RCRA permitted Subtitle C treatment, storage or disposal (TSD) facilities. The tax would be levied on RCRA-designated wastes because they are generally recognized as hazardous and because the regulated community is already accustomed to accounting for these wastes to comply with the RCRA requirements. Although the intent is to tax all wastes that have been generated, the tax would be levied on TSD facilities instead of waste generators because there are far fewer TSD facilities, making the tax easier to administer. A recent survey indicates that there are approximately 4,818 hazardous waste management facilities, compared to an estimated 14,098 generators of hazardous waste.[9/] Generators who operate waste-management

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9/ Westat, Inc., National Survey of Hazardous Waste Generators and Treatment, Storage and Disposal Facilities Regulated Under RCRA in 1981 (Maryland: Westat, Inc., April 20, 1984). These estimates and all other data from the Westat survey do not reflect the effect of the RCRA reauthorization legislation which was enacted on November 9, 1984.

EXHIBIT 4-4

CALCULATION OF FEEDSTOCK TAX II RATES

Feedstocks	Contribution	Tax Bill (in millions of dollars)	Tax Rate[3/] (dollars per ton)
Acetylene	0.75%	7.5	42.61
Aluminum	0.14	1.4	0.20
Ammonia	1.27	12.7	0.65
Antimony	0.03	0.3	9.09
Antimony trioxide	0.03	0.3	13.64
Arsenic	1.58	15.8	[1/]
Arsenic trioxide	1.58	5.8	290.00
Asbestos	0.88	8.8	36.67
Barium sulfide	0.20	0.2	28.57
Benzene	13.38	133.8	22.26
Boron trioxide	0.09	4.0	5.78
Bromine	0.35	3.5	19.34
Butadiene	0.08	0.8	0.45
Butane	0.43	4.3	1.48
Butylene	0.57	5.7	2.52
Cadmium	2.38	2.8	687.54
Calcium oxide	0.17	4.8	0.32
Chlorine	25.05	250.1	20.67
Chromite	0.04	0.4	1.59
Chromium	4.36	43.6	641.18
Coal coke	3.57	35.7	1.90
Cobalt	0.05	3.6	400.00
Copper	0.67	9.8	4.25
Crude oil	2.44	120.0	0.17
Ethylene	4.20	42.0	2.67
Hydrochloric acid	0.79	7.9	2.83
Hydrogen fluoride	0.29	6.0	27.52
Iron (pig)	0.33	6.4	0.10
Lead	6.59	65.9	49.14
Lithium carbonate	0.01	4.6	328.57
Manganese	0.21	2.1	233.33
Mercury	2.14	4.4	3,050.06
Methane	2.66	26.6	2.74
Naphthalene	0.76	4.6	81.87
Nickel	0.36	6.7	25.48
Nitric acid	0.01	0.1	0.01
Other	7.29	[2/]	[2/]
Phosphoric acid	0.34	3.4	0.36
Phosphorus	0.14	4.5	15.68
Potassium hydroxide	0.03	3.4	31.78
Propylene	2.07	20.7	2.68
Selenium	0.38	1.6	2,206.33

EXHIBIT 4-4 (continued)

CALCULATION OF FEEDSTOCK TAX II RATES

Feedstocks	Contribution	Tax Bill (in millions of dollars)	Tax Rate[3/] (dollars per ton)
Sodium hydroxide	0.99	9.9	0.83
Sulfuric acid	1.44	14.4	0.35
Toluene	4.50	45.0	46.83
Uranium oxide	0.93	9.3	620.00
Vanadium oxides	0.16	1.6	200.00
Xylene	2.15	21.5	7.88
Zinc	1.14	11.4	10.82
TOTAL	100.00%	1,000.0	

1/ Production figures were not available for arsenic; thus, it was not possible to compute its tax rate.

2/ Because of the difficulty of taxing "other" substances, the tax bill has been spread among the other feedstocks.

3/ Tax rates calculated to exceed one-third of a feedstock's 1985 projected price were adjusted downward to one-third of price. The reduction in revenues was offset by increased taxes on other feedstocks. This adjustment is explained in detail in the text.

Source: ICF Incorporated analysis of HRS data.

EXHIBIT 4-5

NON-INCENTIVE WASTE-END TAX

Tax Base	Tax Rate	Total Revenue
Generation of RCRA-designated hazardous waste after adjusting for 20 percent shrinkage (annual volume: 211 million metric tons)	$4.73 per metric ton (collected at TSD facility)	$1 billion

Source: Tax base: Westat, Inc., National Survey of Hazardous Waste Generators and Treatment, Storage, and Disposal Facilities Regulated Under RCRA in 1981 (Maryland: Westat, Inc., April 20, 1984).

facilities onsite (i.e., generators with a RCRA Part A permit) would pay the tax directly on the total quantity of waste that is treated, stored or disposed of on-site. This group is believed to constitute 85 percent of all RCRA permitted facilities.[10/] When wastes are managed offsite, the tax would be paid by the TSD facility on the quantity of waste received for treatment, storage, or disposal. A single quantity of waste would not be taxed twice. For example, if a generator operating an on-site TSD facility generated and treated 100 metric tons of wastes and subsequently sent the same wastes -- which have been reduced by treatment to 10 metric tons -- offsite for disposal, the tax would be paid on the quantity originally treated (i.e., 100 metric tons). The quantity disposed would not be taxed a second time. The administration of this system will be discussed in Chapter 5.

The wastes that would be taxed under the proposed waste-end tax are delineated in 40 CFR Section 261. As explained in Chapter 2, RCRA designates as hazardous approximately 450 wastes (i.e., listed wastes) and approximately 90 waste streams. Also regulated under RCRA and taxable under the waste-end tax are all wastes that show any of four hazardous characteristics: (1) ignitability, (2) corrosivity, (3) reactivity, and (4) extraction procedure toxicity. Many discarded commercial chemicals, off-specification chemicals, and residues are also subject to RCRA regulation. Exhibit 4-6 shows an estimate of the percentage of the total quantity of hazardous waste handled in 1981 by waste management facilities that is represented by each type of waste.

The 1984 survey conducted by Westat, Inc. estimates the volume of hazardous waste generated in the United States in 1981 to be approximately 264 million metric tons.[11/] The estimate includes wastes covered by RCRA and managed in processes subject to regulation under RCRA. While the estimate represents the best available data, it is subject to a high degree of uncertainty. Statistical analysis by Westat indicates that the volume of hazardous waste generated may range from 156 million metric tons to 394 million metric tons.[12/]

10/ Ibid. , p. 84.

11/ The Westat survey reports quantities in gallons rather than metric tons. The conversion factor used for this discussion is .00371952 metric tons per gallon.

12/ The confidence interval around the Westat estimate of the volume of waste generated is very large for a variety of reasons related to the nature of the sample. This implies a high degree of uncertainty surrounding the estimate and means that the actual value may lie within a broad range surrounding the estimated value. A 95 percent confidence interval sets the upper bound of this range at +48.8% of the estimated value (i.e., 264 + 48.8% (264) = 394). The lower bound is set by summing the quantities of waste reported by a Westat survey of generators that underestimated waste volume because it under-sampled the large generators. Although the estimate derived from this survey, 156 million metric tons is not a useful measure of the total volume, it can be used to set the lower bound of the estimate because it represents the smallest possible quantity of waste generated by the total population in 1981. The estimate of 156 million metric tons falls within the lower bound set by a 95 percent confidence interval, which is -48.8%, or 135 million metric tons.

EXHIBIT 4-6

PERCENTAGE OF HAZARDOUS WASTE HANDLED BY WASTE MANAGEMENT FACILITIES IN 1981 BY TYPE OF WASTE GROUP

Type of Waste	Percentage of Waste Handled [1/]
RCRA listed wastes	16
RCRA hazardous waste streams	7
Characteristic wastes:	
ignitable	2
corrosive	40
reactive	4
E.P. toxic	14
Off-specification or discarded chemicals	4
Other and unspecified	14

1/ These percentages are based on an estimate of the total quantity of waste managed. This estimate is believed to overstate the actual volume of wastes generated. The primary reasons for the disparity are double-counting of some wastes that fell into more than one RCRA classification and the inclusion of wastes not eligible for taxation under the RCRA criteria. Similar data are provided by Westat for the minimum volume of wastes generated. The percentages of wastes generated belonging to each RCRA waste category are roughly the same as the estimates of the volume of waste managed.

Source: Westat, Inc., National Survey of Hazardous Waste Generators and Treatment, Storage and Disposal Facilities Regulated Under RCRA in 1981 (Maryland: Westat, Inc., April 20, 1984), p. 180.

Tax Rate: The annual tax revenue target of $1 billion can be divided by the tax base (i.e., 264 million metric tons) to determine the tax rate. The uncertainty of the estimate of the volume of hazardous waste generated should be considered along with potential changes in the size of the tax base to ensure that rates are set high enough to generate adequate revenue. As in almost any tax, variation in the size of the tax base may be caused by economic factors such as changes in the level of economic activity. The tax base could also decrease because of shifts in waste management technologies, and reductions in reported waste volumes (reflecting both legal reductions of previously over-reported volumes and illegal tax avoidance).

An early survey showed that three States, New York, New Hampshire, and California, have implemented waste-end tax systems and have experienced reductions in the estimated volume of taxed wastes reaching almost 90 percent of the level projected when establishing the rates.[13/] Preliminary findings of a survey currently being conducted by EPA indicate that these State results were due to inadequate initial data on actual waste volumes, economic recession during the period of start up, failure to account for the costs of tax exemptions, and lack of programmatic resources for enforcement of the tax. In six States surveyed by EPA, revenues are now reportedly reaching 71 to 98 percent of adjusted projections.[14/] Lack of extensive experience with waste-end tax systems makes it difficult to estimate the amount of shrinkage, if any, that would result if a Federal waste-end tax were implemented. The success of a Federal waste-end tax in meeting its revenue target in the early years would largely depend on its ability to avoid the types of problems confronted by the States in projecting volumes for setting tax rates.

Exhibit 4-7 shows the tax rates that would have to be charged in order to raise the targeted tax revenue of $1 billion per year. Three separate volume projections are presented, based on the range of the Westat estimate described previously. For comparative purposes, three different tax rates have been calculated for each estimated volume of waste to reflect differing degrees of shrinkage in the tax base. The required tax rates range from a low of $2.54 per metric ton -- representing a tax base equal to the upper bound of the Westat estimate at a 95 percent confidence level and no shrinkage in the tax base -- to $12.82 per metric ton -- representing the lower bound of the Westat estimate of waste volume generated and 50 percent shrinkage in the tax base. Although neither of these rates reflect the most likely estimate of the tax base, the range highlights the difficulty in choosing the appropriate tax rate to raise the required level of funds.

The tax rate used in our illustrative design of a waste-end tax and incorporated in the evaluation of the tax system appearing in Section 5.2 is

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13/ U.S. General Accounting Office (GAO), State Experience with Taxes on Generators or Disposers of Hazardous Waste (Washington, D.C.: GAO, May 4, 1984), GAO/RCED-84-146.

14/ EPA, Survey of States with Waste-End Taxes.

EXHIBIT 4-7

TAX RATES REQUIRED TO RAISE $1 BILLION PER YEAR

	156 million metric tons	264 million metric tons	395 million metric tons
No shrinkage: $/MT	$ 6.41	$ 3.79	$ 2.53
20% shrinkage: $/MT	8.01	4.73	3.16
50% shrinkage: $/MT	12.82	7.58	5.06

Conversion rate: .00371952 metric tons per gallon.

conditional upon the projection of waste volume. A rate of $4.73/metric ton is used.[15/] This rate corresponds to the mid-range value of Westat's estimate of the volume of waste with 20 percent shrinkage in the tax base. The estimate of 20 percent shrinkage is not based on any empirical evidence, but is included because it would be prudent to allow for volume shortfalls when calculating rates in order to ensure that adequate funds are generated.

Exemptions: The waste-end tax would exempt wastes that are currently exempted under RCRA. These wastes are exempted because it is believed that they do not present a threat to the environment or are adequately regulated under other laws. Examples include solid wastes that are not hazardous wastes (e.g., irrigation return flows, household wastes, fertilizers, oil, gas and geothermal drilling muds and brines, mining extraction, beneficiation and processing wastes, cement kiln dust waste and coal combustion wastes); wastes controlled under other laws (e.g., industrial wastewater discharges regulated under the Clean Water Act and nuclear wastes regulated under the Atomic Energy Act); hazardous wastes that are beneficially used or reused or legitimately recycled or reclaimed; and hazardous wastes generated by small quantity generators.

4.4 COMBINATION TAX I: FEEDSTOCK TAX AND NON-INCENTIVE WASTE-END TAX

This section describes a combination tax that consists of two components. Exhibit 4-8 summarizes the tax. The first component is a modified feedstock tax designed to raise $500 million. The second component is a flat-rate waste-end tax also designed to raise $500 million. Each of these components is discussed in turn.

Feedstock Tax: The feedstock tax component of this combination tax is identical to the modified feedstock tax described in Section 4.2, except that it has been designed to raise $500 million annually. It has the following characteristics:

- Tax Base (Taxable Substances, Parties and Activities): The tax base is the same as with the modified feedstock tax. Thus, the tax is levied on the production or use of the 48 feedstocks shown in Exhibit 4-8.

15/ For comparative purposes, the cost of disposing of wastes in a landfill in 1982 ranged from $33-83 per metric ton for bulk material and $110-240 per metric ton for drummed material. The tax rate on land disposal of hazardous wastes that is levied to fund the PCLTF is $2.13 per dry weight ton, which equates to approximately $8.25 per metric ton.

EXHIBIT 4-8

COMBINATION TAX I

Feedstock Tax Component (Total Revenue: $500 million) 1/

Tax Base	Tax Rate ($ per ton)	Tax Base	Tax Rate ($ per ton)
Acetylene	21.31	Hydrochloric acid	1.42
Aluminum	0.10	Hydrogen fluoride	13.76
Ammonia	0.32	Iron (pig)	0.05
Antimony	4.55	Lead	24.57
Antimony trioxide	6.82	Lithium carbonate	164.29
Arsenic	2/	Manganese	116.67
Arsenic trioxide	145.00	Mercury	1,525.03
Asbestos	18.33	Methane	1.37
Barium sulfide	14.29	Naphthalene	40.94
Benzene	11.13	Nickel	12.74
Boron trioxide	2.89	Nitric acid	0.01
Bromine	9.67	Phosphoric acid	0.18
Butadiene	0.23	Phosphorus	7.84
Butane	0.74	Potassium hydroxide	15.89
Butylene	1.26	Propylene	1.34
Cadmium	343.77	Selenium	1,103.16
Calcium oxide	0.16	Sodium hydroxide	0.42
Chlorine	10.33	Sulfuric acid	0.17
Chromite	0.80	Toluene	23.41
Chromium	320.59	Uranium oxide	310.00
Coal coke	0.95	Vanadium oxides	100.00
Cobalt	200.00	Xylene	3.94
Copper	2.13	Zinc	5.41
Crude oil	0.09		
Ethylene	1.34		

Waste-End Tax Component (Total Revenue: $500 million)

Tax Base	Tax Rate
RCRA-Designated Hazardous Waste After Adjusting for 20 Percent Shrinkage (Annual volume: 211 million metric tons)	$2.37 per metric ton (collected at TSD facility)

1/ The rates shown are set at one-half the rates for the $1 billion modified feedstock tax.

2/ Production estimates were not available for arsenic; thus, its tax rate has not been calculated.

Source: ICF Incorporated analysis of HRS data.

- Tax Rates: Because the feedstock tax component of the combination tax is intended to raise $500 million, its rates have been set at one-half the rates of the $1 billion feedstock tax described in Section 4.2. Exhibit 4-8 presents the rates.

- Exemptions: The modified feedstock tax is not intended to tax the fuel uses of chemical substances. Accordingly, methane and butane, when used as a fuel, are exempted. Benzene, toluene and xylene that are added to or resident in gasoline are exempt.

Waste-End Tax: The waste-end tax portion of the combination tax is based on the flat-rate waste end tax described in Section 4.3. It is similar to the flat-rate tax in every respect, except that it is designed to raise only $500 million annually. It can be described as follows:

- Tax Base (Taxable Substances, Parties and Activities): The tax would be assessed on the generation of hazardous wastes and paid by RCRA designated treatment, storage and disposal facilities. While there is some uncertainty as to the size of the tax base, the estimate used in Section 4.3 will be used again. In other words, the tax base is estimated to begin at 264 million metric tons of waste per year with a 20 percent reduction upon imposition of the tax.

- Tax Rates: Because the tax is designed to raise $500 million annually, the tax rate is set at $2.36 per metric ton, or half of the rate described in Section 4.3.

- Exemptions: The waste-end tax component of this combination tax would exempt all those wastes currently exempted under RCRA, such as solid wastes that are not hazardous wastes that are recycled and wastes produced by small quantity generators.

4.5 COMBINATION II: FEEDSTOCK TAX AND INCENTIVE WASTE-END TAX

This section describes a combination tax designed to maximize both the revenue generating capacity of the tax and incentives for improved waste management practices. The tax would have two components: a modified feedstock tax designed to raise approximately $800 million per year (80 percent of revenues) and an incentives-based waste-end tax that would be structured to contribute approximately $200 million (20 percent of revenues) per year. Exhibit 4-9 summarizes the tax. The waste-end component would be implemented in two phases. Phase I would emphasize revenue-generation in an effort to satisfy immediate funding requirements of the Superfund program for cleaning up existing hazardous waste sites, while sending moderate signals to industry regarding waste management practices. Phase II would emphasize

EXHIBIT 4-9

COMBINATION TAX II

Feedstock Tax Component (Total Revenue: $800 million)[1/]

Tax Base	Tax Rate ($ per ton)	Tax Base	Tax Rate ($ per ton)
Acetylene	34.09	Hydrochloric acid	2.26
Aluminum	0.16	Hydrogen fluoride	22.02
Ammonia	0.52	Iron (pig)	0.08
Antimony	7.27	Lead	39.31
Antimony trioxide	10.91	Lithium carbonate	262.86
Arsenic	[2/]	Manganese	186.67
Arsenic trioxide	232.00	Mercury	2,440.05
Asbestos	29.33	Methane	2.19
Barium sulfide	22.86	Naphthalene	65.50
Benzene	17.81	Nickel	20.38
Boron trioxide	4.62	Nitric acid	0.01
Bromine	15.47	Phosphoric acid	0.29
Butadiene	0.36	Phosphorus	12.54
Butane	1.18	Potassium hydroxide	25.42
Butylene	2.01	Propylene	2.14
Cadmium	550.03	Selenium	1,765.06
Calcium oxide	0.26	Sodium hydroxide	0.67
Chlorine	16.53	Sulfuric acid	0.28
Chromite	1.27	Toluene	37.46
Chromium	512.94	Uranium oxide	496.00
Coal coke	1.52	Vanadium oxides	160.00
Cobalt	320.00	Xylene	6.31
Copper	3.40	Zinc	8.65
Crude oil	0.14		
Ethylene	2.14		

(continued on following page)

EXHIBIT 4-9 (continued)

COMBINATION TAX II

Waste-End Tax Component (Total Revenue: $175-$275 million)[3]

Tax Base	Estimated Volume	Tax Rate	Estimated Revenue
Tier 1			
Long-term storage in surface impoundments or waste piles and land disposal of all RCRA hazardous wastes	55 million metric tons[5]	$5/metric ton	$175-$275 million[4]
Tier 2			
Land disposal of highly toxic and highly mobile RCRA hazardous wastes	250,000 metric tons	$15-20/ metric ton	$3.7-$5 million

[1]The rates shown are set at 80 percent of the rates for the $1 billion modified feedstock tax.

[2]Production estimates were not available for arsenic; thus, its tax rate has not been calculated.

[3]Phase 2 of the waste-end tax is not presented here. It is discussed in the text and shown in Exhibits 4-10 and 4-11.

[4]This range accounts for possible errors in EPA's waste volume estimates and for the potential for shifting to alternate waste management practices.

[5]Estimated volume is for land disposal of hazardous wastes only.

Sources: Feedstock tax: ICF Incorporated analysis of HRS data
Waste-end tax base: Westat, Inc., National Survey of Hazardous Waste Generators and Treatment, Storage, and Disposal Facilities Regulated under RCRA in 1981. (Maryland: Westat, Inc., April 20, 1984)

stronger incentives for improved waste management methods in order to limit future environmental hazards created from current land disposal practices by combining a degree-of-hazard tax with a ban. The two components will be discussed in turn.

Feedstock Tax: The feedstock tax component of this combination tax is identical to the modified feedstock tax described in Section 4.4, except for the tax rates. Tax rates would be set at approximately 80 percent of the level specified in Section 4.2 because the feedstock component of this combination tax is targeted to raise approximately $800 million, compared to $1 billion for the modified feedstock tax.

Waste-End Tax (Phase I -- Limited Incentive):

Tax Base (Taxable Substances, Parties and Activities): Phase I of the waste-end component of the combination tax is designed to generate revenue for cleaning up existing Superfund sites while sending a signal to waste generators communicating EPA's and Congress' growing concern over the use of undesirable waste management practices. As shown in Exhibit 4-9, it is a two-tiered flat-rate tax. Tier 1 would be levied on all RCRA wastes that are stored in surface impoundments and waste piles for long periods of time or are land disposed and excluded from Tier 2. Since RCRA regulations define land treatment as land disposal, land treatment would be taxed as well. However, treatment in surface impoundments is not taxable under either Tier 1 or Tier 2. Tier 2 would apply to the storage and land disposal of wastes that are both highly toxic and very mobile. An estimated 55 million metric tons of hazardous wastes were placed in land disposal in 1981, of which an estimated 250,000 tons would qualify for taxation under Tier 2.[16] At the present time, there is no reliable estimate of the volume of wastes stored. The amount which would qualify for taxation under Tier 2 may vary depending on additional characteristics and the level of toxicity and mobility considered. The tax would be collected from RCRA Subtitle C hazardous waste disposal facilities, and facilities with permits to store wastes in surface impoundments and waste piles for long time periods (e.g., 90 days to 1 year). At the present time, this would include approximately 1,028 facilities that are owned or operated by about 500 firms.

Tax Rate: Substances and practices taxed at Tier 1 levels would be subject to a tax rate of $5 per ton. Tier 2 substances would be taxed at $15 to $20 per ton. These tax rates were selected as illustrative rates for the purposes of this analysis. They are not statistically derived from the range of rates discussed in Section 4.3 because of the uncertainties associated with the analysis. The purpose of the rate differential is to communicate to waste generators, EPA's and Congress' growing concerns over the safety of land disposal of the specified high-risk wastes and to send a signal concerning the policy goal of reducing or eliminating these practices. The $10-$15 differential is not high enough and was not intended to bridge the gap between land disposal and more expensive and environmentally preferred waste management practices.

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[16]Westat, Inc., National Survey of Hazardous Waste Generators and Treatment, Storage, and Disposal Facilities Regulated Under RCRA in 1981 (Maryland: Westat, Inc., April 20, 1984).

Exemptions: Under Phase I, exemptions would be provided for practices that do not create the type of problems associated with undesirable land disposal and practices for which it may not be practical to collect the tax. The first category would include (1) neutralization and biological treatment in surface impoundments and (2) waste incineration. The second category would include (1) disposal of Superfund wastes and (2) wastes from small quantity generators currently exempt under RCRA. Similar to the waste-end tax described in Section 4.3, the small quantity exemption would be removed with the promulgation of new RCRA regulations pertaining to small quantity generators.

Waste-End Tax (Phase II -- Strong Incentive):

Phase II of the waste-end tax component of the combination tax would be a complex degree-of-hazard tax combined with restrictions on the disposal of high risk wastes. This option is designed to create effective incentives for substantially reducing the environmental threat created by land disposal of hazardous wastes. This tax and policy option is currently in its initial stages of development and therefore is discussed only in conceptual terms. Tax rates and risk classification system are included for illustrative purposes, but are not meant to represent recommended options determined to be appropriate for meeting revenue targets or for creating the desired incentive. EPA has begun work on land disposal restrictions, a program that is required in the current bills to reauthorize the RCRA statute.[17/] The decision rules developed for the land disposal restrictions would also be used to develop the degree of hazard tax.

Tax Base (Taxable Substances, Parties and Activities): In Phase II, the tax treatment of wastes would be based on a risk classification system. The hazard potential of substances may be classified as low, moderate, or high on the basis of several variables that affect risk, or combinations of these variables. The variables are (1) the inherent hazard of the wastes, (2) the type of disposal technology used and its relevant characteristics, and (3) the location of the facility. Each will be discussed in turn.

Wastes containing components that are very toxic, persistent, have a high propensity to bioaccumulate, or are mobile are likely to present much greater risk to human health and the environment than those without these characteristics. These four characteristics constitute the inherent hazard of the wastes. Toxicity refers to the potency of different chemicals for causing adverse health effects at various levels of exposure. Persistence refers to the resistence of chemicals to degrading readily in air or water. These chemicals tend to remain available for human exposure for significant periods of time. For example, non-radioactive metals do not degrade and other inorganic compounds are extremely persistent. Bioaccumulation means the

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17/ More information on this effort is contained in U.S. EPA, Waste-End Tax: Technical Background Document, Office of Policy, Planning and Evaluation, December 1984.

tendancy of chemicals to accumulate in body tissues and cause biological effects. Mobility means the likelihood of a waste to escape from containment. Water solubility and sorption are often used as surrogates for mobility in soils, surface water, and groundwater. Chemicals that are soluble in water are likely to be dissolved and carried along with hydrological flow systems such as rivers or aquifers. If soluble chemicals are not retarded by sorption to soils or sediments, they are good candidates for escape from land disposal containment systems. Even if a compound is unlikely to be mobile in water, it may still present potential exposure hazards through the air.

It is clear that a waste's toxicity, mobility, persistence, and propensity to bioaccumulate are the four key determinants of a waste stream's hazardousness. Although each of these characteristics is measurable, there is currently no consensus on how much each variable contributes to the hazardousness of a waste. Consequently, EPA has not assigned relative weighting factors to each. As part of ongoing efforts to consider banning the unrestricted land disposal of certain hazardous wastes, EPA plans to evaluate the risk of approximately one-third of RCRA hazardous wastes by early 1988, the second third by 1989, and the remaining third by 1990.

The proposed waste-end component of the combination tax would also consider the type of disposal technology and its relevant characteristics and assign a risk score based on the interaction between technology and the inherent risk of the waste being handled (waste/technology combination). The management practices that might be subject to taxation or banning could include disposal in a landfill, surface impoundment or injection well, land treatment, or storage in a surface impoundment or waste pile. Exhibit 4-10 provides an illustrative example of this interaction for three types of land disposal practices. For example, waste "A" may receive a high risk ranking if disposed of in an unlined landfill and a moderate risk ranking if disposed of in an injection well. The risk assessment system could further be differentiated by facility characteristics (e.g., single or double liner).

The location of the facility is the third variable to affect risk. Examples of locational considerations are distance to groundwater, annual precipitation, proximity to surface water, and proximity to densely-populated urban areas.

Tax Rate and Policy Treatment: Each waste/technology combination would be classified into one of the three risk tiers (e.g., high, moderate, and low) and would receive the tax or policy treatment corresponding to its respective tier. Exhibit 4-11 summarizes these concepts.

The high risk category would be reserved for those waste/technology combinations that very clearly present a significant threat to human health and the environment and which EPA would not want to allow to be land disposed, even if a high tax were paid. All substances receiving the high risk designation would be banned.

Medium risk waste/technology combinations would be subject to a rising tax over time in order to create an incentive to shift these wastes away from land disposal to alternative treatment. The rising tax would provide generators

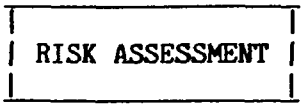
EXHIBIT 4-10

ILLUSTRATION OF THREE-TIERED SCHEME

Waste	Disposal Method	Risk Rating	Policy Treatment
	Unlined Landfill	High	Ban
A	Surface Impoundment	High	Ban
	Injection Well	Moderate	Graduated tax Schedule C
	Unlined Landfill	Moderate	Graduated Tax Schedule A
B	Surface Impoundment	Moderate	Graduated Tax Schedule B
	Injection Well	Low	Flat Rate
	Unlined Landfill	Low	Flat Rate
C	Surface Impoundment	Low	Flat Rate
	Injection Well	Low	Flat Rate

EXHIBIT 4-11

HAZARDOUS WASTES GOING TO LAND DISPOSAL



Tier 1	Tier 2	Tier 3
High Risk Waste/Disposal Technology Combinations	Moderate Risk Waste/Disposal Technology Combinations	Low Risk Waste/Disposal Technology Combinations
BAN	RISING TAX	FLAT TAX
Effective Dates Based on Alternative Capacity	Year 1 $10 per ton Year 2 $20 Year 3 $30 Year 4 $40 Year 5 $50	$5 Per Ton Every Year
Forcefully remove waste from most risky situations	Flexibly shift moderately risky waste away from disposal; Receive some funds for hazardous waste problems	Fund Superfund response: Insolvent Firm problems

more flexibility than the ban and ease the transition from land disposal to treatment. Within the moderate-risk tier, several schedules would be developed to reflect the differing levels of hazard associated with different waste/technology combinations within the tier and the availability of alternatives. Exhibit 4-10 illustrates this concept. In the illustration, a moderate risk ranking is assigned to waste "A" when deep-well injected and waste "B" when disposed in an unlined landfill or surface impoundment. Although each of these scenarios is considered to be of moderate risk, their relative risks differ and they would be subject to different tax rates. As shown in the last column of the exhibit, waste "A," when deep-well injected, would be subject to tax schedule "C". Waste "B" would be taxed according to Schedule "A" when disposed of in an unlined landfill and Schedule "B" when disposed of in a surface impoundment. Exhibit 4-12 presents an example of how these tax schedules might be structured.

For waste disposal practices in the low risk category, the $5 per ton Phase I tax would remain in force. It would not be the goal of the tax system to encourage significant behavioral changes because the risk associated with these waste/technology combinations is low.

The information requirements for developing a system with the level of complexity described here are extensive. Before a tax system of this type can be developed and used for the purpose of taxing or regulation, a number of data gathering and analytical efforts must be undertaken. Some of the necessary analysis is already being developed to support EPA's program to restrict certain hazardous wastes from land disposal and would form part of the basis for developing a waste-end tax system. As part of that process, current data on waste stream toxicity need to be augmented. Also, existing data on the health effects of chemicals need to be reviewed. For some waste streams, it might be necessary to develop primary data. The Agency is in the process of refining its techniques for modeling hazardous waste releases and exposure. The analysis and information gathering effort described here should be completed in several years. At that time, it should be possible to design a sophisticated incentive-based degree-of-hazard tax, consistent with the program of land disposal restrictions.

EXHIBIT 4-12

ILLUSTRATIVE TAX SCHEDULES FOR MODERATE RISK CLASSIFICATION

Taxable Year	Tax Rate
Schedule A	
Year 1	$ 15.00/metric ton
Year 2	$ 30.00/metric ton
Year 3	$ 70.00/metric ton
Year 4	$110.00/metric ton
Year 5	$160.00/metric ton
Year 6	$210.00/metric ton
Year 7	$280.00/metric ton
Year 8	$300.00/metric ton
Year 9	$450.00/metric ton
Year 10	$550.00/metric ton
Schedule B	
Year 1	$ 10.00/metric ton
Year 2	$ 25.00/metric ton
Year 3	$ 45.00/metric ton
Year 4	$ 70.00/metric ton
Year 5	$100.00/metric ton
Year 6	$140.00/metric ton
Year 7	$190.00/metric ton
Year 8	$250.00/metric ton
Year 9	$320.00/metric ton
Year 10	$400.00/metric ton
Schedule C	
Year 1	$ 5.00/metric ton
Year 2	$ 10.00/metric ton
Year 3	$ 25.00/metric ton
Year 4	$ 45.00/metric ton
Year 5	$ 70.00/metric ton
Year 6	$100.00/metric ton
Year 7	$140.00/metric ton
Year 8	$190.00/metric ton
Year 9	$250.00/metric ton
Year 10	$320.00/metric ton

1/ The tax rates contained in this exhibit are not intended to be recommended tax rates. They are for illustrative purposes only and are intended to demonstrate one method for increasing tax rates over time.

5. EVALUATION OF ALTERNATIVE TAX OPTIONS

This chapter provides an evaluation of the five alternative tax options discussed in Chapter 4. For illustrative purposes and to ensure a consistent evaluation of all five tax options, each option is designed to raise $1 billion annually to finance the Hazardous Substances Response Trust Fund. Each CERCLA tax option is analyzed in terms of the six criteria presented in Chapter 3: economic impacts, equity, incentives, revenue generation, administrative feasibility, and programmatic effects.

No single tax option was found to perform best on all six criteria. Indeed, these criteria are intended to permit a uniform analysis of the tradeoffs associated with the selection of a particular option, and not to rank the options at this point in time. The ultimate choice of a tax option requires a decision by Congress about the relative importance of these criteria. Because such a decision has not been made, this analysis contains no recommendation about particular tax options.

Because information in some areas is incomplete or lacking, the analysis that follows may be somewhat uneven among the five options. Where data, time, and cost considerations allowed, in-depth analysis was conducted. In many cases, however, the evaluation of options remains qualitative and conceptual rather than quantitative.

5.1 FEEDSTOCK TAX I: MODIFIED RATES

5.1.1 Economic Impacts

Microeconomic Impacts. The DRI Incorporated model of the chemical industry was used to estimate the microeconomic effects for nineteen of the forty-three feedstocks taxed under CERCLA in the evaluation of Feedstock Tax I.[1/] These nineteen feedstocks are responsible for more than 97 percent of Fund revenues under Feedstock Tax I; thus, they provide a reasonable basis for measuring the microeconomic impacts of the tax.

1/ The DRI Chemical Model consists of a set of integrated linear programming models that produce estimates of equilibrium supply and demand quantities for given prices and income levels. The method of analysis employed was comparative statics. An initial model run using prices consistent with the existing CERCLA tax rates and a forecast of 1985 income levels established the base case. A subsequent run with prices consistent with the modified rates and the same 1985 income level was made. Results include estimates of prices and quantities sold for nineteen of the taxed feedstocks proposed in the feedstock options presented in this report.

The method used to gauge economic impacts (and estimate revenues) for both Feedstock Tax I and Feedstock Tax II (Section 5.2) has been to hold constant all factors that influence equilibrium prices and quantities, except the prices of related products that are taxed by CERCLA and the feedstock's own price. These two prices may only change because of changes in the schedule of CERCLA taxes. Products are related either by being substitutes for or complementary to each other.[2/] If the price of a feedstock's substitute increases, that sends a signal to use more of the feedstock. If the price of a feedstock or its complement increases, that sends a signal to use less of the feedstock. The relative strengths of these sometimes offsetting and sometimes reinforcing effects is an empirical matter. This determination is made by collecting data on past experiences and bringing them together in a computer model. The results of the model analysis for Feedstock Tax I are presented in Exhibit 5-1.

The results in the exhibit indicate that raising CERCLA taxes on feedstocks will result in increased prices for these chemicals of approximately the same size as the increased taxes. As Chapter 4 discusses, the CERCLA taxes on many of the feedstocks in the exhibit (e.g., benzene, butanes, napthalene) are raised by approximately $12 per ton under the Feedstock Tax I. For others, such as hydrochloric acid and sodium hydroxide, the CERCLA tax increase is less than $1 per ton. As Exhibit 5-1 shows, the price increases for these taxed feedstocks increase by approximately $12 per ton and $1 per ton, respectively.

The price increases due to higher CERCLA taxes on feedstocks, however, result from a complex interaction of both supply and demand responses to the higher taxes. In some cases, e.g., acetylene and butadiene, these interactions result in price increases that exceed the increased taxes on these products. In other cases, e.g., ethylene and nitric acid, these interactions result in new prices that do not rise by the amount of the tax increase. Indeed, in the case of benzene, the market price falls after the new taxes are imposed. The ability to account for these complex interrelationships is one of the great benefits of using a well-developed model of chemical markets, such as the DRI model used to generate these results.

The changes in the amounts of the feedstocks produced and sold after the higher CERCLA taxes are imposed are also listed in Exhibit 5-1. For the most part, these changes are small, and in many cases, zero. There is a good reason to expect relatively small movements in the quantities of these feedstocks produced and demanded. The results reported in Exhibit 5-1 reflect raising CERCLA taxes on a large number of feedstocks simultaneously. As a consequence, the impact of a higher tax on a given feedstock, is quite different than the expected result if only that particular feedstock's tax were increased. In the latter case, producers who use the taxed feedstock may be able to substitute other feedstocks or processes that reduce their

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2/ Goods are substitutes if one can be used in place of the other. Goods are complements if they are traditionally used in conjunction with each other.

EXHIBIT 5-1

ECONOMIC IMPACTS OF FEEDSTOCK TAX I[1/]

	Summary, 1985					
	Pre-Tax		Post-Tax		Percent Change	
Chemical	Price 2/	Quantity	Price 3/	Quantity	Price	Quantity
Acetylene	628	176	640	175	1.9	(0.6)
Benzene	408	6,010	403	5,919	(1.2)	(1.5)
Butanes	316	2,910	328	2,910	3.8	0.0
Butylenes	318	2,265	330	2,257	3.8	(0.4)
Butadiene	602	1,764	636	1,750	5.6	(0.8)
Ethylene	439	15,726	445	15,675	1.4	(0.3)
Methane	225	9,720	235	9,720	4.7	0.0
Naphthalene	262	56	274	56	4.6	0.0
Propylene	330	7,725	342	7,707	3.6	(0.2)
Toluene	267	961	279	960	4.5	(0.1)
Xylenes	481	2,727	493	2,727	2.5	0.0
Ammonia	163	19,582	169	19,580	3.7	0.0
Chlorine	180	11,468	186	11,109	3.3	(3.1)
Hydrochloric Acid	58	2,791	58	2,791	0.0	0.0
Sodium Hydroxide	174	11,925	175	11,920	0.6	0.0
Sulfuric Acid	51	41,505	52	41,505	2.0	0.0
Nitric Acid	NA	9,389	NA	9,389	NA	0.0
Crude Oil[4/]	170	1,903	170	1,903	0.0	0.0

1/ Estimates are for chemical and fertilizer use only and do not include fuel use. In the model run, the tax was simulated to apply only to non-fertilizer uses of ammonia, nitric acid, and sulfuric acid. All quantities are in thousands of short tons, where quantity is production plus imports. All prices are in constant 1982 dollars per ton.

2/ Pre-tax price includes current CERCLA tax, if any.

3/ Post-tax price includes Feedstock Tax I.

4/ Thousand tons per day.

Source: ICF Incorporated analysis of data provided by DRI Incorporated.

dependence on the now higher taxed chemical. This would result in a drop in that feedstock's usage. However, in the simulation reported in Exhibit 5-1, many other feedstock taxes are also increased. Thus, the attractiveness of substituting one feedstock or process for another after the taxes are increased is reduced or eliminated relative to the single increased tax scenario. Thus, the quantity movements as a result of the tax should be smaller in the many tax increase situations shown in the exhibit.

This prediction of relatively small quantity movements is upheld by the model results. Indeed, many feedstock quantity changes are virtually zero. This suggests that, as a whole, these feedstocks are demanded quite inelastically.

Macroeconomic Impacts. The macroeconomic computer models that might be used to evaluate these impacts generally do not produce estimates that are precise enough to evaluate a $1 billion tax accurately. As explained in Section 3.4, the macroeconomic impacts of a $1 billion CERCLA tax are not likely to differ between a feedstock and waste-end tax. Consequently, the impacts of revising or replacing the current CERCLA feedstock tax to produce $1 billion annually have not been analyzed for any of the five tax options considered in this chapter.

5.1.2 Equity

Retrospective Equity. As outlined in Section 3.1, the retrospective equity of Feedstock Tax I depends on the degree to which it is able to reach broad groups of substances and parties. While the taxpayers of the current feedstock tax are primarily in the petroleum and chemical industries, it is unclear where the ultimate incidence of the tax falls. In the absence of detailed econometric modeling, it is difficult to say with precision how much of the tax is ultimately borne by the 469 companies now paying it and how much is passed down through the stream of production to the firms and consumers that buy the taxed substances. Some generalizations about the retrospective equity of Feedstock Tax I are, however, possible.

As noted in Section 3.1, the broad industrial groups responsible for the cleanup of existing Superfund sites are the petroleum refining, chemical manufacturing, and metal processing industries. Because these industries both produce and use the feedstocks taxed by the current CERCLA tax, it appears that the tax burden is primarily borne by these industries and their customers. This is consistent with the view that equity requires a rough correlation between the industries paying the CERCLA tax and the industries responsible for Fund spending. As noted in Section 3.1, there is an inevitable mismatch between current taxpayers and previously disposed wastes. Because of this mismatch, we do not know whether the distribution of the the tax burden among these industries and the firms within them reflects the degree to which each has contributed to the problems addressed by CERCLA.

The current CERCLA tax falls on forty-three feedstock substances. Analysis of HRS data on the chemical substances found at sites nominated for the National Priorities List (NPL) suggests that only 33 (or 73 percent) of

these feedstocks have contributed to the wastes cleaned up by Superfund.[3/] This analysis also indicates that 15 additional feedstocks are used in the production of the materials found at these sites. In short, the current tax both includes and excludes feedstocks that HRS data indicate could be appropriately taxed. Consequently, some feedstocks (and the firms involved in their production and use) bear a tax burden that available evidence indicates may be unwarranted. Further, still other feedstocks bear no tax, despite their presence at Superfund sites. Both situations result in an inequity.

As for the chemical composition of the materials taxed, the current CERCLA tax raises 66 percent of its revenues from taxes on organic chemicals, 18 percent from inorganic chemicals, and 16 percent from crude oil.[4/] Presumably, the same would prove true under Feedstock Tax I. This can be compared to the substances found at HRS sites which, on a frequency basis (data are not available for a volumetric allocation), are 38 percent organic, 59 percent inorganic, and 3 percent crude oil, and to the substances generated as wastes which, on a weight basis, are 31 percent organic, 69 percent inorganic, and less than 1 percent crude oil. Feedstock Tax I thus appears to over-tax organic chemicals, while undertaxing the inorganics. This suggests that while the current CERCLA tax falls on the broad industrial groups responsible for Fund spending, its distribution among individual substances is not particularly equitable from a retrospective viewpoint.

Prospective Equity. Prospective equity requires that the burden of a CERCLA tax fall on the parties and substances that are likely to cause Fund spending for hazardous substances that have not yet been released into the environment. Further, similarly situated firms ought to pay the same tax, while firms that are different with respect to the likelihood of causing Fund spending ought to be treated differently. Because the current feedstock tax base is broadly defined and has few exemptions, the tax is levied during the production process of all of the substances that are likely to give rise to Superfund spending. It does not matter if Fund spending occurs because the feedstock itself has been spilled into the environment, one of the feedstock's hazardous products is released, or the wastes at the end of the production process have been released into the environment (legally or otherwise). The point is simply that by taxing all feedstocks very early in the production process, EPA can be confident that firms producing any substance responsible for CERCLA spending have paid into the Fund. In the absence of detailed econometric modeling, however, we cannot estimate the amount of the tax burden passed through the chain of production to these substances.

3/ The list of feedstocks used in the production of substances found at Superfund sites provides a starting point for the selection of feedstocks to tax. Appearance at sites, however, is simply one criterion for choosing such feedstocks and has been used for the purposes of this report. Congress may, of course, consider other criteria in selecting the subjects for taxation.

4/ "Analysis of Superfund Revenue," Environmental Law Institute, prepared for the Office of Emergency and Remedial Response, U.S. EPA, 12/22/83, p 14.

On the other hand, by extending the reach of the feedstock tax so widely, it is possible that the tax burden will not fall equally on similarly situated firms and that some substances and parties may bear a tax burden that is not commensurate with their contribution to Fund spending. For example, benzene is taxed under the current CERCLA tax. To the extent that the price of benzene has risen in response to the tax, products made with benzene also bear some part of the tax, even though they may not pose an equal threat to the environment. The particular product produced and the method by which it and any attendant wastes are handled also affect the threat to the environment. Moreover, two firms that handle identical volumes of a taxed feedstock might, because of their management practices, create significantly different risks to the environment, yet their liability under the feedstock tax would be the same.

In short, the current feedstock tax offers broad coverage of all the substances and situations likely to evoke Fund spending. The result of doing so is that this tax does not produce a high correlation between a firm's tax burden and the chance that its behavior will lead to Fund spending. This is because the tax does not discriminate among firms according to their use of the taxed feedstocks, including the hazardousness of the materials made from the feedstocks and the management of the wastes produced in the production process. While the problem of overinclusiveness might be expected with any form of a feedstock tax, the problem is somewhat worse with regard to Feedstock Tax I. Because the tax base of the current tax includes some feedstocks that are not responsible for hazardous substances and omits others that are responsible, Feedstock Tax I is weaker in terms of prospective equity than the Feedstock Tax II, which taxes a different set of feedstocks at different rates to account for this problem.

5.1.3 Incentives

Changes in the rates at which specific substances are taxed provides a potential incentive for firms to modify their behavior in the use of those substances. Feedstock Tax I adjusts the current feedstock tax to generate $1 billion annually in revenues. The result is an increase in the tax rates of all substances of 244 percent. Despite the size of this increase, however, evidence presented in Section 5.1.1 indicates that feedstock prices and production quantities are not likely to change significantly. Because of the indirect link between feedstock costs and hazardous waste generation, the feedstock tax is unlikely to produce significant incentives for environmental protection. Further, evidence from the DRI model indicates that changes in feedstock prices and quantities are likely to be quite small, and that the overall mix of feedstocks used will remain unaffected. This suggests that associated production process changes (and changes in waste generation) may not be significant. Because a firm's tax liability under Feedstock Tax I is independent of the techniques it uses in managing its hazardous waste, the tax is also expected to have little effect on waste management practices.

5.1.4 Revenue Generation

Ability to Generate Revenue. The current feedstock tax has, in large measure, generated the revenue that could be expected in light of changing

economic conditions. In part because current rates are such a small fraction of a feedstock's price and in part because the tax was levied on a wide range of substances, the tax base does not appear to have decreased significantly in response to the tax. As discussed below, the revenue shortfalls (about 18.7 percent) that have occurred appear to be attributable to difficulties in prediction methodologies rather than tax-induced changes in the production of taxed substances. Evidence from the DRI model suggests that this would remain the case under Feedstock Tax I. The model's results indicate that among feedstocks for which estimates are available, a revenue shortfall attributable to shrinkage in the tax base of less than 1 percent may be anticipated. If the same shortfall were experienced for all taxed feedstocks, the tax would raise about $999 million.

Predictability of Revenue Generation. The experience thus far with revenue collection from a feedstock tax suggests that tax revenues are reasonably predictable. Revenues collected from the current feedstock tax have averaged 15 percent less than projected revenues (see Exhibit 5-2). In 1980, EPA projected that from June 1981 to September 1985, collections from the feedstock tax would total about $1,348 million.[5/] Actual collections were about $1,139 million.[6/]

There appear to be two related reasons for this shortfall. First, the 1980 revenue predictions did not account for the severe recession of 1981-1983. Second, studies of the relationship between the existing CERCLA tax base and summary measures of the performance of the economy such as GNP tended to show a fairly stable relationship when the 1980 predictions were made. This relationship, however, is not exact and may be changing as indicated by the fact that the production of substances taxed by CERCLA did not recover from the recession as quickly as expected. Consequently, EPA overestimated the production of taxable substances and subsequently observed shortfalls of 16 to 22 percent of the predicted revenues during this period.

5.1.5 Administrative Feasibility

The administrative feasibility and reporting burdens of Feedstock Tax I should closely resemble the feasibility and burdens of the current feedstock tax, since the only change is an increase in the tax rates. This section, therefore, discusses Feedstock Tax I in terms of experience with the current CERCLA tax.

Taxable Parties. The present CERCLA tax is levied on producers, importers and exporters, and users of 42 common feedstock chemicals and crude oil at the

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5/ U.S. Department of the Treasury, Office of Tax Analysis, 1980.

6/ U.S. Department of the Treasury. Financial Management Service, Trust Fund Branch. Fiscal years 1981 through 1984 data were obtained from Financial Management Service Monthly Reports. Fiscal year 1985 collection projection was made by the Office of Tax Analysis, U.S. Department of the Treasury.

EXHIBIT 5-2

CERCLA FEEDSTOCK TAX REVENUES

Fiscal Year	Collections	Predictions	Percent Surplus or Shortfall from Predictions
1981 (Quarters III & IV)	$127,900,000	$129,700,000	-1%
1982	$243,994,000	$290,000,000	-16%
1983	$230,225,000	$297,000,000	-22%
1984	$261,200,000	$304,000,000	-14%
1985	$276,000,000 1/	$327,000,000	-16%
TOTAL	$1,139,319,000	$1,347,700,000	-15%

1/ Estimated.

Source: Collections: U.S. Department of the Treasury. Financial Management Service, Trust Fund Branch. Fiscal years 1981 through 1984 data were obtained from Financial Management Service Monthly Reports. Fiscal year 1985 collection projection was made by the Office of Tax Analysis, U.S. Department of the Treasury.

Predictions: U.S. Department of the Treasury. Office of Tax Analysis. These predictions represent the Treasury Department's original 1980 estimates for feedstock tax revenues. The fiscal year 1985 prediction of $327,000,000 includes an estimated $16,000,000 expected to be collected in fiscal year 1986 after the close of the 1985 fiscal year.

point of first sale or use (Feedstock Tax I would tax these same parties). In practice, this means that when the tax is levied on domestically produced crude oil, it is paid by operators of U.S. refineries when the oil is received at the refinery. When levied on imports of petroleum products (including crude oil), the tax is paid by the importer. When levied on international exports of domestically-produced crude oil, it is paid by the exporter. When levied on chemicals, it is paid by the manufacturer, importer, or exporter when the chemicals are sold, or by the manufacturer when they are used on site to make other intermediate or final products. A total of 848 taxpayers have filed returns since the tax was instituted in 1981,[7/] although the tax is currently paid by approximately 467 companies.[8/] The number of taxpayers may vary by as many as 100 from quarter to quarter. Furthermore, according to at least one estimate, a small number of companies (about 12) with very large production volumes pay almost 70 percent of the feedstock tax.[9/]

Firms required to pay the current feedstock tax have encountered little difficulty in recognizing their tax liability. The relatively small number of substances subject to a feedstock tax, the large volume of these substances commonly produced, imported, or exported at individual facilities, and the relatively clear-cut points at which the tax is assessed have assisted this process.[10/] Furthermore, much of the information required for producers and operators to determine their tax liability is available from sources such as sales records, purchase invoices, and production records.

The IRS also has encountered no major difficulties in identifying taxable parties for the current CERCLA feedstock tax. The IRS initially used mailing lists developed by EPA and the Department of Energy (for refineries) to identify parties with a potential CERCLA tax liability. It then notified these parties of the new tax provisions and provided Federal excise tax forms for their use.

For many of the taxable substances, potential taxpayers can be identified using existing commercial and technical sources of information, such as the NIH/EPA Chemical Information System (CIS), the DRI Chemical Data Bank, the SRI

7/ Internal Revenue Service, Statistics of Income Division, Special Projects Branch, "Superfund Revenue Data," August 21, 1984.

8/ U.S. Congress, Joint Committee on Taxation, "Background and Issues Relating to HR 5640, the Superfund Expansion and Protection Act of 1984," JCS-27-84, July 23, 1984, p. 17.

9/ Ibid.

10/ Specialized publications directed to particular industries sometimes have helped to inform firms of the new taxes. See, for example, the description and analysis of the CERCLA tax in C.E. Reese, "Environmental Excise Taxes on Production or Importing of Crude Oil and Petrochemical Feedstocks," 30 Oil and Gas Tax Q., 222-240 (December 1981).

Directory of Chemical Producers, and the SRI Chemical Economics Handbook. Because the tax is levied at the point of first sale, buyers provide a potential additional source of verification of the identity of taxable parties.

Taxable Substances. The burden on government and industry of a feedstock tax depends in part on the number of chemicals taxed and the point in the production process where the tax is levied. Generally, the smaller the number of taxable substances and the earlier in the production cycle the tax is levied, the smaller the costs and complexity of administration. The present feedstock tax is based on a relatively small number of taxable substances, principally primary petrochemicals, inorganic chemicals, and petroleum, from which hazardous substances are generated. These same substances would be taxed under Feedstock Tax I. Imposing the tax on these primary chemicals early in the chemical production process may simplify administration of the tax by requiring the IRS to collect the tax from a relatively small number of taxpayers.

Defining the taxable substances for the purposes of administering Feedstock Tax I would not impose a heavy burden on the IRS because Congress specified in CERCLA what substances are taxed. The CERCLA tax was passed by Congress on December 11, 1980, and temporary IRS regulations providing for its administration as an excise tax pursuant to Sections 4611 and 4662 of the Internal Revenue Code were promulgated on July 22, 1981, establishing requirements that were effective as of April 1, 1981.[11/] Thus, the first tax receipts were received within six months of the passage of the Act. Formal definitions of such terms as "Crude Oil," "Petroleum Product," and "Refining" were supplied in regulations proposed on October 21, 1983. Those regulations also provide clarifying definitions of the taxed chemicals and other terms relevant to the chemical tax.[12/] Enforcement of the tax has not been delayed until the definitions are enacted.

Relatively few questions of interpretation with respect to whether certain chemicals are subject to taxation have been encountered. The two most important interpretive questions to arise -- whether taxes should be levied on light hydrocarbons added to gasoline, diesel fuel, and aviation fuel during the refining process and on certain chemicals with a transitory presence during smelting, refining, and metal extraction processes -- were recently resolved by legislation in the Tax Reform Act of 1984.[13/]

Taxable Activities. The taxable activities specified by the present feedstock tax (the same activities that would be specified under Feedstock Tax

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11/ 26 CFR Part 57, Temporary Regulations in Connection with Environmental Taxes, 46 FR 37631 (July 22, 1981).

12/ 26 CFR Part 52, Environmental Taxes on Petroleum and Certain Chemicals and Hazardous Waste, 48 FR 48839 (October 21, 1983).

13/ Section 1019, Tax Reform Act of 1984.

I) are generally quite simple to define and interpret for the purpose of administering the tax. Form 6627 (shown in Exhibit 5-3), for example, requires the following actions to be reported under the tax on petroleum: receipt of crude oil at a U.S. refinery, entry of petroleum products into the U.S., and use in the U.S. or export from the U.S. of crude oil. However, because the tax is imposed only once with respect to crude oil and petroleum, the IRS has been required to specify in regulations what methods will be sufficient to show that certain taxable activities do not lead to tax liability because the tax has already been paid. Furthermore, for the tax on feedstocks, the IRS has been able to use definitions of "sale or use" found in regulations already promulgated for other taxes. Taxpayers selling or using taxable chemicals are required to pay the tax, but they may receive refunds if they can show that the taxed transaction should not have been taxed because the tax had already been paid by another taxpayer.

Recordkeeping and Reporting. The current feedstock tax relies on existing industry recordkeeping systems to provide adequate information to determine feedstock tax liability, as would Feedstock Tax I. The taxpayers are companies with the resources and experience to maintain adequate records as a normal business practice. Sales records, purchase invoices, and production records all provide information about the types of taxable substances sold or received from which tax liability can be computed and compliance assessed. The IRS therefore has not had to develop extensive recordkeeping requirements for the existing feedstock tax. The proposed regulations are most precise concerning the records necessary to verify that the tax has already been paid on a particular amount of crude oil or petroleum (a statement on a bill of lading or invoice, Customs documents, a written statement by the person entering the crude oil into the country, "or any other form of documentation" establishing the facts to the satisfaction of the IRS). No particular form of records is prescribed for supporting claims to credits and refunds. Taxpayers are required only to keep whatever records are necessary to verify their tax return.[14/]

Taxpayers who cannot use measured quantities of chemicals to compute their tax are required to choose instead one of three methods: (1) average quarterly quantities derived from engineering data, (2) normal periodic testing programs, or (3) consumption formulas based on the ratio of the number of pounds of taxable chemical required to produce a substance to the measured number of pounds of the substance produced. Once the taxpayer has elected to use one of these methods, a change of method requires IRS approval.

The current feedstock tax does not impose a heavy reporting burden. Taxable parties must complete a simple one page reporting worksheet (Form 6627) that lists the substances subject to taxation and their respective tax rates. Tax liability can also be calculated on this form, which is attached to the standard IRS Quarterly Federal Excise Tax Return (Form 720) required of many firms and used for the collection of more than twenty different excise taxes.

14/ 26 CFR Section 52.4662-3, 48 FR 48849 (October 21, 1983).

EXHIBIT 5-3

IRS TAX FORMS USED FOR COLLECTION OF FEEDSTOCK TAX

Form **6627**
(May 1981)
Department of the Treasury
Internal Revenue Service

Environmental Taxes

▶ See instructions on back
▶ Attach to Form 720

OMB No. 1545-0245
Expires April 1, 1983

Name

Employer identification number as shown on Form 720

Date quarter ended | S.I.C. Number

Part I Tax on Petroleum

	(a) Barrels	(b) Rate	(c) Tax
1 Crude oil received at a U.S. refinery . . . . . bbls.			
2 Crude oil taxed prior to receipt at refinery . . . . . bbls.			
3 Taxable crude oil (Subtract line 2 from line 1) . . . . . ▶	bbls.	$ .0079 bbl.	$
4 Petroleum products entered into the U.S. . . . . ▶	bbls.	$ .0079 bbl.	$
5 Crude oil used in or exported from the U.S. before the tax was imposed . .	bbls.	$ .0079 bbl.	$
6 Total petroleum tax. Enter here and on Form 720 on the line for IRS No. 53 . . . . . ▶			$

Part II Tax on the Sale or Use of Certain Chemicals

Chemical	(a) Tons	(b) Rate	(c) Amount	Chemical	(a) Tons	(b) Rate	(c) Amount
1 Acetylene		$4.87		22 Hydrochloric acid		$0.29	
2 Ammonia		2.64		23 Hydrogen fluoride		4.23	
3 Antimony		4.45		24 Lead oxide		4.14	
4 Antimony trioxide		3.75		25 Mercury		4.45	
5 Arsenic		4.45		26 Methane		3.44	
6 Arsenic trioxide		3.41		27 Naphthalene		4.87	
7 Barium sulfide		2.30		28 Nickel		4.45	
8 Benzene		4.87		29 Nitric acid		0.24	
9 Bromine		4.45		30 Phosphorus		4.45	
10 Butane		4.87		31 Potassium dichromate		1.69	
11 Butylene		4.87		32 Potassium hydroxide		0.22	
12 Butadiene		4.87		33 Propylene		4.87	
13 Cadmium		4.45		34 Sodium dichromate		1.87	
14 Chlorine		2.70		35 Sodium hydroxide		0.28	
15 Chromite		1.52		36 Stannic chloride		2.12	
16 Chromium		4.45		37 Stannous chloride		2.85	
17 Cobalt		4.45		38 Sulfuric acid		0.26	
18 Cupric oxide		3.59		39 Toluene		4.87	
19 Cupric sulfate		1.87		40 Xylene		4.87	
20 Cuprous oxide		3.97		41 Zinc chloride		2.22	
21 Ethylene		4.87		42 Zinc sulfate		1.90	

43 Total Chemical Tax. Enter here and on Form 720 on the line for IRS No. 54 . . . . . ▶ $

For Paperwork Reduction Act Notice see back of form. Form 6627 5-d.

EXHIBIT 5-3 (continued)

IRS TAX FORMS USED FOR COLLECTION OF FEEDSTOCK TAX

Paperwork Reduction Act Notice

The Paperwork Reduction Act of 1980 says we must tell you why we are collecting this information, how we will use it, and whether you have to give it to us. We ask for the information to carry out the Internal Revenue laws of the United States. We need it to ensure that you are complying with these laws and to allow us to figure and collect the right amount of tax. You are required to give us this information.

General Instructions

Purpose of this Form.—Use this form to figure the tax liability for petroleum and chemicals subject to the environmental taxes. Attach this form to Form 720, Quarterly Federal Excise Tax Return, as a supporting schedule. The tax is effective beginning April 1, 1981.

Who Must File.—The following must complete this form and pay these taxes:

For Petroleum—

1. The operator of a U.S. refinery that receives crude oil;
2. Any person that imports petroleum products for consumption, use, or warehousing; or
3. Any person using or exporting crude oil on which the environmental tax has not been paid.

For Chemicals—Any manufacturer, producer, or importer who sells or uses taxable chemicals.

When to File.—File Form 720 quarterly by the last day of the month following the end of the quarter. You may have an additional 10 days to file your return if you have made all deposits of the taxes due for the quarter on time and in full. See Form 720 for rules on depositing the taxes. If you are reporting two or more excise taxes, and they are due on different dates, you may file by the later filing date if you made all deposits on time.

Where to File.—

If your principal business, office or agency or legal residence in the case of an individual, is located in ▼	Send your return to: Internal Revenue Service Center At this address ▼
New Jersey, New York City and counties of Nassau, Rockland, Suffolk, and Westchester	Holtsville, NY 00501
New York (all other counties), Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont	Andover, MA 05501
District of Columbia, Delaware, Maryland, Pennsylvania	Philadelphia, PA 19255
Alabama, Florida, Georgia, Mississippi, South Carolina	Atlanta, GA 31101
Michigan, Ohio	Cincinnati, OH 45999
Arkansas, Kansas, Louisiana, New Mexico, Oklahoma, Texas	Austin, TX 73301
Alaska, Arizona, Colorado, Idaho, Minnesota, Montana, Nebraska, Nevada, North Dakota, Oregon, South Dakota, Utah, Washington, Wyoming	Ogden, UT 84201
Illinois, Iowa, Missouri, Wisconsin	Kansas City, MO 64999
California, Hawaii	Fresno, CA 93888
Indiana, Kentucky, North Carolina, Tennessee, Virginia, West Virginia	Memphis, TN 37501

If you have no legal residence, principal place of business, or principal office or agency in any Internal Revenue district, file your return with the Internal Revenue Service Center, Philadelphia, PA 19255.

Definitions

Barrel.—42 U.S. gallons.

Crude oil.—includes crude oil condensates and natural gasoline.

Domestic crude oil.—any crude oil produced from a well located in the United States.

Petroleum product.—includes crude oil.

Refineries that produce natural gasoline.—means any U.S. refinery that produces natural gasoline from natural gas. This gasoline is treated as having been received at the refinery at the time it is produced.

United States.—includes the 50 States, the District of Columbia, the Commonwealth of Puerto Rico, any U.S. possession, the Commonwealth of the Northern Mariana Islands, the Trust Territory of the Pacific Islands, the Continental Shelf areas, and any foreign trade zone of the U.S.

U.S. Refinery.—any facility in the U.S. where crude oil is refined.

Exemptions.—crude oil used for extracting oil or natural gas on the premises where the crude oil was produced is exempt from the tax.

Importer.—any person importing the taxable chemical or petroleum product into the U.S. for consumption, use, or warehousing.

Ton.—means 2,000 pounds. If the chemical is a gas, the term "ton" means the amount of gas (in cubic feet) which equals 2,000 pounds. You must take the number of cubic feet of the gas and convert it into pounds. For example, to compute the taxable tons of ammonia you must multiply the cubic feet of ammonia by .0482 (pounds per cubic foot) and divide the answer by 2,000.

Part I—Tax on Petroleum

Fractional barrels are taxed at a proportionate rate using the fraction produced by the number of gallons involved over 42 gallons and then applying the fraction against the price per barrel.

Products may only be taxed once. If an environmental tax has been paid on an item, it cannot be reimposed on a subsequent person who would ordinarily be liable for the tax.

The provisions of sections 7652(a)(3) and 7652(b)(3) relating to revenues from Puerto Rico and the Virgin Islands do not apply to environmental taxes.

Part II—Tax on the Sale or Use of Certain Chemicals

The list of taxable chemicals is on page 1 of this return. The direct use of ammonia as a fertilizer is not taxable.

CONVERSION TABLE

Density of Gases at Standard Conditions (0°C., 1 atm) Pounds per cubic foot			
Ammonia	.0482	Chlorine	.2011
Acetylene	.0732	Ethylene	.0783
Butane	.1686	Methane	.0448
Butylene	.1665	Propylene	.1194

Exceptions.—No environmental tax shall be imposed:

1. on methane or butane if it is used as a fuel. The person using the chemical for the taxable purpose (non-fuel use) is then considered to be the manufacturer and is liable for filing the return and paying the tax.
2. on nitric acid, sulfuric acid, ammonia, or methane which is used in the production of ammonia, and is
   (a) used in the manufacture of fertilizer by the manufacturer, producer, or importer;
   (b) sold for use in the manufacture of fertilizer by the purchaser; or
   (c) sold for resale by the purchaser to a second purchaser for use in the manufacture of fertilizer.
3. on sulfuric acid produced solely as a byproduct of, and on the same site as, air pollution control equipment.
4. on any substance to the extent derived from coal.

If the environmental tax is paid on any taxable chemical and that chemical is later used to manufacture or produce any other substance subject to the environmental tax an amount equal to the tax paid will be allowed as a credit or refund. If an environmental tax has been paid on nitric acid, sulfuric acid, ammonia, or methane used to make ammonia and any person later uses that substance or sells it for use as a fertilizer or in the manufacture of fertilizer, an amount equal to the excess of the tax actually paid over the amount of tax which was due will be allowed as a credit or refund. Credits may be taken on line 2 of Form 720. Form 843, Claim, should be used to claim a refund. In both instances the credit or refund (without interest) is allowable as if it were an overpayment of an environmental tax.

Specific Instructions

Name.—Enter the name that will be shown on Form 720 as the taxpayer.

Employer identification number.—Enter the employer identification number shown on Form 720.

S.I.C. number.—Enter the four-digit code number that best describes the activity that results in your having to report and pay the environmental tax. See Notice 603 for a listing of these code numbers.

Part I.—Enter on:

Line 1.—The number of barrels of crude oil received at the refinery.

Line 2.—The number of barrels on which the tax has been paid. For example, crude oil imported into the U.S. and the tax was paid then later delivered to a refinery. Your records must show that the tax was previously paid. A statement from the person who paid the tax that the tax has been paid will fulfill this requirement.

Line 3.—Subtract line 2 from line 1. This will be the number of barrels that are subject to the tax. Enter this amount in column (a) of line 3. Line 3 column (b) is the tax rate. Multiply column (a) by column (b) and enter the tax liability in column (c).

Line 4.—The number of barrels of petroleum products entered into the U.S. Enter this figure in column (a), multiply it by the tax rate in column (b) and enter the tax liability in column (c).

Line 5.—Repeat the procedure for line 4.

Line 6, column (c).—Add the figures on lines 3c, 4c, and 5c, and enter the total on line 6, column (c). This figure must also be shown on the line for IRS No. 53 on Form 720.

Part II.—Enter on:

Line 1, column (a).—The number of tons sold or used. If the chemical is in a gaseous form, see the conversion table above.

Line 1, column (c).—The amount of tax due. Multiply the figure in column (a) by the tax rate in column (b).

Lines 2 through 42.—Repeat the procedure shown for line 1 on the appropriate line for any other chemical you have sold or used.

Line 43, column (c).—Add the figures on lines 1 through 42 and enter the total tax due on chemicals. This figure must also be shown on the line for IRS No. 54 on Form 720.

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Once a firm has filed as a taxpayer, it is required to continue to file quarterly tax returns, even if it has not incurred liability for the tax in that quarter, until it can show that it has ceased the operations that made it liable for the tax. If, on the other hand, a firm's tax liability exceeds a certain amount, it may be required to file monthly or semi-monthly tax returns.

Monitoring and Enforcement. Because the IRS collects numerous excise taxes at both the manufacturing and retail levels, it already has well-established collection, monitoring, and enforcement systems available for use to enforce the feedstock tax. The current feedstock tax is subject to the existing IRS excise tax audit procedures and audit cycles, as Feedstock Tax I would be.

The relatively small numbers of taxable parties and the fact that many of the taxable substances are produced and transferred in large volumes (subject to review and detection through the use of existing company records) suggest that detecting non-compliance should not impose a particularly heavy burden on the IRS. The sale or receipt of a taxable substance, for example, should be readily identifiable from production and sales records.

Potential compliance problems could arise when taxable substances are used by their producers to make intermediate or final products. Although no sale or transfer takes place, the substances are still subject to taxation if they are used in the manufacturing process. An integrated producer, importer, or exporter therefore must track the use of these substances within its own manufacturing process and report tax liability on these substances. As noted above, special procedures for identifying and quantifying the generation of such substances must sometimes be used by taxpayers.

Exemptions, certifications, and other special situations can add to the burden of monitoring and enforcement by complicating recordkeeping and reporting and creating additional opportunities for mistakes or misrepresentation. As initially enacted, the present CERCLA feedstock tax provided exemptions for the following listed substances:

-- Methane or butane used as fuel;

-- Methane, nitric acid, sulfuric acid, and ammonia used for fertilizer production;

-- Sulfuric acid produced as a byproduct of air pollution control; and

-- Any substance derived from coal.

Regulations proposed in 1983 provided specific forms for exemption certificates to be used to establish the right to exemption from taxation for sales or use of methane, nitric acid, sulfuric acid, and ammonia used for fertilizer production. No similar provisions specified how eligibility for the other exemptions was to be proven. Section 1019 of the Tax Reform Act of 1984 eliminated this certification provision. Thus, in the case of each of

the exemptions, IRS must rely upon ordinary business records in verifying claims to the exemption.

Little information currently is available on the compliance rates for the present CERCLA feedstock tax, although substantial compliance with the tax appears to exist. Revenues have not exceeded initial projections, but the difference is not extreme and probably cannot be attributed to problems of administration or non-compliance. The IRS has not yet undertaken large-scale audit activities.

Separate records of the cost of administering the CERCLA feedstock tax are not maintained by IRS. Costs of administration, however, are not large. The tax has required only two relatively limited rulemaking procedures. Collection and audit costs have not required increases in the annual budget requests for the departments administering the tax. To date, therefore, it appears that the administrative burden of the tax has not been heavy.

5.1.6 Programmatic Effects

The current feedstock tax has not had any apparent effects on existing Federal or State hazardous waste regulatory programs (e.g., RCRA). It has not required changes in RCRA recordkeeping or reporting requirements, affected regulatory compliance, or led to changes in hazardous waste regulatory enforcement. In addition, no effects on State tax programs have been identified, although significant increases in the Federal tax rates could impair revenues of States that tax the same industries. In the Federal system, action by Congress may preempt State or local action on the same subject, and Congress attempted in CERCLA to structure the relationship of the present feedstock tax to other State or local taxes through Section 114(c), which states:

> Except as provided in this Act, no person may be required to contribute to any fund, the purpose of which is to pay compensation for claims for any costs of response or damages which may be compensated under this title. Nothing in this section shall preclude any State from using general revenues for such a fund, or from imposing a tax or fee upon any person or upon any substance in order to finance the purchase or prepositioning of hazardous substance response equipment or other preparations for the response to a release of hazardous substances which affects such State.

The meaning of this clause has not yet been fully clarified. A challenge to the transfer tax on hazardous chemicals and petroleum levied under the New Jersey Spill Compensation and Control Act, on the grounds that section 114(c) of CERCLA preempted the State tax, was dismissed by Federal courts.[15/] The

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15/ Exxon Corp. v. Hunt, 17 ERC 1969 (3rd Cir., 1982), cert. denied 103 S. Ct. 727 (1983).

New Jersey Tax Court found that the New Jersey Spill Tax was not preempted by CERCLA, but apparently suggested that Congress could have precluded the States from using such a tax if it had chosen to do so.[16/] Other more definitive interpretations of section 114(c) may, of course, be made by other courts in the future. Feedstock Tax I does not modify section 114(c), or its effects, in any way.

5.2 FEEDSTOCK TAX II: MODIFIED RATES AND SUBSTANCES

5.2.1 Economic Impacts

Microeconomic Impacts. Like Feedstock Tax I, Feedstock Tax II has been evaluated using the DRI chemical model. Exhibit 5-4 displays the changes in the prices and quantities that are estimated to occur with modifications to CERCLA's tax rates and taxable substances. Under Feedstock Tax II, for the butylenes, propylene, and butadiene, tax rate decreases led to real price declines but were also accompanied by quantity decreases. For these substances, tax decreases were not accompanied by quantity increases because equilibrium quantities depend not only on a feedstock's own price but also on the prices and quantities of substitute and complementary feedstocks. For these three feedstocks, the effect of the price changes on the complementary and substitute feedstocks outweighed the effects generated by the change in the substances' own price.

To illustrate, cumene is a product that is made from benzene and propylene. Under Feedstock Tax II, the tax on benzene is increased and the tax on propylene is decreased. Benzene's share of the cost of producing cumene is larger than propylene's share. In turn, the price of cumene may be expected to increase, and its quantity demanded may be expected to decrease. The result is a decrease in the demand for propylene, in spite of a decrease in its tax and price. In other words, the price of a feedstock used in conjunction with propylene was increased, thus signaling a reduction not only in benzene but also in its complementary products.

DRI's model results indicate that the production of some substances would be relatively unresponsive to price changes brought about by Feedstock Tax II. Naphthalene, for example, experienced a 29 percent increase in price with no quantity change. The production of other feedstocks, however, was affected significantly. Toluene production, for example, fell 27 percent in response to a 16 percent increase in price.

Changes in the prices and quantities of these chemical substances may lead to changes in employment, investment, net income, and profitability within the affected industries. The estimation of such effects is complex and is not possible given available information. However, some generalizations can be made on this issue. The effect of microeconomic price changes on industry

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16/ Exxon Corp. v. Hunt, 190 N.J. Super. Ct. 131 (1983).

EXHIBIT 5-4

ECONOMIC IMPACTS OF FEEDSTOCK TAX II[1/]

	Summary, 1985					
	Pre-Tax		Post-Tax		Percent Change	
Chemical	Price 2/	Quantity	Price 3/	Quantity	Price	Quantity
Acetylene	628	176	668	170	6.4	-3.4
Benzene	408	6,010	430	5,872	5.4	-2.3
Butanes	316	2,910	312	2,946	-1.3	1.2
Butylenes	318	2,265	316	2,257	-0.6	-0.4
Butadiene	602	1,764	594	1,762	-1.3	-0.1
Ethylene	439	15,726	436	15,748	-0.7	0.1
Methane	225	9,700	228	9,700	1.2	0.0
Naphthalene	262	56	339	56	29.3	0.0
Propylene	330	7,725	328	7,707	-0.6	-0.2
Toluene	267	961	312	696	16.9	-27.6
Xylenes	481	2,727	485	3,125	0.8	14.6
Ammonia	163	19,582	162	19,580	-0.6	0.0
Chlorine	180	11,468	198	11,099	10.0	-3.2
Hydrochloric Acid	58	2,791	60	2,791	3.4	0.0
Sodium Hydroxide	174	11,925	175	11,920	0.6	-0.04
Sulfuric Acid	51	41,505	51	41,505	0.0	0.0
Nitric Acid	NA	9,389	NA	9,389	NA	0.0
Phosphoric Acid	500	9,511	500	9,511	0.0	0.0
Crude Oil[4/]	170	1,903	170	1,903	0.0	0.0

1/ Chemical use only. All quantities in thousands of short tons, where quantity is production plus imports. All prices in constant 1982 dollars per ton.

2/ Pre-tax price includes current CERCLA tax, if any.

3/ Post-tax price includes modified feedstock tax.

4/ Thousand tons per day.

Source: DRI Incorporated.

must be interpreted in light of the accompanying changes in equilibrium quantities. In general, given a tax increase, any price change accompanied by a decrease in equilibrium quantity reduces producers' profitability and tends to reduce employment and capital investment associated with the substance. On the other hand, tax increases that result in higher prices and increased quantity increase producers' profitability and tend to increase the employment and investment associated with production of the substance.

5.2.2 Equity

Retrospective Equity. Like the current feedstock tax, Feedstock Tax II would be paid primarily by the petroleum refining and chemical industries. The fact that both the producers and users of taxed feedstocks are a part of the industries believed responsible for existing Superfund sites indicates that Feedstock Tax II meets the broad test of retrospective equity set out by Congress.

With regard to the distribution of the tax burden among different types of chemical substances, Feedstock Tax II raises 35 percent of its revenue from organic feedstocks, 53 percent from inorganics, and 12 percent from crude oil. The feedstocks responsible for wastes and substances found at Superfund sites are, on a frequency basis, 38 percent organic, 59 percent inorganic, and 3 percent crude oil, while currently generated wastes are, on a weight basis, 31 percent organic, 69 percent inorganic, and less than 1 percent crude oil. Feedstock Tax II, therefore, appears to undertax inorganic chemicals somewhat, and place a higher tax burden on crude oil than might be justified by either substances generated as wastes or substances found at sites. However, because crude oil may be underrepresented in the data on both wastes generated and substances found at sites, the mismatch may not have significant equity consequences.

Because Feedstock Tax II was designed in light of the substances found at HRS sites, there is a high correlation between the tax burden on particular feedstocks and the frequency with which each is found at Superfund sites. In other words, each feedstock used in the production of these hazardous substances is taxed and each is generally taxed at a rate that reflects the frequency of finding it at such sites.[17/] Only because of the adjustment of rates to reflect the 33 percent of product price limit, is there is a mismatch between the tax bills of particular substances and the frequency of finding those substances at Superfund sites. In short, while Feedstock Tax II falls on the industries believed to be responsible for Superfund spending, there is

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17/ As noted in Section 4.2, the frequency of finding a byproduct of a particular feedstock at HRS sites is used only as a rough proxy for the feedstock's contribution to cleanup costs. Many other factors that affect cleanup costs are likely to be determined by the types of substances found at sites, but detailed information about those factors sufficient to evaluate a tax system is not available.

somewhat of a mismatch between the distribution of the tax burden across different types of chemical substances and the distribution indicated by the data.

Prospective Equity. The key strength of Feedstock Tax II in this regard is that it offers full coverage of all potentially hazardous substances. In short, if a substance is likely to give rise to Superfund spending, a CERCLA tax will have been paid at some point in its production, even in cases of illegal dumping, product spills, or the cleanup of non-RCRA regulated wastes. The extent to which the tax will have been passed on to the party responsible for releasing a hazardous substance, however, depends on market conditions controlling the economic incidence of the task.

Like Feedstock Tax I, Feedstock Tax II may spread the tax burden more widely than is appropriate. To the extent that derivatives of the same taxed feedstock are used in ways posing different levels of threat to the environment, an inequity may result because the tax burden on both substances is the same, despite the fact that their likelihood of causing Fund spending is different. Further, because Feedstock Tax II does not discriminate among substances based on the methods by which they are managed, an inequity may result among firms. For example, the tax on chlorine may be partially passed on to firms manufacturing chlorofluorocarbons (CFCs), which in turn pass on some of the tax to the purchasers of CFCs, such as computer manufacturers that use CFCs as a solvent to clean newly manufactured computer circuits. Once used, these solvents become a hazardous waste. Two companies may purchase the same amount of CFCs and produce the same amount of hazardous waste, yet one may be extremely careful to prevent a release of the wastes while the other acts less responsibly and lets some wastes enter the environment. Both will bear an equal amount of the tax burden while contributing to likely Fund spending in different degrees.

In short, by taxing every feedstock that may directly or indirectly produce a threat to the environment, Feedstock Tax II offers a guarantee that the tax will have been paid at some point in the production of any substance likely to provoke Fund spending. Conversely, because several substances of varying hazard can be produced from a single taxed feedstock and because such substances may be managed in different ways, Feedstock Tax II may impose a tax burden on substances and parties that is not commensurate with the threat they pose to the environment.

5.2.3 Incentives

Feedstock Tax II eliminates the taxation of ten feedstocks currently taxed and adds fifteen previously untaxed feedstocks to the tax base. This tax also changes tax rates substantially for several feedstocks, increasing some and decreasing others. In general, because of the limited connection between the costs of feedstocks and production of hazardous wastes, the feedstock tax is not expected to cause strong incentives for environmental protection.

As a result of changes in the tax base and the tax rates, the cost of using particular feedstocks changes relative to the cost of using other

feedstocks. As shown in Section 5.2.1, changes in relative costs provide incentives for producers to change the mix of feedstocks used in production and to change their production processes. Because many of the taxed feedstocks are substitutes for or complements to each other, not all tax increases lead to production decreases (e.g., naphthalene) and not all tax reductions lead to production increases (e.g., ammonia). This change in the mix of feedstocks used in the chemical industry may lead to a change in the mix of chemical products, and hence a change in the mix of wastes.

As with Feedstock Tax I, Feedstock Tax II does not provide direct incentives for changes in waste management practices. However, higher tax rates on some feedstocks provide incentives for increased recycling and reclamation, and lower tax rates on other feedstocks decrease the value of recycling and reclaiming wastes which include these feedstocks. Also, as indicated above, there will be a change in the mix of wastes generated to the extent that Feedstock Tax II is effective. This mix may be more or less hazardous than under the current feedstock tax and, as a result, there may be a change in the mix of waste management practices followed.

5.2.4 Revenue Generation

Ability to Generate Revenues. Feedstock Tax II appears capable of generating almost all of the revenue it is designed to raise. The DRI chemical model was used to estimate the changes in price and quantities of 19 of the taxed feedstocks that would be induced by this tax. The results indicate that while it will reduce the quantities of some of the taxed substances, Feedstock Tax II may also lead to production increases for other feedstocks. The overall result is a very small decrease in revenues due to a decrease in the tax base. The DRI model does not include all of the taxed feedstocks, but it does model feedstocks that produce roughly 70 percent of Fund revenues. For the feedstocks included in the model, results indicate that the decrease in the tax base would reduce tax revenues by about 3 percent. If the production of the feedstocks not included in the model changes in a manner similar to feedstocks that are included, the tax would raise roughly $997 million. If the production of feedstocks not included in the model declines proportionally more than the modeled feedstocks, the revenue shortfall may be greater. However, the potential size of this shortfall is limited by the fact that only 30 percent of the revenue comes from feedstocks not included in the model.

Predictability of Revenue Generation. The predictability of Feedstock Tax II is likely to be quite similar to that of the current CERCLA tax. While it is true that economic cycles, changes in the demand for final products, and changes in industry structure, processes, and techniques will affect the predictability of the tax, historical experience shows that the feedstock tax is reasonably predictable. There is a chance that the much higher rates of Feedstock Tax II may affect predictability, but as experience increases over time, the predictability of revenues may be expected to improve, particularly as predictions are made on the basis of previous tax receipts rather than other factors in the economy.

5.2.5 Administrative Feasibility

The administrative and reporting burdens for Feedstock Tax II would not differ significantly from those imposed by the present feedstock tax or Feedstock Tax I. The identification of the additional taxable parties could be conducted in much the same way as for the current feedstock tax. It is also possible that current taxpayers would be producers or users of the additional chemicals. The same activities--sale or use of a taxable substance--are used to specify when the tax is assessed as are used for the present feedstock tax. Therefore, no additional regulations would need to be developed to define taxable acts. An increase in the number of taxable substances from 43 to 48 is not likely to increase the burden of reporting or recordkeeping significantly. Removing the exemptions for coal-derived substances, secondary recovery, and substances used for fertilizers would simplify the administration of the tax and would lessen the amount of recordkeeping and reporting, and potentially also lessen the burden of audit and verification that the tax would require.

5.2.6 Programmatic Effects

The relationship between Feedstock Tax II and State or local taxes is likely to be identical to that of Feedstock Tax I. The type of tax and method of collection would remain the same; only the group of feedstocks taxed and the tax rates would be adjusted. Therefore, no new programmatic effects are anticipated unless the new tax rates affect the ability of States to raise additional revenues from firms subject to Feedstock Tax II or Congressional action implementing Feedstock Tax II alters the current statutory language on preemption of State or local authority.

5.3 WASTE-END TAX: NON-INCENTIVE

5.3.1 Economic Impacts

The flat rate waste-end tax would increase the cost of products produced in processes that generate large amounts of taxed wastes and cause changes in the supply of and the demand for these products. Unlike the model developed by DRI to predict changes in the prices and level of feedstocks resulting from a tax, no comprehensive model exists to precisely estimate waste generators' potential responses (i.e., waste reduction through process or input changes) to a tax on the generation of hazardous waste. Thus, it was not possible at this time to do a detailed economic analysis at a disaggregate level for the purposes of this study. EPA's Hazardous Waste Management Model, which examines generators' choice of waste management options (e.g., landfill versus incineration) once the waste has been generated, estimates economic impacts at a broad industry level. This model has been used to estimate the economic impacts of a waste-end tax on the land disposal of hazardous waste (i.e., Combination Tax II). Over the next few months, EPA will attempt to use this model and other available data to develop better information on the possible economic effects of a tax on waste generation.

To predict these impacts, more information is needed about the production and decision-making processes that affect the supply of and demand for various products. To model the supply component, additional insight is needed about (1) the link between wastes, production processes, and products, (2) the sensitivity of production costs to the waste-end tax, (3) the availability and cost of substitute production processes that would produce less waste, (4) the decision-making processes of firms with regard to capital investment and research and development expenditures, and (5) the expectations of firms regarding the private costs of future waste management regulations. To model the demand component, more information is needed about the sensitivity of demand for final products to changes in cost conditioned by the waste-end tax and the elasticity of demand for the final products. These factors would, in turn, affect equilibrium prices and quantities. While progress is being made in some of these areas, data are not consistently available in enough detail to integrate them into a meaningful representation of the actual economic processes.

Qualitative analysis suggests that such a tax would affect producers differently, depending on their ability to switch to processes that generate fewer wastes. If a producer were able to shift completely away from processes that generate hazardous wastes without increasing costs, there most likely would be little or no change in the quantities of products produced. To the extent that a producer could not shift production processes or could do so only by increasing costs, there would likely be a decline in output. The responses of firms would be determined not only by the level of tax rates but also the relative costs of substitute production processes and the price elasticities of the demand for final products.

5.3.2 Equity

Retrospective Equity. The retrospective equity of the waste-end tax depends on the degree to which it falls on the broad industrial groups and the types of substances believed responsible for causing Superfund spending. Each is discussed in turn.

The waste-end tax is levied on all RCRA-designated hazardous wastes; thus, it will be paid primarily by the petroleum refining, chemical, and metal processing industries. Because these industries are believed to be responsible for the vast majority of existing hazardous waste sites, this tax satisfies the first test of retrospective equity.

A second measure of retrospective equity depends on the distribution of the tax burden across chemical substances. Two standards can be used to make such an assessment. The first reflects data about the types of substances found at Superfund sites. The second is based on the types of substances generated as hazardous wastes. As indicated in Exhibit 5-5, there is a relatively good match between the types of substances taxed by a waste-end tax and the substances responsible for Fund spending. There is, of course, a perfect match between the types of RCRA-regulated wastes generated and the types of wastes taxed. Further, the proportion of organics, inorganics, and crude oil found at Superfund sites is similar to the distribution of

EXHIBIT 5-5

RETROSPECTIVE EQUITY OF WASTE-END TAX

Type of Substance	Distribution of Tax Burden 1/	Distribution of Substances Found at Sites 2/	Distribution of Substances Generated as Wastes 3/
Organic	31%	38%	31%
Inorganic	69	59	69
Crude Oil	<1	3	<1

1/ Types of taxed substances assumed to be identical to the types of wastes generated.

2/ Based on the analysis described in Section 4.2. The substances found at sites were traced back to constituent feedstocks. The information displayed here is based on a frequency count of these feedstocks.

3/ ICF analysis of data provided by Westat, Incorporated, 1984. Results calculated on the weight, rather than volume, of hazardous waste streams.

substances bearing the tax burden. While the burden of the waste-end tax on organics is slightly less than indicated by the analysis of actual sites (i.e., 38 percent of substances found at such Superfund sites are organics while 31 percent of the waste-end tax revenues were from organics), it should be remembered that site data are computed on a frequency basis, while the tax distribution is calculated on a weight basis. If the site data were computed on a weight basis, it is likely that the match would improve because inorganic chemicals tend to be heavier than organics.

In short, the waste-end tax meets both the criteria of retrospective equity. The tax falls on the broad industrial groups responsible for Fund spending and the tax burden is distributed across chemical types in a manner that is identical to the types of RCRA-regulated wastes generated and is similar to the types of wastes found at Superfund sites.

Prospective Equity. To be judged prospectively equitable, a tax must provide a close connection between a party's tax burden and the likelihood that its actions will cause Fund spending. This connection may break down if the tax does not reach substances or situations that cause Fund spending or if the tax burden in such instances is not commensurate with the risk of provoking such spending. While the waste-end tax suffers in both regards, there is a moderate connection between the tax burden and the likelihood of causing Fund spending.

There are a number of instances, however, where the tax under consideration does not reach substances and situations likely to give rise to Fund spending. First, the problem arises primarily because the tax is levied only on RCRA-regulated wastes, even though other hazardous wastes and substances may lead to Fund spending. Second, while the tax is levied on the generation of wastes, it is not collected until the point where the wastes are treated or disposed. Consequently, the possibility of tax evasion exists. If the problem of evasion proves significant, the equity of the tax may be undermined because the release of some wastes may lead to a Superfund response, even though the tax has not been paid. A September 1983 analysis of the substances found at 454 sites that were either on, or proposed for, the National Priorities List, determined that the presence of illegally dumped wastes meant that a waste-end tax would not have been paid at about 11 percent of the sites.[18/] There have, however, been significant changes in legal and regulatory requirements since the time these sites were created. It is not clear that the level of illegal dumping will remain the same.

Finally, there are other situations that can arise where a waste-end tax would not have been paid, even though Fund spending may be involved. Such situations include recycling, transportation, and storage of hazardous substances. The analysis of the 454 sites described above indicates that in addition to illegal dumping, a waste-end tax would not have been paid at:

18/ ICF Incorporated, Analysis of EPA site description data, September 1983.

- 7 percent of the sites where contamination resulted from recycling,
- 7 percent of the sites where contamination resulted from product spills, and
- 2 percent of the sites where contamination resulted from a mining operation.

The sum of these percentages does not equal the total percentage of sites where a waste-end tax would not have been paid because the tax would not have been paid at some sites for more than one reason. While in some cases, it might be possible to collect the tax upon discovery of the site, the data suggest the potential magnitude of the discrepancy between a waste-end tax base and the sites eligible for CERCLA spending.

While the waste-end tax is, in some respects, too narrow, it may also overtax or undertax specific wastes. The problem arises because the tax rate is a uniform $4.73 per metric ton, despite the fact that not all wastes are equally likely to cause Fund spending. Some wastes may be released with greater frequency, pose a greater risk to the environment, be particularly persistent and mobile, or have some other characteristic that increases the chance of creating a situation requiring a CERCLA-financed response. By taxing all wastes at the same rate, some wastes are being undertaxed while others bear a disproportionately high tax.

In short, if a flat-rate waste-end tax is used to finance CERCLA activities, the tax burden will not match responsibility for Fund spending in a way that equity considerations call for. First, the tax does not reach hazardous substances (wastes or otherwise) that are not RCRA-designated wastes, despite the fact that Fund spending may be involved if they are released. Further, tax evasion may mean that some of the wastes cleaned up by Superfund have escaped the tax. Finally, because a flat rate is used, all wastes are treated in the same manner, despite a varying likelihood of causing Fund spending. The omission of these hazardous substances or events from the tax reduces the correlation between those bearing the tax burden and the problems addressed under CERCLA.

5.3.3 Incentives

While the waste-end tax was not designed to provide incentives for improving waste management practices, it does produce a modest level of incentives. In this section, the tax is evaluated in terms of its success in creating the four environmentally preferred incentives established in Section 3.3: (1) an incentive to shift to better waste management practices, (2) an incentive to reduce the volume of wastes produced, (3) an incentive to reduce the hazardousness of the waste produced, and (4) a disincentive to circumvent or illegally handle or dispose of hazardous materials. Each of these will be discussed in turn.

EXHIBIT 5-6

COMPARISON OF OFF-SITE HAZARDOUS WASTE MANAGEMENT QUOTED PRICES FOR NINE MAJOR FIRMS IN 1982 AND CALCULATION OF TAX RATE AS A PERCENTAGE OF WASTE MANAGEMENT COST

Type of Waste Management	1982 Price ($/metric ton)	Tax Rate as a Percentage of Management Cost
Landfill Drum	$110-240	2.0-4.3
Bulk	33-83	5.7-14.3
Land Treatment	$ 5-24	19.7-94.6
Incineration Liquids	$ 53-237	2.0-8.9
Solids & highly toxic liquids	$395-791	0.6-1.2
Chemical Treatment	$ 13-92	5.1-36.4
	$ 66-791	0.6-7.2
Resource Recovery	$ 66-264	0.6-1.8
Deep Well Injection Oily Waste Waters	$ 13-32	14.8-36.4
Toxic Rinse Waters	$132-264	1.8-3.6
Transportation	$.08-.16 MT mile	

Source: Booz-Allen and Hamilton, Inc., Review of Activities of Major Firms In the Commercial Hazardous Waste Management Industry: 1982 Update (Bethesda, Maryland: prepared for U.S. Environmental Protection Agency, August 1983), p. 17.

A flat rate waste-end tax may signal industry to plan to shift to better waste management practices for the future, but is unlikely to provide incentives for measureable changes in these practices in the near term. The proposed tax rate, $4.73 per metric ton, is not differentiated by waste management practice and therefore would not change the ranking of the costs of different management practices. Exhibit 5-6 shows the costs of various off-site waste management practices, indicating that even with the tax, landfill would remain the least expensive option. Furthermore, it is possible that a tax rate of $4.73 may be too low to produce any strong incentive to change waste management practices. In a recent survey conducted by EPA, various State officials indicated that the tax rates charged for their waste-end taxes -- most of which were higher than $4.73 per ton -- were too low to create such an incentive. In their opinions, the increase in costs imposed by the tax has been small relative to price fluctuations in the cost of waste management and the total management cost.19/

On the other hand, the percentage impact of the tax on the cost of waste management would differ by management practice. This may send signals to decision-makers in affected industries to consider alternative (although currently more expensive) waste management methods for the future. The last column on Exhibit 5-6 shows the percentage of total cost represented by the tax. For example, the tax would increase the cost of land disposal of solid wastes by 5.7 to 14.3 percent, compared to an increase in the cost of incineration of only 0.6 to 1.2 percent.

It is difficult to determine at this time if a flat-rate waste-end tax would provide an incentive to reduce the overall volume of wastes generated by increasing the costs of production processes that generate a large amount of waste relative to production processes that generate less waste. Quantifying the effectiveness of a tax rate of $4.73 per metric ton in producing this incentive would require a better understanding of the economic effects and the development of the analytic tools and data described in Section 5.3.1. The tax is unlikely to create an incentive to reduce the hazardousness of the wastes because it does not discriminate this feature in the rate structure or in the definition of the tax base.

Like any other tax, a waste-end tax provides an incentive for circumvention. Tax avoidance may take the form of non-reporting or underreporting the amount of wastes managed or the use of untaxed practices or illegal treatment, storage, or disposal (TSD) practices. The flat rate waste-end tax provides no disincentive for circumvention, and its ability to discourage tax-avoidance would depend on the success of enforcement efforts. The recent EPA survey of States' experience with waste-end taxes indicates that many States attribute the incidence of tax avoidance to a lack of enforcement staff and resources with which to identify these activities.

19/ Office of Policy, Planning and Evaluation, U.S. Environmental Protection Agency, Draft Report, Survey of States with Waste-End Taxes (August 1984).

5.3.4 Revenue Generation

Unlike the feedstock tax, no model has been developed to predict the ability of a waste-end tax to achieve its revenue target by estimating the effect of the tax on the volume of taxable wastes that constitute the tax base. Without a better understanding of the degree to which the tax would create an incentive to reduce the overall volume of wastes generated, it is difficult to predict the ability of the tax to generate revenue. As explained in Section 4.3, various States' experiences with similar taxes have been inconclusive because the proportion of revenue shortfalls that can be attributed to the incentive effects of the tax systems has not been determined. The stability of the revenue stream generated by the tax would vary indirectly with the strength of the incentive created for reducing the volume of waste. A stronger incentive would result in less stable revenues while a weaker incentive would provide a more certain revenue source.

It would seem that the ability of a Federal waste-end tax to meet revenue projections in the first year would improve if it were able to avoid the types of problems encountered by the States. For example, before implementing a waste-end tax, further research would be necessary to determine the availability of good data on waste volumes to be used in developing the rate structure. Similarly, the assurance of adequate resources to meet the enforcement requirements of a nationwide waste-end tax would improve the revenue generating capability of the tax.

5.3.5 Administrative Feasibility

Taxable Parties. A flat rate waste-end tax collected from RCRA-permitted Subtitle C treatment, storage or disposal (TSD) facilities would require the identification of approximately 4,818 facilities, according to a recent survey.[20/] These facilities would include both hazardous waste generators that manage waste on site, and off-site treatment, storage or disposal facilities.

Existing records are available with which to identify potentially taxable parties. RCRA Section 3005 requires all TSD facilities to obtain permits in order to operate. All existing management facilities were required to file a Part A permit application on or before November 19, 1980, and the information from those applications has been entered into the Hazardous Waste Data Management System (HWDMS) maintained by EPA. Facilities coming into existence after November 1980 are required to obtain a permit before they may begin operations. The identities of all TSD facilities, therefore, probably could be determined by reviewing the file of completed permits and permit applications in the HWDMS. However, because the HWDMS data base contains permit applications from inactive sites, so-called "protective filers," and facilities that filed by mistake, the creation of an accurate list of

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20/ Westat, Inc., National Survey of Hazardous Waste Generators and Treatment, Storage, and Disposal Facilities Regulated under RCRA in 1981 (Maryland, Westat, Inc., April 20, 1984), p. 85.

potential taxpayers would require action by EPA or IRS to purge the list of these facilities. Such a process is currently underway.

Verifying the identity of potential taxpayers also might be accomplished through the use of other RCRA reporting and recordkeeping requirements, such as the Part B permit application and the biennial report. EPA has established the goal of calling in all Part B land disposal permit applications by the close of fiscal year 1985. Information derived from these sources could be compared to the list of potential taxpayers developed from HWDMS. Finally, because some potential taxpayers would be in the business of commercial hazardous waste management, the IRS could obtain independent verification of their activities from their customers--hazardous waste generators--who might otherwise be liable for the tax themselves.

The administrative burden of identifying the taxpayers for a flat rate waste-end tax could be increased when the existing RCRA exemption for small quantity generators is revised. A reduction in the threshold amount of waste that can be generated per month in order to qualify as a small quantity generator (for example, from 1000 kg to 100 kg) might significantly increase the number of generators subject to Subtitle C regulation and therefore also potential taxpayers. Many of these generators probably would not treat, store, or dispose of hazardous wastes on site, and thus would not be subject to the waste-end tax. The IRS, however, probably could not completely ignore this group of potential taxpayers. Efforts to identify them, notify them of the tax and its recordkeeping and reporting requirements, and to verify their compliance would be required.

Previous experience with identifying taxpayers for waste-end taxes has been ambiguous. Some states with such taxes have experienced difficulty in identifying taxpayers, although the most difficult problems have probably been associated with identifying hazardous waste generators for taxes assessed against generators, and not with identifying hazardous waste management facilities. States have used registers of State permits and licenses for either generators or landfill operators; other State registers that may correlate with hazardous waste activities (e.g., industrial waste permits, sewer permits, SIC information, and Chamber of Commerce rosters) or Federal registers (e.g., RCRA Part A facility permit applications or EPA identification numbers) can be used. In some instances, States have relied upon notices sent to licensed or permitted generators and/or disposers notifying them of tax obligations and then relied upon voluntary activity reports, or have sent requests to off-site facility operators to identify taxable acts and make the appropriate tax assessments.

As more States obtain authorization to operate hazardous waste regulatory programs that include permitting authority, the decentralization of information concerning permitted TSD facilities could add to the administrative burden of a waste-end tax and require EPA to modify some of its current reporting requirements to ensure that adequate tax collection information is on hand. The IRS or EPA might be required, in addition to using the HWDMS, to contact numerous State hazardous waste regulatory authorities to obtain a complete and up-to-date inventory of potential

taxpayers, particularly if State summary reports continue to be submitted biennially. Alternatively, States might be asked to submit detailed data on an annual basis.

Taxable Substances. The flat rate waste-end tax would be assessed against all wastes defined by 40 CFR Section 261 as hazardous wastes subject to regulation under RCRA. Because the taxable substances are defined by the RCRA regulatory program, the problem of defining them for purposes of the waste-end tax is significantly reduced. The regulatory program has already identified the relatively large number of substances (about 450) included in the category of listed wastes which must be identified specifically, and procedures have been specified for determining ignitability, corrosivity, reactivity, and extraction procedure toxicity in order to identify characteristic wastes. Thus, a time-consuming development of lists and definitions of taxable substances is not necessary for implementing this option.

Defining a unit of measure of the taxable substances could require some time and effort before the tax could be instituted. Experience with the use of "dry-weight" ton as a unit of measure for the PCLTF tax might be compared to other potential measures before a unit of measure is chosen.[21/]

An administrative burden could result from the need to keep the tax and the hazardous waste regulatory program proceeding in parallel. The inclusion of additional wastes or changes in the definitions of characteristic wastes in the regulatory system, for example, could affect the timing of tax-related activities such as expanding the list of taxed substances. If additional wastes were added to the regulatory program before legislation was enacted to add them to the list of taxable substances, tax reports and records could not require taxpayers to report simply the amount of hazardous waste that they had treated, stored, or disposed of during the tax reporting period, because such a report would include non-taxed hazardous wastes. Administering the tax would be complicated by the need to develop and enforce methods for distinguishing non-taxed hazardous wastes from taxed hazardous wastes.

Delisting a particular waste at a particular facility also could pose a difficult administrative problem. Delisting, under 40 CFR Section 260.22, excludes a substance at a particular generating facility from the lists of hazardous waste in Subpart D of 40 CFR Part 261 by amending Subpart D with respect to that waste at that facility. The waste, however, may still be a characteristic hazardous waste as defined by Subpart C of 40 CFR Part 261. If Congress enacts a tax law that lists each waste in Subpart D, then the regulatory delisting may not remove the substance from taxation because of the priority of the statute over the regulation. Administering the tax would be made more difficult, however, because if the substance had been delisted for a

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21/ Section 231 of CERCLA establishes a tax of $2.13 per dry weight ton on hazardous waste received at a hazardous waste disposal facility. The tax receipts fund the Post-Closure Liability Trust Fund (PCLTF) established by section 232 of CERCLA.

facility under Subpart D and did not qualify as a hazardous waste under Subpart C, the facility would no longer be required to include the waste in its RCRA reporting and recordkeeping.

Taxable Activities. A flat rate waste-end tax assessed against all hazardous waste management facilities that treat, store, or dispose of hazardous waste without making any distinctions among waste-management practices would not impose significant burdens with respect to defining taxable activities. Definitions adopted by the regulatory program could be adopted without changes for the purposes of this tax.

Recordkeeping and Reporting. The burden of administering the flat rate waste-end tax, as well as the time necessary to implement it, could be reduced significantly through the use of existing reporting and recordkeeping systems. Regulations under RCRA[22/] require generators of hazardous waste and the owners or operators of treatment, storage, or disposal facilities (TSDs) to submit or maintain the following reports and records:

- Part A Permit Applications;
- Part B Permit Applications;
- Biennial Report;
- State Summary Biennial Reports;
- Operating Record; and
- Uniform Hazardous Waste Manifest System.

Each of these systems is discussed in detail in Appendix B.

These reporting and recordkeeping systems, however, would require certain changes before they would be fully adequate for tax purposes. In particular, using the facility reports and the State summary reports to verify the identity of potential taxpayers or the amounts of waste potentially subject to taxation would be difficult unless the frequency of the reports was changed from biennial to annual. In addition, a change in the content of the State summary report so that it included information on a facility-specific basis would be necessary. Finally, changes in the format of the facility's operating records would be desirable so that they could be used effectively for tax purposes.

Monitoring and Enforcement. A flat rate waste-end tax levied against all RCRA Subtitle C TSD facilities managing any waste identified by 40 CFR Part 261 as hazardous would require IRS to rely heavily on the compliance of taxpayers with regulatory reporting requirements in order to monitor and enforce the tax. Compliance or evasion of RCRA regulatory requirements and the tax could be closely associated with each other.

22/ 40 CFR Parts 262, 264, 265, and 270.

At a minimum, effective enforcement of the tax would require regulatory changes in the existing RCRA reporting requirements. Although facility operating records could be used to verify information concerning the amounts of waste managed, such records are likely to be voluminous and will be kept at the facility itself. Thus, the existing biennial reports probably should be changed to annual reports to ensure that an initial verification of tax returns can be made in an efficient and centralized manner. A regulatory rulemaking procedure to make this change probably would require one to two years to complete.

5.3.6 Programmatic Effects

As noted above, administration of this tax would probably require changes to Federal and State hazardous waste reporting and recordkeeping requirements and enforcement procedures. It might also affect States that have already enacted waste-end taxes to finance different parts of their hazardous waste regulatory and/or response programs. The level of staffing necessary to obtain satisfactory compliance with a State waste-end tax could be reduced, for example, if Federal enforcement of a similar Federal waste-end tax produced data that could be shared with the States (such as currently is done with certain income tax information). Alternatively, double taxation could lead to revenue effects that could reduce the sums available to finance State programs and require staffing reductions.

There are several different ways of dealing with the problem of the interaction of the Federal and State taxes:

(1) Rely on Section 114(c) of CERCLA, as it currently exists and as past and prospective decisions by courts interpret it further;

(2) Specify that no preemption of state taxing power is intended;

(3) Explicitly preempt State taxing power for the same purpose;

(4) Explicitly preempt State taxing of the same revenue source; and/or

(5) Explicitly preempt State taxing of the same revenue source but establish a State revenue sharing program.

The broad preemption options might be challenged on the grounds that unless a State tax presents a direct obstacle to the accomplishment of a Federal legislative goal (such as the encouragement of interstate commerce), the State may impose the tax as an exercise of its concurrent taxing powers. Thus, an analysis of the effects of State and Federal taxation of the same revenue source in terms of altered revenue, changed incentives, and altered economic impacts from those planned, and the subsequent effects of those changes on State hazardous waste regulatory programs, would be necessary to survey the full programmatic effects of the waste-end tax option.

5.4 COMBINATION TAX I: FEEDSTOCK TAX AND NON-INCENTIVE WASTE-END TAX

5.4.1 Economic Impacts

The economic impacts of Combination Tax I described in Section 4.4 reflect the combined effects of the feedstock and waste-end tax systems. These combined effects would not exactly equal the sum of the individual effects because of the complex interaction of economic variables that link the changes in costs resulting from the imposition of a tax to changes in output. This section will discuss each component of the tax -- Feedstock Tax II modified to raise $500 million and a flat rate waste-end tax targeted to raise $500 million -- and describe the possible economic impacts of the combination.

Section 5.2 estimated the changes in prices and quantities of feedstocks that would result from a feedstock tax designed to raise $1 billion annually. Without a similar analysis of a tax designed to raise $500 million in revenues each year, it is difficult to predict the exact effects of the tax. The overall impact of the lower tax would be smaller than the impact of the higher tax. In some cases, however, the elasticities observed at the $1 billion tax level may hold for the lower tax. For example, in the case of acetylene, a 6.4 percent increase in price caused a 3.4 percent decrease in the quantity produced. It is possible that this relationship may be a good predictor of the effects of a lower tax on the price and quantity of acetylene. The exact effect is difficult to predict because it is the relationship between the effect of the tax on the cost of a feedstock and the prices of substitute and complementary products that affect the direction and magnitude of the changes in quantities of feedstocks produced. Therefore, although it is tempting to conclude that the effects would be one-half of those observed under a $1 billion tax, all of the effects will not be proportional. Thus, we can only conclude that the impact would be smaller, but how much smaller is unclear.

Section 5.3.1 suggested that a waste-end tax of $4.73 per metric ton would cause relative increases in the cost of products produced in processes that generate large amounts of wastes. The lower tax rate associated with the waste-end component of Combination Tax I (i.e., $2.37 per metric ton) would produce smaller price increases and a lower magnitude of economic effects. Because the effects of each component (feedstock and waste-end) of Combination Tax I are likely to be less intense than when considered independently with higher rates, the cumulative effect of the two taxes may depend on the extent to which they ultimately affect the same products or firms. To clarify, the feedstock tax directly affects the price of feedstocks that are production inputs. The waste-end tax affects the cost of waste management and, consequently, the price of products that involve the generation of wastes during manufacture. To the extent that the two taxes affect the costs of different products, the rates on each tax may be too low to have any significant economic impacts. If the cost impact of the two taxes is concentrated on the same products, the combined effects may be as great or greater than when the taxes are imposed independently at higher rates. Another possibility is that the economic effects of the two taxes may offset each other as they independently affect the costs of production inputs and final products as well as their substitutes and complements.

Without a better understanding of the magnitude and direction of the economic effects of a combination tax, it is difficult to predict accurately and to evaluate the equity considerations, the combined incentive effects, and the ability of the combination tax to generate revenues that are discussed in subsequent sections.

5.4.2 Equity

Retrospective Equity. Combination Tax I generally appears to meet the two criteria used to evaluate retrospective equity: The tax would be levied on the broad industrial groups believed to be responsible for Fund spending and its distribution across different types of chemicals would be similar to the desired distribution. Each of these issues is discussed in turn.

The feedstock component of Combination Tax I would be paid almost exclusively by the petroleum refining and chemical industries because these two industries produce virtually all of the taxed feedstocks. Depending on several economic considerations, a portion of the tax burden may be shifted out of these two industries in the form of higher product prices. If the tax were passed on in this fashion, the industries facing the higher prices (i.e., those using the feedstocks) would likely be industries paying the waste-end tax component of this tax. The waste-end tax, as indicated in Section 4.3.2, would be paid by precisely those industries believed responsible for Superfund spending. In short, Combination Tax I meets the first test of retrospective equity.

The second test depends on the types of substances on which the tax is levied. Because Combination Tax I has two distinct tax bases (i.e., taxed feedstocks and RCRA-designated hazardous wastes), the overall tax burden on substances would depend on the burden under each tax. For Combination Tax I, the tax burden would be distributed in the following fashion: 33 percent organics, 61 percent inorganics, and 6 percent crude oil. Exhibit 5-7 presents a comparison of the distribution of the tax burden to both the substances found at sites and the substances generated as wastes. The distribution of the tax burden would be similar to the distribution of substances found at sites. The only exception is that crude oil bears 6 percent of the tax burden while only being found at 3 percent of the sites. Because crude oil is usually refined into organic chemicals (as opposed to being released in its unrefined state), market mechanisms may distribute some portion of crude oil's tax burden to other organic chemicals, although some crude oil purchasers (e.g., gasoline users) may pay a part of the tax burden that is not commensurate with the risk to the environment. Further, to the extent that the tax burden is not passed on to consumers, crude oil producers would pay more than appears justified based on the occurrence of crude oil at sites. There would be a more significant mismatch between the distribution of the tax burden and the distribution of substances produced as wastes. In particular, inorganics would pay a smaller share of the tax than might be appropriate based on the types of wastes generated.

In short, Combination Tax I would meet the general requirement that it fall on certain broad industrial groups. The distribution of the tax burden

EXHIBIT 5-7

RETROSPECTIVE EQUITY OF COMBINATION TAX I

Type of Substance	Distribution of Tax Burden 1/	Distribution of Substances Found at Sites 2/	Distribution of Substances Generated as Wastes 3/
Organic	33%	38%	31%
Inorganic	61	59	69
Crude Oil	6	3	<1

1/ Distribution of tax burden calculated as the weighted average of the burden for Feedstock Tax II (described in Section 5.2.2) and the Waste-End Tax (described in Section 5.3.2).

2/ Based on analysis described in Section 4.2. The substances found at sites were traced back to constituent feedstocks. The information displayed here is based on a frequency count of these feedstocks.

3/ ICF analysis of data provided by Westat, Incorporated, 1984. Results calculated on the weight, rather than volume, of hazardous waste streams.

across chemical substances produced within those industries would be somewhat different from the desired distribution.

Prospective Equity. As described in Section 5.2, Feedstock Tax II would offer broad coverage of all the substances and situations likely to give rise to Fund spending. Regardless of how a hazardous substance enters the environment, it is certain that at some point in the production process, the tax would have been paid. This tax, however, may also be overly inclusive because two final products made from the same feedstock would pay the same share of the tax burden, despite the fact that both may not be equally hazardous. Further, Feedstock Tax II would not discriminate among firms based on behavior. One firm may use a taxed feedstock in a safe fashion while another allows it to be released into the environment. Each firm would face the same tax burden, despite their different probabilities of causing Fund spending. The waste-end tax component, on the other hand, would offer a close connection between the threat of causing Fund spending and the tax burden, at least for those wastes subject to the tax. Some substances and situations likely to cause Fund spending, however, may escape taxation. As described in Section 5.3.2, all non-RCRA-designated wastes (e.g., hazardous substances or small generator wastes) would not be taxed, despite the chance that their release may necessitate a Fund response. Furthermore, all wastes would be taxed at a uniform rate of $2.37 per metric ton, despite varied levels of risk.

Taken together, the components of Combination Tax I may be more prospectively equitable than either tax by itself. Through the feedstock tax, all substances likely to cause Fund spending would be taxed, thus reaching the substances and situations missed by the waste-end tax. The use of the waste-end tax would result in a closer match between a firm's behavior and its tax burden. The combination tax would not, however, avoid the over-inclusiveness of the feedstock tax nor, because of the flat-rate nature of the waste-end tax, would it distinguish among wastes according to their chance of causing Fund spending. In short, Combination Tax I would be more prospectively equitable than either tax standing alone, though it would contain some significant shortcomings.

5.4.3 Incentives

It is difficult to make measureable predictions of the incentives created by Combination Tax I without knowing its precise economic effects. Thus, this section will describe the likely incentive effects of each component of Combination Tax I, and compare them to the feedstock and waste-end taxes when imposed independently at higher rates. The analysis focuses on (1) the incentive to shift to better waste management practices, (2) the incentive to reduce the volume of wastes produced, (3) the incentive to reduce the hazardousness of the wastes produced, and (4) the disincentive to circumvention or illegal handling or disposal of hazardous materials.

Previous sections described the incentives created by the feedstock tax for increased recycling of wastes that include feedstocks, and the signal sent to industry by the waste-end tax to begin to explore alternative waste management practices. Changes in the volume of waste production that could be

expected from changes in the volume of feedstocks and changes in production processes were also described. The signals sent to industry by a lower feedstock and waste-end tax under Combination Tax I would be weaker than under a $1 billion dollar per year tax. The combined effects would depend on the overlap in the incidence of the two taxes on industries and products. If the feedstock and waste-end taxes fell on different industries and products, their effects would be diluted and the rates could be too low to achieve significant incentives. The greater the overlapping impact of the two taxes, the stronger the incentive for changing waste management practices and changing the volume of wastes produced.

Section 5.2.3 described the possible change in the hazardousness of wastes that may result from the change in the mix of wastes caused by the feedstock tax. The change in the hazardousness of wastes produced by Combination Tax I is likely to be less than the potential change conditioned by the feedstock tax alone. The weakened impact of a feedstock tax targeted to raise $500 million would not be offset by the waste-end tax component because the latter was not designed to generate any incentive for reducing the hazardousness of wastes. Finally, neither tax would provide disincentives for circumvention. Combination Tax I rates are lower for each component; therefore, this tax may produce a smaller incentive for circumvention if the tax burden were borne by different industries and products. The strength of the incentive to circumvent the tax would be likely to increase with the level of overlap in the tax bases.

5.4.4 Revenue Generation

In gross terms, the tax base is likely to be more stable under Combination Tax I than under either the feedstock or the waste-end tax alone because the tax incidence is divided between two tax bases and each bears only half the burden. As a result, the ability to predict revenues may improve because there is likely to be a reduction in the types of incentive effects that would result in a reduction of the tax base.

5.4.5 Administrative Feasibility

The administrative and reporting burdens of Combination Tax I are likely to be higher than the burdens imposed by either the feedstock or waste-end taxes alone, because in general, the burdens will be the sum of the burdens imposed by each tax.

Taxable Parties. A reduction in the burden required to identify taxable parties for Combination Tax I from the burden required to identify them for each tax individually would occur only if a significant number of the taxpayers of the feedstock tax are also TSD facilities for purposes of the waste-end tax. However, the estimates of the numbers of taxpayers for the two taxes suggest that, at best, this reduction could not be larger than the estimated number of feedstock taxpayers -- about 500 -- and they would make up no more than about 10 percent of the total number of taxpayers for Combination Tax I.

Taxable Substances. Because of the different nature of the substances taxed under the two components of Combination Tax I, there is likely to be no reduction in the burden of defining taxable substances due to the combination. The burden will be the sum of the burdens of the two taxes individually.

Taxable Activities. These activities may be slightly easier to identify with Combination Tax I because certain activities can be expected to be found together. Thus, for example, the use of a particular feedstock identified for the feedstock tax may provide an indication that the manufacturer also generates a waste commonly associated with that feedstock. Even so, however, the generator might dispose of the waste off site, and could not be presumed to be subject to the waste-end portion of Combination Tax I without further investigation. In addition, because of the limited overlap described above between potential taxpayers for the feedstock and waste-end portions of this tax, the reduction in administrative burden from the sum of the burdens of the two taxes might not be particularly large.

Recordkeeping and Reporting. Under Combination Tax I, these activities might be slightly less burdensome than the sum of the reporting and recordkeeping burdens of the two taxes considered individually if combined reports could be used. However, because of the difference between the activities addressed by the two taxes, the tax return form itself appears to be the only report that could be combined.

Monitoring and Enforcement. Enforcement and audit staff might be able to investigate both components of Combination Tax I simultaneously with respect to taxpayers subject to both. Once again, however, potential savings would depend on the overlap between the taxpayers of the two taxes, and that overlap would probably not be large.

5.4.6 Programmatic Effects

The programmatic effects of Combination Tax I are not likely to be different from those of each tax considered separately. Both the feedstock and waste-end portions could raise problems of preemption of State taxing authorities or affect the revenues derived from similar State taxes. The waste-end portion could affect the operation of Federal and State hazardous waste regulatory programs by requiring changes in recordkeeping and reporting requirements or enforcement programs. These preemption, revenue, and regulatory effects, however, could also be possible from either a feedstock or waste-end tax alone. Thus, the combination of the two taxes does not appear to create any unique problems.

5.5 COMBINATION TAX II: FEEDSTOCK TAX AND INCENTIVE WASTE-END TAX

5.5.1 Economic Impacts

Like the other taxes, the Combination Tax II will generate $1 billion. Approximately four-fifths of that will be collected from the feedstock tax, and the other fifth from the waste-end tax.

Rather than examine the economic effects of both components of the Combination Tax II, this section will only concentrate on the effects of the waste-end tax. This is because the effects of an annual $800 million feedstock tax would, of course, be somewhat less than the effects of an annual $1 billion tax on the same substances. However, this section will consider the combination of the feedstock and waste-end taxes insofar as it will expand the current base of feedstock taxpayers and thus generally reduce their burden.

To help estimate the microeconomic effects of a waste-end tax, EPA has developed a computer model.[23/] It compares the cost of land disposal and a tax with the cost of waste treatment. Before presenting the model's results, this section will first explain the model's assumptions and limitations.

Assumptions and Limitations of Waste Management Model. The model's operation is straightforward. It computes both the cost of disposal with the tax and the cost of each treatment alternative available to the generator of hazardous wastes. It then selects the least-cost option and allocates the waste to that option.

The model calculates the incremental cost of complying with the waste-end tax in either of two ways:

- if the generator continues to dispose of wastes on land, the incremental cost is the amount of tax paid on those wastes;

- if the generator adopts a treatment alternative, the incremental cost is the difference between the cost of that treatment alternative and the cost of land disposal (plus any tax paid on the residual wastes generated by the treatment alternative).

Information from EPA's survey of hazardous waste management practices was used to determine the types of quantities of hazardous waste generated and disposed of on land by firms regulated under RCRA.[24/] The initial cost analysis of treatment and disposal options has been limited to the ten highest-volume waste streams handled in each of three land disposal technologies as reported in the survey. The technologies were deep-well

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23/ U.S. Environmental Protection Agency, Office of Policy Analysis, Hazardous Waste Management Model, prepared by Putnam, Hayes and Bartlett, and Pope Reid Associates, Inc., April 1984. A complete description of the model, its assumptions, and limitations and a discussion of the cost estimates developed for each treatment option considered in the analysis are presented in a supplemental document entitled: Waste-End Tax -- Technical Background Document.

24/ U.S. Environmental Protection Agency, Office of Solid Waste, National Survey of Hazardous Waste Generators and Treatment, Storage, and Disposal Facilities Regulated Under RCRA in 1981, prepared by Westat, Inc., April 1984.

injection, landfills, and surface impoundments. As a result, the current version of the model analyzes 28 waste streams that comprise about 83.3 million metric tons (MMTs) of waste classified as hazardous under RCRA. This constitutes about 78 percent of surface impoundments or waste piles in 1981. Approximately 24.4 MMTs of hazardous waste that were disposed of or stored on land in 1981 have been excluded from the model.[25/]

Because the model does not comprise the total universe of potentially taxable land disposed wasts, simplifying assumptions about the effect of the tax on wastes excluded from the model were made in order to present a more complete picture of the total effects from the tax. Throughout the analysis, we will attempt to clearly indicate when results are based only on model analysis and where simplifying assumptions have been introduced for purposes of analyzing the effects on excluded wastes.

Thus, since the model does not include the entire universe of RCRA wastes, the analysis of the effects of a tax will be understated. Alternatively, if the survey did not accurately characterize an industry's waste management practices in 1981 (e.g., estimates of volume of waste disposed of), the resultant cost estimates presented here may be under- or overestimated. In general, the significance of these limitations will depend on the magnitude of the economic impacts that can be estimated. If these effects are insignificant, then it may be reasonable to assume that the incremental impact of the tax on waste streams that are excluded from the model would also be insignificant.

To estimate the impacts from the Phase I tax of $5 a ton, a baseline had to be established. The baseline represents the amount of waste that should be disposed of without a waste-end tax. By setting a baseline, we were able to focus our analysis on the economic effects that would be caused by the tax and not by other environmental control costs. To estimate the baseline, the model was run with the tax set at zero to determine whether it was cheaper to treat rather than to use land disposal for certain waste streams under Part 264 land disposal regulations.[26/] Failing to estimate a baseline that accounts for

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25/ Because some of the respondents to EPA's survey claimed confidential business information, our access to their responses was limited. Also, to develop estimates of the total waste managed in a process, EPA's survey imputed estimates of the volume of waste managed in a process when there was a missing value in a questionnaire. The model, however, included only volumes of hazardous waste that were actually reported as treated, stored, or disposed of on land in 1981. Finally, because we only looked at the top 28 wastes by volume, we excluded many smaller volume wastes.

26/ Estimating the baseline was particularly important to this analysis because the model currently uses data on 1981 waste management activities (the model includes about 83.3 MMTs in either land disposal, or storage in a surface impoundment or a waste pile). However, it was not until 1982 that RCRA's final land disposal regulations were promulgated. These regulations had the effect of increasing the cost of land disposal, making treatment less expensive in some cases.

the effects of the Part 264 land disposal regulations would mean that the economic impacts estimated in this analysis would overstate the incremental effects of the tax.

The baseline analysis indicated that a fully implemented and enforced RCRA program under Part 264 land disposal regulations would have a significant effect on land disposal, assuming the availability of adequate treatment capacity and that generators perceive the long-term liability associated with land disposal alternatives as being low. For approximately 35.5 million metric tons (MMTs) of the 83.3 MMTs in storage or disposal (in EPA's model), Part 264 land disposal regulations would have the effect of making treatment alternatives cheaper than land disposal. Of the remaining 47.8 MMTs of hazardous waste, 27.3 MMTs would be disposed of on land, and 20.5 MMTs would be stored in surface impoundments.27/

Microeconomic Impacts. Ideally, a microeconomic analysis would be done at a plant-, firm-, or industry-segment level. However, data on the costs of products sold, operating margins, and waste management practices are not universally available at such a disaggregate level. Because of these limitations, as well as the large amount of resources required to do a disaggregate analysis, we conducted our analysis at the aggregate industry level (2-digit SIC). Thus, our analysis at a higher level of aggregation may mask some potentially adverse effects a waste-end tax may have on industry segments, firms, or plants.

To determine whether the waste-end tax could have significant microeconomic impacts, we compared the cost imposed by both phases of the tax with both the costs of production and the pretax margins in thirteen manufacturing industries. In general, the ratio of incremental cost to pretax profits provides a measure of the severity of an impact when it is suspected that a firm will be unable to raise prices and thus recover its increased costs. The ratio of incremental cost to the cost of production indicates the magnitude of the price increase necessary to recover cost increases.

We also attempted to qualitatively assess the microeconomic effects of a waste-end tax at the firm level. However, we were unable to do a detailed assessment of these effects because of data and resource limitations.

Although the waste-end tax would be collected from RCRA Subtitle C facilities, the additional cost of the tax would be passed back to industries and firms regulated as generators (14,000 facilities) under RCRA. This is because the demand for commercial land disposal services appears relatively inelastic, and commercial land disposal firms would be able to pass the tax

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27/ EPA's survey did not ask how long a waste was held in storage. Here, the model assumes that if the waste does not shift in response to the Part 264 requirements, then the generator would either leave the waste in storage or send it to land disposal. This is consistent with EPA's current belief that many unlined storage surface impoundments will close as disposal facilities.

back to the generators through price increases.[28/] Therefore, the tax will represent an increase in production costs for industries and firms using land disposal, and may affect the prices of their products as well as their profitability.

Effects on Industries. Only nine of the thirteen manufacturing industries included in this analysis used disposal or storage practices in 1981 that would be taxable under the Phase I scheme. As Exhibit 5-8 shows, incremental cost as a percent of cost of production would be one-tenth of one percent of the chemicals and allied products industry, and less than one-tenth of one percent in all others. This implies the chemical and allied products industry would have to increase prices one-tenth of one percent to recover increased costs from the tax. In none of the nine industries did the ratio of incremental costs to pretax margin exceed four-tenths of one percent. Thus, at the industry level, the effects of the Phase I tax on prices or profits would be negligible.

In addition, because the Phase I tax should expand the current base of taxpayers, the pressure to increase prices in industries that pay the existing feedstock tax may be reduced. This should be particularly helpful to the chemicals industry, which appears to be the largest taxpayer in the current feedstock system and which may be particularly vulnerable to foreign competition.[29/] However, other industries generating hazardous wastes but not paying much feedstock tax would pay the waste-end tax. These industries include the steel, textile, and primary metal industries.

In contrast, the Phase II tax could affect industries significantly. Some firms would incur higher costs as a result of either the rising tax or a decision to ban a waste from land disposal. If waste treatment is substantially more expensive than land disposal, some firms may be unable to continue operating unless they raise prices. Manufacturers of products that have a high elasticity of demand and low growth in demand would most likely be unable to pass through their increased production costs. As a result, they would have to reduce their profit margins and could become unprofitable. Alternatively, manufacturers of products for which demand is relatively inelastic would not be significantly affected.

28/ Based on discussions with commercial disposal operations, which are responsible for collecting the Post-Closure Liability Trust Fund tax, it appears that the disposal facilities are adding the tax to the price for disposal services. If this policy is practiced over the entire hazardous waste management industry, it would seem reasonable to assume that the Phase I tax would be passed back to thousands of waste-generating firms.

29/ Analysis of the revenue-generating capability of the Phase I tax of $5 per ton indicates the chemicals and allied products industry would pay approximately 47 percent of estimated waste-end tax revenues. In addition, the industry may be paying as much as 95 percent of the current feedstock tax, according to industry estimates.

EXHIBIT 5-8

ECONOMIC EFFECTS OF THE PHASE I WASTE-END TAX AT $5/METRIC TON

	SIC Industry	Incremental Cost as a Percent of Production Cost 1/,2/	Incremental Cost as a Percent of Pretax Margin 1/,2/
20	Food Processing 3/	-.-	-.-
23	Textile Manufacturing	0.0	0.0
26	Paper and Allied Products 3/	-.-	-.-
28	Chemicals and Allied Products	0.1	0.2
29	Petroleum and Coal Products	0.0	0.4
30	Rubber and Misc. Plastics 3/	-.-	-.-
32	Stone, Clay, and Glass Products	0.0	0.0
33	Primary Metal Industries	0.0	0.0
34	Fabricated Metal Products	0.0	0.0
35	Machinery, Except Electrical	0.0	0.0
36	Electric and Electronic Equipment	0.0	0.0
37	Transportation Equipment	0.0	0.0
39	Instruments and Related Products	0.0	0.0

1/ Information on cost of production and pretax margin of manufacturing SIC categories represented in our sample were developed from Census of Manufacturers.

2/ The ratios have been expressed as percentages in the table. All estimates are rounded to tenths of a percent, and estimates of less than one-tenth of one percent have been rounded to zero.

3/ Based on EPA's survey data, these manufacturing industries did not dispose of or store hazardous waste in ways that are taxable under the Phase I or II tax.

Source: EPA, Office of Policy Analysis, Hazardous Waste Disposal Model.

As Exhibit 5-9 shows, the incremental cost of a tax of $170/ton would be five-tenths of one percent of the cost of production in the chemical and allied products industry, one percent in the petroleum and coal industry, and less than one-tenth of one percent in the other seven industries. In the petroleum and coal industry, incremental cost as a percent of pretax margin would be 9.8. Although this figure is much higher than in other industries, it still appears insignificant as an indicator of economic effects. If pretax margin in the industry were $100, a 9.8 percent decrease would reduce the margin to $91.20, and thus have little effect on profitability.

Effects on Firms. Although data are inadequate for comprehensively estimating the effects of a Phase I tax at the firm level, we generally believe that small firms that generate and dispose of large volumes of waste on site could be adversely affected by the tax if alternative treatment is not available at a reasonable cost. Estimates of the cost of waste treatment for the 28 waste streams analyzed generally indicate significant economies of scale in waste treatment.30/ Thus, the cost of treatment may be lower than the tax, and the impact on these firms may be insignificant. Because the tax is a small percent of the price of commercial land disposal for firms sending their wastes off site, the incremental effect of the tax appears insignificant here as well. (EPA will attempt to analyze these effects in greater detail in the next few months.)

The Phase II tax could also significantly affect firms. At the industry level, impacts appeared insignificant at $170 a ton because most firms can treat their waste at a fairly low cost and avoid paying the tax. Because of the large economies of scale in waste treatment, large waste generators should find treatment less expensive than land disposal and paying the tax. However, small generators could still find on-site treatment costs prohibitive (e.g., the initial cost of investing in a treatment unit may be significant). As a result, these firms would have to either pay the rising tax or send their waste to a commercial treatment facility. Both of these options may place a large financial burden on small firms in an industry, possibly putting them at a competitive disadvantage with larger firms. For example, a firm with large volumes of waste may pay only $2 per ton to treat its waste, and a smaller firm with less waste may pay a tax of $20 per ton. If the smaller firm tries to recover all of the additional costs through a price increase, it may be put at a competitive disadvantage with the larger firm. The differential impact of the tax may cause the smaller, higher-cost firm to reduce profit margins and, in the extreme case, to close. Electroplaters, small refiners, and wood preservers are examples of firms that may face high treatment costs and may be adversely affected by the tax.

30/ Economies of scale in waste treatment are exhibited when the additional costs of treating another unit of waste (e.g., ton) decreases as the volume of the waste increases.

EXHIBIT 5-9

ECONOMIC EFFECTS OF THE PHASE II WASTE-END TAX AT $170/TON

	SIC Industry	Incremental Cost as a Percent of Production Cost 1/,2/	Incremental Cost as a Percent of Pretax Margin 1/,2/
20	Food Processing 3/	-.-	-.-
23	Textile Manufacturing	0.0	0.0
26	Paper and Allied Products 3/	-.-	-.-
28	Chemicals and Allied Products	0.5	1.2
29	Petroleum and Coal Products	1.0	9.8
30	Rubber and Misc. Plastics 3/	-.-	-.-
32	Stone, Clay, and Glass Products	0.0	0.0
33	Primary Metal Industries	0.0	0.3
34	Fabricated Metal Products	0.0	0.0
35	Machinery, Except Electrical	0.0	0.0
36	Electric and Electronic Equipment	0.0	0.0
37	Transportation Equipment	0.0	0.0
39	Instruments and Related Products	0.0	0.0

1/ Information on cost of production and pretax margin of manufacturing SIC categories represented in our sample were developed from Census of Manufacturers.

2/ The ratios have been expressed as percentages in the table. All estimates are rounded to tenths of a percent, and estimates of less than one-tenth of one percent have been rounded to zero.

3/ Based on EPA's survey data, these manufacturing industries did not dispose of or store hazardous waste in ways that are taxable under the Phase I or II tax.

Source: EPA, Office of Policy Analysis.

5.5.2 Equity

Retrospective Equity. Because Combination Tax II is paid both by waste generators and feedstock producers, it seems likely that the tax burden will fall within the broad industrial groups believed responsible for Superfund spending. The feedstock tax would be collected primarily from the petroleum refining and chemical manufacturing industries, while the waste-end tax would be collected from these two industries as well as the metal processing industry (i.e., those industries responsible for 93 percent of generated waste volumes).[31/] Combination Tax II, therefore, would meet the first test of retrospective equity as defined earlier.

The second measure of retrospective equity depends on the types of chemical substances that are taxed. In order to determine which types of chemicals are taxed, both components of the combination tax must be analyzed. As indicated in Section 5.2, Feedstock Tax II would raise 35 percent of its total revenues from organic chemicals, 53 percent from inorganic chemicals, and 12 percent from crude oil. Under Phase I, the waste-end tax would be collected on land disposed wastes as well as on wastes stored in surface impoundments or waste piles. Some wastes, therefore, would not be taxed. For the purposes of this analysis, it has been assumed that the subset of taxed wastes would be similar in terms of chemical constituents to the total quantity of wastes generated. The assumption may be somewhat incorrect because different wastes have characteristics making them more or less suitable for certain waste management choices. For example, petroleum based wastes with a high BTU content are often incinerated and would thus not be subject to the tax. In the absence of any data, however, it has been assumed that because the distribution of taxed wastes among organic chemicals, inorganic chemicals, and crude oil is similar to the distribution for all wastes. Accordingly, it is estimated that the waste-end tax component will raise 31 percent of its revenue from organic chemicals, 69 percent from inorganic chemicals, and less than 1 percent from crude oil. The tax burden of the combined tax is next estimated as a weighted average of the burden under the component parts. Doing so indicates that Combination Tax II would raise 34 percent of its revenue from organic chemicals, 56 percent from inorganic chemicals, and 10 percent from crude oil.

As shown in Exhibit 5-10, the tax burden on organic chemicals (34 percent) is similar to the fraction of sites at which organics are found (38 percent) and to the proportion of generated wastes that are organic (31 percent). The tax burden on inorganic chemicals appears to be somewhat lower than that suggested by the data, while the tax share for crude oil is higher. As noted in Section 3.2, however, crude oil may be underrepresented in the data available for both HRS sites and generated waste quantities. Thus, from an equity perspective, the distribution of the tax burden for Combination Tax II may be satisfactory.

31/ Westat, Inc., National Survey of Hazardous Waste Generators and Treatment, Storage, and Disposal Facilities Regulated under RCRA in 1981 (Maryland, Westat, Inc., April 20, 1984), p. 141.

EXHIBIT 5-10

RETROSPECTIVE EQUITY OF THE COMBINATION FEEDSTOCK TAX AND INCENTIVE WASTE-END TAX

Type of Substance	Distribution of Tax Burden 1/	Distribution of Substances Found at Sites 2/	Distribution of Substances Generated as Wastes 3/
Organic	34%	38%	31%
Inorganic	56	59	69
Crude Oil	10	3	<1

1/ Distribution of tax burden calculated as the weighted average of the burden for the modified feedstock tax (described in Section 5.2.2) and the waste-end tax (described in Section 5.3.2).

2/ Based on analysis described in Section 4.2. The substances found at sites were traced back to constituent feedstocks. Information displayed here is based on a frequency count of these feedstocks.

3/ ICF analysis of data provided by Westat, Incorporated, 1984. Results calculated on the weight, rather than volume or frequency, of hazardous waste streams.

Prospective Equity. Because the tax under consideration would combine two distinct types of tax, its prospective equity would depend on the characteristics of its constituent parts. As noted in Sections 5.1.2 and 5.2.2, the prospective equity of a feedstock tax would be affected most directly by its broad reach. Because the tax would be levied early in the production process, virtually any substance that is likely to lead to Fund spending would have had the tax paid at some point during its manufacture. This broad reach also implies, however, that the tax burden for some substances or situations may be higher than is equitable. For example, the tax would be borne equally by two products of the same taxed feedstock even if both did not pose the same environmental risk because the feedstock would be taxed without regard to how it was to be used. Further, the feedstock tax would not distinguish between firms based on the methods by which each manages hazardous substances. Two firms may handle the same substance and pay an equal tax, even though the waste management practices of one constitute a more significant environmental threat.

To a large degree, these equity shortcomings would be offset by the waste-end tax component. Given that the waste-end tax is designed primarily to create incentives for firms to act in an environmentally safe fashion, it also would tend to adjust a firm's tax burden to reflect the likelihood that its activities may cause Fund spending. For example, in Phase I, tax rates would be $10 to $15 per ton higher for highly toxic and mobile wastes. Because such wastes would probably be more likely to cause Fund spending (i.e., if released, such wastes may pose a significant threat), equity would be served by taxing them more heavily. Similarly, incineration and recycling would not be taxed under Phase I because wastes managed in such processes would not be likely to lead to Fund spending. Phase II of the waste-end tax may be even more equitable because the tax burden for particular substances and situations would be adjusted to reflect the associated risk in a complex and sophisticated fashion. To the extent that the tax burden may not reflect accurately the probability of a particular substance or situation leading to Fund spending, some inequity may remain. However, this waste-end tax would have the potential to provide a much more direct link between the likelihood of provoking Fund-financed responses and the tax burden than would any of the other taxes considered. It is important to note that the double taxation, to the extent it exists, may also create inequities.

In short, this combination tax would offer a high level of prospective equity. Because of the feedstock tax component, it is reasonably certain that the tax would have been paid at some point in the production of all substances likely to cause Fund spending. As a consequence of the incentive-based waste-end tax, it is also likely that a firm's total tax bill would reflect, at least partially, the riskiness of its activities. Some inequity would still exist, however, because of the excess burden imposed on some substances by the feedstock tax and the chance that the waste-end tax would miss some substances that would be appropriately taxed; however, the combination of the two types of tax minimizes this inequity.

5.5.3 Incentives

In analyzing incentive effects, it is useful to assess the feedstock and waste-end components of Combination Tax II separately. Again, as the result of limited information, this approach may overlook potentially significant interactions between the two taxes.

The incentive effects of the $800 million feedstock component of Combination Tax II would probably fall somewhere between those of the $1 billion Feedstock Tax II evaluated in Section 5.2 and those of the $500 million feedstock component of the Combination Tax I assessed in Section 5.4. In general, higher prices for feedstocks can be expected to reduce demand and to encourage recycling and process innovations that reduce feedstock use. These effects are not detailed in this section.

A waste-end tax creates an incentive to change current hazardous waste management practices by increasing the cost of land disposal relative to other waste treatment and disposal options. In general, the strength of the incentive depends on the size of the tax. However, the waste-end tax component of Combination Tax II system will actually augment existing incentives for improved management of hazardous waste (e.g., existing federal and state regulations, state taxes,and liability under Superfund and other federal and state laws). Yet, while the existing incentives for better waste management have increased the generator's awareness of the long-term cost of land disposal, EPA's survey of hazardous waste generators and treatment, storage, and disposal facilities indicates that in 1981 about 20 percent of all hazardous wastes generated (55 million metric tons) was disposed of on land, and about 52 million metric tons were stored in surface impoundments or waste piles.

The waste-end tax component of a Combination Tax II system could create some primary and secondary incentives for hazardous waste management. Primary incentives include increased use of better treatment and disposal practices, a lower volume of hazardous substances produced, and a reduction in the hazardousness of substances produced. Although the secondary incentives created by the tax are often difficult to readily identify and measure, they can also be very important. They include expanded research and development activities, development of better data on hazardous waste management practices (e.g., improved reporting systems), and increased construction of waste management facilities. The tax can also adversely affect the environment if it contributes to an increase in the incidence of illegal disposal. Depending on the strength of the incentive created by the tax, some or all of these incentives could be created. This section will examine each one as it applied to the Phase I and Phase II waste-end tax systems.

Increased Use of Better Treatment and Disposal Practices. The Phase I tax of $5 a ton is designed primarily to raise revenue, rather than create strong incentives for better waste management practices. It is generally thought that only a significant increase in the price of disposal (e.g., through higher tax rates) or a land disposal prohibition could substantially reduce land disposal. This notion has been supported by analyses of states'

experiences with waste-end taxes and limited EPA analysis of prices in the commercial waste management industry.

The EPA analysis showed that the price of disposal in a landfill or deep well can be as low as $10-$30 a ton. In contrast, resource recovery, treatment, and incineration can be as much as $260-$790 a ton (although the range can frequently be less than this). Price differences still persist, even after EPA has promulgated several rules that increase the cost of land disposal. However, as this section shows, new analysis suggests that substantial amounts of certain types of wastes would no longer be disposed of on land, even at low waste-end tax rates.

Phase I. The model described earlier contains information on the relative cost of land disposal and alternative treatment and disposal practices for the 28 largest volume waste streams that are disposed of on land under RCRA. The current version of the model defines alternative treatment practices as only those practices that do not occur in or on the land. Thus, any shift to non-taxed treatment in a surface impoundment would not be reflected in the model's results.

The preliminary results of such an analysis using the Phase I tax of $5 per ton are shown in the top portion of Exhibit 5-11. They indicate that about 16.8 million metric tons (MMTs), or 35 percent of the hazardous waste disposed of or stored on land,[32] would shift to treatment under the $5 a ton tax. Most of these -- 11.7 MMTs -- are corrosive wastes from underground injection wells and storage surface impoundments. They would be sent to neutralization tanks and then discharged to a publicly owned wastewater treatment facility. Three other waste streams comprise the remaining 5.1 MMTs: about 4.5 MMTs of chrome containing waste (which fail the extraction procedure toxicity test), about .16 MMTs of cyanide-bearing waste would be chemically treated and reduced through vacuum filtration, and about .32 MMTs of organic distillation tars would be biologically treated.[33]

Exhibit 5-11 generally shows that the $5 per ton tax would reduce the amount of waste that would be disposed of in injection wells by 24.0 percent and the amount stored in surface impoundments by 67.3 percent. However, the tax would have a much smaller effect on landfilling and disposal in surface impoundments. The largely unanticipated incentives created by the Phase I tax could significantly affect its ability to generate reveues as the base of taxable wastes decreases in size over time. This issue is closely examined in the section on revenue generation.

In addition to the modeling analysis, we assumed that the waste streams excluded from the model would shift to treatment at roughly the same rate as the wastes that were modeled. By applying the estimates of the percentage

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[32]This figure assumes a baseline of compliance with Part 264 land disposal regulations.

[33]We also simulated the effects of imposing a high tax ($22/ton) on wastes that might qualify as extremely toxic and mobile. Treatment of these wastes was not increased by the $22/ton tax.

EXHIBIT 5-11

TOTAL HAZARDOUS WASTE DISPOSED OF BY TECHNOLOGY AND TAX RATE (millions of metric tons)

Waste Management Options	Current[1/]	$5/MT	Percent Reduction
Wastes in model:[2/]			
Landfill	3.09	2.90	6.0%
Underground Injection	9.76	7.41	24.0%
Surface Disposal Impoundment	14.46	13.97	3.4%
Surface Storage Impoundment	20.54	6.71	67.3%
Total Land Disposal	47.85	31.00	35.2%
Wastes not in model:[3/]			
Underground Injection	6.6	5.0	Assumed same $ reduction as modeled waste stream
Surface Impoundment Disposal	2.4	2.3	
Surface Impoundment	5.0	1.7	
Total Land Disposal	14.0	9.0	
TOTAL LAND DISPOSAL MODELED/NOT MODELED	61.85	40.0	

1/ Current figures reflect a baseline of compliance with RCRA Part 264 land disposal regulations.

2/ The model assumes no capacity constraints on the availability of treatment alternatives, as well as no lag time (e.g., for obtaining a RCRA permit) between switching from land disposal to waste treatment.

3/ These results should be considered preliminary because of the simplifying assumptions used in the analysis. (During the next few months, EPA will attempt to refine its understanding of the waste streams that are currently excluded from the model and develop more reliable projections of potential revenues that could be generated from these wastes.)

Source: EPA, Office of Policy Analysis, Hazardous Waste Disposal Model.

reduction in each land disposal technology predicted by the model to the 24.4 MMTs not in the model, an estimate of the effect of the tax on the total quantity of waste stored or disposed of on land in 1981 was developed. The bottom portion of Exhibit 5-11 presents the results of this analysis. For approximately 10.4 MMTs of the 24.4 MMTs, RCRA would have the effect of making treatment cheaper than land disposal. At $5 per ton, the tax would then shift an additional 5 MMTs to treatment. Thus, the $5 per ton tax could have a total effect of shifting a total of 21.9 MMTs of hazardous waste to treatment.

The analysis assumed that corrosive wastes are hazardous only because of having a high or low pH. It is not clear whether pH alone accurately describes the true nature of waste streams that generators now report to EPA as corrosive.[34/] Additional hazardous constituents, if present in the waste, could increase the cost of treatment precipitously.

To analyze the sensitivity of the results to the assumption that corrosive wastes are hazardous solely because of their pH, we substituted another waste stream with similar pH, but that also contained lead and chrome.[35/] Adding these constituents should have increased the cost of treatment. However, the results showed no difference. One possible explanation of the results is that there are substantial economies of scale for certain treatment technologies, such as neutralization, oxidation, chemical reduction, and biological treatment. Thus, treatment costs for large volumes of a waste stream often were equal to or just slightly higher than the cost of land disposal.

The low unit cost of treatment for certain waste streams appears to disagree with both the conventional wisdom about the effects of a low waste-end tax and States' experiences with their taxes' producing relatively insignificant changes in waste management practices. Our analysis shows that wastes would shift primarily from underground injection and storage surface impoundments under a $5 a ton tax. But most State taxes are levied on commercial land disposal, which occurs primarily in landfills, and waste

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34/ RCRA's waste-listing regulations require generators to first determine whether a substance is listed as hazardous in Subpart D of 40 CFR Part 261. (Listed wastes are substances that either contain specific hazardous constituents or are generated by a specific process.) If a substance is not listed in Subpart D, the generator must determine whether it is hazardous by its characteristics (ignitable, corrosive, reactive, or failing the extraction procedure test). Many generators may not be fully aware of this requirement and, rather than incur additional testing costs to determine whether the substance contains listed constituents, may simply report that the stream meets one of the four aforementioned characteristics. This could explain the tremendous quantities of characteristic wastes now reported to EPA and the lack of information on waste composition.

35/ Chrome and lead were added to corrosive waste in the model because corrosive or caustic substances are often used to treat metals (e.g., pickling liquor). Therefore, we assumed they would be typical waste products in a metal-treating process that used corrosive substances.

storage is usually exempt from a tax.[36/] Therefore, in a number of States, the tax is not applied to land disposal practices that are most likely to change in response to a tax.

On the other hand, the amount of waste disposed of in a landfill that would shift to treatment under the $5 per ton tax is relatively small (6 percent). This result is much more consistent with conventional wisdom and States' experiences.

Phase II. In Phase II, the tax would rise over time to create strong incentives for waste treatment. The results of simulations of the tax at rates of $5, $22, $50, and $170 a ton are shown in Exhibit 5-12.

At $22 a ton, landfilling is reduced by 59 percent, underground injection by 38 percent, and surface impoundment storage by 6 percent. This trend continues at $50 a ton, with the exception of disposal in surface impoundments, which still receives about 13.3 MMTs of waste. Dissolved air floatation float, generated in the process of petroleum refining, appears to constitute the majority of this waste, with the least-cost alternative being incineration, at approximately $151 a ton. At $170 a ton, virtually all land disposal of hazardous waste was eliminated, with the exception of landfills, which can receive residuals from waste treatment as well as some untreated wastes.

Exhibit 5-12 demonstrates the effectiveness of a rising tax in reducing the amount of hazardous waste land disposal. The rates here are illustrative, but a rising tax could be calibrated to shift hazardous wastes away from land disposal to treatment alternatives as additional treatment capacity becomes available. This could also reduce the pressure on firms to consider illicit disposal practices as an alternative to paying the tax. The table also shows a relatively steady reduction in the amount of waste disposed of on land up to approximately $50/ton. Thus, it is possible that the Phase II tax could provide a stream of revenue that would be both relatively significant and generally predictable over time, if rates are allowed to rise to compensate for shrinkage in the base. (The issue of the tax's revenue-generating capability is examined in the section on revenue generation.)

Reduction in Generation of Hazardous Waste. A waste-end tax may induce firms to reduce the volume of hazardous waste they generate, either by changing their manufacturing processes or by using raw materials that do not generate hazardous waste. A comprehensive analysis of these two effects is difficult, because they depend on factors specific to a firm or product (e.g., corporate investment cycle or product quality). However, the plausibility of a firm's adopting process changes (most likely minor changes) in response to a low waste-end tax was tested by undertaking detailed case studies in the organic chemicals industry and by inquiring whether states' waste-end taxes had brought about process changes. The results of these analyses are only useful in a general sense and cannot be generalized to the universe of waste-generating firms.

36/ U.S. Environmental Protection Agency, Office of Policy Analysis, Survey of States' Experience with Waste-End Taxes, draft report.

EXHIBIT 5-12

HAZARDOUS WASTE DISPOSED OF BY TECHNOLOGY AND TAX RATE[1/]
(millions of metric tons)

Waste Management Options	Current 2/	$5.00/MT	$22/MT	$50/MT	$170/MT
Landfill	3.09	2.90	1.19	1.16	1.14
Underground Injection	9.76	7.41	4.83	0.00	0.00
Surface Impoundment Disposal	14.46	13.97	13.83	13.29	.11
Surface Impoundment Storage	20.54	6.71	2.49	1.74	.04
TOTAL	47.85	30.99	22.34	16.19	1.29

1/ Model assumes no capacity constraints on the availability of treatment alternatives, as well as no lag time (e.g., for obtaining a RCRA permit) between switching from land disposal to waste treatment.

2/ Current figures reflect a baseline of compliance with Part 264 regulations.

Source: EPA, Office of Policy Analysis, Hazardous Waste Management Model.

A case study of the chloroethane and chloromethane sector of the organic chemicals industry indicated that a $10 a ton tax on hazardous wastes would induce firms to distill additional residues during the production of carbon tetrachloride. This change would reduce the total waste those firms generate by an estimated 2.5 percent.[37]

EPA conducted a survey of waste-end tax programs in eight states during the summer of 1984. Respondents, which included State program officials, environmentalists, and business persons, were asked whether their state's tax had caused changes in waste management practices. In general, because these programs are young and still evolving, states have typically put little effort into investigating whether, and to what extent, these changes have occurred. However, respondents in California indicated that virtually all solvents are currently being recycled and reused in response to increasingly stringent regulations, the waste-end tax, and a strong concern about the long-term liabilities associated with land disposal. In New Hampshire, as of fiscal year 1982, between one-quarter and one-third of the state's total hazardous waste was recycled (largely methylene chloride, trichloroethylene, and perchloroethylene).[38]

Reduction in the Waste's Degree of Hazard. The Phase I waste-end tax could encourage a reduction in the hazardousness of the waste generated or disposed of. The results of the Phase I analysis indicated that corrosive wastes would be neutralized, and cyanide-bearing waste would be chemically reduced under the simple $5 per ton tax. However, because that tax uses only a very limited degree-of-hazard system, the greatest tax savings should come from reducing the volume of the waste, not its hazardousnes.[39] This would not be true if the tax were based on dry-weight because, unlike a wet-weight basis, a dry-weight tax creates no incentive for volume reduction.

Because the Phase II waste-end tax could adopt multiple hazard classes and use rising rates, it should create a much stronger incentive to reduce the hazardousness of a waste. Generators would be encouraged to use chemical or physical treatment or to use other production methods to reduce their tax liability.

Increases in Research and Development. Many of the available waste treatment technologies merely reduce the waste volume and do little to make the waste less hazardous. A tax system, such as the Phase II approach, that is based on the quantity and characteristics of wastes that are disposed of

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37/ U.S. Environmental Protection Agency, Office of Policy Analysis, Case Study of Three-Tiered Tax versus Ban on Land Disposal -- Chloroethanes/ Methanes, prepared by Industrial Economics, Inc., March 1984.

38/ U.S. EPA, Office of Policy Analysis, Draft Report of Survey of States' Experience with Waste-End Taxes, August 1984.

39/ It uses only two tiers, and only a small number of wastes would potentially be subjected to the higher tax.

or treated and on the hazardousness of treatment or disposal techniques may encourage taxpaying generators to search for new processes to reduce their tax liability.

Generation of Better Hazardous Waste Management Information. EPA has recently completed its most comprehensive survey to date of hazardous waste generators and treatment, storage, and disposal facilities. The information it has generated, along with other existing data sources, has provided an adequate basis for establishing the Phase I tax. However, additional data are required to support enforcement activities and to support the development and implementation of the sophisticated degree-of-hazard tax. As taxpayers report the type and quantity of waste handled during Phase I, a more refined profile of the taxable universe of wastes and facilities could be developed. This information could be used to provide a basis for designing and implementing Phase II of this tax.

Acquisition of Information Useful in Setting Priorities for Permitting and Enforcement Programs. The risk classification analyses used to establish Phase II taxes may also identify the wastes for which treatment capacity may eventually be necessary. This information should help EPA to determine the types and quantities of facility permits that may be demanded by generators in the future. Further, because treatment processes can be very expensive for some waste streams, these wastes may also be strong candidates for illegal disposal. This information could help EPA and IRS to target subsequent enforcement and permitting activities. Already EPA's waste-end tax cost model is providing useful information on which wastes may shift to treatment at low tax rates.

Increased Incidence of Illegal Disposal. Many of the concerns about a waste-end tax rest on the presumption that it may cause an increase in illegal disposal. In general, any policy, regulation, or standard that increases waste management costs creates some incentive for some generators and disposers to consider bypassing the regulatory system.

The strength of the incentive created by the tax will be influenced by the size of the tax and tempered by whether the firm has made a significant investment in resources to comply with existing hazardous waste regulations, the enforcement capability of the government, and the feared consequences of being caught. Firms that have invested heavily and worked hard to comply with existing regulations should be less likely to risk being caught if the tax is low relative to other costs. At $5 and $10 a ton, the Phase I tax is a relatively small percentage of the cost of commercial disposal. Exhibit 5-6 shows that the $4.73 a ton waste-end tax is usually a small percentage of the commercial disposal price.

Since almost all waste-end taxes have been in place for only a few years, it is difficult to accurately assess either positive or negative effects. In recent interviews with states that have waste-end taxes, most States were concerned about the lack of resources to pursue an aggressive enforcement program. However, no States had evidence to confirm or deny the existence of illegal disposal, or increases in illegal disposal, as a consequence of the taxes. Earlier studies raised concerns about the incidence of illegal

disposal because of unexplained shortfalls in revenues and because some State officials suggested that illegal disposal was a factor.[40] However, States now indicate that these shortfalls were mainly due to inadequate data bases, the recession, and ambiguous legislative language creating numerous exemptions.

EPA has also conducted a limited study to compare the incidence of illegal disposal in states with and without waste-end taxes. The results of that study show no difference between illegal disposal activities in States with waste-end taxes and in States with other revenue mechanisms. However, this analysis is more suggestive than conclusive.[41]

In some States, thorough enforcement programs are in place. For example, New York's manifest system includes both on-site and off-site waste management. State hazardous waste personnel thoroughly check all generators' manifests for accuracy and possible abuse of a recycling exemption. Also, voluntary business compliance, which credible tax and regulatory programs have long enjoyed, should be quite high. However, the Phase II system should increase the incentive for some generators to use illegal disposal as the tax rises and wastes are banned from land disposal. By increasing tax rates gradually over time (e.g., five to ten years), the Phase II approach would reduce the price shock that generators might experience if they are required to use expensive technologies to treat their waste in the very near future. In doing so, the Phase II tax also attempts to reduce the pressures toward illegal disposal.

5.5.4 Revenue Generation

In analyzing the ability of the Combination Tax II to generate revenues, we must consider the two components of the tax separately. The DRI results for Feedstock Tax II discussed in Section 5.2.4 suggest that a tax designed to raise $1 billion per year would be unlikely to cause a decline in output sufficient to reduce feedstock tax revenues substantially. The waste-end component, however, may reduce the amount of waste disposed of on land by encouraging a shift to waste treatment. This section of the analysis examines the ability of the Phase I tax and Phase II waste-end tax to generate revenues, and how limitations in data and predictive techniques make very precise revenue projection difficult.

Ability to Generate Revenue. The ability of the Phase I and Phase II taxes to generate revenue depends on the incentives they create. Both Federal

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40/ U.S. General Accounting Office, State Experience with Taxes on Generators or Disposers of Hazardous Waste, May 1984. Office of Emergency and Remedial Response, U.S. EPA (Draft Working Papers), Experience of States with Waste-End Taxes, prepared by ICF, September 1983.

41/ U.S. Environmental Protection Agency, Office of Policy Analysis, Special Analysis of the Implications of a Waste-End Tax and Limited Land Disposal Bans for Illegal Disposal, prepared by Response Analysis, Inc., January 19, 1984.

and State land disposal regulations are increasing the cost of disposal and encouraging generators to use environmentally preferable treatment options.

The clearest example is Congress' decision to have EPA ban certain wastes from land disposal.[42/] In general, these restrictions could shift over time significant quantities of hazardous waste from land disposal to treatment, assuming adequate treatment capacity is available. Thus, they could limit the long-term revenue-generating capability of the waste-end tax. Beyond the next five to eight years, the tax's most appropriate use could be to create strong incentives for better waste management and to complement the existing regulatory program.

In the meantime, the amount of time that elapses between the points when treatment becomes the low-cost option and when generators begin to treat their wastes (lag time) will have significant implications for waste-end tax revenues during the next five to seven years. This section will examine how various lag times affect revenues. Since the federal government has had relatively little experience with levying and collecting a waste-end tax,[43/] the revenue analysis will focus mainly on modeling results and States' experiences with waste-end taxes.

In 1981, 55.0 MMTs of hazardous waste were disposed of on land, and about 52.0 MMTs were placed in storage.[44/] Assuming a continuation of these practices, EPA arrived at an initial annual estimate of $175-$275 million in revenues from the Phase I tax. However, this estimate did not account for revenues from the stored waste because EPA's survey did not ask how long a waste was stored.

42/ In deciding which wastes should be banned, EPA plans to evaluate the risks of a significant amount of waste under a provision of the new RCRA legislation (California list) by 1987, and approximately one-third of the remaining RCRA hazardous wastes by early 1988, the second third by 1989, and the remaining third by 1990. Individual ban decisions will affect plants immediately in some cases and in up to four years in others.

43/ The IRS collects the Post-Closure Liability Trust Fund (PCLTF) tax on hazardous waste disposal. The experience with this tax does not appear to be a good basis for comparison because of its relative obscurity. (In a limited phone survey of firms that were likely to dispose of hazardous waste and would be required to pay the PCLTF tax, approximately half the respondents were not aware the tax existed. According to the IRS, only about 50 firms out of about 430 facilities that were likely to dispose of hazardous waste actually paid the tax in the first quarter the IRS collected it.) Also, the tax is based on dry weight, and IRS has yet to issue interpretative regulations defining the procedures for calculating the tax.

44/ In 1981, 55.0 MMTs of hazardous waste was land disposed as the economy was approaching the peak of a recession. As a result, because of the direct relationship between producing and generating hazardous waste, 55.0 MMTs may be significantly lower than the amount of waste currently disposed of on land.

To develop revenue estimates that comprised the entire quantity of hazardous waste that could potentially be managed in taxable practices, an assumption was made as to how generators use storage impoundments. Generators were assumed to store their wastes for a long period of time or to dispose of their wastes on land, if the imposition of Part 264 land disposal regulations did not cause a shift toward treatment. This assumption is generally consistent with EPA's current belief that many unlined storage surface impoundments will eventually close as disposal facilities.

Earlier analysis suggests that the approximate tax base, assuming compliance with the Part 264 land disposal regulations, would be about 61.9 MMTs annually (which includes 47.8 MMTs disposed of on land in the model's base case plus 14.1 MMTs not in the model but assumed to be disposed of on land, as well). Also, at the $5 per ton tax rate, an additional 21.9 MMTs would shift to treatment. Therefore, the relevant range of taxable wastes appears to be 40.0-61.9 MMTs. This translates into a revenue range of $200-$310 million annually where $200 million annually assumes all 21.9 MMTs can immediately shift to waste treatment, and $310 million annually implies none of the 21.9 MMTs can shift to treatment.

Exhibit 5-13 lists the industries that would pay the tax, and their contribution, based on the modeling analysis. However, the table reflects only wastes included in the model and assumes generators can immediately shift their wastes to treatment, if cheaper than disposal. Thus, the annual revenue estimate is only $155 million based on the land disposal of 31.0 MMTs as compared with the previously stated quantity range of 40.0-61.9 MMTs and revenues of $200-$310 million annually. The exhibit indicates the approximate distribution of the tax burden among taxpaying industries. Individual contribution, however, will vary depending on the availability of adequate treatment capacity.

Because of limited treatment capacity and the time needed to construct and permit such capacity, it is unlikely that all 21.9 MMTs could shift to treatment immediately. To examine the revenue implications of various rates of transition from land disposal to treatment, we had to make assumptions about the rate at which this shift, and concurrent shrinkage in the tax base, would occur.

We assumed that an additional 10, 15, 25, and 50 percent of the 21.9 MMTs would shift to treatment in each of the five years of the tax. The term "annual shrinkage" is used here to mean the amount of waste that can be diverted from land disposal to treatment each year. Since in each year of the tax, a generator can add new capacity, the cumulative amount of shrinkage over the five years should appropriately reflect the amount of waste that could go to treatment.[45/]

45/ In general, using an annual shrinkage rate appears to be a reasonable method of accounting for the variability in the rate at which firms can switch from disposal to treatment.

EXHIBIT 5-13

MODEL PROJECTIONS OF ANNUAL TAX REVENUE BY INDUSTRY TYPE FOR PHASE I TAX ASSUMING AN IMMEDIATE SHIFT TO TREATMENT 1/

SIC	Industry	Tax Revenues (Thousands of $)
13	Oil and Gas Extraction 2/	$0
20	Food Processing 3/	0
23	Textile Manufacturing 2/	0
26	Paper and Allied Products 3/	0
28	Chemicals and Allied Products	72,600
29	Petroleum and Coal Products	74,730
30	Rubber and Plastic Products 3/	0
32	Stone, Clay, and Glass Products 2/	0
33	Primary Metals Industry	2,026
34	Fabricated Metal Products	597
35	Machinery, Except Electrical	132
36	Electric and Electronic Equipment	471
37	Transportation Equipment	170
38	Instruments and Related Products 2/	0
39	Miscellaneous Manufacturing	2
42	Trucking and Warehousing	21
49	Sanitary Services 4/	4,490
99	Nonclassifiable Establishments	253
Annual Revenues:		$155,500

1/ The annual revenue estimate generated by EPA's model is based on the land disposal of 31.0 MMTs of waste annually. This assumes that of the 47.8 MMTs modeled in the base case, a $5 per ton would shift 16.8 MMTs to treatment immediately. By including the waste streams we were not able to model, and using simplifying assumptions about the effect of the tax on these wastes, the analysis suggests a quantity of taxable waste of about 40.0-61.9 MMTs and a relevant revenue range of about $200-$310 million annually.

2/ Based on EPA data, these industries used taxable practices in 1981 but would shift to treatment under the Phase I waste-end tax.

3/ EPA data show these SIC's used nontaxable handling practices.

4/ Sanitary services should include firms in the commercial hazardous waste management industry.

Source: EPA, Office of Policy Analysis, Waste Management Model.

For example, as Exhibit 5-14 shows, at a 10 percent annual shrinkage rate, 50 percent of 21.9 MMTs would be diverted to treatment by year five. Alternatively, at 50 percent shrinkage a year, generators would have sent all of their waste to treatment in the second year of the tax. A 50 percent rate represents the most conservative of the four scenarios. In general, it may take a generator two or three years to plan, construct, and obtain a permit to operate a treatment facility.

Exhibit 5-15 shows total revenue estimates for the five years of the tax using 10, 15, 25, and 50 percent shrinkage rates. These projections are compared with a five-year revenue goal of $1 billion. The analysis assumes that for the 40.0 MMTs for which it would still be cheaper to land dispose and pay the tax than treat the waste, generators would continue to land dispose these wastes in a year, generating $1 billion over the five year period. At annual shrinkage rates of 10, 15, 25, and 50 percent, revenue projections are over the $1 billion target by 38, 30, 16, and 5 percent, respectively. Together with earlier revenue projections of $200 million and $310 million annually, these estimates generally indicate an ability of the Phase I tax to generate $1 billion over five years, with a possible surplus of five to thirty-eight percent annually.

Effects of Rate Increases on Revenues. To assess whether a waste-end tax could generate more revenues without huge increases in tax rates, we examined the effects of doubling and tripling the tax to $10 and $15 per ton. This analysis was restricted to wastes included in the model because it was not clear that the simplifying assumptions about the effects of the tax on wastes not modeled would hold as the rates were increased. As a result, the rate increases examined here apply only to a tax base of 31.0 MMTs (and changes from annual revenues of $155 million) -- the amount of waste remaining in land disposal at a $5 per ton tax. Increasing the tax to $10 a ton nearly doubled revenues, generating at least $302 million annually, and the potential for more if adequate treatment capacity is not available to those wastes for which treatment is now cheaper than land disposal. The same is true for a tax of $15 per ton, which shifted only an additional 6 MMTs to treatment, and would still generate at least $362 million in annual revenues. These results suggest that the wastes remaining in land disposal under the $5 per ton tax are not extremely sensitive to small increases in the tax. This further suggests that the Phase I tax can generate substantial revenues at modest rates and also create a relatively strong incentive for some wastes to shift to treatment.

Phase II. The waste management model was also used to examine how a rising waste-end tax could affect revenues. To estimate annual revenues under Phase II, we assumed the size of the tax that would apply to residuals from waste treatment.[46/] Unless a waste stream was solidified, it was assumed to

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46/ The Phase II tax rate for treated and untreated wastes would be set on a degree-of-hazard basis. This analysis does not attempt to use any of the available ranking systems to establish tax rates because EPA has not fully developed an appropriate method for estimating risks. As a result, it uses a simplified assumption of $10/ton for unsolidified wastes. This assumption appears fairly conservative when the tax is high, and less so when it is low.

EXHIBIT 5-14

ALTERNATIVE TAX BASE SHRINKAGE SCENARIOS

Year of Tax	Rate of Cumulative Shrinkage (%)			
Year 1	10	15	25	50
Year 2	20	30	50	100
Year 3	30	45	75	-
Year 4	40	60	100	-
Year 5	50	75	-	-

EXHIBIT 5-15

REVENUE PROJECTIONS UNDER ALTERNATIVE TAX BASE SHRINKAGE SCENARIOS

Revenue Projection	Rate of Annual Shrinkage	Estimated Revenues	Percent of Shortfalls
$1,000 million	10%	$1,382 million	38.2
$1,000 million	15%	$1,300 million	30.0
$1,000 million	25%	$1,163 million	16.3
$1,000 million	50%	$1,054 million	5.4

be taxed at $10 per ton, if disposed of on land. This rate was selected not to reflect the risk a waste may pose to human health and the environment, but only to indicate that a tax would be applied to wastes that remained after treatment. Therefore, annual revenues under Phase II would come from a rising tax on the land disposal of untreated wastes and a constant $10/ton tax on disposal of treatment residuals on land.

Although the results of the Phase II analysis are preliminary and subject to limitations, they suggest a waste-end tax can achieve revenue and incentive goals simultaneously. Exhibit 5-16 shows, because of the relatively large spread in treatment costs for the waste streams examined in the analysis, some generators would switch to treatment at a low tax, while others would continue to use land disposal until the rising tax made treatment the cheaper option. Because the tax rose at a faster rate than the tax base declined, annual revenues increased as the tax approached $75/ton. At a tax of about $113/ton, almost all generators would prefer to treat rather than to dispose of their untreated waste on land. At $170 per ton, land disposal of untreated hazardous wastes would be virtually eliminated, and annual revenues would be only $40 million, as taxpayers would solidify the bulk of the hazardous wastes generated in each year.

Several factors may induce a generator to switch to treatment, even at a tax rate lower than that projected by the model. For example, some states already levy a tax on land disposal of hazardous wastes; the combined effect of a Federal and State tax could create a strong enough incentive for a firm to shift to treatment. (During the next few months, EPA plans to examine the incentive and revenue effects of this combination, although an analysis of higher tax rates already suggests that revenues may not be adversely affected between $15 and $75/ton -- which represents the relevant range of tax rates if State and Federal taxes are added together.) Similarly, generators who perceive the long-term liabilities associated with land disposal as significant will most likely choose treatment rather than land disposal at a lower tax. Other firms could change production processes or begin to use nonhazardous waste-generating inputs. Finally, the tax base would be reduced by a decision to restrict a waste from land disposal. Each of these responses appears reasonable. However, firms' abilities to carry them out will be strongly influenced by available capacity, construction and permitting requirements (which are likely to be relatively fixed in the short term), and the availability of investment capital.

Data Reliability. A number of States levy and collect waste-end taxes to finance their site cleanup and waste management programs. Upon examining States' experiences with waste-end taxes in 1983 and early 1984, the General Accounting Office found that some States were experiencing problems in correctly projecting revenues from the tax.

A major reason cited for erroneous projections was a thoroughly inaccurate and inadequate data base. For example, New Hampshire initially estimated annual revenues of $700,000 in 1981; it received $76,000. The State's estimates of the amount of taxable hazardous waste had been extrapolated from an analysis of a New England regional survey. Because the regional survey had been done by a very reputable firm, and because the state was just "gearing

EXHIBIT 5-16

PROJECTED ANNUAL REVENUES AND QUANTITIES OF HAZARDOUS WASTE DISPOSED OF ON LAND UNDER A PHASE II TAX

	Tax Rates				
	$22/ton	$50/ton	$75/ton	$113/ton	$170/ton
Revenues 1/ (millions of $)	$495	$804	$1,075	$154	$40
Quantities of Waste Disposed of on Land (millions of tons)					
Solidified Wastes	.08	.27	2.62	7.10	9.44
Treated Wastes 2/	.45	.77	3.12	7.61	.51
Untreated Wastes	22.34	15.98	14.27	1.33	.21

1/ Total revenues equal the quantity of untreated waste multiplied by the designated tax rate, plus the quantity of waste that remained after treatment that would be disposed of on land, multiplied by $10.

2/ Treated waste category does not include solidification.

up" its program, with no capability for checking the contract work, the State accepted the estimates at face value. Since then, the State has derived more accurate waste volumes from manifests and has increased its tax rates. Current revenue projections are more stable, and income has surpassed them.[47/]

In New York, the Assembly publicly announced that it wanted $10 million for the State's waste-end tax program. It passed a bill with numerous waste exemptions that were difficult to analyze adequately, partly because of time constraints, and mainly because of major data limitations. The State Department of Environmental Conservation was making projections for different drafts of the bill as it evolved. This was quite difficult, because legislative definitions for exemptions did not match up well with how the State's data base was structured. Also, the State was using the best available data at the time, which were later discovered to be significantly inadequate. Ultimately, the Department projected that the legislation would produce "$7 to $8 million," recognizing the potential for error because of the inability to accurately analyze exemptions.

Actual revenues in New York were half of this projection. The Department gives the following reasons for the shortfall in order of importance:

(1) Inadequate data for this type of revenue projection, a limited data base and limited time to develop accurate projections;

(2) The recession;

(3) The economic competitiveness of out-of-state facilities; and

(4) Industry's evasion of, or confusion about, tax responsibility.

Present projections are based on surveys of industry, permit data, State manifest information (New York's manifest system records both on-site and off-site management), and the previous year's revenue reporting. Further, estimates are being revised regularly on the basis of revenue reporting. The State believes its revenue collection experience is a good basis for making revenue projections because it thoroughly checks all generators' manifests. Industry confusion or evasion has been ascribed to such factors as ambiguous language in the law.[48/]

47/ U.S. Environmental Protection Agency, Office of Policy, Planning and Evaluation, draft report, Survey of States' Experiences with Waste-End Taxes, August 1984.

48/ Ibid.

A more recent EPA survey of eight States in the summer of 1984 reflects substantial improvement over their revenue projections. In fact, a number of States now believe the tax is responsible for generating much of the information necessary to better define the regulated community and to develop more realistic projections. As data bases improve and programs settle into operation, problems reported in the past have, in many cases, been shown to be merely start-up problems. In six States, waste-end taxes had recently generated revenues between 71 percent and 98 percent of projections; in three states, revenues were ahead of projections.[49/] Exhibit 5-17 shows the revenues projected and collected in each State.

Thus, while our current data cannot be called conclusive, they suggest that waste-end taxes in the States surveyed have approximately the same revenue-generating reliability as feedstock taxes at the Federal level.[50/] Continued analysis of the experience of States and their future program needs will be useful in designing Federal tax policy.

EPA's recently completed survey and other Agency efforts have provided data that we used to prepare this study. Reports on hazardous waste generation and management activities in calendar year 1983 were due to EPA on March 1, 1984. By late 1984 or early 1985, this information could be computerized. EPA's survey estimates of the quantity of hazardous waste disposed of or stored on land could then be verified and refined using more current, nonrecession-year data that comprise the total universe of waste generators and treatment, storage, and disposal facilities, rather than comprising just a sample.

EPA could also assess in detail both the activities of generators of large quantities of hazardous waste and their plans for handling such waste in the future. Approximately 90 percent of all hazardous wastes regulated under RCRA in 1981 were generated by about 140 facilities, or 1 percent of all generators.[51/] The biennial report and existing Part A permit data could be used to reduce the scope of the assessment.[52/] EPA could also coordinate this effort with states that currently require generators and treatment, storage, and disposal facilities to report their activities annually.

49/ Ibid.

50/ The existing feedstock tax has generated 78-84 percent of revenue projections over its initial three years.

51/ Surveying of these large-volume generators before implementing a Federal tax would enable EPA and IRS to eliminate large volumes of waste that may no longer be taxable because of a possible change in waste management practices.

52/ RCRA requires firms to file with EPA or the state agency (if the state has program authorization) a record of any changes they have made in their facilities, such as expansions of capacity, management of additional wastes, or facility modifications.

EXHIBIT 5-17

REVENUES PROJECTED AND COLLECTED FROM WASTE-END TAXES IN STATES IN MOST RECENT FISCAL YEARS (thousands of $)

State	Most Recent State Fiscal Year Projection 1/	Actual Income	Income as a Percent of Projection	Next SFY Projection
California	$6,114	$5,468	89%	$6,513
Connecticut	1,000	712	71	None
Illinois	400	330	83	1,600
Ohio	1,227	1,205	98	1,400
Minnesota	900	921	102 2/	900
New Hampshire	232	247	107	230
New York	3,500	3,546	101	4,000
South Carolina	750	720	96 3/	None

1/ Survey conducted in summer 1984.

2/ Minnesota's actual income figure is based on six months or two quarters of collections put on an annual basis.

3/ South Carolina's figure reflects five months of collection, also put on an annual basis.

Source: U.S. Environmental Protection Agency, Office of Policy, Planning and Evaluation, draft report, Survey of States' Experiences with Waste-End Taxes, August 1984.

Earlier revenue analysis indicated a waste-end tax could generate approximately $1 billion annually, with an approximate surplus of between five and thirty-eight percent annually. Additional data analysis before implementing the tax would help to refine and further reduce possible error in the revenue projections. Since the availability of alternative treatment capacity is the primary determinant of the amount of hazardous waste that will remain in the tax base and generate revenues, better information in this area should have the most significant impact on our ability to refine predictions on revenues.

Predictive Techniques. One impediment to more accurate revenue projections has been States' failure to accurately ascribe dollar amounts to exemptions before projecting the tax. This can cause unexpected but explainable revenue shortfalls. For example, in Connecticut, legislation passed in 1982 called for a fund of $1 million annually for three years. Actual collections were just under 60 percent of projections: $886,809 for six quarters, or $591,126 per year. Asking for an explanation of the shortfall, the state legislature learned that it had failed to account for the cost of exemptions in the bill that was passed. In the original legislation, all manifested hazardous waste was used to estimate the tax base. But the final bill included exemptions for small generators and waste oil. (Further, out-of-state generators were part of the original estimate, but did not start paying until the first quarter of 1983, which was not reflected before the third reporting quarter of 1983.)[53/]

In general, another significant limit in EPA's predictive techniques is less than complete understanding of the decision-making process for managing hazardous waste. It is unlikely that EPA will ever be able to precisely predict generators' behavior on a case-by-case basis, since there are considerations such as long-term liability, public perception, and reliability of waste management services that are difficult, if not impossible, to quantify and factor into models for predictive behavior. However, by assuming both that all generators are generally concerned about their public image and about the long-term liabilities associated with land disposal, and that all have equal access to alternative treatment technologies, the current version of the waste management model takes the logical first step in developing the framework for analyzing the decision-making process. That step is comparing the cost of alternative technologies.

5.5.5 Administrative Feasibility

The administrative and reporting requirements of Phase I of Combination Tax II (feedstock tax and incentive waste-end tax) would probably exceed those of Combination Tax I (feedstock tax and non-incentive waste-end tax) due to additional features of the waste-end tax. However, the type of information necessary to calculate the tax is available from the existing RCRA information

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53/ U.S. EPA, Office of Policy, Planning and Evaluation, draft report, Survey of States' Experience with Waste-End Taxes, August 1984.

system. The requirements of Phase I of Combination Tax II are the sum of the administrative and reporting requirements of the feedstock tax and the waste-end tax considered separately. No economies of scale or synergistic effects appear to result from combining the two taxes. In general, this is because the two taxes are levied on significantly different activities and substances and affect different groups of taxpayers. Because the administrative and reporting requirements of the feedstock portion of Combination Tax II have already been described, this section will concentrate on assessing the requirements of the limited incentives waste-end tax component (Phase 1 of Combination Tax II).

Taxable Parties. The Phase I waste-end tax component of Combination Tax II is applied to the disposal on land of all RCRA regulated hazardous wastes, as defined under 40 CFR Part 261, and their management in a landfill, surface impoundment, land treatment facility, waste pile or underground injection well, as described in 40 CFR Parts 264 and 265. In addition to taxable parties classified as disposal facilities (currently defined by RCRA as landfills, injection wells, disposal surface impoundments, and land treatment facilities), the Phase I tax would also require identification of waste management facilities that store wastes for long periods of time in a surface impoundment or a waste pile. This results in a total taxable universe of about 1,028 facilities. This estimate includes all facilities using storage impoundments, but may decrease when long-term storage is defined as a specified length of time. Currently, facilities that store wastes for longer than 90 days must have a RCRA permit. It is not anticipated that the current number of storage facilities will drastically increase or decrease in the near future; however, some storage impoundments may be closed as disposal facilities, which is allowable if certain RCRA provisions are met. EPA is currently calling in RCRA Part B land disposal permit applications, with the goal of calling in all in FY 1985. As this is done, the total number of potential taxpayers should decrease as some facilities are denied their final RCRA permits or choose to close rather than upgrade to permitting standards.

These 1,028 RCRA facilities are owned by approximately 500 firms. About 430 of these facilities are engaged in land disposal activities and have the following disposal units: 199 landfills, 116 disposal surface impoundments, 87 injection wells, and 70 land treatment facilities.[54] These taxable parties should be identifiable through the HWDMS and other information sources in the regulatory system.

Taxable Activities. The Phase I waste-end tax is levied on two activities: the land disposal of hazardous wastes, and the long-term storage of hazardous wastes, when storage takes place in a storage impoundment or a waste pile. A typical storage lagoon is used on a fairly constant basis.

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[54]The number of disposal facilities does not equal the sum of the processes because of multiple processes at some facilities. Regulations under RCRA in 40 CFR Section 260.10 provide definitions for landfills, surface impoundments and land treatment facilities.

Wastes are often piped into the lagoon and later shipped off site or allowed to flow into another lagoon to evaporate. There is likely to be a wide variation in storage practices, which may make it difficult to characterize precisely what is "long-term."

To administer a tax effectively on both disposal and long-term storage, it may be necessary to make the period on which the tax is assessed identical for both activities. Otherwise taxpayers have an incentive to shift their waste from disposal activities to storage each time the tax is due and temporarily defer payment of the tax. Eventually, the tax should catch up with these wastes; however, the result could be some unpredictability in revenues in each collection period. A possible means of avoiding this problem is to assess the tax on both disposal and long-term storage by levying it on the total amount of waste held at a permitted facility in either a surface storage impoundment or a waste pile on the last day of a reporting period and on the total tonnage of waste that was land disposed in the same reporting period. Another option is to require taxpayers to account for the wastes held in long-term storage by last in, first out methods. This would tax a portion of the stored waste when waste is flowing in and out of the facility on a continuous basis. However, because some storage impoundments are used to settle out the solids in liquid wastes, and may be dredged infrequently, the wastes in these facilities could be taxed more than once if the tax is assessed on a quarterly basis. Quarterly dredging would be impractial because the firm could be left without storage capacity for weeks, and frequent dredging could damage the integrity of liner systems. Thus, additional reporting and estimating procedures may be required to enforce this option.

Taxable Substances. The Phase I tax would place a higher rate on wastes that are highly toxic and very mobile. Administrative problems of defining and identifying taxable substances could arise with respect to (a) defining highly toxic and mobile wastes, (b) applying the tax to waste mixtures, (c) taxing hazardous treatment residuals, and (d) defining the unit of taxation. Each of these administrative requirements is discussed in this section.

- Defining highly toxic and mobile wastes: The Phase I tax places a higher rate on wastes that are highly toxic and very mobile. EPA or IRS would not necessarily be required to develop regulations dividing RCRA wastes into high and low hazard categories if legislation lists wastes that have been determined to be highly toxic and very mobile, in the same way that the current list of taxable feedstocks appears in CERCLA. The wastes to be taxed at a higher rate could be identified by using the EPA four-digit waste code identification; all other RCRA wastes could then be defined as taxable at a lower rate by a simple comprehensive rule of taxation.

Because EPA is in the process of delegating the RCRA program to the States, a tax on wastes listed under RCRA could allow States to add substances to the list of taxable wastes. This could create a number of administrative problems that could hinder implementation, collection, and enforcement of the tax. It would also create an incentive for generators to send their wastes to States that do not tax certain substances. If the tax initially were limited to only hazardous wastes listed by EPA, the time necessary to implement the

tax could be reduced significantly and the collection and enforcement process would be simplified.

• Applying the tax to waste mixtures: The Phase I limited incentive waste-end tax sets differential rates on substances. It may, therefore, create an incentive for taxpayers to mix high tax wastes with low tax wastes, classify the entire waste stream as a low hazard stream, and pay the lower rate. One means of eliminating the incentive to mix wastes created by a differential tax is to define the entire stream as taxable at the rate applicable to the most hazardous waste in the mixture. However, this would not eliminate the incentive to misclassify taxable wastes. Thus, regular site audits, waste analysis, and other methods to detect noncompliance will be necessary to reduce the misclassification of wastes and tax avoidance. The potential for misclassification may not be significant under the Phase I tax, however, because the wastes subject to the high tax are relatively small in number and quantity.

• Taxing hazardous treatment residuals: Hazardous waste treatment technologies usually reduce the volume of the waste, render the waste nonhazardous, or alter the chemical or physical state of the waste, thereby reducing the degree of hazard of the stream. Almost all forms of waste treatment generate a hazardous residue that must be properly disposed. For example, incineration can generate toxic ash.

The Phase I limited incentives waste-end tax applies to treatment residuals that are disposed of using taxable practices. Taxing all residuals at the same rate and on the same unit of taxation as the original waste stream greatly simplifies the task of administering the tax. Neither the IRS nor EPA is required to make a technical distinction between the degree of hazard of the original waste compared to that of its treatment residuals for the purposes of assigning a different tax rate.

This approach may appear inequitable to taxpayers who choose to treat their wastes prior to disposal, but the inequity is not as significant as it first appears. Because the tax uses a very simple two-tiered incentive scheme and the high tax applies to only a limited group of wastes, a taxpayer's actual tax liability will be affected more by the quantity of waste disposed than by the hazardousness of the waste. In other words, under the Phase I limited incentives tax, a taxpayer should receive greater tax savings by reducing the quantity of taxable waste than by rendering the waste less hazardous. This is not necessarily true for the Phase II tax in which one rate is much higher (e.g., 5 to 10 times) than another rate, or where the system has multiple hazard tiers. For wastes that are truly rendered nonhazardous, EPA's delisting process is available as a means of rewarding desirable behavior and reducing inappropriate taxation.

If residuals are exempted rather than taxed, an incentive would be created to claim falsely that waste treatment was performed in order to avoid all tax liability or taxpayers might seek low-cost, ineffective treatments to qualify for the exemption. A tax with a residuals exemption would be very difficult to administer. Standards defining adequate treatment would have to be

developed for all wastes and treatment technologies. EPA is now working on an approach to classifying hazardous treatment residuals; however, this analysis may require two or three years to complete. Based on that analysis, the Phase II tax proposal, which provides strong incentives, could apply a lower rate to less hazardous treatment residuals or exempt them altogether.

• Waste Listings and Delistings: EPA's waste listing and delisting process could add and delete waste streams from the list of taxable wastes. The tax is least burdensome to administer if, as EPA lists a waste according to its regulatory authority, the waste becomes taxable and if a decision to delist a waste exempts the substance from the tax. Waste delisting also could present some administrative difficulties because a delisting decision could depend on where the waste would be disposed. Thus, a delisting could apply to a waste regardless of its disposal location or only when it is disposed at a particular facility. However, an individual listing or delisting decision would not have an effect on the taxable status of other RCRA wastes. In addition, over the past few years, EPA has only approved a few delisting petitions and recent RCRA legislation passed by Congress makes it more difficult to delist a waste.

• Unit of Taxation: A critical variable affecting the simplicity of the tax is the unit of taxation. The tax could be based on the weight or volume of wastes, or some variant of these such as dry weight. If the tax is based on a unit of measurement that conforms with existing practice and is simple to calculate, the tax will be more effective than if new measuring and testing procedures must be developed and implemented. A study performed for EPA suggests that dry weight may be more difficult than wet weight to administer as a unit of taxation.[55/] Examples of problems include:

- Dry-weight would have to be defined as either the nonwater weight of the waste or its solids content. A solids content tax basis would make many highly mobile solvents tax exempt, whereas a nonwater definition would require fairly sophisticated waste analyses to determine the nonwater portion of the waste.

- Wastes could be mixed together or diluted with water to reduce tax liability, and IRS or EPA could not verify taxes owed. Such incentives to dilute exist when there are high differential tax rates among disposal methods and especially when wastes are put into an underground injection well and cannot be sampled.

- Mistakes in calculating dry-weight could contribute to significant revenue losses.

55/ Pope-Reid Associates, "Effects of Changing the CERCLA Tax Basis," prepared for Office of Policy Analysis, EPA, December 1983.

- The dry-weight of a waste could vary significantly from shipment to shipment, requiring frequent waste sampling and analyses to calculate the proper tax liability.

- Waste-management facilities must perform tests for either the solid content of waste or its nonwater content in order to report under the Post-Closure Liability Trust Fund tax, but EPA currently has no standard procedure for testing for dry-weight.

Using a wet-weight ton basis would reduce or eliminate a number of factors that could contribute to an error in calculating the tax. This common standard of measurement is frequently used by waste management facilities to maintain records and report information to EPA. Finally, a wet-weight tax would not result in additional testing requirements for taxpayers and would eliminate the need to develop and implement testing protocols, which would have to be incorporated into the implementing regulations.

Reporting and Recordkeeping. The administrative feasibility of the Phase I waste-end tax depends in large part on the ability to rely on existing reporting systems. Taxpayers use this information to calculate tax liability, and the government uses the reporting and information systems to perform important tax management functions, including:

- identifying taxable parties and verifying taxpayer status;

- levying and collecting the tax; and

- auditing taxpayers and performing other routine enforcement functions.

IRS must have access to four basic pieces of information to implement the Phase I waste-end tax:

- a list of potential taxpayers;

- information on waste types and quantities managed at taxable facilities;

- information on the waste management processes conducted (e.g., storage in impoundments) at each facility; and

- the quantity of waste managed by process type (e.g., 100 tons of corrosive wastes were landfilled).

If extensive and time-consuming changes are required in existing reporting and recordkeeping systems in order to obtain the information necessary to administer a tax, the desirability of a particular tax is lessened. If much

of the information already exists, the burden of reporting and recordkeeping and the time required to implement the tax can be reduced significantly.

Combination Tax II Phase I will require only moderate changes to the existing reporting and recordkeeping system. Currently, hazardous waste generators and treatment, storage, and disposal facility operators are required under RCRA to notify EPA of certain activities, maintain a number of records, and periodically report their waste management activities to EPA. The records they must collect and/or submit include the biennial report, operating records, Part A and B permit applications, and hazardous waste manifests. EPA has developed data bases incorporating national surveys of hazardous waste facilities. None of these records in their current form satisfy the needs of a reporting system for implementing and enforcing the Phase I waste-end tax but they can be used in combination and revised to provide the necessary data. Appendix B describes in detail the existing reporting and recordkeeping systems, required changes, and uses of the data.

In summary, the data required to administer the Phase I tax could be obtained from the following sources:

- Part A and B permit applications and biennial reports from non-authorized states could be used to identify potential taxpayers;
- Biennial reports and facility operating records could be used to provide data on the quantities of wastes managed by waste and by process and could be used as the basis of the tax returns;
- Biennial reports, operating records, and manifests could be used for enforcement and verification.

The current limitations of these reporting and recordkeeping systems are (1) biennial rather than annual submissions, (2) differences in data reported by RCRA authorized and non-authorized states, (3) the format and contents of the facility operating record may make it difficult to use for tax enforcement purposes, and (4) the waste manifest applies only to wastes managed off site.

Although changes to the existing reporting and information systems are necessary to provide data on an annual basis for all facilities, these changes are not likely to impose a large incremental burden on the regulated community, the states, or EPA. A number of states already have more comprehensive reporting requirements (e.g., annual reports) than EPA. However, time and resources will be required to promulgate the necessary regulatory amendments. The two changes most likely to be necessary would probably be requiring annual rather than biennial reporting and specific recordkeeping requirements for identifying hazardous wastes and processes at individual facilities. These modifications could take one or two years to make. Another option would be to require reporting of some information that facilities are currently required to keep in their operating record.

Monitoring and Enforcement. The problems of levying, collecting, and enforcing the Phase I and II waste-end taxes are technical and complex. Traditional collection and verification procedures may not be adequate to administer the tax effectively, and IRS and EPA probably will be required to share the responsibility of administering the tax.

EPA may be required to provide considerable technical expertise to IRS in a number of key areas. Regulation development, for example, will require extensive understanding of technical hazardous waste regulations, standards, and practices. EPA also may be required to provide IRS with information, through a formal information exchange system, for identifying taxpayers and waste types, quantities, processes at TSDFs, and screening for potential non-compliance.

A strong enforcement program will be an important factor, if not the most important factor, in effectively administering the waste-end tax. Regular site audits by well-trained auditors and inspectors may be the only method to verify taxpayer claims with actual facility practices. Joint IRS and EPA auditing teams might be required for regular site inspections or surprise inspections.

State experience with waste-end taxes suggests that monitoring and enforcement is extremely important. EPA recently surveyed States with waste-end taxes to determine what administrative problems they have encountered. Because State waste-end tax programs are evolving, most State officials indicated that they had experienced some initial administrative problems in running the tax program, but appear to have resolved many of these problems and are administering the tax more effectively now. Among the problems States experienced are the following:

- Insufficient staff in enforcement, inspection, and collection; and inadequate training for tax collection personnel in understanding regulatory programs under State and Federal statutes.

- Ambiguous legislative language, which created problems for the administrative agency in defining taxable substances and activities.

- Poorly defined exemptions, which allowed wastes that were intended to be taxed to escape the system, also creating an incentive for generators to shift waste to exempt practices.

- "Honor System" self-reporting of taxable volumes and lack of adequate on-site inspection appear to have contributed to early losses in revenues, although they are not quantifiable at present.

State experience suggests that EPA and IRS could require additional resources in order to enforce the waste-end tax. Among the key elements that would be required as part of a tax enforcement program are:

- A well-trained enforcement staff consisting of scientists, engineers, and tax auditors to conduct thorough site audit/inspections to verify tax returns with waste management practices and operating records;

- Adequate resources to: perform site audits, conduct surveillance to monitor for illegal disposal (e.g., training and partial funding for State highway patrols and local police in surveillance techniques), improve existing detection methodologies (e.g., metering waste flows), and develop new enforcement methods;

- Access to comprehensive data on waste management practices at taxpaying facilities; and

- Stiff penalties for tax violations to increase the cost to violators and increase their visibility, if caught.

APPENDIX A

"TRACEBACK" OF FEEDSTOCKS

DETERMINING THE RELATIVE CONTRIBUTION OF
FEEDSTOCKS TO THE MANUFACTURE OF SUBSTANCES
FOUND AT HAZARD RANKING SYSTEM (HRS) SCORED SITES

BACKGROUND

In order to determine a feedstock's contribution to the problem at a particular hazardous waste site, one must trace back from the chemicals found at the site to their feedstocks. The "traceback" involves determining the relative contribution of feedstocks (and raw materials) to the production of substances found at HRS sites. To the extent possible, the substances were traced back to feedstocks currently taxed under CERCLA; where this would not account for some of the feedstocks of a substance, additional feedstocks were included.

In order to determine the relative contribution of feedstocks, data from actual production processes should be used. Reaction yields are rarely 100 percent of theoretical yields; therefore, mass balance data (weight of feedstocks per unit of product) are needed. Because a substance may be produced by a variety of processes, the percent contribution of each process to total production is needed. The relative contribution of feedstocks can be calculated in the following manner:

(1) For each process, list the feedstocks and the tons of feedstock required per ton of product;

(2) For each process, multiply these mass balance data by the relative contribution of that process;

(3) For each feedstock, add the resulting values for each process (some feedstocks may not appear in all processes); and

(4) Calculate the percent contribution of each feedstock.

In many cases, the reactants for a process are not taxed CERCLA feedstocks but are derived from them, and the processes that produce the reactants must also be evaluated. The goal is to express the production of a substance in terms of CERCLA-taxed feedstocks and other feedstocks that are not derived from taxed feedstocks.

Because of the data collection and calculations required, the above process is time consuming. In order to minimize the time required to evaluate the over 450 substances found at HRS sites, only the 44 most frequently found substances (found more than 20 times) were evaluated according to the procedure outlined above. For the remainder of the substances, the production processes were not investigated; the feedstocks were determined from more general sources (e.g.,

SRI Chemical Origins and Markets). In such cases, all of the feedstocks used to manufacture a substance were assumed to be used in equal amounts. Thus, equal relative shares were assigned to each of the feedstocks.

In some cases, this simplification may lead to significantly different relative shares than would be obtained from a detailed analysis; the identity of the feedstocks, however, is relatively consistent. The error is minimized, however, by evaluating the most frequently found substances in detail; evaluating more substances would provide smaller increases in accuracy. The 44 chemicals evaluated in detail account for 71 percent of the 4,950 observations of chemicals at HRS sites. Evaluating another 22 chemicals would raise this to 78 percent; evaluating 44 more chemicals would raise this to 83 percent.

Even detailed evaluations are subject to uncertainties. Relative shares of feedstocks may vary over time as economic conditions that favor one process over another change. Data used were the most recent available from SRI's Chemical Economics Handbook.

ASSUMPTIONS

- In many reactions involving chlorination, hydrochloric acid (HCl) is produced as a byproduct. HCl is also often used as a chlorine source. If the chlorine in the HCl byproduct is attributed to the production of the principal product, that HCl would be counted twice if the HCl was used as a chlorine source. Therefore, the quantity of chlorine used in a reaction that forms HCl is not counted against the main product. However, wastes which are generally not recovered and recycled (e.g., sodium chloride) are included when assessing the feedstock's share. This is a judgment decision, and generally only affects reactions producing HCl.

- Oxygen is not considered a feedstock because it is readily available from the air.

- For listings in the HRS data base that are generic (e.g., heavy metals, not otherwise specified (N.O.S.)), the assessment of the feedstocks is as detailed as possible. For example, heavy metals, N.O.S. is not traced back to any specific feedstocks; trichloroethenes, N.O.S. is traced back to the feedstocks of specific trichloroethenes on the HRS list.

- If no specific production or capacity data are available, one process is chosen if the data indicate that it is clearly dominant; equal shares are assumed if no data are available.

SOURCES

The data used to perfom these calculations are from:

- Hawley, Gessner G., ed. The Condensed Chemical Dictionary 8th ed. New York: Van Nostrand Reinhold Company, 1971

  -- General information
  -- Process information

- Lawler, Gloria M., ed. Chemical Origins and Markets 4th ed. Menlo Park: Chemical Information Services, Stanford Research Institute, 1977

  -- Process flow diagrams

- Rudd, Fathi-Afshar, Trevino, and Stadtherr. Petrochemical Technology Assessment. New York: John Wiley & Sons, 1981

  -- Mass balance data
  -- Process information

- Stanford Research Institute. Chemical Economics Handbook. Menlo Park.

  -- Process information
  -- Production and capacity data

APPENDIX B

RCRA REPORTING AND RECORDKEEPING REQUIREMENTS AS SOURCES FOR ADMINISTRATION OF COMBINATION TAX II, PHASES I AND II

The following RCRA reporting and recordkeeping requirements could be used to provide data necessary to administer the Combination Tax II, Phases I and II. The existing system, required changes, and uses of the data are described in this Appendix.

- Biennial Report

RCRA requires generators and owners or operators of TSDFs in non-authorized States to submit data on their hazardous waste activities of the previous year on a biennial basis, beginning in 1984. Reports of activities conducted in calendar year 1983 were due March 1, 1984; subsequent reports are due March 1st of even-numbered years. The biennial report form provides much of the data necessary to implement the waste-end tax:

- Basic information about the facility, including current and future status;
- Type of waste handled, in general descriptive terms and EPA waste codes;
- Methods used to manage the waste; this information is entered in the form of a code for each process (e.g., D79 -- Injection well, S04 -- Storage surface impoundment);
- The quantity of waste managed using a particular process; and
- Information on the total waste in storage.

The data provided by the biennial reports could be used to verify and update an initial list of taxpayers developed from other sources and to collect, verify, and enforce the tax.

Authorized States must submit a State Summary Report to EPA on a biennial basis. In the report, the State must supply a list of generators and disposers in the State, and summary statistics on the types and amounts of waste generated and managed by process type (e.g., landfill, surface impoundment). Many authorized States are using the same form as nonauthorized States are required to use, but with some minor modifications, and some are collecting data annually. The information presented in the report must conform to EPA's waste and process codes. States without program

authorization are currently submitting their biennial reports directly to EPA Regional Offices.

Because State reports provide only summary statistics, they could not be used to verify a taxpayer's liability. In order to use the biennial report effectively to implement a waste-end tax, States would have to be required to present the information they currently gather from their facilities in a different form. For example, States now report the total quantity of hazardous waste handled by all regulated TSDFs in a reporting year. Instead, data would be necessary on an individual facility basis. These data should already be on hand for use in developing the summary report; therefore, altering the presentation of the report should not place a great burden on the States.

At present, one significant limitation of the report is that information on hazardous waste activities is only reported every other year. As a result, valuable tax enforcement information is not available in non-reporting years. While the report generates all the information necessary to collect and verify tax payments, its biennial cycle greatly limits its usefulness. An annual report would overcome this problem and provide the information necessary for the collection and verification processes; it would also generate information on taxpayer status for updating a list of taxpayers.

- Facility Operating Record

RCRA regulations require all owners or operators of TSDFs to maintain a written operating record at the facility at all times which records all waste management activities conducted from the time waste is generated or received from another facility until its ultimate disposal or shipment off-site. Some of the information that is required to be maintained in the record includes:

  - A description of each hazardous waste by its common chemical name and its EPA four-digit hazardous waste code.

  - The physical form of the waste and its quantity. If the waste is accompanied by a manifest, this is also indicated.

  - Method of handling the waste -- treatment, storage, or disposal.

  - Dates that wastes were received and managed, including intermediate processes such as treatment.

  - The amount of each waste being managed by a particular process (e.g., placed in storage), and for wastes that are disposed, a map designating the location of the waste on the facility.

Because of its scope and detail, the facility operating record should provide taxpayers with all the information necessary to calculate their tax

liability. The operating record can also serve as a valuable source of information for enforcing the tax. The detailed information on waste type, quantity, and process, and the flow of the waste through the facility to its final disposition should provide an auditor with the information necessary to determine whether a taxpayer facility has paid the proper amount.

One limitation of the operating record is that while the regulations clearly articulate the type of information that must be maintained, they do not specify the format in which the information should be kept. For purposes of the waste-end tax, disposal facilities could be required to maintain operating records according to one or more prespecified optional or mandatory formats or be required to maintain uniform summary sheets of their waste management activities.

Currently, the owner or operator is required to keep the physical record of daily operations on-hand at the facility only until the facility closes. Thus, if time had elapsed between the facility closing and a final audit by IRS, the operating record might not be available. This problem could be easily rectified by modifying the regulation to extend the time in which the record must be kept after closure.

- Part A Permit Application

All owners or operators of facilities that treat, store, or dispose of hazardous wastes were required to file a Part A permit application with the EPA Regional Administrator by May 19, 1980 as a condition of operating under interim status. This information is maintained on EPA's Hazardous Waste Data Management System (HWDMS). A record of changes, such as expansion of capacity, management of additional wastes, or facility modifications, must be supplied to EPA or the State agency, if the State has program authorization.

The Part A and HWDMS is the most comprehensive source of data available for identifying potential taxpayers. The permit application provides data on wastes handled, waste management process used, amount of unused capacity remaining at the facility, and even requests a scale drawing of the facility, including designations of current, past, and future waste management operating areas.

Because applications were filed in 1980, a number of firms filed "protectively" in order to obtain interim status in the event they decided to handle hazardous waste in the future. For this reason, HWDMS may contain some facilities not currently engaged in hazardous waste management activities. Although the existence of some nontaxpaying facilities in the data base is not an impediment to developing a preliminary roster of taxpayers, their current status in HWDMS should be verified. Three possible sources of information exist for cross-checking HWDMS, including:

- the biennial report, which provides information on current facility status;

- EPA has recently completed an extensive mail survey of generators and TSDFs that could provide a reliable check on the facilities that responded to both Part A and the mail survey; and

- EPA has a goal of call-ins for all Part B final land disposal permit applications in 1985.

- Uniform Hazardous Waste Manifest

Any shipment of wastes subject to RCRA regulation and shipped off-site after September 20, 1984 must be accompanied by a Uniform Hazardous Waste Manifest. The manifest tracks the shipment as it leaves a generator and is transported to a TSDF. The manifest system requirements have been in existence for a number of years; however, a uniform reporting form has not been required until recently. The manifest form requests information that identifies the generator, all transporters, and the TSDF receiving the shipment. Other basic waste type and quantity information is also required.

The usefulness of the manifest as a collection tool for the waste-end tax appears limited, mainly because it only covers wastes managed off-site. In addition, the manifest is not returned to EPA; rather, a copy must be retained for three years by all parties that handled the waste. Also, most of the information reported on the manifest is already required by the biennial report and operating record. Therefore, requiring generators that manage waste on-site to complete a manifest would not be necessary if EPA were to make changes to other existing reporting systems.

The manifest does provide information that could be used to detect noncompliance. Because the manifest tracks the movement of waste shipments and because parties handling the wastes must retain a copy for three years, the manifest could be used to monitor the behavior of generators who ship off-site. Enforcement agents could examine the historical record of manifest shipments to TSDFs to determine whether a waste generator has significantly reduced the number of shipments to a TSDF in any reporting period. If significant changes were to be detected, enforcement agents could go back to the generator to determine the reason for the changes (e.g., sent waste another TSDF or constructed an on-site treatment facility, making them an eligible taxpayer) or whether possible RCRA violations have occurred. Because the generator is not liable for the tax, it may be necessary to pursue the firm under RCRA. Approximately 85 percent of all generators send some wastes off-site; therefore, the manifest can provide an accounting system that uses the manifest forms of less than 1,274 TSDFs to monitor the behavior of thousands of generators. To increase the efficiency of the manifest system, it may be desirable to have TSDFs submit a copy of each manifest received to EPA.