THE APPLICATION OF ECONOMIC INSTRUMENTS FOR WASTE MANAGEMENT

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The purpose of this paper is to describe three major portions of the waste management program in the United States and to explain how economic factors are consider in each of them. The waste management program in the United States can be subdivided into three distinct functional areas: prevention, protection, and remediation. The prevention program is designed to reduce or eliminate the generation of waste materials through process modifications and raw material substitutions. The protection program is designed to regulate the generation, transportation, treatment, storage, and disposal of waste materials to protect public health and the environment. The remediation program is designed to restore older sites where waste materials have been previously mismanaged or abandoned. Each of these three functional areas will be described separately below.

PREVENTION

In the United States of America, the first pollution control activities were directed at "end of pipe" restrictions on wastes. In recent years, Pollution Prevention (P2) has become one of the major concerns and focuses in the environmental field. President Clinton and United States Environmental Protection Agency (U.S. EPA) Administrator Carol Browner have emphasized its importance and are committed to a preventative strategy to eliminate or reduce the generation of environmentally harmful pollutants which may be released to the air, land, or water. As early as 1976 when the Resource Conservation and Recovery Act (RCRA) was passed by the U.S. Congress, a hierarchy for waste

management listed source reduction as the preferred management option. Since that time the concept of waste minimization has been strengthened in the RCRA program.

The Pollution Prevention Act of 1990 established a national goal with a hierarchy of: 1. prevention or reduction at the source; 2. environmentally sound recycling; 3. environmentally safe treatment; and 4. only as a last resort, disposal or release in an environmentally safe manner. This law further requires U.S. EPA to report biennially to Congress on various aspects of the source reduction program. U.S. EPA issued a National P2 strategy in 1991. This provided guidance and policy on how P2 is to be integrated into all environmental protection efforts. Whether the reference is to P2, waste minimization, or source reduction, the focus is directed at the source of the pollutants.

Governmental Financing

The Federal, state, and local government hazardous waste programs are funded in a variety of ways. Appropriation of public monies are made by Congress to the U.S. EPA, which are then distributed to various media programs such as air, water, and hazardous waste. A portion of these funds are then further distributed to the states and other organizations via contracts or grants. P2 language is being incorporated in most of these contracts and grants. While P2 is not usually an absolute requirement of each grant of contract, it is strongly encouraged and is given as much support as possible by the Federal government. Financing of P2 programs at the state level is usually derived from fees or taxes on hazardous substances and "waste end" taxes levied at the point of treatment or disposal. These provide an economic incentive for industries to reduce waste, and provide revenue for state programs. A 1989 National Governors' Association survey of all states found that approximately $100 million was being collected in fees and taxes that year to help fund environmental programs.

For example, in the State of Minnesota to help fund its P2 program, large quantity generators (more than 1,000 kg per month) are charged $500 a year if they have not met certain reporting requirements. Also, facilities that have

toxic chemical releases are assessed a fee of 2 cents per pound of released chemical. In the State of California, when 500 tons or more of certain chemicals are emitted to the air, a $5 per ton emission fee is assessed.

State Role

There must be full partnership between the Federal, state, and local governments. U.S. EPA believes that in order to implement an effective national P2 program, the state organizations must play a major role. The state organizations have a closer and more direct contact with industry, business, and the public. States can be more aware of their needs and their concerns. State-based environmental programs have supported P2 in a variety of ways such as developing legislation; establishing regulatory and financial incentives; creating P2 departments; establishing training programs, clearing houses, waste exchanges and workshops; providing technical assistance for research and development; and providing financial assistance to businesses and local governments for P2 implementation.

States have also established P2 activities in departments outside their environmental agencies. For example, Agriculture Departments can encourage the use of alternatives to chemical fertilizers and pesticides. Transportation Departments can directly impact a major source of air pollution from the motor vehicle sector.

The State of Connecticut Department of Transportation has developed a program to organize ride sharing programs. They have set up more than 12,000 carpools and 180 vanpools reducing gasoline consumption and air pollution emissions. Funding is provided by the state and participating corporations. The State of New Jersey Department of Transportation has developed legislation where certain companies must provide employee benefits that discourage the use of individual automobiles. These benefits, such as public transportation subsidies or priority parking spots for carpool vehicles, can be deducted from the companies' taxes as a business expense.

Costs and Benefits

There are a number of factors that motivate businesses of all sizes to consider investing in waste reduction programs. These include increased profits, increased employee job satisfaction and morale, and community concerns. The relative importance of these factors varies based upon the type and size of the company. However, economic factors tend to be the most important and get the most consideration. The economic costs and benefits can be looked at from the perspective of the consumer, society, government, and industry.

The consumer can benefit from reduced production costs which may be reflected in reduced product prices, improved product performance, or reduced health hazards. Society can benefit from reduced costs of care for those in need of medical treatment resulting from an unhealthy environment, the creation of new employment opportunities, and better use of land which would otherwise be used for landfills, incinerators, or other waste management activities. Governments at the Federal, state, and local level benefit by saving the costs needed to develop, administer, and implement environmental control programs. Some of the numerous economic benefits to industry for the reduction of waste include more efficient use of raw materials; decreased recycling, treatment, and disposal costs; reduced costs of complying with administrative regulations, and more productive use of capital.

Waste reduction programs also must be considered from the perspective of increased costs for the consumer, society, government, and industry. Consumers may incur costs in the form of higher prices, reduced product performance, or a more limited range of product choices. Society may bear the costs of increased unemployment in some sectors. Government may have increased costs due to expenses involved in developing and implementing programs for education, technology transfer, research, technical assistance, and data collection. The costs to industry may include the initial investment for research and design of new equipment, substitution of a more costly raw material, operation and maintenance expenses, hiring new employees or retraining existing employees, and a possible decrease in sales.

In many cases attaching dollar values to some of the costs and benefits is difficult, if not impossible; however, they need to be considered in the assessment of the waste reduction program options. For example, costs which may be difficult to determine include most of the indirect costs, the cost of lost raw materials at the time of disposal, and intangibles such as insurance, potential liability, and future disposal costs.

Measurements

The importance of developing systems and processes to measure accurately the results of P2 activities cannot be over emphasized. Decisions must be made early in the process as to what kind of data is needed, how to collect this data, and how to conduct the measurements. It is necessary to be able to track the progress toward waste reduction goals in order to be able to determine the need and profitability of a P2 project. This includes the ability to measure the actual amount of a specific waste eliminated, transferred to another media, or released to the environment. All of these issues present a major challenge for those involved in P2 activities. There are several current programs that are used to measure the economic and waste reduction accomplishments of P2 activities. These are described below.

Biennial Reporting System (BRS)

The Hazardous and Solid Waste Amendments of 1984 required that hazardous waste handlers report RCRA waste minimization information through biennial reports. The reports describe the types and total quantities of hazardous waste generated or managed in the preceding odd-numbered year. The States review and input the required data into the BRS, and it is then used to address program needs and assess status. The most recent National Biennial RCRA Hazardous Waste Report is based on 1989 data, and it states that 29% of the handlers that reported did engage in one or more new waste minimization activities during that year. Many of these were generators of the largest volumes of waste. 90% of all of the waste minimization activities reported involved source reduction, 16% involved recycling, and 6% involved both source reduction and recycling. Lack of economic feasibility was the most commonly reported factor preventing the handlers from initiating new waste minimization activities.

Toxics Release Inventory (TRI)

The Toxics Release Inventory program was initiated in 1986, and it mandates reporting the released volume of more than 300 chemicals. The data is made readily available to the public. This data is used by other governmental agencies, communities, and the public to develop regulations, identify issues, set priorities, and monitor industry performance. Over the years the data has become more accessible and understandable, thus, empowering the public to convince industry to reduce its chemical releases.

The TRI data has shown year-to-year overall decreases in the volume of releases and transfers of chemicals. Since late 1988 U.S. EPA has taken about 680 enforcement actions against industry for failure to submit the required TRI reports. Penalties of more than $34 million have been imposed.

In 1988 the State of Louisiana, which is a major chemical manufacturing state, had the highest level of chemical releases as reported by TRI. The state contacted the top 12 companies with the largest releases to each of the three media: air, land, and water (32 companies in all as some had large releases to more than one medium). The companies were requested to voluntarily submit their P2 plans. As this was well publicized, most companies complied eventually leading to a 38% decrease in releases by these companies.

33/50 Program

This program began in 1991 when U.S. EPA established a voluntary program to achieve major reductions in the release of 17 toxic pollutants reported on the TRI. The chemicals chosen were those that pose serious potential health risks, are produced in large volumes, are released into the environment from a large number of sources, and are readily amenable to reduction through P2. The national goals were set at 33% reduction by 1992 and 50% reduction by 1995. The program is voluntary, and it has been widely publicized and accepted by a variety of industries. The program is not limited to those 17 chemicals. In fact, in some geographical areas, other chemicals are of greater concern, and their reduction has been encouraged. Total releases and transfers of the 17 chemicals has decreased, and studies have showed that companies participating in this voluntary program are reporting greater

reductions than non-participating companies.

Economic Instruments

Economic analysis plays a very important role in the implementation of P2. Although P2 is at the top of the waste management hierarchy and companies receive favorable public reaction when the implement P2 projects, the positive economic benefit is usually the primary factor upon which a company makes its decision to proceed with any given P2 project. To that end, various levels of government in the United States have developed economic analytical methods, incentives, and disincentives to encourage companies to pursue a greater number of P2 projects. A number of these are described below.

Total Cost Assessment (TCA)

U.S. EPA sponsored work by the Tellus Institute to develop and test this investment analysis tool. P2 needs economic justification by all involved, including corporate decision makers, accountants, bankers, lenders, educators, environmentalists, and the public. A project must be justified by showing how it will increase revenue and how the added revenue will not only recover costs, but substantially increase the earnings of the company. Many companies are failing to recognize the long-term, less tangible savings (such as future liabilities), and direct and indirect costs in the financial analysis of P2 projects. Businesses tend to group environmental costs together in a single overhead account, if they track them at all, or to add them to other line items. Thus, one cannot identify those parts of the operations that cause the greatest environmental expenditures or the products that are most responsible for the waste production. A much larger number of production areas will benefit by P2 measures than with most other kinds of capital investments, and this fact is not addressed by traditional analysis methods. This forms the underlying rationale for TCA.

TCA is a flexible tool that can be adapted to a company's specific needs and circumstances. It can be used step by step by gradually bringing in to the process different information. Two P2 projects in the pulp and paper industry were examined using the TCA process. When TCA analysis and a typical company analysis were compared, there were marked differences. The TCA approach

demonstrated that the P2 project was a better investment than the conventional financial analysis indicated.

Tradable Permits

One economic instrument that has been developed and that has recently been put into use is the "tradable permit" or "emission credit." At the start of the process the government sets an amount of total allowable emissions of a specific pollutant. This amount is then divided among those companies that emit this pollutant. As a result a company receives permission to emit a maximum amount, commonly referred to as an emission credit. The company has the option to reduce its emissions below the maximum amount and then profit by selling the remainder of its allocation to other existing companies, new companies, or public groups who may want to hold the allocation to see the overall emission levels decrease. Companies must decide between purchasing more credits if its emissions exceed its initial allocation or installing pollution control equipment. This approach does have some limitations on its use. There are some pollutants for which it would be too difficult to establish the total allocation, the trading rules would be too complex, certain environmental groups would object, or not enough traders would participate.

In March 1993 the first exchange of emission credits in the United States took place at the Chicago Board of Trade between electric utilities and investors. This was an exchange of sulfur dioxide emission credits, a pollutant which is the cause of acid rain. Less than 1% of the bidders were public interest groups; more than 95% of the bidders represented utilities. The remainder were private investors. The value of the emission credits traded was $21.4 million.

Deposits/Refunds

This system is primarily aimed at recycling as is imposes the cost on the product when it is purchased and gives it back to the customer when the product is returned. Bottle Bills are mandatory deposit systems for beverage bottles and cans and are in effect in at least 9 states. In the State of Michigan bottles that can be refilled have a smaller deposit than those that

are only returned. This promotes source reduction.

Disposal Fees

This system has been used in connection with municipal solid waste collection programs. It differs from the usual method of solid waste collection funded through general municipal tax revenues. Charges are assessed based upon weight or volume. Quite often recyclable materials are picked up free. It is thought that if there was no fee for recyclable materials and a charge for solid waste, this would promote source reduction by causing people to become more aware of the volume of solid waste that they produce.

Taxes/Fees

The advance disposal tax/fee incorporates the cost of waste disposal into the price of the product. It can be imposed at any point of the product chain, from the manufacturer to the consumer. Nineteen states have placed these costs on at least one product. Automotive tires and batteries are examples where these taxes and fees are in use.

Tax Credits

Credits from local governments are given to businesses and institutions that buy waste-reducing equipment, like reusable tableware, and that reduce waste at the source. Examples include packaging reduction, reusable packaging, and reuse/refill containers.

When examining the economic aspects of P2, it can be viewed as a "win-win" proposition for governments, businesses, policymakers, academicians, and the public. Creativity, co-operation, and hard work are needed to develop the analytical techniques and the technology to replace the toxic substances currently in use and to reduce the hazardous wastes produced by industry. These common problems are not restricted to any geographical border. Likewise, solutions to these problems will result from a joint commitment to share and exchange the ideas that will lead to an increased use of waste reduction and pollution prevention.

PROTECTION

In the United States hazardous waste is regulated by the Resource Conservation and Recovery Act (RCRA) of 1976. Regulations under this law became effective in November 1980. The purpose of this law is to provide "cradle to grave" management of hazardous waste by establishing regulations for the generation, transportation, treatment, storage, and disposal of hazardous waste. The movement of hazardous waste is monitored from the point of generation to its final disposal by the use of a manifest. Every person who receives the waste along its route to final disposal must sign the manifest to acknowledge both the receipt and delivery of the shipment and then notify the original generator that the waste has been managed as the generator had directed.

Today many countries are trying to find better ways to protect the environment. One way that is gaining more favor is known as a market mechanism. This includes fees on pollution generation, pollution trading systems, and deposit-rebate systems. These market mechanisms can be effective alternatives to strict regulatory systems. Although the "polluter pays principle" is now becoming widely accepted in the United States, RCRA being an older law still relies quite heavily on the earlier approach to environmental regulation which has become known as command and control. With a command and control approach, comprehensive regulations are promulgated which are then vigorously enforced. However, RCRA does use economic analysis in some parts of its implementation. Two specific areas, regulatory impact analysis and penalty assessment, are described below.

Regulatory Impact Analysis

A regulatory impact analysis is conducted to evaluate the need for proposed regulatory changes and the benefits and costs of those changes. The regulatory impact analysis contains the full complement of economic information needed to develop a regulation. Economic analysis is required for the majority of United States Environmental Protection Agency (U.S. EPA) rule-making activities. Environmental control can be a costly enterprise. Moreover, it is likely to become more costly in the future as governments address more complex problems, such as the control of wastes that can be toxic

at very low concentrations.

Although many people believe that such expenditures are fully justified, given the magnitude of the costs, it is natural to ask a number of questions:

> Are we getting the most environmental protection for the resources we are expending?
>
> Are we accomplishing our environmental objectives in the most efficient manner?
>
> As we exert tighter and tighter controls on particular sources of pollution with more and more expense, are additional pollution reductions still worth the cost?
>
> Is the distribution of costs and benefits of environmental programs across companies, workers, the general public considered fair?

The U.S. EPA hazardous waste statutes prelude making a decision solely on the basis of a cost-benefit calculation which involves a comparison of the costs of a regulation with the benefits to be derived converted to monetary terms. The net benefit of a regulation is the difference between the benefits and the costs. According to economic theory, a regulation would not be worth doing (from the perspective of economic efficiency) unless the net benefit is positive, that is, the benefits exceed the costs. In choosing among alternative regulatory approaches, the one that results in the greatest net benefit would be preferred. However, public policy as incorporated into environmental legislation quite often establishes the protection of public health and the environment as a desired outcome despite any negative economic consequences on the regulated community.

Because attaching a monetary value to environmental benefits can be quite difficult and often controversial, a comprehensive cost-benefit analysis usually can not be performed. Data gaps usually must be filled by assumptions or extrapolations. The assumptions that are most critical to the decision

process can be evaluated by running the economic analysis under different assumptions (a process known as a sensitivity analysis). In some cases these critical assumptions can be supported by additional data gathering. In other cases it is not feasible to collect the additional data, but the decision maker needs to be aware of the critical nature of the assumption and the uncertainty surrounding the particular choice made.

Since the RCRA regulations went into effect in November 1980, the market price for hazardous waste treatment and disposal has increased as a direct result of these regulations. These increased costs are ultimately passed on to the consumer in the form of higher priced goods and services. However, public opinion polls continue to show very strong support for the proper management of hazardous waste in the United States. In fact some economists believe that without the proper management of hazardous waste, the public pressure placed on certain industries would have been so great that they may not have been able to remain in business. Based on August 1992 prices, the estimated costs that a hazardous waste generator in the United States would have to pay for the proper management of its wastes are as follows:

Treatment Costs	
On-site incineration	$400/ton
Off-site incineration	$1600/ton
Solvent extraction	$500/ton
Transportation Costs	
200 mile trip	$53/ton
500 mile trip	$118/ton
Disposal Costs	
On-site land disposal	$75/ton
Off-site land disposal	$200/ton

Penalty Assessment

If a facility is determined to be out of compliance based upon a compliance inspection or record review, there are three types of enforcement actions that

may be taken pursuant to RCRA to bring a facility back into compliance.

Administrative Action - a non-judicial enforcement measure taken by the government.

Civil Action - a formal law suit, filed in court against a person who has failed to comply with any statutory or regulatory requirement or an administrative order, or has contributed to a release of hazardous wastes.

Criminal Action - the most severe type of an enforcement action which includes the highest monetary penalties and the possibility of imprisonment; knowing violations and negligent actions often result in criminal enforcement.

The enforcement and penalty provisions of RCRA are found in Section 3008 of the statute. If U.S. EPA determines that any person has violated any requirement of the hazardous waste regulations, U.S. EPA has the authority to issue an administrative order or file a civil judicial action to require compliance and assess civil penalties of up to $25,000 per day per violation. In assessing such penalties, U.S. EPA must consider the seriousness of the violation and any good faith efforts to comply with the applicable requirements. This section also includes specific criminal penalties. In order to provide clear guidance for all enforcement personnel regarding the calculation of RCRA civil penalties, U.S. EPA issued its first RCRA Civil Penalty Policy in 1984; it was subsequently revised in 1990.

The purpose of the RCRA Civil Penalty Policy is to ensure that penalties are assessed in a fair and consistent manner, that penalties are appropriate for the gravity of the violation committed, that any economic benefit for noncompliance with the RCRA regulations is eliminated, that penalties are sufficient to deter persons from committing future RCRA violations, and that compliance is expeditiously achieved. The penalty calculation system established through this policy consists of (1) determining a gravity-based penalty for a particular violation using a penalty assessment matrix,

(2) adding a multi-day component to account for the duration of the violation, (3) adjusting the sum of the gravity-based and multi-day components, up or down, for case specific circumstances, and (4) adding the appropriate economic benefit gained through non-compliance.

U.S. EPA developed a computer model to calculate the economic benefit that a violator may derive from delaying or avoiding compliance with environmental regulations. The model calculates the after tax net present value of both the capital costs and operation and maintenance costs avoided due to the failure to comply with the regulations by the required date. The model can be used to estimate the economic benefit of noncompliance for any type of organization: corporations, partnerships, sole proprietorships, not-for-profit organizations, and municipalities. The model was developed to assist in fulfilling one of the main goals of the policy. That goal is to recover, at a minimum, the economic benefit from noncompliance. In practice, penalty assessments contain an additional amount to ensure that the regulated community has a strong economic incentive to comply with environmental regulations in a timely manner.

Originally all RCRA civil penalties required the payment of funds to the United States Treasury; these funds did not directly benefit U.S. EPA or the environment in general. In 1991 U.S. EPA, in consultation with the United States Department of Justice, developed a policy which allows the violator to apply some or all of the civil penalty to a project that has direct environmental benefits. These projects are known as Supplemental Environmental Projects (SEPs). U.S. EPA believes that SEPs, if carefully crafted and executed, provide useful environmental benefits beyond what can be secured solely through the assessment of a penalty. They offer several options for alternative payments; while at the same time, they preserve effective deterrence and accountability for compliance and environmental results. In addition, they can be a useful vehicle in promoting pollution prevention both as a means to return to compliance and to develop new applications and technologies. All SEPs must improve the injured environment or reduce the total risk burden to the public health or the environment by the identified violation. The five categories of permissible SEPs are

(1) pollution prevention, (2) pollution reduction, (3) environmental restoration, (4) environmental auditing projects, and (5) public awareness projects which are located directly within the area where the violation took place. Prior U.S. EPA approval of a SEP is required before it can be used to offset a civil penalty.

The overall purpose of the hazardous waste protection program is to establish a workable set of regulations that will ensure the proper management of hazardous waste by business and industry at a reasonable cost to society. This program protects the health and environment of all citizens in the United States and reduces future costs that society would have to bear to address the impacts of hazardous waste that is mismanaged. Although not initially a major part of the RCRA regulatory program, economic considerations are playing a greater role as this program matures.

REMEDIATION

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) - commonly known in the United States as "Superfund" - was passed into law by the United States Congress in December 1980 in response to the concerns of citizens and lawmakers about such obvious hazardous waste sites as the "Love Canal" and the "Valley of the Drums". Superfund established a program to identify sites where hazardous substances have been, or might be, released into the environment and to ensure that they are cleaned up by responsible parties or the government. The program is appropriately called "Superfund" because the initial statute created a 5-year, $1.6 billion fund to finance the cleanup of these sites through the United States. In addition, the first reauthorization of this original statute by the Congress in 1986, known as the Superfund Amendments and Reauthorization Act (SARA), extended the program for another 5-year period and significantly increased the size of the fund to $8.5 billion.

The program distinguishes between sites that require immediate action to protect human health and the environment and sites that present a longer range problem. The special demands of each situation are considered before deciding

on the most appropriate response. Emergency Removal Actions are short term actions that stabilize or clean up hazardous sites that present an immediate threat to human health or the environment. A removal can be initiated and carried out at any time at any site. In contrast with such short term removal actions, the program is also responsible for longer term Remedial Actions.

Remedial Actions consist of a series of processes which are administered and conducted by staff of the United States Environmental Protection Agency (U.S. EPA). These processes include a Preliminary Assessment (PA) which is an initial analysis of existing information to determine if a site requires additional investigation or action, and a Site Inspection (SI) which is an on-site investigation to determine whether there has been a release of hazardous substances and what is the nature of the associated risks. A relative ranking of the site occurs at this point to determine if the situation warrants the site being placed on the National Priorities List (NPL), a catalogue of sites throughout the United States which are eligible for cleanups paid for out of the Superfund. A Removal Action can take place at a site whether or not it is on the NPL. The NPL was established so that Superfund resources would be expended first on the most serious of those sites which needed long-term remedial cleanup. The ranking as such is a mathematical system that combines the potential of a release to cause a hazardous situation, the severity of such potential impacts, and the number of people who may be affected.

The remaining Remedial Action processes include a Remedial Investigation and Feasibility Study (RI/FS) which examines the type and extent of contamination and identifies possible remedies; a Record of Decision (ROD) which documents U.S. EPA's selection of an appropriate cleanup remedy; the Remedial Design (RD) which details the plans and specifications for conducting the cleanup; and a Remedial Action (RA) which is the construction or implementation phase and puts in place the actual site cleanup measures. Some of these remedial cleanups can take several years to complete and may require maintenance far into the future.

The actual monetary fund itself was financed in the 1980 statute primarily by excise taxes on petroleum and several listed chemicals. With the

reauthorization of the statute these original revenue sources were retained, and this law also expanded the sources of revenue to support the fund. Those added sources included an environmental tax on corporations, $1.25 billion from general appropriations, costs recovered from the parties responsible for hazardous waste sites, punitive damages and penalties, and earned interest.

Now 13 years after its enactment, Superfund is up for its second reauthorization, and since then the Congress has authorized over $15 billion to finance the program. While there are some problems, the achievements cannot be overlooked. Since 1980, approximately 1300 sites have been placed on the NPL, with more being added regularly. According to a recent 1993 update, while only 51 of these sites have been deleted from the NPL, another 130 have completed all necessary construction. Remedies have been selected at 800 sites, construction is underway at 470 sites, and some type of work has begun at 1219 sites. Also, U.S. EPA has completed over 2800 removal actions at over 2000 sites.

The fact that some cleanups can take years to complete and may require maintenance far into the future has resulted in some adjustments in the administration of the program within the past year and a half. These issues regarding the perceived slowness of the program have been voiced by both the public and the Congress. In response to these concerns, the U.S. EPA has initiated the Superfund Accelerated Cleanup Model (SACM). It can be seen as the next generation of the Superfund program which emphasizes the need for early actions at sites, and the integration of what have tended to become separate assessment processes in the two components of the program - the remedial and the removal. It is meant to radically speed up risk reduction and streamline the overall Superfund program within existing statutory and regulatory constraints. SACM envisions a more efficient program that focuses on rapid risk reduction to human health and the environment. Some of the anticipated benefits are the majority of risk from sites will be more rapidly reduced, more money will be spent on cleanups rather than on site studies, standard remedies for similar sites and innovative technologies will be emphasized, success will be measured by risk reduction not RA completions, and long-term soil and groundwater restoration will be made a separate and

distinct activity.

Any program which has been authorized to expend these large sums of money or has caused even greater amounts to be expended by others through enforcement is going to have economic impacts and raise cost issues. While there are several and varied cost and economic issues which have been the subject of public debate, a few of the most important issues are presented below.

Unfair Liability Provisions

Since liability translates into "cost," many responsible parties have been especially critical of Superfund's broad, and what is often characterized as unfair, liability structure. The statute's "retroactive, strict, joint, and several" system can implicate parties associated with a site, regardless of whether or not they are directly responsible for the contamination. Also, in theory, any liable party can be forced to pay for the total cost of cleanup even if they contributed only minimally to the contamination. And, since it is retroactive, parties can be legally responsible, even if they complied with the law as it existed at the time of their involvement with the site. Certain options are available to the administrators of the program to lessen the impact of "strict, joint, and several." *De minimis* settlements can be reached with parties that contributed minimally to the problem, and using mixed funding agreements, U.S. EPA can pay for the portion of the costs attributable to insolvent or unidentified parties.

Significant Transaction Costs

It is widely felt that too much money is being spent on attorneys and consultants. The President of the United States has himself expressed this view, in a specific reference to the Superfund program, at his Economic Summit in Little Rock, Arkansas in December 1992. Also, in a late August 1993 edition of the *National Law Journal* in a special section on environmental law, the results of a survey just completed by the Journal were published. More than two-thirds of the over 200 corporate attorneys contacted noted that environmental law occupies one-fifth of the time of attorneys for major businesses in the United States. Also, two-thirds have hired outside attorneys in the past year to assist them with environmental compliance

matters. As to Superfund in particular, the existence of this issue stems in part from the liability system. The allocation of cleanup costs is contentious, particularly because the relationship between responsibility and liability is frequently unclear or absent. As a result, attorney fees build up either in or out of court as parties to disputes negotiate cost sharing. Also, it has been argued by some that U.S. EPA has exacerbated a difficult situation by not managing its contractors more closely and by allowing some duplication in site studies.

Remedy Selection

Some critics of Superfund argue that tremendous resources are spent to cleanup sites that do not pose significant threats to human health. They note that the often unrealistic assumptions set forth in the risk assessment process can lead to overly stringent cleanup standards and remedies. U.S. EPA frequently requires liable parties to clean up sites to residential standards, even if the site will be used as an industrial facility. Also, at times costly and relatively ineffective remedies are implemented simply because better technologies are not yet available. Two related, and as yet unanswered, questions are at the root of these dissatisfactions with the cost related aspects of the remedy selection process: "What are the ultimate goals of Superfund - protection of human health, environmental restoration, or beneficial use?" and "How clean is clean?" Until there are definitive answers to these questions, different expectations and the debate over costs are not likely to subside.

Indirect Economic Impacts

Local governments, bankers, and developers among others have stressed that Superfund negatively affects property values and can impede property transactions. The property values in entire communities can be devalued by the presence of a Superfund site in the area. Even after a site is declared "clean" and deleted from the NPL, the impact can remain. In fact, such impacts can be present even if no NPL site is present. In an effort to limit their exposure to potential Superfund liability, bankers, developers, and other companies have adopted some very cautious investment approaches. Investors are now more likely to develop pristine land rather than buy and

develop property that may already be contaminated. As a result, abandoned industrial sites often remain unused.

Incentives for Pollution Prevention and Voluntary Cleanups

Although this type of indirect economic effect can be very difficult to measure, the possible threat of Superfund liability has without question compelled industry and others to take more care in disposing of their wastes. With this added risk of Superfund liability, businesses try to minimize the use of toxic substances in their processes and are more concerned with recovering these toxics when substitutes can not be found. Owners of contaminated sites may also cleanup their properties voluntarily in order to avoid the sometimes more costly Superfund cleanup process. Because of regular environmental audits and potential liability, tainted property now has a cost associated with it.

Market Efficiencies Gained Through the Program

Those who do not like the Superfund liability system may not like to admit it, but while some innocent parties may at times bear a part of the burden, parties that did contribute to the contamination shoulder a more substantial proportion of the cleanup costs than they otherwise would. It is difficult to argue that the "retroactive, strict, joint, and several" system is a fair concept in the general sense of the word. However, it can be argued that it is probably more fair than a concept that spreads the costs across all taxpayers, or even across certain industries. In addition to this advantage, the current approach incorporates some incentives for actually minimizing costs. The fact that private parties are often paying for the work encourages cost savings as well as managerial and technological innovation.

Overall Program Costs

As to macro cost projections, the U.S. EPA report; *Environmental Investments: The Cost of a Clean Environment* found that overall annual Superfund spending will rise to over $8 billion by the year 2000, more than four times the 1990 figure. The report, which was an attempt to provide an estimate of the direct costs of public and private pollution control activities, also noted that this Superfund figure is part of almost $50 billion that is expected to be spent

annually by the end of the decade on pollution control. Also, among the findings of the cost projections is that the share of land pollution control costs, including Superfund and RCRA, will rise from 26% of the total spent on all pollution control in 1987 to almost 34% of the total in 1997.

There is little doubt that the public debate regarding the Superfund remediation programs in the United States will continue. Different interest groups will continue to have widely varying preferences, ranging from permanent remediation of sites to the far less costly containment of contaminants. It can be argued that there is no right answer. With the opportunities provided by the upcoming reauthorization, perhaps all interested and affected parties can derive some workable solutions. If reauthorization can somehow instill cooperation and a more reasonable approach to remedy selection, the program can evolve into one which is trusted by the American public and which is considered fair and equitable by the American business community.

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