28036

BY THE COMPTROLLER GENERAL

Report To The Congress

OF THE UNITED STATES

Cost-Benefit Analysis Can Be Useful In Assessing Environmental Regulations, Despite Limitations

Cost-benefit analysis, although imprecise, is a useful tool for estimating the costs and benefits of various regulatory actions. Its role may become increasingly critical because complying with federal environmental regulations could mean billions of dollars in costs and benefits.

GAO found three specific problems which have hampered cost-benefit analysis. These problems involve major gaps in underlying scientific data (such as tying air or water quality to specific health effects), legal restrictions preventing the use of such analyses even when their results may be useful, and the Environmental Protection Agency's partial implementation of Executive Order 12291. This order requires federal agencies to prepare cost-benefit analyses for major regulations

GAO makes specific recommendations to overcome the non-legal problems and enhance the usefulness of cost-benefit analyses involving environmental regulations GAO also provides suggestions for congressional consideration pertaining to the legal restrictions.

GAO/RCED-84-62
APRIL 6, 1984

028631

Request for copies of GAO reports should be sent to:

U.S. General Accounting Office
Document Handling and Information
Services Facility
P.O. Box 6015
Gaithersburg, Md. 20760

Telephone (202) 275-6241

The first five copies of individual reports are free of charge. Additional copies of bound audit reports are $3.25 each. Additional copies of unbound report (i.e., letter reports) and most other publications are $1.00 each. There will be a 25% discount on all orders for 100 or more copies mailed to a single address. Sales orders must be prepaid on a cash, check, or money order basis. Check should be made out to the "Superintendent of Documents".

COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON D.C. 20548

B-210402

To the President of the Senate and the
Speaker of the House of Representatives

This report describes the Environmental Protection Agency's major efforts to prepare cost-benefit analyses to support regulatory decisions, as required under Executive Order 12291. It also discusses the Office of Management and Budget's review of those analyses and identifies many problems that affect the potential usefulness of cost-benefit analysis in assessing environmental regulations.

We made this review because of the large costs and benefits associated with federal regulations and the widespread interest which has been shown for weighing the costs and benefits of major regulations before their promulgation.

We are sending copies of this report to the Director, Office of Management and Budget; the Administrator, Environmental Protection Agency; and other interested parties.

Charles A. Bowsher

Comptroller General
of the United States

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

COST-BENEFIT ANALYSIS CAN BE USEFUL IN ASSESSING ENVIRONMENTAL REGULATIONS, DESPITE LIMITATIONS

D I G E S T

Cost-benefit analysis involves weighing the costs and benefits of several alternatives to a proposed action to determine which alternative yields the greatest net dollar benefit (total dollar benefits less total dollar costs). In this report, cost-benefit analysis is discussed in relation to its ability to provide decisionmakers useful information on what level of standard and accompanying regulation should be recommended for protecting the environment. (See p. 1.)

GAO undertook this review to evaluate how useful cost-benefit analysis has been or can be in assessing environmental regulations. GAO chose this area because estimates for complying with federal regulations to clean up or protect the environment during the 10-year period 1979-88 now exceed $500 billion. Benefits from such regulations during this period could also total many billions of dollars. GAO focused its review on the Environmental Protection Agency (EPA) because it is responsible for many significant environmental regulations. (See pp. 2 to 4.)

GAO's review addressed the adequacy of the available data used in EPA's cost-benefit analyses, legal restrictions on the use of such analyses, and EPA's implementation of Executive Order 12291, which requires federal agencies to prepare cost-benefit analyses for the Office of Management and Budget (OMB) to review before promulgating major new regulations, reviewing major existing regulations, and developing legislative proposals concerning major regulations. (See pp. 3 to 6.)

MAJOR GAPS PREVENT COST-BENEFIT ANALYSIS FROM PROVIDING EXACT ANSWERS

GAO found large gaps in the underlying scientific information EPA uses to estimate environmental benefits. For example, one EPA analysis pointed out that a major weakness in an analysis of water pollution controls is knowing how much cleaner the water will be

from lower discharges of pollution. It may take some time before EPA can make significant headway to close these data gaps. (See pp. 7 and 8 and p. 12.)

EPA has also had problems in placing dollar values on physical measures of health and other environmental improvements because determining how much people are willing to pay for those improvements is difficult. (See pp. 9 and 10.)

Although major gaps in underlying scientific data make it difficult to attribute dollar values to environmental costs and benefits, cost-benefit analysis can still provide useful information to regulatory decisionmakers if it presents a range of dollar values reflecting the uncertainty in the estimates. In this way, the analysis will show how the ranking of alternatives depends on what particular estimates a decisionmaker chooses to select from a range of possible values. Also, the analysis should make use of special techniques for analyzing uncertainty to determine the likely distribution of results within that range. (See pp. 7 and 11 and 12.)

CERTAIN LAWS PROHIBIT OR LIMIT THE USE OF COST-BENEFIT ANALYSIS RESULTS

Some environmental laws passed in the early 1970's placed more emphasis on the level of cleanup to be achieved than on the costs involved in reaching those levels. Such laws prohibit or limit the use of cost-benefit analysis in setting standards and the accompanying regulations. Consequently, the results of a cost-benefit analysis prepared under Executive Order 12291 cannot always be used in the decision-making process. The Clean Water Act limits the kinds of regulatory alternatives that can be considered, since the act requires each regulated industry to individually comply with an effluent limitation that can be achieved by installing the best available technology. Consequently, a more flexible regulatory approach, which would take advantage of the fact that one industry may be able to control water pollution at only a fraction of the cost charged by another industry, could not be adopted although such an approach might achieve the same overall level of pollution control at a lower cost. (See pp. 15 to 17.)

A further difficulty resulting from legal restrictions is that useful data may be obtained but then not used. For example, the Clean Air Act states that primary air quality standards are to protect public health, and costs cannot be considered in setting the standards. Nevertheless, EPA prepared a cost-benefit analysis on an air quality standard to comply with Executive Order 12291. Because of the legal restriction, the analysis is not being used in the standard-setting process, although it cost over $2 million to prepare. (See pp. 15 and 16 and pp. 18 to 20.)

Although certain laws prohibit or limit cost-benefit analysis results from being used in environmental rulemaking, the analysis could still provide useful information to the Congress during its oversight responsibilities. At present, these analyses are not transmitted to the Congress. (See p. 20.)

EPA'S IMPLEMENTATION OF EXECUTIVE ORDER 12291 CAN BE IMPROVED

Executive Order 12291 generally requires EPA and other federal agencies to provide a detailed cost-benefit analysis for any "major" regulation, with major being defined, among other things, as any regulation likely to have an annual effect on the economy of $100 million or more. The order, however, allows for a great deal of flexibility in establishing the estimated costs of proposed regulation. In GAO's view, EPA has not always considered all important compliance costs to determine if a proposed rule is major. For example, EPA considers expenditures which would be required from existing sources of pollution to comply with the regulations but frequently does not consider planned expenditures from new sources of pollution necessary for compliance. Because of this omission, total compliance costs have been understated, and some regulations which could have been major were designated as minor. (See pp. 3 and 4 and pp. 23 and 24.)

Furthermore, EPA has at times also selected regulatory alternatives that are expected to cost less than the $100-million cutoff established by the executive order without

analyzing alternatives costing more than $100 million which could yield higher net benefits. For example, this situation occurred in setting the leather tanning and finishing industry's effluent limitation guidelines. GAO believes that EPA needs to prominently document in the public record why it chose a particular alternative to cost out in determining whether a proposed regulation was major or minor. With that information, OMB, under its review authority, can better determine whether EPA is not doing cost-benefit analysis which should be performed and which could result in regulations yielding higher net benefits. (See pp. 24 and 25.)

The executive order also requires that the most promising alternatives be considered in a cost-benefit analysis. In each of the two water pollution control analyses GAO reviewed, EPA estimated dollar costs and benefits for only one regulatory alternative to the existing regulation. EPA attributes this deficiency to a court-ordered deadline which did not allow EPA the time to consider other alternatives. However, in GAO's opinion, EPA could have analyzed additional alternatives in a short period of time with little added expense, as the cost and benefit models were already developed. In its air quality analysis for particulate matter, EPA reviewed a range of alternatives. However, after completing the analysis, EPA found that the most stringent alternative considered, in terms of pollution control, showed the greatest net benefits. This raises the question as to whether net benefits would have continued to increase had additional, more stringent alternatives been considered beyond that extreme end of the range. EPA needs to identify the regulatory alternative where net benefits peak in order to determine which regulatory action maximizes net benefits. (See pp. 25 to 27.)

GAO also found that EPA's cost-benefit analyses generally highlighted only single-dollar estimates in executive summary form, while ranges of estimates for the cost and benefit categories were available in other parts of the analysis or in other documents. Such presentation makes it difficult for decision-makers to appreciate the range and significance of uncertainty unless they have time to sift through numerous documents. In addition,

EPA covered major cost and benefit categories, such as compliance costs for new pollution sources or monitoring and enforcement costs, in some of its analyses but not in others. (See pp. 27 to 29.)

Despite these problems, OMB has generally accepted EPA's analyses. When GAO brought these problems to OMB's attention, the OMB reviewing officials said they were aware of most of the problems and agreed that they needed to be corrected. However, those reviewing officials also said that EPA's cost-benefit analyses cannot be expected to be too exact because of the roughness of the data bases and estimating procedures. (See p. 29.)

EPA's future cost-benefit analyses can be improved as EPA has recently adopted guidelines for performing the analyses. Following these guidelines will result in more credible cost-benefit analyses. (See p. 30.)

RECOMMENDATIONS TO THE ADMINISTRATOR, EPA

GAO recommends that the Administrator, Environmental Protection Agency,

--direct the program offices performing cost-benefit analysis to use special techniques for analyzing uncertainty so that the most likely estimates of key regulatory effects can be isolated (see p. 13);

--highlight in its budget submissions to the Congress a discussion of the priorities it has assigned to address the most critical data gaps affecting the precision of cost-benefit analysis and the measures planned to narrow those gaps (see p. 14); and

--transmit to the Congress, in executive summary form, those cost-benefit analyses that cannot be used in environmental rulemaking because of legal restrictions. (See p. 21.)

Furthermore, GAO recommends certain additional actions that the Administrator should take to improve the cost-benefit analysis process. (See pp. 31 and 32.)

MATTERS FOR CONGRESSIONAL CONSIDERATION

Some laws, such as the Clean Air and Clean Water Acts, prohibit or limit cost-benefit

analysis results from being used in environmental rulemaking. The Congress may wish to reexamine the need for such restrictions in light of subsequent improvements in environmental protection and consider easing or eliminating such restrictions on a case-by-case basis. In GAO's opinion, cost-benefit analysis even with its limitations can provide decisionmakers useful information in assessing alternative environmental regulations. (See p. 22.)

AGENCY COMMENTS

EPA agreed, in general, that cost-benefit analysis is useful in considering options for setting standards despite some inherent limitations. EPA stated that the report accurately assesses the limitations and usefulness of cost-benefit analysis at EPA and that the recommendations to the Administrator correspond directly to the Agency's overall philosophy. EPA believed, however, that the report emphasizes cost-benefit analysis to the exclusion of other considerations, such as environmental impact statements, which are also necessary to make adequate regulatory judgments. While GAO agrees that other considerations are certainly useful, the focus of this review was only on cost-benefit analysis.

OMB stated that the report provides useful insight into how cost-benefit assessments can be improved and how they can be used to improve regulatory decisions. OMB believed the quality and scope of the analyses are often affected by pragmatic concerns, such as limited resources, court-imposed deadlines, and statutory constraints. GAO agrees, although it believes that, in general, the problems discussed in chapter 4 of this report can nevertheless be corrected.

EPA's and OMB's detailed comments to a draft of this report are included in appendixes III and IV, together with GAO's evaluation. Where appropriate, this report has been revised to reflect GAO's agreement with EPA's and OMB's suggested changes. (See pp. 6, 14, 32 and 33, and apps. III and IV.)

Contents

		Page
DIGEST		i
CHAPTER		
1	INTRODUCTION	1
	Cost-benefit analysis for assessing environmental regulations	2
	Cost-benefit analysis requirements of Executive Order 12291	3
	Objective, scope, and methodology	4
	Handling agency comments	6
2	DATA GAPS PREVENT COST-BENEFIT ANALYSIS FROM PROVIDING EXACT ANSWERS	7
	Cost-benefit analyses reveal large gaps in underlying scientific information needed to estimate benefits	7
	Estimating the costs of environmental regulations is difficult	10
	EPA's cost-benefit analyses indicate that uncertainty is inevitable but potentially manageable	11
	Implications for future research at EPA	12
	Conclusions	13
	Recommendation to the Administrator, EPA	13
	Agency comments and our evaluation	14
3	CERTAIN LAWS PROHIBIT OR LIMIT THE USE OF COST-BENEFIT ANALYSIS RESULTS IN ENVIRONMENTAL RULEMAKING	15
	Some environmental statutes prohibit or limit use of cost-benefit analysis results	15
	Executive Order 12291 requires cost-benefit analysis, even when results cannot be used to meet the order's objectives	17
	Cost-benefit analyses could be useful even when their results cannot be used in environmental rulemaking	20
	Conclusions	21
	Recommendation to the Administrator, EPA	21
	Agency comments and our evaluation	21
	Matters for congressional consideration	22
4	IMPROVEMENTS IN EPA'S COST-BENEFIT ANALYSES CAN BE ACHIEVED	23
	EPA has not always estimated new source compliance costs of proposed regulations	23
	EPA has not included all of the most promising alternatives in its cost-benefit analyses	25

CHAPTER		Page
	EPA's cost-benefit analyses need to prominently present the uncertainties of the estimates	27
	EPA's cost-benefit analyses have partially covered cost and benefit categories	28
	OMB generally accepts EPA's cost-benefit analyses	29
	Using EPA guidelines to perform cost-benefit analysis will result in more credible estimates	30
	Conclusions	31
	Recommendations to the Administrator, EPA	31
	Agency comments and our evaluation	32
APPENDIX		
I	Reference materials considered in preparing this report	34
II	Contacts made during this review	38
III	Letter dated October 20, 1983, from the Acting Assistant Administrator for Policy, Planning, and Evaluation, EPA and GAO's evaluation	40
IV	Letter dated December 16, 1983, from the Deputy Director, OMB, and GAO's evaluation	57

ABBREVIATIONS

CASAC	Clean Air Science Advisory Committee
CPSC	Consumer Product Safety Commission
EPA	Environmental Protection Agency
FDA	Food and Drug Administration
GAO	General Accounting Office
NAAQS	national ambient air quality standards
NRDC	Natural Resources Defense Council
OMB	Office of Management and Budget
OSHA	Occupational Safety and Health Administration
RIA	regulatory impact analysis

GLOSSARY

Ambient air	Atmosphere (outside of buildings) accessible to the public.
Compliance costs	Industry expenses to meet environmental regulations or standards.
Cost-benefit analysis	A procedure requiring (1) identification of all costs and benefits of a proposed action and its alternatives, (2) translation of those costs and benefits into a common measure (such as dollars), (3) discounting of future costs and benefits into the terms of a given year, and (4) ranking alternatives according to net dollar benefits (total dollar benefits less total dollar costs).
Cost-effectiveness analysis	A procedure requiring identification of costs and benefits of a proposed action and its alternatives, but not requiring translation of benefits into dollars. It allows one to identify (1) the least costly means to accomplish a specific objective and (2) the set of dominant (least costly relative to other) alternatives.
Discounted value	A percentage reduction in future cost or benefit estimates to reflect a present value.
Effluent limitations	Restrictions established on the quantity, rate, and concentrations of pollution discharged from point sources, such as factories, into waterways.
Epidemiological studies	Medical research which studies the natural or accidental incidence of diseases among groups of people.
Linear-dose response	A technical term which indicates that the risk from pollution increases in exact proportion to the increase in the dose of pollution.
Particulate matter	Any solid or liquid particles dispersed in the atmosphere, such as dust, pollen, ash, soot, metals, and various chemicals.

Threshold	A level below which no damaging effect of a risk occurs.
Uncertainty	The absence of information; that which is unknown.

CHAPTER 1

INTRODUCTION

Cost-benefit analysis is a rigorous, quantitative, and data-intensive procedure which involves weighing the costs and benefits of various alternatives to a proposed action. In principle, for each alternative considered, cost-benefit analysis aims to estimate net dollar benefits (total dollar benefits less total dollar costs) of that action. Then, the net benefits of the various alternatives can be compared to identify the alternative which yields the greatest net benefit.

Cost-benefit analysis can assist decisionmakers in making choices among competing life-saving or safety-related expenditures. For example, cost-benefit analysis can help to identify which regulatory alternative provides the most health benefits for a given dollar expenditure. In addition, cost-benefit analysis can show decisionmakers how costs and benefits are distributed to different populations. With this information, decisionmakers can then decide whether, on equity grounds, the cost to one population is worth the benefits to another population.

In this report, cost-benefit analysis is discussed in relation to its ability to provide decisionmakers useful information on what level of standard and accompanying regulation should be recommended for protecting the environment. For example, in setting a regulation to improve air quality, cost-benefit analysis can be useful in providing estimated costs (such as the expense of pollution control equipment) and estimated benefits (such as better health and improved visibility) for various regulatory levels. With this information, a decisionmaker would be able to consider the trade-offs between the costs and benefits. A less stringent regulation, corresponding to poorer air quality, may yield lower costs and lower benefits. Conversely, a more stringent regulation, corresponding to better air quality, may yield higher benefits at higher costs. Thus, cost-benefit analysis can indicate potentially which regulatory level yields the highest net benefit.

Unfortunately, the term "cost-benefit analysis" can suggest a degree of analytical precision that is not attainable. Particularly in the environmental area, major gaps in underlying scientific data make it difficult to estimate environmental costs and benefits. This problem is further complicated since precise dollar values for those costs and benefits are not readily available.

Despite such uncertainty, cost-benefit analysis can still prove useful to regulatory decisionmakers. Rather than providing single dollar values for various costs and benefits, which would give the impression that those values are precise, the analysis can present a range of dollar values. Then, for each alternative

considered, a range of net benefits can be presented. This range reflects the fact that data gaps make single dollar values meaningless. In this way, cost-benefit analysis may not point clearly to the most efficient alternative, but it will show how the ranking of alternatives depends on what particular estimates a decisionmaker chooses from a range of possible estimated values of costs and benefits. In so doing, it reduces the need to rely solely on intuitive judgment.

Although less data-intensive frameworks such as "cost-effectiveness analysis," which does not entail placing dollar values on benefits, are available for assessing environmental regulations, these frameworks are also plagued by gaps in scientific data. For example, the lack of data on air pollution's effect on human health is a fundamental problem in developing air quality regulations which have some scientific basis.

Quite clearly, added costs and benefits occur when collecting and analyzing better information on the various effects of environmental regulation. A good cost-benefit analysis will probably cost more to perform than other less data-intensive efforts. However, cost-benefit analysis offers in principle a more accurate analytical framework for identifying the more efficient regulatory strategies. Whether to proceed from a simpler, less costly analytical framework, such as cost-effective analysis in which dollar values are not computed for benefits, to a more expensive cost-benefit analysis is a difficult decision. Given this trade-off between cost and accuracy, some economists have suggested that cost-benefit analysis be done only when the expected payoff is very high. For example, cost-benefit analysis should be done if the analysis is likely to reveal an alternative which is far less costly and/or yields far greater improvements in health benefits.

In this report, we focus on the use of cost-benefit analysis in evaluating different levels of environmental protection, as in different air quality standards. We do not focus on efforts to meet a given level of environmental protection at the least cost, which is a form of cost-effectiveness analysis.

COST-BENEFIT ANALYSIS FOR ASSESSING ENVIRONMENTAL REGULATIONS

For many years, federal agencies have been promulgating regulations to protect and enhance the environment. The Council on Environmental Quality's 11th annual report, dated December 1980,[1] estimates that it will cost the nation nearly $520 billion to comply with federal environmental regulations during the 10-year period 1979-88. By the same token, benefits in the form of better health and improved environmental quality from such regulations will also likely amount to billions of dollars.

[1]That report represents the most recent cost data available from the Council on Environmental Quality's annual reports.

On February 17, 1981, President Reagan issued Executive Order 12291, requiring that federal agencies prepare cost-benefit analyses before promulgating major new regulations, reviewing major existing regulations, and developing legislative proposals concerning major regulations. This action was taken to help determine whether the costs to comply with federal regulations were in proportion to the benefits received. By requiring that cost-benefit analysis be prepared only for major regulations, the executive order is consistent with the philosophy that such analysis be done only when the expected payoff is very high.

COST-BENEFIT ANALYSIS REQUIREMENTS OF EXECUTIVE ORDER 12291

Executive Order 12291 generally covers all federal agencies in the executive branch. The order requires that each agency prepare, in connection with every major rule (see below), a Regulatory Impact Analysis (RIA)[2] for Office of Management and Budget (OMB) review which contains the following information:

--A description of the potential benefits of the rule, including any beneficial effects that cannot be quantified in monetary terms, and the identification of those likely to receive the benefits.

--A description of the potential costs of the rule, including any adverse effects that cannot be quantified in monetary terms, and the identification of those likely to bear the costs.

--A determination of the potential net benefits of the rule, including an evaluation of effects that cannot be quantified in monetary terms.

--A description of alternative approaches that could substantially achieve the same regulatory goal at lower costs, together with an analysis of potential benefits and costs and a brief explanation of the legal reasons why such alternatives, if proposed, could not be adopted.

The executive order defines a major rule as any regulation that is likely to result in

--an annual effect of $100 million or more on the economy;

--a major increase in costs or prices for consumers, individual industries, federal, state, or local government agencies, or geographic regions; or

---

[2]In this report, RIA, as described in Executive Order 12291, and the term "cost-benefit analysis" are used interchangeably.

--significant adverse effects on competition, employment, investment, productivity, innovation, or the ability of U.S.-based enterprises to compete with foreign-based enterprises in domestic or export markets.

The executive order recognizes that some legislative statutes could prohibit or limit the use of cost-benefit analysis for assessing federal regulations. Nevertheless, the executive order requires that a cost-benefit analysis be prepared even if it cannot be used, and that such information be made available to the public. In that way, the public at least has a better understanding of how or why particular regulatory decisions should be made.

OBJECTIVE, SCOPE, AND METHODOLOGY

Our overall objective in this review was to evaluate how useful cost-benefit analysis has been or can be in assessing viron- mental regulations. Our primary focus was on the Environ ital Protection Agency (EPA) because it is responsible for man. signif- icant environmental regulations. We reviewed the environmental area because of the billions of dollars that are being spent to regulate that area and because of the high degree of difficulty in measuring environmental costs and benefits. We addressed three factors which we believe have an important bearing on the usefulness of cost-benefit calculations. These three factors involve the adequacy of the data used to determine the state of the art of cost-benefit analysis as applied to environmental problems, statutes which prohibit or limit the use of cost-benefit analysis results in environmental rulemaking, and problems that EPA has encountered in implementing Executive Order 12291.

To assess the state of the art of cost-benefit analysis as applied o environmental problems, we gathered information from the publ shed Regulatory Agenda relevant to cost-benefit analyses EPA did or planned to do to comply with the executive order. (A cost-benefit analysis which comes closest to providing precise and unbiased estimates of costs and benefits would, in our opinion, be labeled state of the art.) We performed a detailed review of three EPA analyses which EPA and/or OMB identified as state of the art. These analyses were of the effluent limitation guidelines for the iron and steel industry, and the organic chemicals, plastics, and synthetic fibers industry, and the ambient air quality standard for particulate matter. EPA and OMB indicated that other EPA analyses included only a very rudimentary calculation of benefits, and we therefore did not include them in this review.

Our detailed review was done to evaluate how well EPA's cost-benefit analyses were able to provide precise and unbiased estimates. We considered the following criteria, which were used as general guides:

--Are the data reliable enough to identify a most likely single (or point) estimate of a particular benefit or cost component?

--Are the data reliable enough to construct confidence intervals bounding the true value of a particular benefit or cost estimate? For example, a 95-percent confidence interval means that a certain dollar range would include the true (but unknown) value 95 percent of the time.

--Are the procedures for collecting data and for making estimates of benefits and costs replicable? Simply put, would different researchers using the same information arrive at the same conclusions? Tied to this is the question of verification. If it is impossible to verify an estimate, it is less likely that independent researchers would arrive at a common conclusion.

--Do the methods or tools for analyzing data provide unbiased estimates of benefits and costs? For example, are these methods likely to overstate or understate health benefits from regulation?

To check the validity of our detailed review findings, we surveyed literature on cost-benefit analysis of environmental problems. (See app. I.) Additionally, we sought input from EPA officials, various environmental interest groups, and industrial trade associations to determine their perceptions about state-of-the-art issues. Finally, we augmented our work at EPA by interviewing key personnel familiar with cost-benefit analysis applications germane to health and safety regulations at the Occupational Safety and Health Administration (OSHA), the Food and Drug Administration (FDA), and the Consumer Product Safety Commission (CPSC). (See app. II for the contacts made during the review.)

To assess the effects of environmental statutes which restrict the use of cost-benefit analysis results in rulemaking, we interviewed officials at EPA, OMB, OSHA, the Natural Resources Defense Council (NRDC), and the Business Roundtable. We also reviewed various environmental statutes, legislative histories, and related court cases that discuss the acceptability of cost-benefit analysis results for setting environmental regulations.

To assess the problems EPA encountered in its implementation of Executive Order 12291, we examined the three EPA cost-benefit analyses previously mentioned. We focused on correctible rather than state-of-the-art problems. We evaluated these analyses in light of the executive order and OMB guidance, employing the following criteria:

--Does the cost-benefit analysis consider the most promising alternatives and include an explanation of the rationale for choosing the selected alternative? Our review focused on identifying major omissions, such as computing net benefits for only one level of regulation or not considering all significant alternatives.

--Are all costs and benefits estimated or discussed? Again, we focused on finding serious omissions, such as not considering costs to implement or enforce proposed regulations.

--Are estimates of monetized costs and benefits, and net benefits, provided? If so, are they discounted to show a present value for future costs and benefits?

--Does the cost-benefit analysis address important aspects of uncertainty in the estimates? Our review focused on identifying instances where only single point estimates were presented with no accompanying discussion of uncertainty.

Another important aspect in assessing EPA's implementation of the executive order deals with how EPA computes the cost of its major and minor rules. (As discussed earlier in this chapter, only major rules are subject to the cost-benefit analysis requirement.) To address this issue, we reviewed the cost calculations that EPA made for its effluent limitation guidelines by examining Federal Register notices which were available on 18 of 21 proposed or final guidelines. We reviewed the effluent guidelines area because it is a program area for which EPA has performed cost-benefit analyses for major rules and has also designated a number of minor rules.

We conducted our review between October 1982 and May 1983 in accordance with generally accepted government auditing standards.

HANDLING AGENCY COMMENTS

On October 20, 1983, EPA commented on a draft of this report. In general, EPA agreed with our findings and recommendations, and stated that the report provides very accurate assessments of the limitations and usefulness of cost-benefit analysis at EPA.

On December 16, 1983, OMB also commented on a draft of this report. OMB stated that the report provides useful insight into how cost-benefit assessments can be improved and how they can be used to improve regulatory decisions.

EPA's and OMB's overall comments are included in this report, together with our evaluation of them. (See apps. III and IV.) In addition, we revised this report as appropriate to reflect some of EPA's and OMB's suggested changes, and responded to their comments, as appropriate, at the end of each respective chapter.

CHAPTER 2

DATA GAPS PREVENT COST-BENEFIT ANALYSIS FROM PROVIDING EXACT ANSWERS

Although gaps in scientific data prevent cost-benefit analysis from providing exact answers, such analysis can nevertheless be useful in making the most out of limited information. Sometimes, cost-benefit analysis can present a range of plausible dollar estimates reflecting the uncertainty about particular costs and benefits. It can also show how different cost or benefit estimates in that range were derived and what regulatory action, if any, would maximize expected net benefits. Sometimes, cost-benefit analysis can reduce the range of uncertainty or identify those estimates within that range which are most likely to be accurate. In this way, cost-benefit analysis can reduce although not eliminate the guesswork in environmental rulemaking, while at the same time identify those areas where research is most needed.

EPA's cost-benefit analyses cannot provide exact answers to regulating complex environmental problems largely because of gaps in underlying scientific data rather than because of analytical weaknesses that EPA can readily correct. This data gap is troublesome in estimating physical measures of the benefits of environmental regulation, such as improvements in water quality or better visibility. Problems also arise in calculating dollar values for those improvements. Similar but less serious problems arise in estimating the costs of complying with environmental regulations. These data weaknesses are not unique to EPA, as they also affect other federal agencies dealing with health and environmental regulations.

Recognizing that cost-benefit analysis does not provide exact answers to environmental problems is not new. In 1978, we reported that estimating environmental benefits was difficult because of deficient information.[1] And other research (see app. I) underscores the need for better physical and natural science data for cost-benefit analysis to be more useful in addressing environmental problems in such areas as air, water, and hazardous waste.

COST-BENEFIT ANALYSES REVEAL LARGE GAPS IN UNDERLYING SCIENTIFIC INFORMATION NEEDED TO ESTIMATE BENEFITS

A list of causal relationships, covering for example, the effect of a regulation on water quality to its ultimate impact on human health must be understood and measured before dollar

---

[1] 16 Air and Water Pollution Issues Facing the Nation (CED-78-148B, Oct. 11, 1978).

estimates of benefits from a particular regulation can be derived. However, cost-benefit analyses in the environmental and health areas reveal shortcomings in the underlying scientific data needed to quantify these relationships. In some cases, the data are simply not available.

The following examples, taken from the EPA analyses we reviewed, illustrate the kinds of information gaps, uncertainties, and resulting difficulties that prevail in trying to isolate and measure the benefits of environmental regulation prior to placing a dollar value on them. These examples highlight problems that are not readily correctible and are not meant to be critical of EPA's effort to perform cost-benefit analysis.

In analyzing the effluent limitation guidelines for the iron and steel industry, EPA noted a number of basic data weaknesses. For example, knowing how much cleaner the water will be from lower discharges of pollutants was described as ". . . one of the weaker links in benefit analyses of water pollution controls." EPA also addressed the difficulty of isolating benefits due solely to water quality improvements, noting that tying water quality to disease is often controversial, partly because data are unavailable on other possible explanatory factors for disease, such as occupation and smoking.

In analyzing the effluent limitation guidelines for the organic chemicals, plastics, and synthetic fibers industry, EPA quantified health benefits using methods in which health risks to humans from low-level doses of pollution were based on high-dose animal experiments. EPA's contractor described these methods as debatable and referred to the estimates as the ". . . best guess of the unknown." In estimating recreation benefits, little data connecting water quality to recreation activity were available. As a result, the EPA contractor stated that it would be extremely difficult to isolate the effect of cleaner water from other factors, such as increased income, likely to influence recreation.

In analyzing the benefits of an air quality standard for particulate matter, EPA noted that the underlying theory of how particulate matter affects human mortality is not known. As a result, different epidemiological studies EPA reviewed came to conflicting conclusions about the dangers of such pollution. These conflicting results can be traced in part to different researchers considering different possible causes of adverse health effects. As an example, some of these studies did not account for reasons such as cigarette smoking, diet, and occupational exposure to explain illness and mortality. Not considering these factors can result in biased estimates of the health effects attributable solely to air pollution--namely, these estimates can be too high. In a similar vein, some researchers did not account for the possible influence of exposure to other outdoor pollutants, such as sulfur oxides, in addition to particulate matter in their estimates. Another fundamental problem was data on

pollution. For example, one study estimating the influence of particulate matter on mortality in the United States was based on air quality data from London, England, during the late 1950's to early 1970's. However, the contractor who prepared the cost-benefit analysis for EPA acknowledged that the chemical makeup of this London air pollution could differ significantly from air quality characteristics in U.S. cities today.

As previously mentioned, the data weaknesses and uncertainties described above are not unique to EPA. Our interviews with officials at OSHA, FDA, and CPSC, as well as our review of relevant literature (see app. I), point to the same kinds of problems in estimating health benefits for other regulations. Although representatives from these other agencies stated that they had less difficulty estimating such benefits because they were dealing with higher human exposure levels to the pollutants, fewer confounding variables, and better information on populations at risk, fundamental problems exist such as extrapolating from high to low doses of pollution exposure and using animal studies to set standards.

Cost-benefit analyses also reveal difficulties in valuing health and other environmental effects

Problems similar to those described above also arise in placing dollar values on physical measures of health and other environmental improvements. Fundamentally, this is because determining how much people are willing to pay for environmental improvements is difficult.

One method of measuring dollar values EPA cited in its analyses relied on the prices people pay for commodities affected by changing environmental quality. For example, property values along a river should increase as the water quality of the river improves. However, as noted in EPA's iron and steel analysis, tying gains in property values to improvements in water quality can be difficult because data pointing to such a connection are scarce.

Another method of calculating dollar benefits employed in EPA's iron and steel, organic chemicals, and particulate matter analyses assumes that people will require higher wages for taking riskier jobs or living in a more polluted environment. For instance, if higher wages can be tied to higher risks and vice versa, a value for risk can be derived. However, like the property value technique described above, this method, to be accurate, requires reliable information on the risk as well as on other factors, such as an upturn in the economy and information on individual and job characteristics (previous schooling, occupation, etc.) which can be expected to affect wage levels.

Another technique EPA uses to value health and other environmental effects relies on the use of surveys. This approach involves asking individuals how much they value specific changes in environmental quality. As EPA's iron and steel analysis notes, many potential sources of bias exist when using this technique. For example, people may have an incentive to overstate or understate their preferences for environmental improvements depending on whether they actually have to hand over money for those improvements.

Given the difficulties of placing dollar values on benefits, the question arises as to whether any advantages derive from this step. One advantage is that placing dollar values on benefits makes it easier to compare them with costs, since all effects--whether costs or benefits--are computed explicitly using the same measure. Another fundamental advantage can be seen by focusing on a decision to omit this step in estimating benefits. This does not mean that regulatory decisions would be divorced from any monetary valuation of the environmental benefits. For example, a decision to promulgate a regulation costing $50 million to prevent 1,000 premature deaths implies at least a minimum dollar value for preventing a premature death. Similarly, a decision not to impose a more stringent regulation costing an extra $10 million to prevent 10 extra premature deaths implicitly suggests the maximum dollar value for preventing a premature death. Thus, the critical question may center on whether an effective decisionmaking framework is more likely if environmental benefits are explicitly or implicitly valued.

ESTIMATING THE COSTS OF ENVIRONMENTAL REGULATIONS IS DIFFICULT

Problems also arise in estimating direct compliance costs of environmental regulations because of weaknesses in underlying scientific data. For example, in estimating the direct compliance costs of EPA's air quality standard for particulate matter, measurements or calculations of air quality before and after the proposed regulation is in place has to be made before dollar estimates are made. This requires reliable monitoring data on current air quality and accurate projections of future air quality using computer models. In a 1982 report,[2] we noted that such modeling requires information on emission rates, the heights of smokestacks, and weather conditions, which can be difficult to obtain.

In determining what pollution controls to install and their cost, EPA needed economic and financial data which were not readily available. For example, EPA had to estimate the number of

---

[2]A Market Approach to Air Pollution Control Could Reduce Compliance Costs Without Jeopardizing Clean Air Goals (PAD-82-15, Mar. 23, 1982).

facilities needing to install pollution controls. This required projections about future demand for the products of these plants. In EPA's iron and steel analysis, a major source of uncertainty was determining the future demand of the product. As pointed out in that analysis, a number of difficult-to-predict factors affect this demand, such as business-cycle fluctuations, foreign competition, and reduction of steel content in automobiles.

Other direct costs of environmental regulation which may not be easy to predict include government costs to issue permits, monitor performance, and enforce compliance. Likewise, companies can incur significant costs in applying for permits, including the cost of long delays before projects can be started and completed.

The direct expense of regulation can also trigger indirect or secondary costs which are potentially significant but difficult to measure. These costs include worker unemployment and underuse of capital resulting from regulation, and also include declining innovation and productivity. These effects are difficult to predict because information on future demand and the reaction of industry to new regulation are not available.

EPA'S COST-BENEFIT ANALYSES INDICATE THAT UNCERTAINTY IS INEVITABLE BUT POTENTIALLY MANAGEABLE

Despite data weaknesses, cost-benefit analysis can identify ranges of estimates where a single estimate is not very accurate. These estimates can be useful if they represent a range of likely values associated with a particular benefit or cost. The analysis can also trace the effect that a particular estimate chosen from such a range will have on the net benefits and desirability of a given regulatory alternative. This approach can reduce uncertainty to more manageable proportions because a decisionmaker can select a particular alternative without having to rely solely on guesswork.

In dealing with uncertainty caused by data weaknesses, two of the three cost-benefit analyses we reviewed emphasized single values rather than ranges of dollar estimates for costs and benefits. However, EPA's particulate matter analysis is a good example that shows how net benefits--and the ranking of regulatory alternatives--change depending on what health studies are used to calculate benefits. The health studies in question provide sometimes conflicting results about adverse health reactions to air pollution exposure.

Net benefit estimates and the ranking of alternatives from using different health studies were presented in EPA's particulate matter analysis because the "true" model of human health is not known. These various studies indicate how benefits vary depending on what plausible explanations of health are included in the

analysis. For example, some studies account for the influence of smoking on mortality incidence while others do not. Similarly, some studies consider the influence of diet and medical care while others do not. Because all of these factors, besides air pollution, are plausible reasons for explaining mortality, their influence should be accounted for, even if it means using the range of results of several studies.

While the particulate matter analysis shows how health benefits depend on what health studies are relied on, EPA's organic chemicals, plastics, and synthetic fibers analysis is instructive in showing how consecutive layers of uncertainty in estimating benefits could be handled. First, in measuring the effluent discharged from chemical plants, an error band ranging from one-half to one and one-half times the value of the midpoint estimate of effluent was found. Next, in predicting water quality resulting from this effluent, an error band ranging from about one-third to three times the midpoint value of water quality was discovered.

What effect this water quality has on fish contamination and, in turn, what this contamination means in terms of cancer risk to humans are estimated, and large error bands are found. The analysis notes that when all of these various sources of uncertainty are combined, overall uncertainty ranges from as high as 20 times the point estimate of cancer incidence to as low as about one-thirtieth of this midpoint estimate. To determine the likely distribution of results within this overall range, the analysis suggested, but did not use, a Monte Carlo simulation technique. Essentially, this method would involve repeated sampling of values in each of the error bands described above to determine the most frequently occurring values for effluent, water quality, contaminated fish and, finally, health effects. While these ranges of estimates can at times be large, it is important to keep in mind how large uncertainty would be if no attempt was made to estimate these effects.

IMPLICATIONS FOR FUTURE RESEARCH AT EPA

The examples cited in this chapter suggest that a lack of basic data could prevent cost-benefit analysis or any other method that uses scientific information from generating exact answers about the effects of environmental regulations. A number of considerations suggest that it may be some time, however, before EPA can make significant headway to address this data problem. First, this review has shown that critical data gaps abound, especially in estimating benefits of environmental regulations. Second, Executive Order 12291 is the first such directive emphasize benefits estimation, but it has been in place only since February 1981. The third and related point is that research of this nature generally takes a long period of time before it bears results.

A number of officials from EPA's Offices of Policy Analysis and Research and Development and from the Conservation Foundation have pointed to the need for more basic scientific data. Some, such as EPA's Clean Air Scientific Advisory Committee (CASAC),[3] have pinpointed special problem areas, such as the critical need for better epidemiological data to evaluate the health effects of air pollution. In light of the information needs discussed earlier, the assistant administrator of EPA's Office of Research and Development has indicated that future research efforts to identify areas where there is a lack of scientific knowledge will be among EPA's main priorities.

CONCLUSIONS

Cost-benefit analysis shows promise as a tool for identifying and understanding the significance of major sources of uncertainty in the cost and benefit estimates caused by data weaknesses. Cost-benefit analysis, for example, can show how the ranking of alternative solutions varies as different assumptions are made about what estimates to use in place of unknown values of key regulatory effects. In this way, cost-benefit analysis can reduce the decisionmaker's need to rely on guesswork by revealing the likely estimates for each alternative action.

Presently, cost-benefit analysis cannot be used as a precise tool for setting environmental regulations because it requires a degree of reliability not yet attainable. Gaps in scientific data underlying benefit and cost estimates appear to be the biggest problem, but closing these gaps may take many years of intense effort. Because EPA has indicated that future research efforts in this area are among its main priorities, EPA should include in its annual budget submission to the Congress its research priorities and its plans for narrowing the scientific data gaps.

RECOMMENDATION TO THE ADMINISTRATOR, EPA

In light of scientific data gaps, we recommend that the Administrator, Environmental Protection Agency, direct the program offices performing cost-benefit analysis to use special techniques for analyzing uncertainty so that the most likely estimates of key regulatory effects can be isolated. An example is a Monte Carlo technique which could have been used in the organic chemicals, plastics, and synthetic fibers analysis to narrow the range of estimates.

---

[3]CASAC is an independent scientific review committee established under section 109(d)(2)(A) of the Clean Air Act. Among other duties, its members, appointed by the EPA Administrator, appraise the adequacy and basis of existing, new, or revised national ambient air quality standards.

We also recommend that the Administrator, Environmental Protection Agency, direct his budget office to highlight in its annual budget submission to the Congress the priorities it has assigned to address the most critical data gaps affecting the precision of cost-benefit analysis and the measures planned to narrow those gaps. This information can be used to monitor EPA's progress in making cost-benefit analysis more useful.

AGENCY COMMENTS AND OUR EVALUATION

In our draft report, we sent EPA and OMB for comment, we proposed that EPA identify and close the most critical data gaps in estimating the benefits of environmental regulation. Many of these gaps relate to underlying scientific knowledge. EPA indicated in its comments to our draft report that research on health and environmental effects is extensively addressed in its Office of Research and Development budget. We have therefore modified our proposal by recommending that EPA include in its annual budget submission to the Congress a discussion of its priorities for addressing data gaps.

EPA also stated in its comments to our draft report that, given the data gaps that are inherent in cost-benefit analyses, it may not always be possible even to develop a plausible range of values narrow enough to be useful for policy purposes. We agree, and believe that cost-benefit analysis can be used to identify whether there is such a range. EPA also commented that research on physical measures of health and environmental improvement should be structured to serve as an input to cost-benefit analysis to improve the credibility of the analysis. We agree, and believe that EPA should keep this in mind when developing research to narrow the data gaps in estimating the benefits and costs of environmental regulation.

OMB stated in its comments to our draft report that EPA's work could benefit from more use of sensitivity analysis, which is a technique for analyzing uncertainty. We agree with OMB's statement.

CHAPTER 3

CERTAIN LAWS PROHIBIT OR LIMIT THE USE OF COST-BENEFIT ANALYSIS RESULTS IN ENVIRONMENTAL RULEMAKING

Some environmental laws passed in the early 1970's placed more emphasis on the level of cleanup to be achieved than on the costs involved in reaching those levels. Thus, laws such as the Clean Air and Clean Water Acts prohibit or limit the use of cost-benefit analysis in setting standards and accompanying regulations. Consequently, the results of a cost-benefit analysis prepared under Executive Order 12291 cannot always be used in the decisionmaking process.

At the time such legislation was enacted, the nation was confronted with substantial threats from air and water pollution. There were strong feelings that the benefits of environmental protection would clearly outweigh the costs. Today, actions taken have reduced many of these threats, and the emphasis now involves the control of smaller and smaller amounts of air and water pollution. Yet the costs of such control continue to escalate by tens of billions of dollar annually. For example, the Council on Environmental Quality estimates that air and water pollution abatement costs will rise from $35 billion in 1979 to $62 billion in 1988. Thus, the use of cost-benefit analysis results becomes more relevant.

SOME ENVIRONMENTAL STATUTES PROHIBIT OR LIMIT USE OF COST-BENEFIT ANALYSIS RESULTS

Legislation prohibiting consideration of economic factors or limiting consideration of all feasible alternatives to a proposed rule affects the use of cost-benefit analysis. While we did not attempt to identify all laws that contain such prohibitions or limitations, we did identify several major environmental laws with prohibitions or limitations of direct relevance to our review and to the EPA analyses we examined. Three of those laws are discussed below.

Regarding limitations placed on economic factors, the Clean Air Act (42 U.S.C. §7401 et seq.) provides that primary national ambient air quality standards (NAAQS) are to protect the public health. In Lead Industries Association v. EPA,[1] followed in American Petroleum Industry v. Costle,[2] the Court of Appeals concluded that ". . . the statute and its legislative history make

---

[1]647 F. 2d 1130, 1148-1156 (D.C. Cir. 1980), cert. den., 101 S. Ct. 621 (1980)

[2]665 F. 2d 1176, 1185 (D.C. Cir. 1981), cert. den., 102 S. Ct. 1737 (1982)

clear that economic considerations play no part in the promulgation of ambient air quality standards." Since the court was unable to discern any congressional intent "to require, or even permit" the EPA Administrator to consider economic or technological feasibility in setting ambient air quality standards, the court concluded that EPA is not ". . . free to trespass beyond the bounds of its statutory authority by taking [economic] factors into account."

Similarly, the Clean Air Act requires that national emission standards for hazardous air pollutants are to provide an ample margin of safety to protect the public health. We read this provision of the act to preclude cost considerations in setting hazardous air emission standards.[3]

The Occupational Safety and Health Act of 1970 (29 U.S.C. §651 et seq.) requires that health standards for toxic materials or harmful physical agents adequately assure "to the extent feasible" that no employee will suffer material health impairment as a result of regular exposure to the substance. In American Textile Manufacturers Institute v. Donovan (452 U.S. 490 (1981)), the Supreme Court concluded that cost-benefit analysis is neither required nor permitted in setting health standards for toxic materials or harmful physical agents. The Court found that

> ". . . Section 6(b)(5) [of the Act] directs [the Occupational Safety and Health Administration] to issue the standard that 'most adequately assures . . . that no employee will suffer material impairment of health,' limited only by the extent to which this is 'capable of being done.'. . . Congress itself defined the basic relationship between costs and benefits, by placing the 'benefit' of worker health above all other considerations save those making attainment of this benefit unachievable. Any standard based on a balancing of costs and benefits . . . that strikes a different balance than that struck by Congress would be inconsistent with the command set forth in Section 6(b)(5)."

In comparison, the Federal Water Pollution Control Act (33 U.S.C. §1251 et seq.), commonly referred to as the Clean Water Act, specifically permits the use of cost-benefit analysis results in certain regulatory decisions. However, legal prohibitions in the Clean Water Act limit the kinds of regulatory alternatives that can be adopted through rulemaking. The act requires each major industry regulated under the law to individually comply with an effluent limitation that can be achieved by installing the best available technology. As a result, regulatory alternatives that would allow one industry to control water pollution in lieu of another industry cannot be adopted. However, if the act allowed

---

[3]Delays in EPA's Regulation of Hazardous Air Pollutants (GAO/RCED-83-199, Aug. 26, 1983).

EPA to consider such a regulatory approach, an in-depth cost-benefit analysis would show that, in some cases, that approach could be more economically attractive in achieving the same overall level of pollution control. For example, EPA did a comparison of costs by type of industry, such as iron and steel versus leather tanning, to remove water pollutants and found that the costs per pound of pollution removed ranged from less than $1 to as much as $406, depending on the industry.

EXECUTIVE ORDER 12291 REQUIRES COST-BENEFIT ANALYSIS, EVEN WHEN RESULTS CANNOT BE USED TO MEET THE ORDER'S OBJECTIVES

Executive Order 12291 requires that cost-benefit analyses be prepared on major rules, even when the results of those analyses cannot be used to meet the order's objectives.

The Executive Order lays out the following objectives:

--In promulgating new regulations, reviewing existing regulations, and developing legislative proposals concerning regulations, all agencies, to the extent permitted by law, shall adhere to the following requirements:

  -administrative decisions shall be based on adequate information concerning the need for and consequences of proposed government action;

  -regulatory action shall not be undertaken unless the potential benefits to society for the regulation outweigh the potential costs to society;

  -regulatory objectives shall be chosen to maximize the net benefits to society;

  -among alternative approaches to any given regulatory objective, the alternative involving the least net cost to society shall be chosen; and

  -agencies shall set regulatory priorities with the aim of maximizing the aggregate net benefits to society, taking into account the condition of the particular industries affected by regulations, the condition of the national economy, and other regulatory actions contemplated for the future.

To implement these objectives, Executive Order 12291 directs each agency to "prepare, and to the extent permitted by law consider" a cost-benefit analysis on major rules (explained on p. 3). According to EPA and OMB officials we contacted, the phrase, "to the extent permitted by law consider" only limits an agency's consideration of a cost-benefit analysis, not the preparation thereof. For example, the Special Assistant to the Director,

Office of Policy Analysis, EPA, told us that nothing precludes EPA from performing cost-benefit analyses. An official on the Benefits Staff, Economic Analysis Division, Office of Policy Analysis, EPA, stated that performing a cost-benefit analysis complies with the requirement of the executive order, but pointed out that language in various statutes seems to indicate that cost-benefit analysis estimates should not be used in regulatory decisionmaking. In addition, the Deputy Administrator, Regulatory and Statistical Analysis Division, Office of Information and Regulatory Affairs, OMB, told us that the executive order is clear in requiring that a cost-benefit analysis must be done for any regulation designated as major.

Some results of the particulate matter cost-benefit analysis cannot be used

EPA officials indicated that at least some of the results of the cost-benefit analysis on particulate matter, which was required by Executive Order 12291, cannot be used in setting an ambient air quality standard because section 109 of the Clean Air Act prohibits considering economic factors. Although these officials took the position that the estimated costs of complying with the standard could not be considered, there was confusion as to whether the results of the estimated benefits of the standard could be used.

In an October 8, 1982, letter to OMB's Administrator for Information and Regulatory Affairs, EPA's Administrator acknowledged that she was ". . . legally bound not to consider economic and technological feasibility in setting air quality standards." She indicated that although EPA would not let the development of a cost-benefit analysis slow down the setting of a standard in the ambient air quality area, she believed that ". . . benefits analyses are a useful tool which can be very helpful in evaluating alternative standards."

EPA officials we contacted were unsure as to whether the results of the particulate matter analysis could or would be used. For example, EPA's Acting Director of the Science Advisory Board[4] told us that EPA's position was that the particulates standard should be set on the basis of human health effects, not on the basis of the results of the cost-benefit analysis. He added that although the analysis cannot be used as the basis for a revised standard, it will nevertheless generate information useful to the states in implementing the standard. Furthermore, he stated that the benefits analysis could be used to articulate to the public the need and justification for the standard.

---

[4]The Science Advisory Board is responsible for providing expert and independent advice to the EPA Administrator on issues relating to scientific, technical, and policy matters.

The former EPA Chief, Economic Analysis Branch, Strategies & Air Standards Division, Office of Air Quality Planning & Standards, who later became Special Assistant to the Director of that office, said that the particulate matter cost-benefit analysis is for informational purposes only, and that the Administrator should base the particulate matter standard on the information contained in EPA's criteria document,[5] which had been approved by CASAC. He added that, while the Clean Air Act's prohibition against considering economic factors clearly ruled out using the results of the cost segment of the analysis, determining whether the prohibition also ruled out the consideration of the results of the benefits segment was unclear.

In the March 1983 particulate matter analysis, EPA concluded that:

> "Under the Clean Air Act, the Administrator of EPA may not consider economic and technological feasibility in setting National Ambient Air Quality Standards (NAAQS). Although this precludes consideration of benefit-cost analyses in setting NAAQS, it does not necessarily preclude consideration of benefit analyses for that purpose."
>
> . . . . .
>
> "Although the . . . [March 1983] study reflects the 'state-of-the-art' in particulate matter benefit analysis, the approach and results have not been subjected to a comparable extensive peer review process. In addition, some EPA staff have raised questions regarding the approach taken in the analysis and the significance of the results for standard setting purposes under the Act. These circumstances do not necessarily preclude use of the benefit analysis in some manner after appropriate peer review and further consideration of the questions that have been raised."

Legal prohibitions thus prevent EPA from using the net benefit results of its cost-benefit analysis to help set a particulate matter air quality standard. Nevertheless, EPA had to prepare the cost-benefit analysis to comply with the requirements of Executive Order 12291 regarding major rules. Work on studies which later became part of this analysis began in fiscal year 1979. As of March 1983, total contract costs amounted to $1.871 million, and 12.3 staff years had been spent by EPA; so, the

---

[5]The criteria document was prepared to present air quality criteria in accordance with requirements of the Clean Air Act. The document evaluated and assessed scientific information on the health and welfare effects associated with exposure to various concentrations of particulate matter and sulfur oxides in ambient air.

cost of the particulate matter analysis could well exceed $2 million. The time and money invested, though, may be minor in comparison to the billions of dollars in net benefits derived from the analysis. For example, depending on what alternative standard is considered, EPA's particulate matter analysis shows that net benefits could range from $1.2 billion over a 7-year period to $230 billion over a 9-year period.

The substantial costs and limited use of cost-benefit analysis in the air area becomes all the more important because OMB's Deputy Administrator, Regulatory and Statistical Analysis Division, Office of Information and Regulatory Affairs, told us that all ambient air quality standards are generally recognized as major rules. Therefore, each rule shall require a cost-benefit analysis. On the basis of the cost of the particulate matter analysis, preparing an analysis for the air quality standards could involve a large expenditure of resources.

In conjunction with this problem in other environmental areas, OSHA officials told us that they are also prohibited from using the results of cost-benefit analyses in setting health standards for working environments. Despite the fact that OSHA is unable to use the results of cost-benefit analyses in setting health standards, OSHA must also prepare a cost-benefit analysis for any rule that is designated as major because it is required by Executive Order 12291.

COST-BENEFIT ANALYSES COULD BE USEFUL EVEN WHEN THEIR RESULTS CANNOT BE USED IN ENVIRONMENTAL RULEMAKING

When cost-benefit analysis results cannot be used because of legal prohibitions or limitations, a decisionmaker may not have the opportunity to choose a regulatory objective which maximizes net benefits to society. Despite these restrictions, however, cost-benefit analysis results that cannot be used in rulemaking could still be useful.

For instance, an official with the Business Roundtable suggested that even if an agency does not use a cost-benefit analysis in its regulatory decisionmaking, the analysis could still be useful to the Congress as a source of information. The Deputy Administrator, Regulatory and Statistical Analysis Branch, Office of Information and Regulatory Affairs, OMB, told us that performing cost-benefit analyses for major regulations is still useful even though applicable legislation prohibits considering costs and/or benefits because the results of these analyses can provide information to the Congress and the public on the dimensions of costs. While this type of feedback may occur, at present, these analyses are not now formally transmitted to the Congress. This information is simply part of the record available to the public.

CONCLUSIONS

At present, certain environmental legislation, such as the Clean Air Act and Clean Water Act, limit or prohibit using cost-benefit analysis results in regulatory decisionmaking. Nevertheless, Executive Order 12291 requires that cost-benefit analysis be done for all major regulations, regardless of the legal prohibitions that may exist. A cost-benefit analysis such as the one prepared on particulate matter cannot be used to make regulatory decisions because the Clean Air Act indicates that economic considerations play no role in setting ambient air quality standards.

Preparing a cost-benefit analysis associated with major regulations could entail a substantial expenditure of resources, as in the particulate matter analysis. While the analysis may be used outside the environmental rulemaking process as a source of information, its usefulness within the rulemaking process to maximize net benefits cannot be realized as long as legal constraints prevail.

We believe that cost-benefit analyses that are prepared but not used because of legal restrictions should be sent in summary form to the Congress in order to assist it in carrying out its oversight responsibilities. At present, however, no means exist to ensure that the Congress is made aware of such information.

We also believe that the Congress may want to reconsider legislative provisions which prohibit or limit the use of cost-benefit analysis in light of improvements in environmental protection that have occurred since enactment of these provisions.

RECOMMENDATION TO THE ADMINISTRATOR, EPA

We recommend that the Administrator, Environmental Protection Agency, transmit to the cognizant oversight committees in the Congress, in executive summary form, those cost-benefit analyses that cannot be used in environmental rulemaking because of legal restrictions.

AGENCY COMMENTS AND OUR EVALUATION

EPA supports our recommendations to transmit to the Congress those cost-benefit analyses that cannot be used in environmental rulemaking because of legal prohibitions. EPA noted, however, that care should be taken to explain the findings in light of the uncertainties and data gaps prevalent in the analyses. EPA also noted that other qualitative types of analyses (such as environmental impact analyses) should also be transmitted to give the Congress a broader view of the consequences of the regulatory action.

We agree that the Congress could gain a broader perspective if it is provided more complete analytical information. However, this review was only on cost-benefit analysis.

MATTERS FOR CONGRESSIONAL CONSIDERATION

Some laws, such as the Clean Air and Clean Water Acts, prohibit or limit cost-benefit analysis results from being used in environmental rulemaking. The Congress may wish to reexamine the need for such restrictions in light of subsequent improvements in environmental protection and consider easing or eliminating such restrictions on a case-by-case basis. In our opinion, cost-benefit analysis shows promise as a tool for assessing environmental regulations. This tool can contribute to more cost-effective regulation by systematically presenting the advantages and disadvantages of alternative regulatory approaches.

CHAPTER 4

IMPROVEMENTS IN EPA'S COST-BENEFIT ANALYSES CAN BE ACHIEVED

OMB allows EPA a great deal of flexibility in implementing Executive Order 12291. Possibly as a result of this flexibility, EPA has not always considered important compliance costs to determine if a proposed rule is major and thus subject to cost-benefit analysis. Furthermore, in the three cost-benefit analyses we reviewed, EPA did not consider all of the most promising alternatives or prominently discuss the uncertainties of the cost and benefit estimates, nor did EPA consistently include all major cost and benefit categories. For the most part, these are correctable rather than state-of-the-art problems as identified in chapter 2, and they can easily be corrected by EPA.

In December 1983, EPA adopted guidelines for performing cost-benefit analysis which address the problems we found during our review. Following the guidelines will improve EPA's implementation of the executive order. Although perfect cost-benefit analysis can never be achieved because of data uncertainties, EPA is nevertheless taking steps to improve its process.

EPA HAS NOT ALWAYS ESTIMATED NEW SOURCE COMPLIANCE COSTS OF PROPOSED REGULATIONS

EPA has determined that 16 of 18 proposed effluent limitation guidelines regulations we reviewed were not major rules, as defined in Executive Order 12291, because they did not have annual effects of $100 million or more on the economy. Thus, those regulations did not require EPA to prepare cost-benefit analyses. In all but one of these guideline regulations, new source compliance costs were not included in its estimates of total annual costs. Had EPA always included compliance costs of new sources of pollution in these estimates, then 2 of the 16 regulations not considered major rules could likely have cost more than $100 million annually, triggering the executive order's requirement for cost-benefit analysis.

For example, EPA published, in the August 31, 1982, Federal Register, a proposed effluent limitation guidelines regulation for the electroplating and metal-finishing industry. In the proposal, EPA estimated that the regulation, if promulgated, would have an annual cost effect of $92 million; therefore, EPA did not consider it a major rule.

In the economic analysis EPA prepared for the electroplating and metal-finishing regulation, EPA did not include annual compliance cost estimates for new sources. Yet, EPA recognized that the regulation would affect both new and existing sources. Because EPA did not include new source compliance costs in the annual cost estimates, EPA could not be certain that the proposed regulation would cost less than $100 million.

Unlike its cost estimates for the electroplating and metal-finishing regulation, EPA included new source compliance costs for the iron and steel regulation, which was published in the May 27, 1982, Federal Register. Those new source costs made up more than one-half the total annual cost estimates cited. Had new source costs been excluded, as EPA did for electroplating and metal finishing and for its other effluent limitation guidelines regulations, then the iron and steel regulation would have been identified as a minor rule, and no cost-benefit analysis would have been required.

Officials in EPA's Office of Analysis and Evaluation, as well as the OMB officials responsible for reviewing EPA's compliance with the executive order, are aware that new source compliance costs were inconsistently handled in the effluent limitation guidelines regulations. OMB reviewing officials told us that OMB was interested in new source compliance costs as part of the overall cost compilations. EPA's recently adopted guidelines for performing cost-benefit analysis explicity recognize the importance of considering both existing and new source compliance costs. The guidelines identify these costs as one of the principal components of the cost analysis.

EPA's Director, Effluent Guidelines Division, Office of Water Regulations and Standards, told us that EPA generally makes a concerted effort to keep annual cost estimates of its proposed regulations under $100 million. Therefore, EPA would not be required to perform a cost-benefit analysis under the executive order. One EPA effort that led to a decision not to prepare a cost-benefit analysis is brought out in the effluent limitation guidelines regulation for the leather tanning and finishing industry. In 1979, EPA proposed to adopt regulations for that industry which would have had annual costs estimated at $96.1 million. Given the error margi that EPA acknowledged existed in its cost estimates, and given n source compliance costs that were omitted, it is probable that those annual costs would have exceeded the $100-million cutoff established by Executive Order 12291. Although the executive order had not been issued at the time of the proposal, the final rule for the leather tanning and finishing industry was not published until November 23, 1982--nearly 2 years after the executive order was issued, and thus it was subject to the order's requirements.

For the final rule, EPA chose a less costly, more relaxed regulation than it had proposed in 1979 mainly because the industry had criticized the feasibility and costs of its earlier proposal. The relaxed regulation had annual costs estimated at $51.7 million; therefore, a cost-benefit analysis was not required to satisfy the now-existing executive order.

No simple solution exists for selecting a regulatory proposal to cost out for determining major or minor rule designations. One way to check the inevitable "judgment call" in this initial but

critical decision would be a requirement that EPA prominently document in the public record[1] which regulatory proposals were considered and why one particular proposal was selected to ascertain whether it was a major or minor rule. With that information, OMB, under its review authority, can better determine whether EPA is not doing cost-benefit analysis which should be performed and which could result in regulations yielding higher net benefits.

EPA HAS NOT INCLUDED ALL OF THE MOST PROMISING ALTERNATIVES IN ITS COST-BENEFIT ANALYSES

Once EPA decided to do a cost-benefit analysis, EPA did not include all of the most promising alternatives. EPA's ability to determine the most efficient regulatory action to take will be hampered until EPA can consider all of the most promising alternatives in its cost-benefit analyses.

Executive Order 12291 states that each cost-benefit analysis shall, among other things, contain a description of alternative approaches that could substantially achieve the same regulatory goal at lower cost. OMB's interim regulatory impact analysis guidance, dated June 12, 1981, further states that, although only the most promising alternatives need to be evaluated at length, EPA should consider

--the consequences of having no regulation;

--the major alternatives (if any) that might lie beyond the scope of the specific legislative provision under which the proposed regulation is being promulgated;

--alternatives within the scope of the specific legislative provision, including alternative stringency levels, effective dates, and methods of ensuring compliance; and

--alternative, market-oriented ways of regulating (whether or not they are explicity authorized in EPA's legislative mandate), including information or labeling to enable the public to evaluate hazards themselves, performance rather than design standards, and economic incentives such as fees or permits.

We found that EPA did not include alternatives as envisioned in the executive order. For example, EPA considered only one

---

[1]The public record consists of voluminous documents. Therefore, it will be necessary to prominently document this critical information.

regulatory alternative[2] in each of the two effluent limitation guidelines analyses. EPA was under a court-ordered deadline to finalize the regulations and EPA officials said they had little time to consider other alternatives. In its analysis of particulate matter, EPA preselected a range of alternatives which it believed at the time would include maximum net benefits. In each of these examples, we believe that additional alternatives could have been considered with little added resources, as the models for estimating costs and benefits had already been developed. The following discussion provides additional details.

Cost-benefit analyses for effluent limitation guidelines considered only one alternative

In the cost-benefit analyses prepared for the iron and steel industries and the organic chemicals, plastics, and synthetic fibers industries, EPA performed an in-depth cost-benefit analysis only on one alternative to the existing regulation. However, in the iron and steel analysis, EPA compared the costs of industrial compliance for different treatment scenarios with the corresponding reductions in pollution. Having done this, EPA chose to estimate dollar costs and dollar benefits for only one of these scenarios.

The organic chemicals, plastics, and synthetic fibers cost-benefit analysis also estimated the dollar costs and dollar benefits of only one regulatory strategy. That analysis stated that other alternatives, such as the "bubble"[3] concept, could have been considered, but they were not made part of the analysis.

Cost-benefit analysis for ambient air quality standard considered a number of significant alternatives

The cost-benefit analysis EPA prepared for the ambient air quality standard on particulate matter examined 10 alternative approaches, which is more in keeping with the intent of Executive Order 12291. Those alternatives involved various combinations of particulate size measures, allowable ambient concentrations, implementation dates, and attainment levels. They included the current level of regulation plus a variety of alternative levels within a range recommended to EPA by CASAC following its approval of EPA's criteria document.

---

[2]At the time the effluent guidelines cost-benefit analyses were prepared, existing less stringent regulations were in place. The regulatory strategy shown in each analysis was an alternative to the existing regulation.

[3]The bubble is EPA's alternative emission reduction option which allows a source to reduce pollution control requirements at one point by increasing controls correspondingly at another point.

However, the analysis concluded that a wider range of alternatives was needed to identify the most efficient regulatory level because the most stringent alternative considered, in terms of pollution control, showed the greatest net benefits. This raises the question as to whether net benefits would have continued to increase had additional, more stringent alternatives been considered beyond that extreme end of the range. EPA needs to identify the regulatory alternative where net benefits peak in order to determine which regulatory action maximizes net benefits.

EPA'S COST-BENEFIT ANALYSES NEED TO PROMINENTLY PRESENT THE UNCERTAINTIES OF THE ESTIMATES

While "best" estimates of costs and benefits should always be an objective of a detailed cost-benefit analysis, it is important as well to provide some indication of the uncertainties of those estimates, and prominently present them in executive summary form. Knowing the underlying uncertainty is important because, among other things, it indicates the degree of preciseness that can be attached to the estimates, and it provides guidance to the decisionmaker for planning future research efforts to sharpen the precision of the estimates. If, for example, much of the uncertainty can be traced to a single statistic, such as exposure of humans to outdoor pollution, then future research can be targeted toward better measures of that statistic.

In our assessment of how well EPA handled uncertainty in its three indepth cost-benefit analyses, we focused primarily on two issues. First, we looked at the depth of uncertainty (i.e., the ranges and sources of uncertainty), and second, we looked at the emphasis placed on the presentation of uncertainty. For example, was a discussion of uncertainty prominently displayed in the executive summary of the analysis so that the decisionmaker could adequately consider it?

Two of the three cost-benefit analyses we assessed included single point estimates rather than a range of estimates of either costs or benefits in the executive summary section. EPA's decision not to include at least a range of plausible estimates in the summaries, however, was not strictly due to the unavailability of such estimates. In the organic chemicals, plastics, and synthetic fibers analysis, for example, a range of uncertainty for nonhealth benefits was presented at the end of the analysis but not in the executive summary. Also, for that analysis, other ranges of uncertainty were estimated which did not appear in the cost-benefit analysis document. Instead, they appeared in other EPA or contractor documents, making it difficult for decisionmakers to appreciate the range and significance of uncertainty unless they had the time to sift through numerous documents. The particulate matter analysis, as a positive example of how to present uncertainty, emphasized how net benefits changed (1) as various health/nonhealth benefit studies were included or omitted, (2) as a threshold level was incorporated or not, and (3) as full or partial compliance with the analyzed regulation was assumed.

Another potentially important aspect of uncertainty which should be addressed in a cost-benefit analysis is the issue of which discount rate to use. The discount rate adjusts future benefits and costs to account for society's usual preference for present versus future dollars. In the organic chemicals, plastics, and synthetic fibers analysis, a discount rate was not indicated. In the other two analyses, costs and benefits were discounted at 10 percent, in accordance with OMB's general guidance. However, OMB recommends that other rates also be used to test the sensitivity of the analysis' results, when desirable. This advice was followed to some extent in the iron and steel analysis, wherein both a 6-percent and a 10-percent discount rate were used. The particulate matter analysis shows results at a 10-percent discount rate, then the analysis acknowledges that 10 percent is probably too high and states that controversy continues among researchers about the appropriate discount rate to use. In light of the considerable uncertainty about the "right" discount rate to use, we believe that EPA's analyses would have been more complete had multiple discount rates been used.

EPA'S COST-BENEFIT ANALYSES HAVE PARTIALLY COVERED COST AND BENEFIT CATEGORIES

In assessing the quality and resulting usefulness of EPA's cost-benefit analyses, the coverage of major cost and benefit categories becomes important. Our focus here is on problems that can be easily corrected by EPA, as opposed to what are probably better labeled as data deficiencies.

In the organic chemicals, plastics, and synthetic fibers analysis, no estimate of new source compliance costs was made. However, such costs were estimated in both the iron and steel and particulate matter analyses. Also, in the particulate matter analysis, some administrative, monitoring, and enforcement costs were calculated, whereas neither of the two effluent limitation guidelines analyses identified such costs. In contrast, all three analyses included estimates of temporary unemployment of resources caused, for example, by a plant shutdown.

Although both the executive order and OMB guidance indicate that cost-benefit analyses should include qualitative discussions of nonquantified effects, only the particulate matter analysis does so. However, nonquantified benefits and costs are not presented in a way which would facilitate review and evaluation. For instance, none of the analyses provided both dollar net benefits and nonquantified benefits and costs of different options.

The problems reported in this chapter are summarized in the following table. "Yes" denotes that EPA considered the factor in its cost-benefit analyses; "No" denotes that EPA did not consider the factor.

Problems in EPA's Cost-Benefit Analyses

Factor	Cost-benefit analysis: Iron and steel	Organic chemicals, plastics, and synthetic fibers	Particulate matter
New source compliance costs	Yes	No	Yes
More than one alternative	No	No	Yes
All significant alternatives	No	No	No
Range of estimates in executive summary	No	No	Yes
Administrative monitoring and enforcement costs	No	No	Yes
Temporary unemployment of resources	Yes	Yes	Yes
Nonquantified effects	No	No	Yes
Multiple discount rates	Yes	No	No

Source: GAO.

OMB GENERALLY ACCEPTS EPA'S COST-BENEFIT ANALYSES

The OMB reviewing officials we contacted were aware of most of the cost-benefit analysis problems reported above and agreed that they needed to be corrected. However, those reviewing officials believe that EPA's cost-benefit analyses cannot be expected to be too exact because of the roughness of the data bases and estimating procedures. As a result, OMB has generally accepted EPA's cost-benefit analyses.

At the time of our review, OMB had not officially received the particulate matter cost-benefit analysis for review. Therefore, the selected OMB review comments that follow apply only to the two effluent limitation guidelines analyses.

Officials in OMB's Regulatory and Statistical Analysis Division, Office of Information and Regulatory Affairs, acknowledged that EPA does not always include new source compliance costs in its estimates. Also, the Deputy Administrator of the Division recognized that EPA had not considered all significant alternatives in its analyses, and he said that OMB would encourage an agency to give more attention to considering a variety of alternatives. However, he explained that if an agency was constrained by resource limitations, OMB would not recommend that additional

funds be provided. Rather, OMB would encourage the agency to reallocate its existing resources. The Deputy Administrator also responded to the use of only a 10-percent discount rate by stating that a 10-percent rate had been a long-standing practice.

An OMB economist who reviews EPA's cost-benefit analyses said that he is generally looking for a "credible" analysis, making sure that it "generally points in the right direction," that "best estimates look like best estimates," and that it addresses "broad methodological issues" to avoid big mistakes. OMB's Deputy Administrator, Regulatory and Statistical Analysis Branch, supported those statements further by saying that OMB's review of EPA's analyses is only done to determine whether the regulatory proposal looks reasonable in general. He added that OMB does not expect fine-tuned analytical results because of the lack of good scientific data.

In our judgment, a cost-benefit analysis that estimates net benefits for only one alternative to the existing regulation is not credible because it does not indicate whether that action yields the highest net benefits of other promising alternatives.

USING EPA GUIDELINES TO PERFORM COST-BENEFIT ANALYSIS WILL RESULT IN MORE CREDIBLE ESTIMATES

We believe that many of the problems found in the EPA cost-benefit analyses we reviewed were, in part, due to EPA's lack of detailed, finalized guidelines to perform such analysis. The guidance provided in the executive order and by OMB were too general, in our opinion. However, in December 1983, EPA finalized guidelines addressing the correctable problems we have identified. Following these guidelines should result in more credible analyses.

Executive order and OMB guidance do not specify all costs

Both Executive Order 12291 and OMB guidance are unclear as to what specific cost estimates should be included in an agency's cost-benefit analysis. The executive order, for example, indicates only that the potential costs of a rule should include any adverse effects that cannot be quantified in monetary terms and the identification of those likely to bear the costs. OMB, in its June 12, 1981, interim regulatory impact analysis guidance, states only that a schedule of costs should include the type of cost (capital, recurring, etc.), who would bear the cost, and when that cost would be incurred.

EPA's guidelines specify the costs to be included in cost-benefit analysis

In December 1983, after commenting on our draft report, EPA finalized and adopted guidelines that specifically describe how various elements of a cost-benefit analysis should be performed. In describing the cost element, the guidelines state that a cost-benefit analysis requires an estimate of the total costs that regulations impose on society. A principal cost cited is compliance costs, which explicitly include both existing and new sources. By following these guidelines in establishing future cost estimates, EPA will eliminate the inconsistencies we found in its earlier efforts.

The EPA guidelines also provide a centralized mechanism for controlling the direction and quality of future cost-benefit analyses. The guidelines state that program offices should contact EPA's Office of Policy, Planning and Evaluation and OMB in the early stages about the procedures, extent of detail, and degree of quantification appropriate for the analyses.

In the draft report we sent EPA and OMB for comment, we proposed that EPA revise the detailed guidelines it drafted in 1982 to recognize new source compliance costs. Further, we proposed that these guidelines be finalized. Because EPA revised, as we suggested, its draft guidelines to explicitly recognize new source compliance costs, and then finalized the guidelines in December 1983, the above proposals are no longer necessary.

CONCLUSIONS

The problems we found in EPA's cost-benefit analyses can, in our judgment, be readily corrected by following EPA's recently adopted guidelines. To improve the usefulness of EPA's cost-benefit analyses as decisionmaking and informational tools, however, EPA needs to include and prominently document, in executive summary form, all cost and benefit categories, areas of uncertainty, and all of the most promising alternatives in its future analyses.

RECOMMENDATIONS TO THE ADMINISTRATOR, EPA

We recommend that the Administrator, Environmental Protection Agency,

--require that all elements of costs be considered and consistently applied when determining whether regulations are major or minor;

--prominently document, for inclusion in the public record and transmittal to OMB, a thorough explanation of the regulatory alternatives considered prior to EPA's decision to perform or not perform a cost-benefit analysis; this documentation should include a clear explanation as to why a particular alternative was considered and others were not so that decisionmakers and reviewing officials will have a complete understanding of the process; and

--require that future cost-benefit analyses prominently include, in the executive summary, (1) a clear recognition of all costs and benefits, even those that cannot be quantified; (2) the range of uncertainties associated with those cost and benefit figures, as well as the sources of uncertainty; and (3) a comparison of all feasible alternatives.

AGENCY COMMENTS AND OUR EVALUATION

EPA stated in its comments to our draft report that it expects to continue its work with cost-benefit analysis and increase its usefulness in decisionmaking. EPA, however, questioned some of our findings. For example, EPA stated that there is substantial consistency in the methodology used for estimating costs. In addition, EPA stated that it has not considered all potential policy options in its analyses because of resource and time constraints, and data and scientific uncertainties.

Although we agree that EPA's methodology for estimating costs has assured some consistency, we found some potentially serious problems, such as not always including new source compliance costs. Further, we recognize that EPA has performed its analyses under resource and time constraints. However, in the cost-benefit analyses we reviewed, EPA had already developed the models used to estimate costs and benefits. Thus, an analysis of other alternatives involving only a different level of stringency would have been straightforward and would have involved little additional expense. In response to EPA's statement about data and scientific uncertainties, such problems should apply with equal force to all significant alternatives. Thus, it is not evident that such uncertainties affect the ranking of those alternatives.

In OMB's comments to our draft report, OMB stated that it was working closely with EPA to improve the analyses associated with rules currently in development, and our report will be helpful in guiding further improvements. In our draft report, we had proposed that OMB require that EPA implement the recommendations in this chapter. In light of OMB's statement that it is working closely with EPA to improve the analyses, we believe our draft report proposal to OMB is not necessary.

OMB also stated that EPA's work would benefit from a fuller exploration of alternatives. Furthermore, OMB agreed that new source costs should be included in the estimated total costs of a regulatory action so that better determinations can be made of the rule's status and resulting need for analysis.

OMB believed that the quality and scope of EPA's analyses are often legitimately affected by pragmatic concerns, such as limited resources, court-ordered deadlines, and statutory constraints. In addition, OMB believed that a decision on whether EPA should examine additional alternatives or improve the estimates of costs and benefits ought to depend on the expected gains and costs of conducting further study. Although we agree that pragmatic concerns such as court-ordered deadlines could affect the quality and scope of EPA's analyses, Executive Order 12291 allows for an agency to examine additional alternatives after a rule has been promulgated. Furthermore, because models had already been developed to estimate costs and benefits, EPA could have analyzed additional alternatives in a short period of time with little added expense.

OMB also stated that we over-emphasized the significance of the $100-million cutoff used as a criterion under Executive Order 12291 for designating a regulation as major, and thus requiring a cost-benefit analysis. In OMB's view, the $100-million criterion is flexible, and OMB stated that EPA has frequently done cost-benefit analyses where expected impacts were well under $100 million. We believe that such a flexible criterion is not consistent with Executive Order 12291's intended purpose to have cost-benefit analyses prepared only for major regulations.

OMB stated that, in the instances we cited of inconsistent treatment of new source costs, the gains from further analysis were limited. We found no evidence to support OMB's comments. Furthermore, considering how large new source compliance costs were in the iron and steel industry case, gains from analysis in the other cases might have been substantial.

Finally, OMB stated that our report calls for perfect compliance with the principles of Executive Order 12291. Such was not our intent, for perfection is not a realistic objective. We pointed out problems in the cost-benefit analyses that can be readily corrected which would help improve the usefulness of EPA's analyses.

REFERENCE MATERIALS

CONSIDERED IN PREPARING THIS REPORT

ECONOMICS LITERATURE

Adams, R.M., T.D. Crocker, and N. Thanavibulchai. "An Economic Assessment of Air Pollution Damages to Selected Annual Crops in Southern California," Journal of Environmental Economics and Management, March 1982, 9(1), pp. 42-58.

Bailey, M. "Risks, Costs, and Benefits of Fluorocarbon Regulation," The American Economic Review, May 1982, 72(2), pp. 247-50.

Bayless, [illegible]. "Measuring the Benefits of Air Quality Improvements A Hedonic Salary Approach," Journal of Environmental Economics Management, March 1982, 9(1), pp. 81-99.

Bird, P.J.W.N. "Neoclassical and Post Keynesian Environmental Economics," Journal of Post Keynesian Economics, Summer 1982, 4(4), pp. 586-93.

Bishop, R. and T. Heberlein. "Measuring Values of Extramarket Goods: Are Indirect Measures Biased?" American Journal of Agricultural Economics, December 1979, 61(5), pp. 926-30.

Brookshire, D.S., M.A. Thayer, W.D. Schulze, and R.C. d'Arge. "Valuing Public Goods: A Comparison of Survey and Hedonic Approaches," The American Economic Review, March 1982, 72(1), pp. 165-77.

Christainsen, G.B. and R.H. Haveman. "The Contribution of Environmental Regulations to the Slowdown in Productivity Growth," Journal of Environmental Economics and Management, December 1981, 8(4), pp. 381-90.

Crandall, R. and L.B. Lave, eds., "The Scientific Basis of Health and Safety Regulation" (Washington: Brookings Institution, 1981).

Dudley, N. and G. Waugh. "Exploitation of a Single-Cohort Fishery Under Risk: A Simulation--Optimization Approach," Journal of Environmental Economics and Management, September 1980, 7(3), pp. 234-55.

Elliott, D. and C. Yarrow. "Cost-Benefit Analysis and Environmental Policy: A Comment," Kyklos, 197[illegible](2), pp. 300-9.

Fisher, A.C. and F.M. Peterson. "The Environment in Economics: A Survey," Journal of Economic Literature, March 1976, 14(1), pp. 1-33.

Freeman, A.M., III. "Air and Water Pollution Control: A Benefit-Cost Assessment" (New York: Wiley, 1982).

Gerking, S. and W. Schulze. "What Do We Know About Benefits of Reduced Mortality From Air Pollution Control?" The American Economic Review, May 1981, 71(2), pp. 228-34.

Ippolito, P.M. "Information and the Life Cycle Consumption of Hazardous Goods," Economic Inquiry, October 1981, 19(4), pp. 529-58.

Lave, L.B. "The Strategy of Social Regulation: Decision Frameworks for Policy" (Washington: Brookings Institution, 1981).

Lave, L.B., ed., "Quantitative Risk Assessment in Regulation" (Washington: Brookings Institution, 1982).

Loehman, E. and V.H. De. "Application of Stochastic Choice Modeling to Policy Analysis of Public Goods: A Case Study of Air Quality Improvements," The Review of Economics and Statistics, August 1982, 64(3), pp. 474-80.

Mendelsohn, R. and G. Orcutt. "An Empirical Analysis of Air Pollution Dose-Response Curves," Journal of Environmental Economics and Management, June 1979, 6(2), pp. 85-107.

Olson, M. and M. Bailey. "Positive Time Preference," Journal of Political Economy, February 1981, 89(1), pp. 1-25.

Pearce, D. "The Limits of Cost-Benefit Analysis As a Guide to Environmental Policy," Kyklos, 1976, 29(1), pp. 97-112.

Porter, R. "The New Approach to Wilderness Preservation Through Benefit-Cost Analysis," Journal of Environmental Economics and Management, March 1982, 9(1), pp. 59-80.

Rosen, S. "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition," Journal of Political Economy, January/February 1974, 82(1), pp. 34-55.

Rosen, S. "Valuing Health Risk," The American Economic Review, May 1981, 71(2), pp. 241-45.

Russell, C.S. and W.J. Vaughan. "The National Recreational Fishing Benefits of Water Pollution Control," Journal of Environmental Economics and Management, December 1982, 9(4), pp. 328-54.

Schulze, W., R. d'Arge, and D. Brookshire. "Valuing Environmental Commodities: Some Recent Experiments," Land Economics, May 1981, 57(2), pp. 151-72.

Thompson, W.A., C.S. Holling, D. Kira, C.C. Huang, and I. Vertinsky. "Evaluation of Alternative Forest System Management Policies--The Case of the Spruce Budworm in New Brunswick," Journal of Environmental Economics and Management, March 1979, 6(1), pp. 51-68.

GAO REPORTS

A Market Approach to Air Pollution Control Could Reduce Compliance Costs Without Jeopardizing Clean Air Goals, GAO/PAD-82-15, Mar. 23, 1982.

A Technical Guide to Assessing and Preparing Economic Impact Analysis of Regulatory Legislation, GAO/PAD-81-3, 1980.

Air Quality: Do We Really Know What It Is? GAO/CED-79-84, May 31, 1979.

Cleaning Up the Environment: Progress Achieved but Major Unresolved Issues Remain, GAO/CED-82-72, July 21, 1982.

The Debate Over Acid Precipitation: Opposing Views, Status of Research, GAO/EMD-81-131, Sept. 11, 1981.

Government Regulatory Activity: Justifications, Processes, Impacts, and Alternatives, GAO/PAD-77-34, June 3, 977.

Improved Quality, Adequate Resources, and Consistent Oversight Needed if Regulatory Analysis Is to Help Control Costs of Regulations, GAO/PAD-83-6, Nov. 2, 1982.

Improving the Scientific and Technical Information Available to the Environmental Protection Agency in It's Decisionmaking Process, GAO/CED-79-115, Sept. 21, 1979.

Problems in Assessing the Cancer Risks of Low-Level Ionizing Radiation Exposure, GAO/EMD-81-1, Jan. 2, 1981.

16 Air and Water Pollution Issues Facing the Nation, GAO/CED-78-148B, Oct. 11, 1978.

The Review Process for Priority Energy Projects Should Be Expedited, GAO/EMD-80-6, Nov. 15, 1979.

CONGRESSIONAL REPORTS

Hearing Before the Subcommittee on Regulatory Reform of the Committee on the Judiciary, U.S. Senate, 97th Congress, 1st session, on S. 1080, Regulatory Reform Act, May 14, 1981. Washington: U.S. Government Printing Office.

The Regulatory Reform Act--Report of the Committee on the Judiciary, United States Senate, to Accompany S. 1080, November 30, 1981. Washington: U.S. Government Printing Office.

Cost-Benefit Analysis: Wonder Tool or Mirage? report together with Minority Views by the Subcommittee on Oversight and Investigations of the Committee on Interstate and Foreign Commerce, U.S. House of Representatives, December 1980. Washington: U.S. Government Printing Office.

OTHER REPORTS

A Workshop: Cost/Benefit Analysis of Environmental Regulations, unedited transcript, sponsored by United States National Committee, World Energy Conference, August 25-27, 1982, Arlington, Virginia.

Cost of Government Regulation Study for the Business Roundtable. New York: Arthur Andersen & Co., March 1979.

Economic Report of the President, Council of Economic Advisors, transmitted to the Congress, February 1982. Washington: U.S. Government Printing Office.

Environmental Quality, Council of Environmental Quality, December 1980. Washington: U.S. Government Printing Office.

OTHER ARTICLES

Kelman, S. "Cost-Benefit Analysis: An Ethical Critique," Regulation, January/February 1981, p. 36.

Lave, L. "Environmental Solution Aren't Simple," The Washington Post, April 6, 1983.

"Cost-Benefit Analysis," Environmental Science and Technology, December 1980, Vol. 14, No. 12, pp. 1415-17.

OTHER BOOKS

C. Russell, ed., Ecological Modeling in a Resource Management Framework. Washington: Resources for the Future, Inc., 1975.

R. Friedman, Sensitive Populations and Environmental Standards. Washington: The Conservation Foundation, 1981.

APPENDIX II

CONTACTS MADE DURING THIS REVIEW

ENVIRONMENTAL PROTECTION AGENCY

Office of the Administrator,
  Science Advisory Board

Associate Administrator for Policy and
  Resource Management:
    Office of Policy Analysis,
      Economic Analysis Division,
        Benefits Staff
    Office of Management Systems and Evaluation,
      GAO Liaison

Assistant Administrator for Water:
    Office of Water Regulations and Standards,
      Effluent Guidelines Division
    Monitoring and Data Support Division,
      Water Quality Analysis Branch
    Office of Analysis and Evaluation,
      Economic Analysis Staff

Assistant Administrator for Solid Waste and
  Emergency Response:
    Office of Management Information and Analysis,
      Hazardous and Industrial Waste Division,
        Economic & Policy Analysis Branch

Assistant Administrator for Air, Noise and
  Radiation:
    Office of Air Quality Planning and Standards,
      Strategies and Air Standards Division,
        Ambient Standards Branch
        Economic Analysis Branch

Assistant Administrator for Research and
  Development:
    Office of Exploratory Research

OTHER FEDERAL AGENCIES

Office of Technology Assessment

Office of Science and Technology Policy

APPENDIX II

Occupational Safety and Health Administration

Food and Drug Administration

Consumer Product Safety Commission

Office of Management and Budget

ENVIRONMENTAL INTEREST GROUPS AND INDUSTRIAL TRADE ASSOCIATION

U.S. Chamber of Commerce

Business Roundtable

Conservation Foundation

American Iron and Steel Institute

Natural Resources Defense Council

APPENDIX III

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

OCT 20 '983

Mr. J. Dexter Peach
Director
Resources, Community and Economic
Development Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Peach:

On September 19, 1983, the General Accounting Office (GAO) issued a draft report entitled "Cost-Benefit Analysis Has Limitations, But Can Still Prove Useful In Assessing Environmental Regulations" (RCED-83-206) for the Environmental Protection Agency's (EPA's) review and comment. As required by section 103(f)(i) P.L. 96-226, we are submitting the following comments on the contents and recommendations of the report.

In general EPA agrees with GAO in its finding that cost-benefit analysis is a useful tool in considering options for setting standards despite some inherent limitations. The report provides very accurate assessments of the limitations and usefulness of benefit-cost analysis at EPA and the recommendations to the Administrator correspond directly to the overall philosophy of the Agency. The draft report, however, is emphasizing cost-benefit analysis to the exclusion of other considerations. For example, EPA's regulatory procedures require analysis of alternatives and associated environmental impacts. Many of EPA's major regulatory activities fall under the Agency's Voluntary Environmental Impact Statement (EIS) Program. These analyses uncover important qualitative considerations which should be included in decisionmaking. While there may be some deficiencies in EPA's analyses, we believe that the information acquired from all of these reviews is necessary to make adequate regulatory judgments.

[See GAO comment 1, p. 51.]

GAO states that EPA is inconsistent in estimating costs and tries to avoid total annual compliance costs that exceed $1 million. While the procedure for estimating costs is not identical in every case, there is substantial consistency in the methodology used for estimating costs. Also, there is little opportunity for the Agency to purposely underestimate costs, because all of our estimates are subject to public scrutiny during a formal public comment period.

[See GAO comment 2, p. 51.]

[See GAO comment 3, p. 51.]

GAO states that EPA's cost-benefit analyses do not consider a broad enough range of technology alternatives. While in some instances full cost-benefit analyses have not been performed for the complete array of potential policy options, these limitations were due to resource and time constraints. Further, given the data and scientific uncertainties, benefit-cost analyses can not yet always provide useful results for finely-tuned variants of certain policies. Therefore, the Agency has focused its resources by conducting cost-benefit analyses for a selected subset of the most relevant options, and has relied on cost-effectiveness and other analytical techniques to evaluate the full spectrum of policy alternatives. Also, the cost-benefit analyses that have been conducted, identify problems with the data and deal with the uncertainty of the estimates by presenting ranges for the benefit estimates. [See GAO comment 4, p. 52.]

EPA expects to continue its work with cost-benefit analyses and, by improving the underlying data and the analytical techniques used, increase the usefulness of cost-benefit analysis in decision making. However, it will be useful to address the issue of legislative change in a more cohesive manner than that suggested by the GAO. Rather than sending individual cost-benefit analyses to Congress on a piecemeal basis as they are completed, the Agency suggests that a broader perspective may be gained by providing Congress with analytical information in more complete packages. This would imply sending Congress cost-benefit, cost-effectiveness and other analyses pertaining to related policies so that specific results and policy decisions may be viewed in the broad context of all available information rather than in isolation.

Enclosed are the Agency's specific comments referenced to pages of the report for GAO's review. [1]

I hope this response to this draft is useful when GAO prepares the final report. We appreciate the opportunity to provide comments on this draft report.

Sincerely yours,

John M. Campbell, Jr.
Acting Assistant Administrator
for Policy, Planning and Evaluation

Enclosure

[1]The final report title and number have been changed.

SPECIFIC COMMENTS ON GAO DRAFT REPORT ENTITLED COST BENEFIT ANALYSIS HAS LIMITATIONS, BUT CAN STILL PROVE USEFUL IN ASSESSING ENVIRONMENTAL REGULATIONS

Page	Paragraph	Lines	Comment
cover summary	2		We agree that there often is a problem in complying with E.O. 12291 when the law prohibits using benefit-cost analysis, but that even in these cases the analysis can provide useful information. Beyond the recommendation that these analyses should be presented to Congress for assistance in their oversight responsibilities, benefit-cost analysis in these instances may indicate how far off the selected regulatory alternative may be from the "efficient" alternative. [See GAO comment 6, p. 52.]
			We suggest that a key sentence now found on page i, beginning the third paragraph, "Major gaps in underlying scientific data make it difficult to precisely estimate single dollar values attributed to environmental costs and benefits," be included in the cover summary.
Glossary (1)	4	1-5	The definition avoids mention of the key features of cost-effectiveness analysis (CEA). Specifically, CEA allows one to identify the least-cost means of accomplishing a specific objective. CEA also allows one to identify the set of dominant (least cost relative to other) alternatives. [See GAO comment 7, p. 52.]

Page	Paragraph	Lines	Comment
i	2	9-14	The statements regarding the movement of benefits and costs with stringency level are generally true only when one has used cost-effectiveness analysis to identify and compare dominant regulatory alternatives. The statements are generally false when one compares dominant with inferior regulatory alternatives.
[See GAO comment 8, p. 52.]			
ii	1	1-5	Benefit-cost analysis is founded on the premise of consumer sovereignty. To the extent the various ranges and rankings reflect the uncertainties in measuring revealed preferences, they can be valuable. To the extent the ranges and rankings result from artificial constraints imposed by policy, they can be misleading.
[See GAO comment 8, p. 52.]			
iii	1		As written, it is not clear whether the EPA standard or the Agency resources expended to conduct the analysis will cost $2 million. It should be reworded to reflect the latter. This statement should be expanded and put into a separate paragraph.
[See GAO comment 9, p. 52.]			
iii	1	3-7	Under the Clean Air Act, the Administrator of EPA may not consider economic and technological feasibility in setting National Ambient Air Quality Standards (NAAQS). Although this precludes consideration of benefit-cost analyses in setting NAAQS, it does not necessarily preclude consideration of benefit analyses for that purpose. The Agency is considering the generic issue of the role, if any, of benefit analysis, or parts thereof, in setting ambient standards.
[See GAO comment 10, p. 52.]			

Page	Paragraph	Lines	Comment
iii	3	12-21	Contrary to the GAO report, all impact analyses related to new source performance standards do consider the cost of controlling such sources of pollution.
[See GAO comment 11, p. 52.]			
iv	2		EPA disagrees with the observation that EPA's analyses generally provide single estimates rather than ranges. EPA analyses almost always present ranges along with a discussion of the uncertainty factors which produce the range.
[See GAO comment 12, p. 53.]			
vi	1	11-17	The most recent guidelines draft does not preclude explicit valuation of reduced mortality risk or the value of a statistical life saved. Also, there is an important distinction between the valuation of a specific life and the valuation of a statistical life which should be noted. These are confused in the present GAO report.
[See GAO comment 13, p. 53.]			
3	1	1-10	Previous Executive Orders were also concerned, but from the narrower perspectives of cost and economic impact. This should be noted.
[See GAO comment 14, p. 53.]			
5		10	The words "validity" and "validate" should be replaced with the words "verification" and "verify".
[See GAO comment 15, p. 53.]			
7	2	8-10	The last sentence could be better stated as--similar problems may arise in estimating costs.
[See GAO comment 15, p. 53.]			

Page	Paragraph	Lines	Comment
7 [See GAO comment 16, p. 53.]	3	5-9	Better access to existing socio-demographic, health, and economic data sets is also needed. In addition, better physical and natural science data for benefit-cost analysis should be defined by example. Specifically, better means 1) improved experimental design to measure concentration-response relationships within the context of averting and mitigating action, 2) physical effects indexes amenable to valuation, 3) mechanisms for extrapolating results across time and space, etc.
7,8,9 [See GAO comment 17, p. 53.]			GAO incorrectly assumes the damage function approach is the only way to estimate benefits. The discussion on pp. 7, 8 and 9 should be qualified to note that contingent valuation hedonic wage, property value, and other techniques may not require as much information on physical or other measures.
8 [See GAO comment 18, p. 53.]	4	1-9	True, some of those studies did not control the other variables. But, the basis for the benefit estimate did reflect the results of the other studies having such controls. Furthermore, using ordinary least squares estimation techniques, estimates will not be biased upward without specification of those factors if the pollution variable and other factors are uncorrelated.

Page	Paragraph	Lines	Comment
9		7	The statement that "particulate matter to visibility changes is not scientifical feasible at this time" is incorrect. These calculations are scientifically feasible but were not undertaken for the PM analysis because the controls under consideration are not expected to substantially improve visibility.
[See GAO comment 19, p. 54.]			
10	2	9-12	This statement is true only if you know the number of deaths with certainty.
[See GAO comment 20, p. 54.]			
11	3	1-4	The report suggests that cost-benefit analyses are potentially manageable through use of a range of values. This is assuming that sufficient information exists to develop a range. Given the data gaps that are inherent in cost-benefit analyses, it may not always be possible even to develop a plausible range of values narrow enough to be useful for policy purposes.
[See GAO comment 21, p. 54.]			
13	1	7-11	The implication of this statement is that scientific research on physical measures of health and environmental improvements are only addressed under the 4 million dollars allocated to benefits research. GAO should note that research on health and environmental effects are extensively addressed in other portions of the ORD budget.
[See GAO comment 22, p. 54.]			
14	3	1-12	See the comment on page 7, paragraph 3, lines 5-9. Unless the research on physical measures of health and environmental improvement is structured to serve as an input to benefit-cost analysis, it will do little to improve the credibility of benefit-cost analysis.
[See GAO comment 23, p. 54.]			

Page	Paragraph	Lines	Comment
16	3	1-6	The report statement that the Clean Water Act does not prohibit cost-benefit results from being used in regulatory decisionmaking is not accurate. There is serious question whether the Agency may rely on such analysis in developing the technology based effluent limitations guidelines and standards under the Clean Water Act.
[See GAO comment 24, p. 54.]			
18	1	1-9	EPA has made no decision as to whether the environmental benefits section of the particulate matter benefit-cost analysis can be used in setting NAAQS.
[See GAO comment 25, p. 54.]			
21	3	1-5	We generally support the suggestion in the GAO report that cost-benefit analyses, which are prepared but not used because of legal prohibitions, should be transmitted to Congress; however, care would have to be taken in this type of transmittal. Without any kind of accompanying explanation the findings could be misleading, given the uncertainties and data gaps prevalent in this type of analysis. Also, cost-benefit analyses should not be transmitted without including other qualitative types of analyses (environmental impact analysis) to give a broader view of the consequences of the regulatory action.
[See GAO comment 26, p. 55.]			
[See GAO comment 27, p. 55.]			

Page	Paragraph	Lines	Comment
23	1	13-15	The particulate matter analysis was reviewed at various stages by Thomas Crocker, Lester Lave, Paul Portney, Eugene Seskin, V. Kerry Smith, William Watson, and CONSAD Research Corporation (under contact to AISI). Howev , as mentioned, more formal and extensive review in a public forum would improve the credibility of the analysis.
[See GAO comment 28, p. 55.]			
23	3		Contrary to suggestions by GAO of inconsistancy in designating major rules, the Agency has been as consistent as possible in this regard.
[See GAO comment 29, p. 55.]			(a) Federal Register Agenda of Regulations forcasts early estimates of major or minor rules based primarily on engineering cost estimates of many control options, size of industry, etc. Except when public comment on new data greatly changed things, the forcecast held true.
23	3		(b) Compliance costs for new sources of pollution are examined in setting new source performance standards. As such, it is inaccurate to suggest, as the GAO report does, that more major rule designations would be made under Executive Order 12291. As stated above, these costs are estimated using engineering cost analyses because few facilities are available.
[See GAO comment 30, p. 55.]			

Page	Paragraph	Lines	Comment
23	5		Metal Finishing is a large, diverse industry for which projections of new sources could be misleading. As in Iron and Steel, if we can reasonably do the cost estimates, we assess the effluent reduction benefits.
[See GAO comment 31, p. 55.]			
24	3	1-4	The statement, "EPA generally makes a concerted effort to keep annual cost estimates of its proposed regulations under $100 million...," is incorrect.
[See GAO comment 32, p. 55.]			
[See GAO comment 33, p. 55.]			The Effluent Guidelines Division of the Office of Water assesses the full range of technology options and the full cost of each option, which may be more or less than $100 million depending on the per plant cost, number of plants, etc. In estimating the cost of each of these options, EPA tries, wherever possible, to fully account for technology already in place. Many segments of industry have already installed pollution control equipment. If we did not take this into account, the Agency's costs would be overstated and some regultions would be inappropriately identified as major.

Page	Paragraph	Lines	Comment
24	4		In response to public comments on the 1979 proposed regulation, EPA reevaluated existing data, collected additional data and determined that the technology underlying the proposed standards was inappropriate. EPA promulgated less stringent regulations than had been proposed because these public comments and new analyses established that the Agency's proposed limitations and standards were not appropriate. There was no conscious view to avoid promulgating a "major" rule.
[See GAO comment 34, p. 56.]			
30	1	1-4	See comment on page ii, paragraph 1, lines 1-5. The words "limited" use should be clarified. CASAC review does imply a great deal of credibility in the present approach to ambient standards development. However, to date CASAC has not reviewed Criteria Document study selection, classification, and interpretation procedures.
[See GAO comment 35, p. 56.]			
32		Recommendations	GAO has recommended an expansion of the effort devoted to benefit-cost analysis by examining greater number of alternatives and more detailed cost information. However, GAO should recognize that time and resource constraints often force the Agency to focus its resources by conducting full cost-benefit analyses for only the most relevant opitions (and that EPA often relies on cost-effectiveness and other analytical techniques to narrow the broad range of feasible policy alternatives to narrow the range of options).
[See GAO comment 36, p. 56.]			

GAO'S EVALUATION

1. [GAO COMMENT: The overall objective of our review was to evaluate how useful cost-benefit analysis has been or can be in assessing environmental regulations. We agree with EPA that other considerations are certainly useful in decisionmaking.]

2. [GAO COMMENT: EPA's Director, Effluent Guidelines Division, Office of Water Regulations and Standards, told us that EPA generally makes a concerted effort to keep annual cost estimates of its proposed rules under $100 million. Although EPA's methodology for estimating costs has assured some consistency, our review revealed some potentially serious inconsistencies, such as not always including new source compliance costs in proposed effluent limitation guidelines regulations.]

3. [GAO COMMENT: We acknowledged in our report EPA's reasons for not considering a broader range of alternatives in its cost-benefit analyses. Although the costs of doing a more in-depth analysis may at times be significant, there can also be substantial benefits derived from that effort, whether it be saving industry from needless expenses or preventing disease and death. Further, in two cost-benefit analyses we reviewed, only one alternative was considered. In our opinion, a cost-benefit analysis that considers only one alternative is not credible because it does not indicate whether that action yields the highest net benefits.

In analyzing alternatives, it is unclear to us how the recognized data and scientific uncertainties make it any more difficult to evaluate one subset of alternatives compared to another subset. For example, if EPA estimates dollar costs and benefits for one regulatory alternative, after having already grappled with the uncertainties, it should be fairly straightforward to estimate costs and benefits for variants to that alternative (less stringent and more stringent ones) without having to undertake a completely new analysis of uncertainty.]

4. [GAO COMMENT: We agree. However, EPA has not always presented those data uncertainties and ranges of benefit estimates in a prominent manner in the executive summaries. Rather, they have been presented in a way that requires decisionmakers to perform extensive searches of voluminous documentation.]

5. [GAO COMMENT: Deleted]

6. [GAO COMMENT: We agree with EPA's comments and believe that the final cover summary accounts for EPA's concerns.]

7. [GAO COMMENT: We agree th EPA's commen and have included them in the fi glossary.]

8. [GAO COMMENT: We basic y agree with these EPA comments. However, they pertain to technical issues that are not germaine to this report.]

9. [GAO COMMENT: The final report reflects that the cost-benefit analysis will cost $2 million.]

10. [GAO COMMENT: EPA's comment is fully discussed in the report text.]

11. [GAO COMMENT: EPA may consider new source compliance costs in it's impact analyses. We found, however, that EPA in most cases did not include those costs when determining whether its proposed effluent limitation guidelines regulations were major or minor.]

12. [GAO COMMENT: We revised the final digest to show that EPA generally "highlighted" single dollar estimates rather than ranges of estimates in its cost-benefit analyses. We believe it is important that EPA prominently displays ranges of estimates in its executive summaries, as a decisionmaker may not have time to sift through numerous documents to obtain such information.]

13. [GAO COMMENT: We have deleted reference to explicit values in our report. However, in our opinion, the distinction between the valuation of a specific life and the valuation of a statistical life does not appear critical in deciding whether to place explicit dollar values on health risks.]

14. [GAO COMMENT: The scope of our review addressed cost-benefit analysis, and EPA's efforts to implement Executive Order 12291. We do not believe that there is a need to note previous executive orders that did not specifically require cost-benefit analysis.]

15. [GAO COMMENT: The final report reflects EPA's suggested wording.]

16. [GAO COMMENT: We agree with EPA's comments. However, they are technical points that are not necessary to support our statement that better physical and natural science data are needed. Thus, we have made no revision.]

17. [GAO COMMENT: Contingent valuation and other associated techniques are used to measure how much people are willing to pay for a certain amount of environmental improvement. Importantly, people perceive the improvement (end) and place a value on it without knowing about the necessary regulation (means) to bring about the improvement. EPA must determine the means that will accomplish the end. To do so requires the type of scientific and physical information discussed in this report.]

18. [GAO COMMENT: This point is addressed in chapter 4 of this report, wherein we note that the benefit estimates reflect the results of various studies. In a number of those studies, the pollution variable and other factors were correlated.]

19. [GAO COMMENT: A December 1981 draft PM analysis stated that it was not currently possible to estimate directly the visibility benefit associated with the PM standards analyzed. That statement was not included in the final PM analysis. Therefore, we have also deleted the sentence from our final report, as it is not needed to support our point that there are problems in estimating physical measures of benefits.]

20. [GAO COMMENT: EPA is commenting on a hypothetical example we included in our report to explain explicit and implicit dollar values associated with premature deaths. If you do not know the number of deaths with certainty, you simply compute expected minimum and maximum dollar values.]

[GAO COMMENT: We recognize that there may be instances where it may not be possible to develop a plausible range of values. Therefore, we have revised the report to reflect that cost-benefit analysis can be used to identify whether there is such a range.]

22. [GAO COMMENT: Our report has been revised to reflect EPA's future research efforts that are tied to the data needs of cost-benefit analysis.]

23. [GAO COMMENT: We agree with EPA's comment and believe that EPA should keep this in mind when developing research to close the most critical data gaps.]

24. [GAO COMMENT: We agree in part with EPA's comment and have revised the report accordingly. Section 304(b)(1) of the Clean Water Act directs EPA to perform limited cost-benefit analysis when setting best practicable control technology standards. However, section 304(b)(2) only lists "the cost of achieving such effluent reduction" as a factor in assessing best available technology standards, and does not specifically answer the question whether such costs are to be considered in relation to the benefits derived from such standards.]

25. [GAO COMMENT: EPA's comment is consistent with our report.]

26. [GAO COMMENT: We believe such explanations should be a vital part of the executive summaries of all cost-benefit analyses, as we recommended to EPA in chapter 4 of this report.]

27. [GAO COMMENT: We believe that the important findings of these other analyses should be included in the executive summaries of the cost-benefit analyses.]

28. [GAO COMMENT: We have deleted the segment of the report dealing with scientific review.]

29. [GAO COMMENT: The inconsistent treatment of new source compliance costs in EPA's effluent limitation guidelines regulations may have resulted in incorrect designation of some rules as major or minor. It is unclear from EPA's comments how that agency determines the accuracy of its "forecasts" of major/minor rules.]

30. [GAO COMMENT: We disagree with this EPA comment, as we found that new source compliance costs were not considered in determining major/minor rules for most of EPA's effluent limitation guidelines regulations.]

31. [GAO COMMENT: Based on EPA's comment, it is unclear why projections of new source compliance costs would be any more misleading than omitting such cost estimates altogether.]

32. [GAO COMMENT: This statement was made by EPA's Director, Effluent Guidelines Division, Office of Water Regulations and Standards, and is consistent with our review findings.]

33. [GAO COMMENT: We do not question the validity of excluding the cost of technology already in place. Our report addresses the inconsistent use of compliance costs pertaining to existing and new sources of pollution.]

34. [GAO COMMENT: The final rule for the leather tanning and finishing industry was promulgated nearly 2 years after Executive Order 12291 was issued. We question why a cost-benefit analysis of the proposed regulation, which stood a good chance of exceeding $100 million, was not done in accordance with the Executive Order. In that way, a better measure of the benefits not gained because a less stringent regulation was chosen would have been available.]

35. [GAO COMMENT: We have eliminated this segment from the final report.]

36. [GAO COMMENT: While we agree that EPA should use its scarce resources judiciously in evaluating proposed regulations, we question the value of spending sizeable sums to estimate the costs and benefits of only one regulatory alternative. Knowing the net benefits of just one alternative basically gives a decisionmaker a false sense of confidence to believe that is the best way to regulate.]

37. [GAO note: Page references in this appendix which referred to our draft report were changed to reflect their location in this final report.]

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D C 20503

DEC 1 6 1983

Mr. William J. Anderson
Director, General Government Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Anderson:

Thank you for giving us an opportunity to review GAO's draft report to the Congress, "Cost-Benefit Analysis has Limitations, But Can Still Prove Useful in Assessing Environmental Regulation." This report provides useful insight into how we can improve cost-benefit assessments and into how they can be used to improve regulatory decisions.

We agree that many of the Environmental Protection Agency's cost-benefit analyses could be improved. As your report points out, some deficiencies are uncontrollable by EPA and reflect the state-of-the-art of such analysis and the unavailability of certain data. We agree that, in other cases, EPA's work could benefit from more use of sensitivity analysis or a fuller exploration of alternatives. Also, we too support EPA's efforts to issue final internal guidance on cost-benefit analysis. However, we take exception to several of your specific arguments and will discuss these below.

Your report criticizes EPA and OMB because some agency analyses are not as complete as one would ideally wish them to be. We also would like to see perfect cost-benefit analyses come from EPA. But we believe that the quality and scope of the analyses are often legitimately affected by pragmatic concerns, such as limited resources, court-imposed deadlines, and statutory constraints. EPA and OMB are working closely to improve the analyses associated with rules currently in development. However, for most of the rules EPA has published during the past three years, analysis has been underway for as much as five to seven years. In such cases, a decision on whether the agency should examine additional alternatives or improve the estimates of cost and benefits ought to depend on the expected gains and costs of conducting further study. The additional information gained may not justify the additional cost and delay. Also, legislative or court deadlines often allow little leeway for the agency to expand the scope of its analysis. [See GAO comment 1, p. 60]

We think GAO over-emphasizes the significance of the $100 million cutoff used as a criterion under Executive Order 12291 for designating a regulation as major, and thus requiring a Regulatory Impact Analysis (RIA). We believe this criterion was never meant to be an inflexible threshold, eliminating the need

for decisions regarding the usefulness of RIA's in specific cases. Rather, the "major" designation serves as general guidance on when intensive analysis is most appropriate. In some cases, impact analysis is justified for rules with relatively minimal economic impact, and, in fact, EPA has frequently done cost-benefit analyses where expected impacts were well under $100 million. On the other hand, if adequate data have already been developed regarding likely benefits and costs, additional cost-benefit analysis may not only be unnecessary, it may itself not be cost effective. In addition, it should be noted that some of EPA's statutes require analysis of costs and benefits (the air office's New Source Performance Standard program for example), and that the Executive Order simply requires the development of better information, across a broader varie of programs, n has been developed in the past. [See GAO c ment 2, p. 60.

We agree with you that new source co s should be include e estimated total costs of a regulator actio, so that bet determinations can be made of the rule's status and result need for analysis. We also believe that better analysis of ne effects of regulations on new sources is important to counteract the "new source bias" that underlies much of environmental regulation. However, in the instances you cite of inconsistent treatment of new source costs, the gains from further new source analysis were limited in view of the extensive analyses already prepared by EPA and the court-set deadlines.
[See GAO comment 3, pp. 60-61.]
You also express concern about the ten percent discount rate employed in EPA RIAs. In its draft RIA guidelines, OMB suggests that discount rates other than ten percent be used to evaluate the sensitivity of the analysis to alternative discount rates. Where there are substantial differences in the time stream of benefits and costs, a cost-benefit analysis may be sensitive to the discount rate. However, where an analysis develops only a qualitative estimate of the benefits of a proposed action, as in cost-effectiveness analysis, the use of alternative discount rates would provide no significant additional information because the effect of alternative rates on the present value of costs is unambiguous. [See GAO comment 4, p. 61.]

Finally, your report seems to imply that EPA's supporting analyses are inadequate because they fail to comply perfectly with the principles of Executive Order 12291. We believe, however, that EPA's compliance with the Order should be viewed as an evolutionary process rather than as a discrete event. We expect EPA's analyses will continue to improve as the agency gains experience in preparing RIA's, and has the opportunity to plan for such analysis from the very start of its development of regulations. [See GAO comment 5, p. 61.]

As I hope we have made clear, the above comments are not meant to suggest that we are entirely satisfied with the quality of the analytical base underlying EPA's regulations. We are working closely and continuously with EPA to improve the analysis of its rules. We believe, given all of the constraints under which the agency must operate, that it is doing a commendable job on its analyses, and that they are continually improving. We also believe that this report will be helpful in guiding further improvements.

Sincerely,

Joseph R. Wright, Jr.
Deputy Director

on other proposed regulations shed no light on total new source compliance costs. Considering how large new source compliance costs were in the iron and steel industry case, gains from additional analysis in the other cases might have been substantial.

Regarding OMB's comment on court-set deadlines, we note that the iron and steel analysis included new source estimates despite such a deadline.]

4. [GAO COMMENT: The three cost-benefit analyses we reviewed were not cost-effectiveness analyses. They gave dollar estimates of benefits and net benefits, and the time stream of benefits and costs differed. Thus, the use of alternative discount rates is important and is consistent with OMB guidance.]

5. [GAO COMMENT: Our report does not suggest that EPA's cost-benefit analyses be perfect. Rather, the report points out correctable deficiencies. While we agree with OMB that EPA's analyses are improving, we believe that added effort is needed to make the cost-benefit analyses credible.]

(089211)