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**HIGH PERFORMANCE
PUBLIC WORKS**

**A New Federal
Infrastructure Investment Strategy
for America**



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**U. S. Advisory Commission
on Intergovernmental Relations
SR 16S
September 1994**

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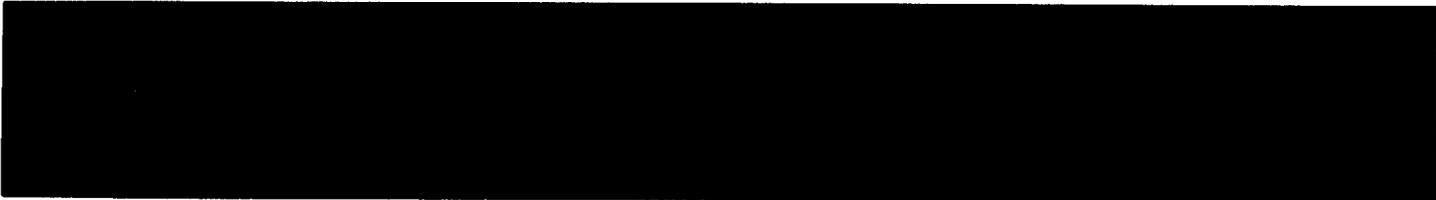
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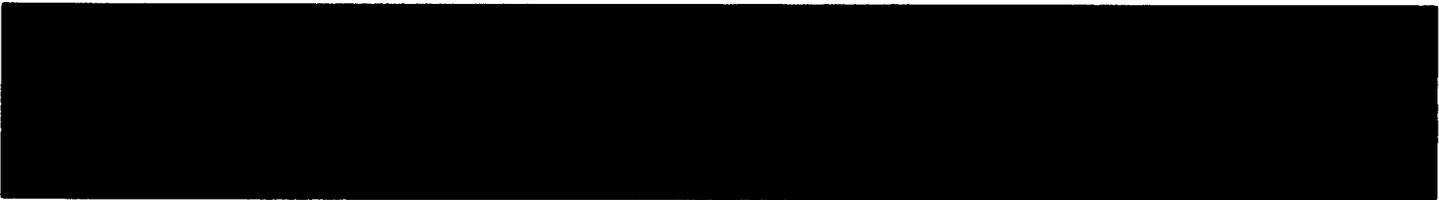


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**A New Federal
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**U. S. Advisory Commission
on Intergovernmental Relations
SR 16S
September 1994**

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PREFACE AND ACKNOWLEDGMENTS

In February 1994, the U.S. Advisory Commission on Intergovernmental Relations (ACIR) endorsed an action agenda and implementation plan known as the Federal Infrastructure Investment Strategy. The purpose of the strategy, contained in ACIR's report *High Performance Public Works* (Report SR-16, November 1993), is to establish consistent governmentwide approaches to infrastructure investment and maintenance.

The objectives of the Federal Infrastructure Investment Strategy are to ensure that future spending will be for:

- **The highest quality investments** that can yield maximum benefits compared to their costs;
- **Cost-effective maintenance** of existing facilities and equipment that will help avoid premature and costly repairs, rehabilitation, and replacement;
- **Soundly and equitably regulated projects** that can meet environmental and other performance requirements effectively and efficiently in the setting where they are located; and
- **Affordable facilities** that are priced efficiently and can be supported financially now and in the future.

The elements of the recommended strategy and action agenda represent the culmination of three years of joint work between ACIR and the U.S. Army Corps of Engineers, plus intensive consultations with representatives of infrastructure agencies at all levels of government, research and academic institutions, and private and public organizations concerned with infrastructure programs and issues.

During the last stage of the project, ACIR convened six intergovernmental, public/private task forces to examine the six most urgent infrastructure issues that had been identified earlier:

- Improving the quality of infrastructure investments;
- Applying benefit-cost analysis more consistently to investment options;
- Improving the maintenance of infrastructure;
- Making federal regulation of infrastructure more effective, efficient, and equitable;
- Improving environmental decisionmaking for public works; and
- Improving the financing of infrastructure.

Content

The task forces were presented with resource documents totaling nearly 3,500 pages. This sourcebook presents selected documents and excerpts from the materials judged to be the most useful references for planning, designing, and executing infrastructure policies. Some additional materials that were issued after the task forces completed their work have been added.

Purpose

The purpose of this sourcebook is to make these fundamental documents conveniently available to a wide range of public works professionals and policymakers in the public and private sectors who may have an opportunity to help implement the recommended strategy. It should be used in conjunction with the *High Performance Public Works* report and the Action Agenda therein.

We are encouraged to note that, since completion of the ACIR report, several federal infrastructure policy initiatives have been taken that reflect elements of the recommended Federal Infrastructure Investment Strategy. In particular, President Bill Clinton issued Executive Order 12893, which establishes sound investment principles as the basis for budgeting infrastructure programs; Executive Order 12866, which calls for fuller consideration of the benefits, costs, and intergovernmental implications of regulatory actions; and Executive Order 12875, which spells out the need for partnership between the levels of government to avoid new unfunded mandates. In addition, the *Government Performance and Results Act of 1993* became law, initiating several dozen pilot projects for innovative management, budgeting, and planning techniques to optimize the performance of government services. Each of these documents is included in the sourcebook to encourage continuing efforts to enhance the contribution of public infrastructure to a sound economy and a rising quality of life.

Organization

The material in this sourcebook is organized under the six key task force issues listed above. Each section begins with the Statement of Principles and Guidelines developed by the task force. Each statement concludes with a list of the references considered by the task force. The task force statement is followed by groups of documents addressing the main themes in the statement.

Acknowledgments

The Commission expresses its thanks to the U.S. Army Corps of Engineers for making this effort possible and to the many government officials and private individuals who served on the task forces, reviewed the documents, and provided input into the process.

Charles Griffiths and Cameron Gordon compiled this sourcebook. ACIR takes full responsibility for any errors that may have been made in preparing this report.

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TABLE OF CONTENTS

Chapter I: Improving the Quality of Infrastructure Investments	1
"Improving the Quality of Infrastructure Investments: Statement of Principles and Guidelines," <i>High Performance Public Works</i> , U.S. Advisory Commission on Intergovernmental Relations (ACIR), Report SR-16, November 1993	2
Investment Analysis	
Executive Order 12893, "Principles for Federal Infrastructure Investments," January 27, 1994	11
<i>Primer on Transportation, Productivity and Economic Development</i> , NCHRP Report 342, Transportation Research Board, September 1991, pp. i-xvi	15
<i>Investment Criteria</i> , Subcommittee on Transportation and Related Agencies, Committee on Appropriations, U.S. House of Representatives, May 5, 1993	33
<i>Value Engineering</i> , U.S. Office of Management and Budget, Circular A-131, May 21, 1993	47
Performance Measures	
<i>Program Performance Measures: Federal Agency Collection and Use of Performance Data</i> , U.S. General Accounting Office (GAO), GGD-92-65, May 1992	57
<i>Exposure Draft: Objectives of Federal Financial Reporting</i> , Federal Accounting Standards Advisory Board (FASAB), January 8, 1993, pp. 32-35	69
<i>Exposure Draft: Proposed Statement of the Government Accounting Standards Board on Concepts Related to Service Efforts and Accomplishments Reporting</i> , Governmental Accounting Standards Board (GASB), September 15, 1993, pp. 21-31	75
"Reinvesting In America," <i>Fragile Foundations: A Report on America's Public Works</i> , National Council on Public Works Improvement, February 1988, Chap. II	83
<i>The Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance Report of the Secretary of Transportation to the United States Congress: Summary</i> , Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), U.S. Department of Transportation, FHWA P.L.93-017, 1993, i-iii	87
Performance Budgeting	
<i>Budget Issues: Incorporating an Investment Component in the Federal Budget</i> , GAO, AIMD-94-40, November 1993	93

<i>Government Performance and Results Act of 1993</i> , 107 STAT. 285, 31 U.S.C. 1101, August 3, 1993	111
<i>Government Performance and Results Act Implementation</i> , U.S. Office of Management and Budget, Circular A-11, Sections 12.1, 12.3(h), 15.2 and 34.1	123
Chapter II: Applying Benefit-Cost Analysis to Investment Options	131
"Applying Benefit-Cost Analysis to Investment Options: Statement of Principles and Guidelines," <i>High Performance Public Works</i> , ACIR, SR-16, November 1993	132
OMB Guidance	
<i>Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs</i> , U.S. Office of Management and Budget, Circular A-94, revised October 29, 1992	139
Agency Implementation Examples	
<i>Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies</i> , U.S. Water Resources Council, March 1983, pp.iii-ix, 1-17	167
<i>National Economic Development Procedures Manual--Overview Manual for Conducting National Economic Development Analysis</i> , Institute for Water Resources, U.S.Army Corps of Engineers, IWR Report 91-R-11, October 1991, pp. v-ix, 1-16	191
<i>Procedures and Technical Methods for Transit Project Planning</i> , FTA, September 1986, Part II, pp. 9-1 through 9-6	213
<i>Guidelines for Performing Regulatory Impact Analysis</i> , U.S. Environmental Protection Agency (EPA), December 1983 (reprinted March 1991), pp. 2-15	221
Chapter III: Improving the Maintenance of Infrastructure	239
"Improving the Maintenance of Infrastructure: Statement of Principles and Guidelines," <i>High Performance Public Works</i> , ACIR, SR-16, November 1993	240
Selecting Maintenance Strategies	
<i>Infrastructure Assets: An Assessment of User Needs and Recommendations for Financial Reporting</i> , Raymond Van Daniker and Vernon Kwiatkowski, GASB Research Report, 1986, pp. 111-120	247
<i>Guide to Selecting Maintenance Strategies for Capital Facilities</i> , Harry P. Hatry and Bruce G. Steinthal, The Urban Institute, 1984, pp. 1-13, 69-79	259

Assessing Infrastructure Condition

Guide to Assessing Capital Stock Condition, Stephen R. Godwin and George E. Peterson, The Urban Institute, 1984, pp. 23-27, 32 **283**

Agency Examples

"National Perspective on Pavement Management," Frank Botelho, *TR News*, August 1994, pp. 5-8 **291**

Procedures and Technical Methods for Transit Planning, FFTA Review Draft, September 1990, Part II, 4-1: 4-11 **297**

National Operations and Maintenance Program Plan of Improvement: Policy and Procedures Options Study for Project Operations and Maintenance, Institute for Water Resources, U.S. Army Corps of Engineers, IWR Report 93-R-11, pp. i-viii, 1-13 **309**

Capital Asset Management Process, U.S. Department of Energy, Order DOE 4320.2A, February 10, 1994, pp. I-1 through II-4; IV-1 through IV-9 . . . **329**

Asset Condition and Maintenance Schedules for Major Portions of the City's Capital Plant: Agency Reconciliation of Maintenance Schedules and Executive Summary, Office of Management and Budget, City of New York, 1993, pp. 1-10, 11.1 **345**

Chapter IV: Making Federal Regulation of Infrastructure More Effective, Efficient, and Equitable 357

"Making Federal Regulation of Infrastructure More Effective, Efficient, and Equitable: Statement of Principles and Guidelines," *High Performance Public Works*, ACIR, SR-16, November 1993 **358**

Regulatory Analysis

Executive Order 12866, "Regulatory Planning and Review," September 30, 1993 **363**

Executive Order 12875, "Enhancing the Intergovernmental Partnership," October 26, 1993 **375**

"Regulatory Impact Analysis Guidance," *Regulatory Programs of the United States Government: 1990, Appendix V*, Regulatory Information Center, 1992 . . **377**

"Paperwork Reduction Act (Overview)," *Federal Administrative Procedure Sourcebook Statutes and Related Materials*, 2nd ed., Administrative Conference of the United States, 1992, pp. 819-825 **393**

Regulatory Flexibility

"The Regulatory Flexibility Act," *Fact Sheet 11* (EPA Regulation Management Series), August 1992 401

"Regulatory Flexibility Act," *Federal Administrative Procedure Sourcebook, Statutes and Related Materials*, 2nd ed., Administrative Conference of the United States, 1992, pp. 1023-1026 403

"Negotiated Rulemaking Act," *Federal Administrative Procedure Sourcebook, Statutes and Related Materials*, 2nd ed., Administrative Conference of the United States, 1992, pp.791-807 415

The United States Experience with Economic Incentives to Control Environmental Pollution, Alan Carlin, EPA, July 1992, pp. vii-xi, 1-1 through 1-6, 2-1 through 2-8 430

Water Pollution: Pollutant Trading Could Reduce Compliance Costs if Uncertainties are Resolved, GAO, RCED-92-153, June 1992 450

Chapter V: Improving Environmental Decisionmaking for Public Works 463

"Improving Environmental Decisionmaking for Public Works: Statement of Principles and Guidelines," *High Performance Public Works*, ACIR, SR-16, November 1993 464

Environmental Integration

"National Environmental Policy Act," *Federal Administrative Procedure Sourcebook, Statutes and Related Materials*, 2nd ed., Administrative Conference of the United States, 1992, pp. 681-699 471

NEPA Integration: Effective, Efficient Environmental Compliance in the 1990s, Council on Environmental Quality, December 1991, pp. i-iii, 1-7 481

Executive Order 12906, "Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure," April 11, 1994 491

Departmental Manual: Environmental Quality, U.S. Department of the Interior, 1980, Chaps. 1-3 495

"Principles, Findings, and Recommendations," *Intergovernmental Decisionmaking for Environmental Protection and Public Works*, ACIR, A-122, November 1992, pp. iii-iv, 1-5 507

Interagency Coordination

Implementation of the Intermodal Surface Transportation Efficiency Act: Protecting the Environment and Reducing Regulatory Inefficiencies, Memorandum of Understanding

between the U.S. Department of Transportation, U.S. Department of the Army, and U.S. Environmental Protection Agency, May 1, 1992	515
<i>Applying the Section 404 Permit Process to Federal-Aid Highway Projects</i> , Federal Highway Administration, National Marine Fisheries Service, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, and U.S. Fish and Wildlife Service, September 1988, pp. i-vii, 1-1:1-15, 4-1:4-3, 11-1:11-10 . . .	521
<i>Memorandum: Revised Guidance on Cooperating Agencies</i> , FHWA, March 19, 1992	547
Chapter VI: Improving the Financing of Infrastructure	571
"Improving the Financing of Infrastructure: Statement of Principles and Guidelines," <i>High Performance Public Works</i> , ACIR, SR-16, November 1993	572
Financial Analysis	
"Finding the Money," <i>Fragile Foundations: A Report on America's Public Works</i> , National Council on Public Works Improvement, February 1988, pp. 11-14	578
"Investment and Financing: Who Pays and How?" <i>Delivering the Goods: Public Works, Technologies, Management, and Financing</i> , U.S. Congressional Office of Technology Assessment, 1992, pp. 12-26	583
<i>Narrowing the Gap: Environmental Finance for the 1990s</i> , EPA, 1992	599
"Financing," <i>Investing in Our Future: Report of the Public Infrastructure Subcouncil to the Competitiveness Policy Council</i> , March 1993, pp. 778-781 . . .	623
Alternative Sources of Funds	
<i>Alternative Financing Mechanisms for Environmental Programs</i> , EPA State Capacity Task Force, The Alternative Financing Mechanisms Team Report (EPA), August 7, 1992, pp. i-ii, 1-17	629
<i>Financing the Future</i> , Report of the Commission to Promote Investment in America's Infrastructure, February 1993, pp. 1-11, A-1 through A-14	653
<i>One Solution to Capital Budget Shortfalls: A Primer for Public-Private Ventures</i> , Trevor L. Neve, Robert L. Crosslin and John E. Petersen, Logistics Management Institute, June 1992	660

CHAPTER I

IMPROVING THE QUALITY OF INFRASTRUCTURE INVESTMENTS

Task Force One of the ACIR project to develop recommendations for a federal infrastructure investment strategy examined the literature and agency documents related to increasing the quality (and performance) of federal infrastructure investments. The resulting principles and guidelines are presented in the first selection of this chapter. This chapter should be read in conjunction with Chapter 2, which deals with benefit-cost analysis, a specific tool for helping assess the performance and quality of proposed investments.

The source documents included in this chapter address three interrelated topics:

- **Investment analysis;**
- **Performance measures;**
- **Performance budgeting.**

Economic benefits and program performance both are of key importance in budgeting to achieve the greatest returns on infrastructure investments. Documents under the heading of **Investment Analysis** include the President's January 1994 Executive Order outlining "Principles for Federal Infrastructure Investments"; criteria developed by Rep. Bob Carr, Chairman of the House Transportation Appropriations Subcommittee, for evaluating the quality of proposed transportation projects; and a portion of a Transportation Research Board report that illustrates performance criteria and assessment from the perspective of transportation's relationship to economic development

Documents under the heading of **Performance Measures** contain proposed standards for federal accounting for capital assets; proposed standards for state and local governments to use in reporting the service efforts and accomplishments related to their budgets; federal agency use of performance reporting; and an analysis of a broad range of infrastructure investments from a performance perspective.

Selections in the **Performance Budgeting** section include a General Accounting Office proposal for an investment component for the federal budget and for the *Government Performance and Results Act of 1993*, which is designed to begin with pilot programs to develop performance measures that might support performance budgeting in future years.

HIGH PERFORMANCE PUBLIC WORKS

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SR-16
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IMPROVING THE QUALITY OF INFRASTRUCTURE INVESTMENTS

I. OBJECTIVE

The objective of this statement of principles and guidelines is to improve the quality of infrastructure investments in the United States by ensuring that all projects funded are likely to yield maximum benefits compared to their costs. This can be accomplished by requiring sound investment analysis of proposed investments as the basis for selecting and funding the construction, maintenance, and operation options likely to yield the greatest net rates of return as measured by social, environmental, and economic benefits and costs.

II. FINDINGS

Importance of Infrastructure. A sound public infrastructure forms a key part of the nation's capital stock and thus plays a vital role in encouraging a more productive and competitive national economy. In addition, public works are vital to meeting immediate as well as long-term public demands for safety, health, and a clean and ecologically healthy environment.

Definition of Infrastructure. This statement applies to public works infrastructure broadly defined, including transportation, water, waste management, and environmental protection facilities, as well as public buildings.

Need for Investment Analysis and Prioritization. Too many public works investments have been of questionable value. Charges of waste and favoritism often are leveled at public works spending proposals. Too often, projects with little or no demonstrable merit have been approved, while other projects with demonstrated merit have gone unfunded. With the current scarcity of federal, state, and local funds for infrastructure, these wasteful practices cannot be tolerated. They are not only inefficient but also are part of the reason for the loss of confidence in government by many citizens.

Current Initiatives for Improving the Quality of Infrastructure Investments. The President, the Congress, and others appear to be moving rapidly toward the use of

performance measures, investment budgeting, and other devices designed to improve the quality of public investment. Examples include the following:

- The White House work group on infrastructure investment policy;
- Vice President Al Gore's National Performance Review;
- Recent GAO reports on investment budgeting, performance budgeting, and federal agency collection and use of performance data;
- Inclusion of a public infrastructure investment policy in *A Competitive Strategy for America*, the second report to the President and Congress by the Competitiveness Policy Council;
- Enactment of the *Chief Financial Officers Act of 1990*;
- Enactment of the *Government Performance and Results Act of 1993*;
- Publication of preliminary views on Service Efforts and Accomplishments (SEA) reporting by the Governmental Accounting Standards Board (GASB); and
- Establishment of an FASAB work group to assist in developing infrastructure accounting and reporting standards (July 1993).

III. BASIC PRINCIPLE

Given the profound economic and social importance of infrastructure, it is essential that the federal government identify, assess, and undertake infrastructure investments that will pay the greatest possible dividends for the nation now and in the future. Citizens and taxpayers need to be assured that these public investments are not wasted and that they will help the nation respond to current and future economic and social demands.

Achieving this objective requires a governmentwide commitment to better data, improved measures of per-

formance, and investment analysis that goes well beyond current practice. This improved analysis then needs to be communicated effectively to government officials and the general public.

To merit public expenditure, an investment proposal should show a good likelihood of (a) returning future benefits (public and private) that substantially exceed its estimated costs, (b) supporting related public and private investments, and (c) reinforcing other national strategic goals. These standards should apply to direct federal investments as well as to investments by state, local, or private bodies that federal agencies encourage, assist, or regulate.

This principle, and the guidelines that follow, should be applied by federal infrastructure agencies and their assisted and regulated partners to develop, plan, and implement improved infrastructure investment strategies. They also should be followed by all federal entities in the executive and legislative branches when they evaluate public works programs, projects, and systems. The expected result is that infrastructure investments will become increasingly effective, economical, and equitable in meeting program goals, and more readily supported and understood by the public and their political representatives.

IV. GUIDELINES FOR EVALUATING INFRASTRUCTURE INVESTMENTS

Strengthening the analysis of infrastructure investments requires: setting program goals, improving the measurement and analysis of program performance, supporting a strategic framework for overall economic and environmental improvement, and improving the communication of results.

1. **Define Performance Goals.** Defining performance goals is an essential first step in evaluating any program and set of related investment options (public or private). An important part of this effort is to identify the customers of the program, consult with them, and assess their needs. Customers (or stakeholders) should be defined broadly, including direct users (trucking firms for highways, for example) as well as indirect clients (manufacturers and service firms that need on-time shipments). The goals of customers should not be assumed, but rather should be assessed as directly as possible, perhaps using market research and public involvement.

In most cases, negotiating and setting goals will help define a meaningful set of performance measures. While the specific goals for each program will vary according to the category of infrastructure and the government responsible for making decisions, they are likely to include direct economic benefits, general economic productivity, public health and safety, social well-being,

quality of life, environmental protection, and national security.

Typically, this goal-setting should be undertaken as part of an agencywide strategic planning process that reexamines agency missions, legislative requirements, and underlying trends. The recently completed strategic planning exercises at the Department of Transportation and the Department of Energy are examples worth examining for lessons learned in crossing program boundaries, reconceptualizing issues, and reformulating goals in light of changing realities.

2. **Measure and Analyze Performance.** Achieving these goals requires, in turn, better measurement and analysis. In addition to the analytic techniques highlighted below, these efforts should include descriptions of current physical conditions, level of demand, and service quality. Care should be taken to formulate performance indicators that go beyond simple averages and to work toward program-specific indicators. Demand forecasts, along with high-capital and low-capital options for meeting and managing this demand, should be developed. The appropriate government to undertake this work will vary across programs.
3. **Establish an Investment Strategy.** This improved measurement and analysis should be conducted within an overall framework that incorporates a strategic perspective. Infrastructure programs are only one of the ways available to each agency in carrying out its overall mission. As such, the capital investment program should be coordinated with other agency activities and with the activities of agencies that have complementary roles and goals. Frequent and full communication within the agency and with other agencies to develop a shared understanding of these roles is important.
Furthermore, public infrastructure investments differ from most private investments in the longevity of their impacts (for example, such facilities as roads, airports, and dams are rarely torn down), and in their potential to have profound effects on the nature and quality of our lifestyles and the productivity of the private economy. This means that their evaluation should consider the qualitative aspects of the benefits and costs of infrastructure, assess and compare the risks of different programs, and consider their long-term public policy implications.
4. **Consider Alternative Program Designs.** Program objectives can be achieved through several different means, including direct administration, financial aid to others, regulation, or a combination. Each method has different pros and cons, different levels and patterns of benefits and costs, and

different implications for the roles of governments. These differences should be explored before new programs are proposed or old ones revised. Choices to consider might include block grants versus categorical grants, grants versus mandates, loans versus grants, regulation versus financial assistance, market-based incentives, pricing policies, and tax changes (tax expenditures) versus regulations or grants. Criteria for helping to make these choices are summarized in the 1988 *Fragile Foundations* report by the National Council on Public Works Improvement.

In assessing these choices, it is useful to consider the near-term and long-term incentives that each may place on the builder and operator of the infrastructure facility. Any assessment of program alternatives will be more useful if it can be linked to changes in efficiency, effectiveness, expected performance measures, and future budgets of affected parties.

5. **Examine Needs for Cross-Program Flexibility.** The relative priorities among different programs typically are left to political judgment. Sole reliance on these judgments, however, does not necessarily serve well to optimize national economic productivity and efficiency in meeting agreed-on societal objectives.

For example, arbitrary national funding levels divided between highways and transit or between new construction and rehabilitation can skew local investment decisions by requiring sub-optimal investments or programs that may not consider how to minimize life-cycle costs. Redefining program goals in terms of "zones of competition" (such as mobility rather than the specific means of achieving that mobility), can help overcome the inherent bias of some programs—if the program's performance measures reflect the broader concept.

Achieving this outcome requires (a) enough flexibility among related programs to allow consideration of alternative solutions using resources from multiple programs, (b) time and ability to apply economic and program performance analysis, and (c) a role in the decision process for the people and governments affected most directly.

Establishing investment priorities as legislative mandates may set inappropriate spending priorities that do not take into account current data, more comprehensive performance goals, or analytic results. For example, agencies may be directed to implement statutory mandates against the advice of sound investment analysis or performance assessments. In some cases, Congress even prohibits the economic analysis of some mandates, thus ensuring some wasteful investments.

All budgets have limits, forcing hard choices. The role of consistent investment analysis processes is to encourage the funding of the most worthy programs and projects. While the political process will (and should) allow for overriding pure analysis, the identification of direct and indirect subsidies and inefficiencies should be made explicit.

Congress and the executive have taken some positive steps to provide the flexibility needed to seek out and make the best investments. For example, the *Intermodal Surface Transportation Efficiency Act of 1991* (ISTEA) encourages greater flexibility and realism in setting project priorities by requiring state departments of transportation and metropolitan planning organizations—the agencies now responsible for making many of the investment decisions—to prepare financially constrained transportation improvement plans. In contrast to past "wish lists," these new project lists are limited in magnitude to the funds that can be demonstrated to be available over the six-year program period. This constraint requires much more fiscal discipline than has usually been exercised in the past, but it has also attracted greater public and private interest since the projects in the plan are now more likely to be implemented. Also, a broader array of projects can be considered, including highways, bridges, transit, bicycle and pedestrian facilities, intermodal facilities, and other forms of surface transportation that might be more effective in achieving program goals under particular circumstances.

6. **Analyze Long-Term Financial Implications.** Just as infrastructure investments provide services over long periods of time, so too they generate long-term financial impacts that can also affect the quality of services provided many years in the future. For example, limited explicit attention to the rehabilitation and maintenance costs of the Interstate Highway System in 1956 meant that it deteriorated faster and further than expected during the 1970s. Life-cycle costing of alternative designs and practices for operating and maintaining facilities would help to reduce long-term costs and eliminate biases toward construction.

Some federal programs now require grant recipients to show the expected source of funds to operate and maintain the system as well as remaining costs to complete. Such analysis should be required for directly administered federal programs, federal-aid programs, and federal regulatory programs, showing who will be responsible for meeting future costs and how they could do so. Financial analysis of this type should be performed for alternative program designs before

choices are made, and as a reality check on programs being implemented. Simplified and inexpensive means of performing this type of analysis should be developed and made widely available.

7. **Develop Confidence in Investment Analysis.** Confidence in the system of investment analysis requires implementing the decision-support tools in an even-handed and technically correct manner, with widespread understanding of the methods that are being applied. Such understanding should spread beyond the staff who perform the calculations. This means that the analytic results should be communicated effectively and fully to decisionmakers and the general public. Openness and full disclosure in this process are important, since the quality and extent of available data vary widely across infrastructure programs, as does the ease of implementing the techniques. Papering over these difficulties creates a false sense of the quality of analysis, exposes the process to attack, and hides the need for better data and better techniques.
8. **Communicate Effectively.** The need for improved public awareness of the value of infrastructure means that investment analyses should be developed with inputs from and communicated effectively and fully to the public and to their elected representatives. Clarity and simplicity are important, as well as an active effort to explain what the analysis shows and does not show.

V. MENU OF DECISION-SUPPORT TOOLS

No single analytic method provides comprehensive answers. As many of the following types of analysis as practical should be used to help policymakers evaluate potential public works investments and develop sound investment strategies, plans, and budgets. Over time, the quality, extent, and consistency in applying these tools should be improved. The federal, state, and local governments all should use equivalent methods—tailored to their own needs—to establish consistency in the analytical evaluations of directly administered federal infrastructure programs and related federal-aid and regulatory programs. These tools will need to be used differently in evaluating programs and projects, and in making cross-program comparisons. Some further development of these methods may be necessary to meet all of these needs.

Performance Measures. Relevant and internally consistent measures of performance provide the key raw material for internal evaluations of the expected effectiveness of infrastructure investments while also helping to make the results more understandable to decisionmakers and the public.

Different programs have different goals or provide a different emphasis to similar groups of goals. (For example, urban mobility is important for both transit and highways, but each may emphasize different aspects of mobility.) Some programs provide services; others emphasize risk reduction (better health or safety), while others aim to stimulate productive private investments. Most will serve a combination of goals. Program performance should be defined not by inputs, but in terms of program outputs and by the social, economic, and environmental outcomes that will result (such as a specific threshold or improved performance compared to the past).

Efforts to evaluate investments need improved measures of performance. The SEA reporting concepts being considered by GASB and FASAB should be pursued to help meet the need for better measures of conditions and performance. Such measures should be reported regularly, both to track specific programs (thus helping to hold their sponsors accountable) and to establish longitudinal data bases to aid in projecting future outcomes under new or changed programs.

One of the few existing performance efforts in the federal government is DOT's biennial report to Congress, *The Status and Condition of the Nation's Highways, Bridges, and Transit*. The 1993 volume is the latest to report on the characteristics, condition, and performance of these systems. Future federal and non-federal investment requirements for all highways and bridges are estimated based on the costs to meet different performance levels in pavement condition and traffic service.

The report has not been static; regular efforts have been made to expand the scope and type of analyses, and to improve underlying data and analysis. Transit and highways are now combined, and changes are under way that should provide a more comprehensive assessment of alternative investments. A new Highway Economic Reporting System (HERS) using a benefit-cost framework is being developed to complement the long-standing Highway Performance Monitoring System (HPMS), which uses an engineering-based analytic process. Improvements also are needed to incorporate operational options for improving "level-of-service" performance, focusing on outcomes, and tracking program performance and outcome trends over time.

Although each infrastructure program has its own unique needs, other departments and agencies should consider adopting analytic and reporting systems similar to those developing in DOT.

Benefit-Cost Analysis. This form of analysis incorporates a range of traditional evaluation techniques developed by economists, including rate of return analysis, net present value of benefits, and various timing measures. As practiced by water resource agencies, benefit-cost analyses typically estimate how much better off the nation's economy would be if the project were to be built. Other

applications frequently have less expansive horizons, focusing on more narrowly defined geographic regions and on more direct project benefits and costs.

A minimum threshold for this type of analysis is usually whether or not benefits exceed costs (after discounting future streams), but the methods can be used to rank projects according to the highest returns, thereby helping to select a program of projects that provides the greatest overall return within a limited budget. If applied consistently across programs, the techniques of benefit-cost analysis can provide information (however imperfect) that can help set cross-program priorities. This advantage should be cultivated. As mentioned below, the costs of externalities should be included in the benefit-cost analysis whenever possible.

Timing measures such as pay-back period (how long before the benefits exceed costs) and first-year benefits (does the rate of return exceed a hurdle rate in the first year of operation) are important outputs from this analysis.

Benefit-cost techniques, however, also present some shortcomings for infrastructure investments. First, results depend on the rate of discount used to convert future streams of benefits and costs to current dollars. As a practical matter, early-year impacts receive a much greater weight—a possible problem in projects that may have useful lives of several decades. Second, these techniques are best suited to well-defined projects and may be awkward if used for regional or national systems. Third, as with many analytic tools, they are best suited for investments not likely to stimulate a significant shift from business as usual. Thus, strategic implications and non-linear impacts are often missed (witness, for example, the effect of the Interstate Highway System on stimulating new national-scale markets and the consequent changes in distribution networks and economic concentration) and their ability to remold market shares (witness the rapid growth in large trucks).

Cost-Effectiveness Analysis. Once performance measures have been developed, they can be used to assess individual investments and programs in terms of their ability to improve performance and their cost-effectiveness in doing so. They can be particularly valuable when used as part of a strategic planning effort that assesses the relative merits of alternative program structures, including qualitative factors that can complement a comprehensive benefit-cost analysis.

Analysis of Externalities and Unintended Consequences. In addition to their planned economic and environmental benefits, infrastructure investments often have unexpected positive and negative impacts on the environment, health and safety, the financial condition of governments and private parties, and established patterns of daily behavior. Some of these impacts become apparent only over long time periods, such as the role of Interstate

Highways and other road improvements in encouraging suburbanization. The net effect is often difficult to calculate, but the potential scenarios should be searched out as much as possible.

Adverse effects may have to be mitigated by law or political necessity (the FAA, for example, makes federal funds available for a series of mitigation measures for neighborhoods in noise impact zones near airports). The costs of these impacts should be identified and quantified in monetary terms where possible (many environmental impacts do not have a formal market place and thus may require using proxies to determine their monetary values). Alternative program or project designs that would maximize net benefits or reduce adverse effects should be considered.

Analysis of Risks. Inadequate, insensitively designed, and poorly maintained infrastructure puts environments at risk, raises health and safety risks, and creates potential financial liabilities. Prioritization of infrastructure investments should take these factors into account. Formal risk analysis procedures should be used for major investments that have high-risk features.

Long-Term Analysis. Traditional analytic methods grew out of the need to assess individual projects or specific investments. As such, they may be misleading when considering the long-term or strategic impacts of infrastructure investments. The importance of these long-term impacts can outweigh the net economic value shown by benefit-cost analysis. In considering these projects, it is important not to ignore qualitative factors such as:

- **System effects** (How much does the value of the air traffic control system or the Interstate Highway System exceed the sum of their individual parts?);
- **Non-linearities** (Will the investment encourage shifts in how infrastructure systems are used by the private sector?) For example, investment in high-speed rail may change long-distance travel patterns; double-stack trains may generate significant shifts in what and how much freight is moved over long distances. The importance of a global economy, with its emphasis on new patterns of producing goods and services, has implications that are difficult to specify; and
- **Quality of life**, including long-term environmental implications and possible effects on where people live and work. These issues are particularly difficult to assess, since they require speculation about changes in individual values and behaviors. Nevertheless, they can have profound effects.

Long-term impacts are difficult to assess with precision. It may be useful to consider the consequences (economic, health, and safety risks) of alternative scenarios, including not building the facility, or designing facilities

with flexibility to adapt to changes in technology, life styles, and business practices. Flexibility and the treatment of risk are important factors in making strategic planning a realistic part of decisionmaking.

Uncertainty. The analysis of any long-lived project needs to consider the issue of uncertainty. All forecasts will be wrong in their details. In some cases, this uncertainty can be assessed quantitatively using various types of sensitivity analyses. For example, OMB's Circular A-94 on benefit-cost analysis highlights the value of probability-based techniques to help assess the multiple forces that influence investments.

VI. IMPLEMENTATION STEPS

The principles and guidelines presented above offer an opportunity to generate a profound change in how federal (and state and local) agencies nominate, evaluate, implement, and assess infrastructure investments. This should, in turn, result in more effective spending of scarce resources, a better understanding by decisionmakers and the public of infrastructure, improved infrastructure programs, and enhanced social, economic, and environmental outcomes.

While full implementation of these changes will require some time, the following near-term actions can generate significant benefits and initiate more fundamental changes.

Issue Principles and Guidelines to Require Investment Analysis. The President should require all federal infrastructure agencies to justify their budget requests and their legislative and regulatory initiatives with investment analysis, including life-cycle costing.

Leadership in encouraging and developing analytical guidelines and supporting data systems should be assigned to OMB, GAO, CBO, FASAB, and the chief financial officers in each executive branch department and agency. The goal should be to establish widely accepted analytic procedures that:

- Are applicable and accepted across the executive and legislative branches;
- Account for all costs of alternatives, including development, construction, operation, and maintenance;
- Can be validated by independent reviewers;
- Will permit regular audit of results;
- Can be readily understood by the public and the decisionmakers who must make use of them; and
- Are designed to foster interaction and constructive communication among analysts and decisionmakers and across different agencies, levels, and branches of government.

The analytic staffs of federal agencies should consider the data and methodologies appropriate to each analytic problem, rather than limiting themselves to the data available. These data should be produced and verified objectively. A process for automated data collection, analysis, and reporting should be in place before agencywide implementation begins.

The National Income Accounts should be revised to be more helpful in tracking the economic benefits and costs of infrastructure.

Encourage Continued Interagency Cooperation. Interagency cooperation should continue and expand to include efforts to build an active dialogue on how best to implement the principles and guidelines described here, efforts to identify successful applications and areas for improvement, communication of successes and problems, and efforts to tie in with other performance-related studies or mandates (such as the White House National Performance Review and activities designed to respond to the *Government Performance and Results Act of 1993*).

A National Infrastructure Council should be established to pursue these tasks. It could take the form of the old interagency Water Resources Council or a Cabinet sub-council.

Develop Examples. Application of these principles and guidelines will not be clear or easy. The methods need further development and demonstration within the complexities of public programs. This effort should begin as soon as practical, and it should be undertaken carefully, with the lessons learned shared widely among the relevant individuals in federal agencies.

Establish an Interagency Working Group. The work of Task Force I benefited greatly from active participation by senior program analysts and policymakers from many key federal agencies involved in infrastructure. The process of sharing examples and techniques and discussing ways to apply performance analysis is stimulating and self-reinforcing. This working group mechanism should continue under the auspices of the White House or OMB.

Pursue Pilot Projects. The *Government Performance and Results Act of 1993* calls for agencies to volunteer to develop and implement appropriate performance measurements. Infrastructure agencies have an advantage in that it is relatively easy to quantify many benefits and costs of their programs. Also, most infrastructure agencies already have some form of performance assessment under way. Coordinated pilot study reports by several infrastructure agencies would provide an early test of the new opportunities provided by this legislation. Federal infrastructure agencies should participate actively with OMB in the administration of the act.

Provide Infrastructure Training. While a stand-alone infrastructure institute has much to recommend it, the

need to begin disseminating these ideas is too important to wait for agreement on organization, funding, and direction for such an enterprise. Until these important details can be worked out, needed infrastructure investment training should be provided by existing training programs, such as the National Highway Institute, the Federal Executive Institute, and other agency and program-specific efforts.

Convene a National Conference on Infrastructure Performance. An annual conference offers one way to speed up communication across agencies and governments, among different levels of managers, and between managers and decisionmakers. To add prestige and to encourage attendance by senior managers, this should be sponsored by the White House, perhaps as a follow-up to the National Performance Review efforts. The conference should be scheduled for more than one day, and should include sessions devoted to techniques and case studies, interaction with private-sector consumers of infrastructure services, and feedback from public decisionmakers.

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THE WHITE HOUSE
Office of the Press Secretary

For Immediate Release

January 27, 1994

EXECUTIVE ORDER

12793
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PRINCIPLES FOR FEDERAL
INFRASTRUCTURE INVESTMENTS

A well-functioning infrastructure is vital to sustained economic growth, to the quality of life in our communities, and to the protection of our environment and natural resources. To develop and maintain its infrastructure facilities, our Nation relies heavily on investments by the Federal Government.

Our Nation will achieve the greatest benefits from its infrastructure facilities if it invests wisely and continually improves the quality and performance of its infrastructure programs. Therefore, by the authority vested in me as President by the Constitution and the laws of the United States of America, it is hereby ordered as follows:

Section 1. Scope. The principles and plans referred to in this order shall apply to Federal spending for infrastructure programs. For the purposes of this order, Federal spending for infrastructure programs shall include direct spending and grants for transportation, water resources, energy, and environmental protection.

Sec. 2. Principles of Federal Infrastructure Investment.

Each executive department and agency with infrastructure responsibilities (hereinafter referred to collectively as "agencies") shall develop and implement plans for infrastructure investment and management consistent with the following principles: (a) Systematic Analysis of Expected Benefits and Costs. Infrastructure investments shall be based on systematic analysis of expected benefits and costs, including both quantitative and qualitative measures, in accordance with the following:

(1) Benefits and costs should be quantified and monetized to the maximum extent practicable. All types of benefits and costs, both market and nonmarket, should be considered. To the extent that environmental and other nonmarket benefits and costs can be quantified, they shall be given the same weight as quantifiable market benefits and costs.

(2) Benefits and costs should be measured and appropriately discounted over the full life cycle of each project. Such analysis will enable informed tradeoffs among capital outlays, operating and maintenance costs, and nonmonetary costs borne by the public.

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(3) When the amount and timing of important benefits and costs are uncertain, analyses shall recognize the uncertainty and address it through appropriate quantitative and qualitative assessments.

(4) Analyses shall compare a comprehensive set of options that include, among other things, managing demand, repairing facilities, and expanding facilities.

(5) Analyses should consider not only quantifiable measures of benefits and costs, but also qualitative measures reflecting values that are not readily quantified.

(b) Efficient Management. Infrastructure shall be managed efficiently in accordance with the following:

(1) The efficient use of infrastructure depends not only on physical design features, but also on operational practices. To improve these practices, agencies should conduct periodic reviews of the operation and maintenance of existing facilities.

(2) Agencies should use these reviews to consider a variety of management practices that can improve the return from infrastructure investments. Examples include contracting practices that reward quality and innovation, and design standards that incorporate new technologies and construction techniques.

(3) Agencies also should use these reviews to identify the demand for different levels of infrastructure services. Since efficient levels of service can often best be achieved by properly pricing infrastructure, the Federal Government -- through its direct investments, grants, and regulations -- should promote consideration of market-based mechanisms for managing infrastructure.

(c) Private Sector Participation. Agencies shall seek private sector participation in infrastructure investment and management. Innovative public-private initiatives can bring about greater private sector participation in the ownership, financing, construction, and operation of the infrastructure programs referred to in section 1 of this order. Consistent with the public interest, agencies should work with State and local entities to minimize legal and regulatory barriers to private sector participation in the provision of infrastructure facilities and services.

(d) Encouragement of More Effective State and Local Programs. To promote the efficient use of Federal infrastructure funds, agencies should encourage the State and local recipients of Federal grants to implement planning and information management systems that support the principles set forth in section 2(a) through (c) of this order. In turn, the Federal Government should use the information from the State and local recipients' management systems to conduct the system-level reviews of the Federal Government's infrastructure programs that are required by this order.

Sec. 3. Submission of Plans. Agencies shall submit initial plans to implement these principles to the Director of the Office of Management and Budget ("OMB") by March 15, 1994.

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Agency plans shall list the actions that will be taken to provide the data and analysis necessary for supporting infrastructure-related proposals in future budget submissions. Agency implementation plans should be consistent with OMB Circular A-94 that outlines the analytical methods required under the principles set forth in section 2 of this order.

Sec. 4. Application to Budget Submissions. Beginning with the fiscal year 1996 budget submission to OMB, each agency should use these principles to justify major infrastructure investment and grant programs. Major programs are defined as those programs with annual budgetary resources in excess of \$50 million.

Sec. 5. Application to Legislative Proposals. Beginning March 15, 1994, agencies shall employ the principles set forth in section 2 of this order and, at the request of OMB, shall provide supporting analyses when requesting OMB clearance for legislative proposals that would authorize or reauthorize infrastructure programs.

Sec. 6. Guidance. The Office of Management and Budget shall provide guidance to the agencies on the implementation of this order.

Sec. 7. Judicial Review. This order is intended only to improve the internal management of the executive branch and does not create any right or benefit, substantive or procedural, enforceable by a party against the United States, its agencies or instrumentalities, its officers or employees, or any other person.

WILLIAM J. CLINTON

THE WHITE HOUSE,
January 26, 1994.

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM
REPORT

342

PRIMER ON TRANSPORTATION, PRODUCTIVITY AND ECONOMIC DEVELOPMENT

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RESEARCH SPONSORED BY THE AMERICAN
ASSOCIATION OF STATE HIGHWAY AND
TRANSPORTATION OFFICIALS IN COOPERATION
WITH THE FEDERAL HIGHWAY ADMINISTRATION

AREAS OF INTEREST

Planning
Forecasting
Socioeconomics
(Highway Transportation, Public Transit, Rail Transportation,
Air Transportation)

TRANSPORTATION RESEARCH BOARD
NATIONAL RESEARCH COUNCIL

OVERVIEW

If the living standards to which all Americans aspire are to be satisfied over the next quarter-century and beyond, the United States will need to achieve a long-run rate of growth in the Gross National Product of some 3.5 percent annually. Yet most long-term forecasts foresee no more than 2.6 percent real growth if current trends continue.

Productivity: The Key to Economic Vitality

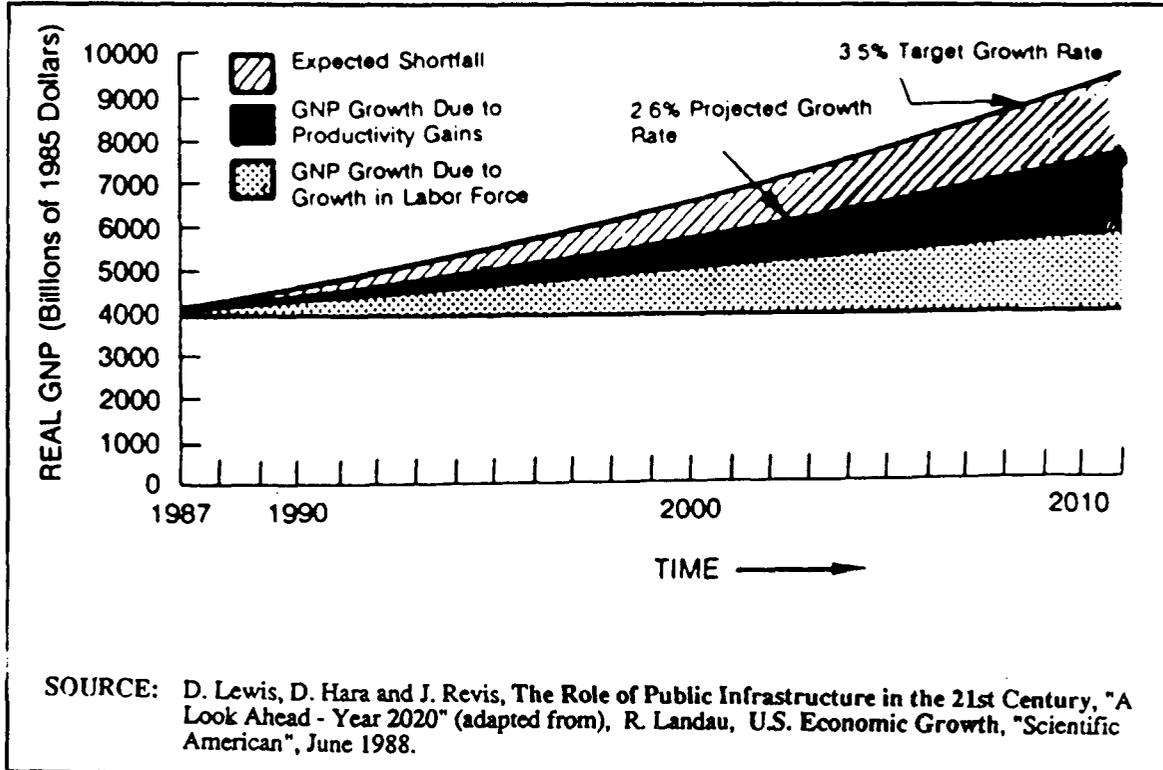
Which "current trends" need to be redirected if the nation is to pick itself up by its economic bootstraps? The Gross National Product -- the sum of all goods and services produced within domestic borders -- may be viewed as the number of workers times the output, or production, per worker. Growth in the Gross National Product will come from these two sources, growth in the labor force and growth in productivity.

The sources of growth which fueled America's 20th century rise to world prominence are changing sharply in their relative importance to future economic vitality. An aging society in particular, but also less net immigration, dictate much slower growth in the labor force in the 1990s and beyond. As a result, there is now widespread consensus that productivity growth must shoulder the nation's economic development and expansion into the 21st century. To achieve the target level of some 3.5 percent annual growth over the next 25 years, an increase in the yearly growth rate in productivity of 0.8 percent is needed. Although a 0.8 percent growth target for productivity may seem small on an annual basis, the compound effect over many years would be substantial (Overview Figure 1).

To be sure, growth in the Gross National Product is not to be regarded as a good thing regardless of its cost. Growth has implications for environmental and other living standards that are not measured by GNP and these have critical economic implications of their own. And the way in which economic expansion is shared between regions and individuals occasions independent priority. Growth for growth's sake has never been the center-piece of American public policy. Nevertheless, the fact stands that growth, through acceptable means and at acceptable costs -- "sustainable development" -- is the only means available to recover and sustain ground in American living standards, and most of the increased growth can be achieved only through increased levels of productivity.

The Key Role of Capital Investment in Promoting Productivity Growth

Whereas productivity is the key to economic growth, the rate of capital investment -- all investment, both private and public -- is key to improved productivity. It is well known that the productivity of labor depends to a large extent upon the total quantity and quality of capital per worker. The greater the capital intensity per worker, the more leverage the worker has on production. Research has documented a strong relationship between the growth rate in capital investment per worker on the one hand and the growth rate in labor productivity. Nations with high capital formation display high growth rates in labor productivity and vice versa. With the lowest growth rate in capital investment per worker among the nations of North America, Europe and Japan, the United States has also realized the lowest rate of growth in labor productivity.



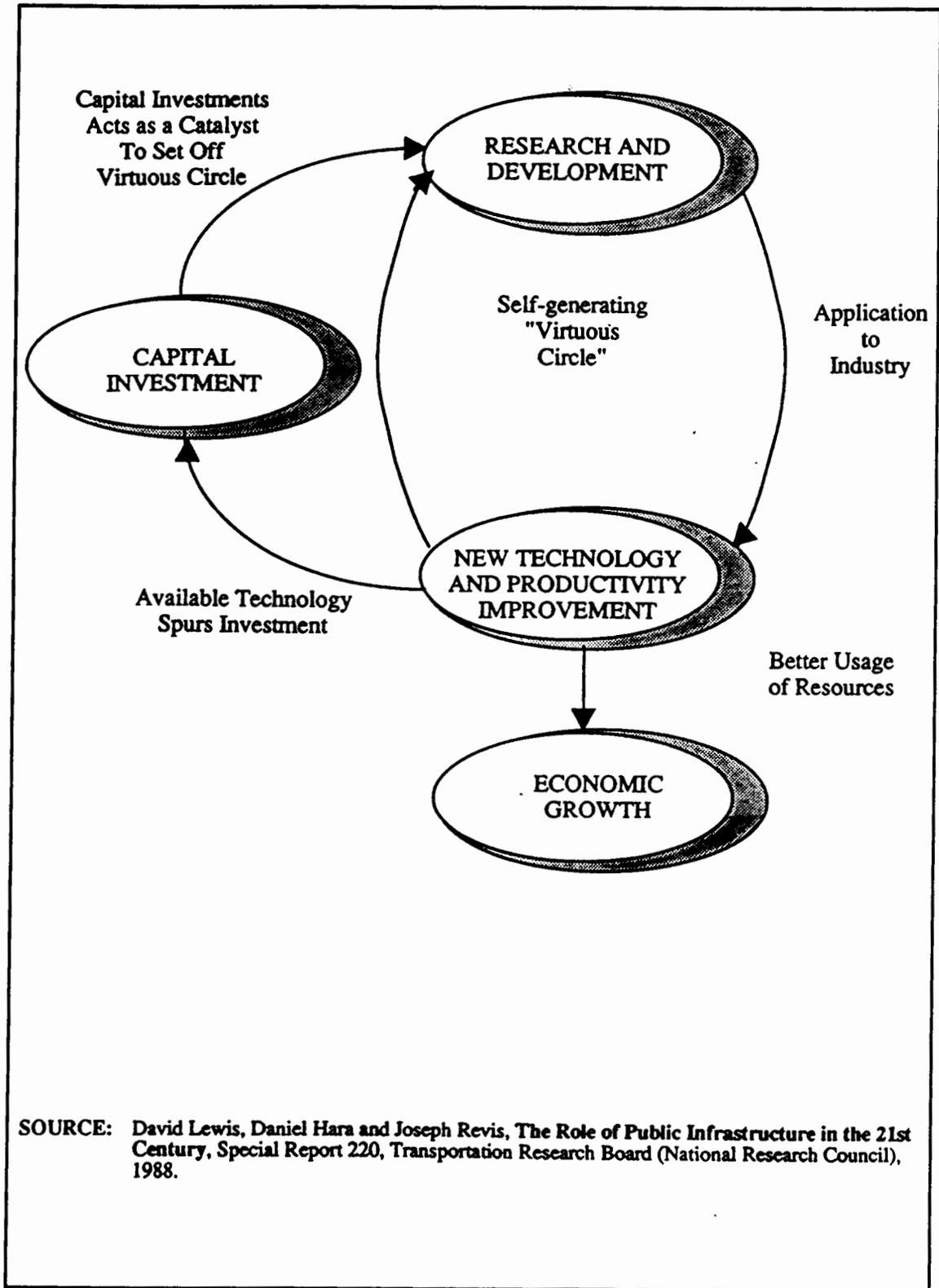
OVERVIEW FIGURE 1: PRODUCTIVITY AND LABOR CONTRIBUTIONS TO REAL GNP GROWTH

How is it that capital investment stimulates technological advance and productivity growth? According to recent economic research, the answer may be found in the way technological change is incorporated into capital equipment and facilities (see Overview Figure 2). Except for a small part devoted to basic science, research and development is seldom undertaken unless its results are expected to be applied in new facilities and superior operating modes that can improve productivity, reduce costs or raise the quality of goods and services.

Therefore, a larger rate of investment creates a market for technological improvements, spurring technological advance and improved productivity. The following quotation from the *Brookings Institution Review*¹ sums up the importance of capital formation to the nation's economic future:

If the United States wants to take advantage of the robust high correlation between capital-per-worker and growth and raise real living standards, it will need to adopt stable policies favoring long-term investment. The business cycle and long-term growth must be viewed from one overall perspective. Economists may quarrel over whether growth stimulates investment or vice versa, but in practice the order is immaterial. Supply is no longer assured, even if demand is stimulated, because of the long gestation periods now required to adopt technology more efficiently. What matters is that investment in productive physical capital can promote growth, as can the proper and stable management of macroeconomic policy by the government and of individual companies by the private sector.

¹ Ralf Landau, *Capital Investment: Key to Competitiveness and Growth*, *The Brookings Review*, September 1990



SOURCE: David Lewis, Daniel Hara and Joseph Revis, *The Role of Public Infrastructure in the 21st Century*, Special Report 220, Transportation Research Board (National Research Council), 1988.

OVERVIEW FIGURE 2: ECONOMIC GROWTH THROUGH CAPITAL INVESTMENT

The Special Role of Public Investment

There is wide-spread consensus that higher rates of capital investment are key to the future growth of productivity and living standards. What, then, is the specific role of investment in transportation infrastructure?

Public works are a fundamental and necessary part of the nation's total capital stock. Chosen and planned carefully, transportation investments can generate time savings and reductions in vehicle operating expenses that yield productivity gains well in excess of the investment and environmental costs. In addition, recent studies of industrial logistics show how retail businesses and many other sectors of industry and commerce explicitly incorporate transportation improvements into their production and distribution technology, often "substituting" the transportation system for expensive storage facilities and heavy inventories to reduce overheads and improve competitiveness. Any strategy to boost productivity and achieve higher economic growth for states and the nation as a whole can recognize a legitimate and increasingly significant role for public infrastructure.

To say that more infrastructure investment is necessary, however, is partly to miss the point. In the private sector, profit seeking market forces help executives and decision makers ensure that more investment will be good investment. In the public sector, where market forces are weak and objectives multi-faceted, executives and decision makers need to make special efforts to ensure that transportation investments yield productive gains to the economy and that these exceed the costs of achieving them. The challenge is two-fold:

- The executive must ensure that the objectives assigned to transportation policies and investment programs are properly targeted; policies should not aim to influence aspects of the economy over which transportation has little effect or to achieve aims that are better served by non-transportation initiatives; and
- The executive must ensure that transportation policy and investment opportunities are appraised with methodologies appropriate to the objectives at-hand.

Appropriate Objectives for Transportation Investment

The economic objectives of transportation policies and investments can relate to the distribution of economic activity (how the pie is shared); to growth in the volume of economic activity (the size of the pie); or to both. In general, transportation policies and investments are far more effective in promoting productivity, economic growth and improved living standards they are as instruments of redistribution.

The weight of available evidence indicates that transportation policies and investments make very little difference to total employment and income in a region. While studies often report large numbers of jobs either directly or indirectly associated with transportation facilities, more in-depth investigations find that virtually all employment associated with transportation investments would be absorbed elsewhere in the labor market if the investment were not to take place. (The jobs are not "incremental"). Only where a regional economy displays long-term structural unemployment can regional net gains in employment and income stem from transportation policies and projects. Even then, the gains are typically small.

On the other hand, many transportation investments yield rates of return up to 10-times the yield on typical private sector investments. Many of these investment opportunities are long-overdue, as much as 10 years in some cases, from the viewpoint of spurring productivity and economic growth. Policies and investments aimed at reducing congestion and increasing the extent of automation in transportation systems offer especially high gains in productivity and growth. Congestion and aging technologies may thus be viewed as bottlenecks not just to traffic, but to productivity and economic growth itself. On the other hand, the impact of such projects on the distribution of regional economic activity (employment and income in particular) are very modest in relation to the overall size of regional economies, indicating a much smaller relative distributional impact.

While productivity gains alone can often justify the economic costs of transportation investments, this is rarely (if ever) the case with the employment, income and other targets of regional redistribution. Shifting the uneven distribution of economic prosperity, both nationally and among the regions and localities of individual states, has long been a priority of state and local policy makers; more often than not, state and local transportation investments claim employment impacts as their main objective. This emphasis needs to shift. If one region grows at the expense of others without generating a net addition to the sum of all economic activity, there will be no contribution to economic growth and living standards overall will stagnate and decline. Transportation executives need to emphasize productivity and growth over the redistribution of economic activity as the principal objectives of transportation policies and investment programs.

Appropriate Methodologies for Transportation Investment

From the executive's point of view, a "methodology" is simply a means of obtaining information to help guide policy and investment decisions towards the achievement of their objectives. Information is, without doubt, the decision maker's most important resource -- good information fosters good decisions while poor or inappropriate information fosters bad decisions.

Only about one-third of all transportation investment appraisals conducted over the past twenty years applied methodologies of relevance to growth in productivity, output or living standards. The remaining two-thirds produced information about the prospective redistribution of employment and income alone. Without growth-related tests, decision makers cannot discern whether or not proposed policies will yield increases in productive economic activity and living standards.

Whether growth is defined in terms of productivity, gross output or the standard of living, it can only occur if more of value is put into the economy than is taken out (spent) in order to achieve it. Only by gauging transportation policies and investments in terms of their rate of return can decision makers assess their implications for productivity and economic growth.

In assessing transportation policies, rate of return computations must embody impacts beyond those of direct consequence to the executive's responsibility area. For example, in addition to changes in the structural sufficiency of pavement expected to result from a proposed road improvement program, the highway executive needs to examine the proposal's monetary implications for vehicle operating costs and time savings, both in relation to the capital expense and future maintenance costs associated with the proposal.

As well, impacts on parties other than users of the transportation system need to be taken into account, including effects on the environment and noise. Accounting for these negative "spillovers" in "social" rate of return calculations ensures that transportation-related productivity and growth strategies are not at odds with the higher aim of improved living standards. With these modifications to the traditional rate of return principle, transportation executives can use rate of return as an index of transportation's contribution to productivity, economic growth and the standard of living. The Primer demonstrates that decision makers can be assured that policies based on social rate of return will not cause reduced economic competitiveness even where output-enhancing programs are rejected because of environmental costs. This is because such costs are ultimately, if not immediately, borne in the form of reduced efficiency and thus diminished output (see Chapter 3).

In practice, the rate of return principle should be applied to establish both *whether* a policy or investment proposal promotes productivity and growth and *when* the economically appropriate time to invest occurs.

Whether to Invest. Translating Rate of Return into Net Present Value as a Criterion of Productivity. The rate of return test permits decision makers to discern whether transportation policies and investments make a worthwhile contribution to productivity and economic growth. This requires the use of a procedure called "discounting" (see Chapter 8.0) under which the minimum-required rate of return – such as the social opportunity cost of capital – is used to align all forecasts of costs and benefits to a common basis of comparison. This is accomplished by computing their equivalent present-day values, a procedure designed to compensate for the fact that different policies produce costs and benefits at different rates over their service lives. The present value of the costs is then subtracted from the present value of the benefits, resulting in the *net present value*. As shown in Overview Table 1, there is a direct, simple relationship between rate of return and net present value. Although one is as good as the other in assessing a single investment proposal, net present value is the appropriate yardstick for *comparing* the economic merits of alternatives.

If the net present value of a prospective policy or investment is greater than zero, it may be considered a worthwhile contribution to productivity and well worth funding (for it means that the minimum-required rate of return is assured). The net present value criterion also permits alternative policies and investments to be ranked in order of merit. Policies and programs with higher net present values promote more productivity and growth than those with lower results. Due to certain mathematical anomalies that can arise in the use of rate of return to rank alternatives, the executive should always insist that policy and investment proposals be presented in terms of their estimated net present values.

In addition to net present value, there are other popular measures that provide interesting supplemental growth-related information for use in decision making. As shown in Overview Table 1, the "internal rate of return" indicates the *extent to which* the expected return on investment exceeds or falls short of the minimum-required rate of return and thus provides insight into project risk. The Benefit-Cost Ratio indicates the dollars of benefit generated by the policy or investment in question for each dollar cost. While these indicators provide decision makers with additional useful information, only net present value may be regarded as the basis for establishing, categorically, whether or not a prospective investment is economically worthwhile (see Overview Box 1).

**OVERVIEW TABLE 1:
KEY MEASURES OF PRODUCTIVITY AND ECONOMIC GROWTH**

<u>Measure of Worth</u>	<u>Definition</u>	<u>Interpretation</u>
Net Present Value	Present-day value of benefits minus present-day value of costs.	NPV greater than zero means project is economically efficient. Projects are ranked according to NPV.
Rate of Return	The discount rate at which NPV=0	Rate of return should exceed pre-set hurdle rate to qualify for consideration.
Benefit-Cost Ratio	Present value of benefits divided by the present value of costs. Indicates dollars of benefit per \$1.00 of cost.	A ratio of greater than one means the project is worthwhile.
<u>Measures of Timing</u>		
First-Year Benefit	Benefits in the first year after construction divided by costs to date including interest paid during construction, expressed as a percent.	A ratio equal to the hurdle rate means the project is optimally timed. A ratio below the hurdle rate means the project is premature. A ratio above the hurdle rate means the project is overdue.
Pay-Back Period	Number of years until capital recouped through the flow of benefits.	A short pay-back period means less risk.

OVERVIEW BOX 1

CASE STUDY

**TRANSPORTATION, PRODUCTIVITY AND OVERDUE INVESTMENT:
The Use of Rate of Return; Net Present Value; and First-Year Benefit Tests**

In 1982, the Federal Aviation Administration formulated a \$24 billion plan to modernize the nation's air traffic control system. Through automation, the Plan would increase capacity to handle traffic, diminish risks of mid-air collision and other hazards, and shorten flight times by allowing aircraft to follow more direct routes. Facility consolidation and staff reductions from automation would increase productivity and reduce operating and maintenance costs.

Rate of Return

On the basis of these benefit and cost projections, the CBO calculated that the annual rate of return to be expected from the FAA plan over the two decades is 24.3 percent -- a healthy return by any standard (see Summary Table). Indeed, measured against the commonly used if somewhat arbitrary standard of 10 percent set by the Office of Management and Budget (OMB) for federal investment, it was concluded that the FAA plan is likely to offer very good value.

CBO noted that another useful guide to the economic value of a capital project is the present value of the expected benefits minus the costs (net present value). Using 10 percent rate of return to adjust future costs and benefits to their present-day values, the benefits of the FAA plan were estimated to exceed its costs by \$9.1 billion in net productivity gains.

Forecasts	Return on Investment		Timing	
	Rate of Return (in percents)	Benefit-to-Cost Ratio <i>g/</i>	Benefits Minus Costs (in billions of dollars) <i>Net Present Value</i>	Return in the First Year after Completion (in percents)
Under FAA Assumptions	24.3	2.3:1	9.1	14.9
Under Lower Traffic Forecast Scenario	21.3	2.0:1	6.8	13.1

SOURCE: Congressional Budget Office.

- a. Benefits and costs are discounted to their 1982 values at the annual rate of 10 percent.

Timing and Identification of Overdue Investments

The Congressional analysis also looked closely at the project's timing from the viewpoint of productivity and economic growth. Using the First-Year Benefit ratio, the study concluded that since the return in the first year after project completion was likely to *exceed* the minimum-required rate of return, automation of the system was actually overdue.

The recent application of this test of infrastructure investment timing to airport expansion projects at Vancouver and Minneapolis-St. Paul indicate that these investments are each more than 10 years overdue (First-Year Benefit Ratios in each case exceed 100 percent, more than ten-times the 10 percent minimum-required annual rate of return set for these investments).

In the case of the air traffic control system and that of airport expansion in Minneapolis-St. Paul, evidence about timing strongly influenced decisions to undertake large-scale investments.

Net Present Value Versus Sufficiency Ratings and Cost-Effectiveness Analysis as a Basis for Infrastructure Decision Making. Many states, localities, transportation authorities (and the federal government) use pavement sufficiency ratings, volume-to-capacity criteria and various forms of cost-effectiveness analysis to judge the merits of alternative investment policies, programs and projects. The executive thus needs to know whether these approaches will lead decision makers to the most economically productive projects.

All the evidence, both theoretical and actual experience, indicates that sufficiency ratings, volume-to-capacity criteria and cost-effectiveness tests do a poor job of helping decision makers find the most productive transportation policies and projects. Where the economic aims of transportation policies include diminished vehicle operating costs, reduced congestion and delay, enhanced safety and environmental conditions and stronger business and industrial productivity, net present value leads to different and substantially better investment decisions than sufficiency ratings or cost-effectiveness analysis.

The Highway Case. Highway sufficiency ratings -- engineering standards used to evaluate the structural, safety and level of service attributes of roadways -- are used by most states to rank construction projects. As well, the Federal Highway Administration and a number of states have devised cost-effectiveness tests as a basis for decision making. These tests are typically measured by the capital cost of a proposed improvement divided by the projected change in sufficiency rating. In some cases, the sufficiency rating is first multiplied by the annual average daily traffic over the roadway in question in order to favor the improvements of heavily travelled over lightly travelled roads. A few states use discounted life-cycle cost in forming the cost-effectiveness ratio (capital costs and plus maintenance costs expected to be incurred in each year of a project's estimated life, all expressed in the present day equivalent and then divided by the sufficiency rating).

Economic theory predicts that the benefits of roadway and network improvements will be greater (maximized, in fact) if net present value is used instead of sufficiency ratings and cost-effectiveness tests as a basis for decision. This has been confirmed in tests of actual projects. These tests show that net present value test guides decision makers to projects with significantly greater highway benefits than those arising under other criteria. This means that more vehicle cost savings, reductions in delay, safety and environmental benefits and business and industrial productivity gains will be achieved if decisions are guided by the net present value criterion as compared with the application of sufficiency ratings or cost-effectiveness tests (see Overview Box 2).

An advantage of the sufficiency rating and cost-effectiveness approaches is their broad acceptance in the highway planning community. It is clear however that the use of these approaches for investment decision making causes a major sacrifice in the economic benefits to be drawn from transportation infrastructure and in the contribution of transportation investment to productivity and economic growth. Executives should thus insist upon the availability of net present value information as part of the highway investment decision making process.

The Transit Case. The net present value criterion has also been found to be the only reliable test of economic performance in other aspects of transportation infrastructure. In theoretical tests, the London School of Economics has concluded that sizeable reductions in welfare and economic living standards can result from the use of cost-effectiveness tests in lieu of net present value

OVERVIEW BOX 2

CASE STUDY

**Net Present Value versus Sufficiency Ratings and Cost-Effectiveness Analysis
as a Basis for Highway Investment Decisions**

The Texas Transportation Institute compared three techniques for ranking and selecting highway construction projects under a budget constraint. Benefit-Cost Analysis was used to estimate net present values for 1,942 capacity-related projects. Sufficiency ratings and cost-effectiveness tests were also developed and all projects were ranked accordingly.

The net present value criterion was found to guide decision makers to better and more economically sound highway projects than either of the other two approaches. The table below reports cumulative estimated benefits in the form of vehicle cost savings; time savings; safety and environmental benefits; and business and industrial productivity gains. For a ten-year budget of \$5.7 billion, decisions based on the Net Present Value procedure yield over \$22 billion more benefits than decisions based upon the sufficiency rating and some \$7.8 billion more than the cost-effectiveness approach.

**Cumulative Highway Improvement Benefits as Selected
Budget Levels, by Decision Criterion**

Ranking and Decision Criterion	Cumulative Benefits (\$ Billion) for Cumulative Cost of:		
	\$0.785 Billion (One-Year Program)	\$3.551 Billion (Five-Year Program)	\$5.742 Billion (Ten-Year Program)
Texas Sufficiency Rating	\$ 7.316	\$ 24.610	\$ 36.512
Texas Cost Effectiveness	12.980	39.034	51.618
Net Present Value	18.780	45.723	59.202

SOURCE: Texas Transportation Institute, 1987

maximization in transit decision making.

Tests with actual projects (see Overview Box 3) confirm that cost-effectiveness tests can deter decision makers from choosing transit projects with the highest potential contribution to productivity and economic growth.

The Airport Case. Many airport authorities use volume-to-capacity criteria to make judgements about the need for runway, taxiway, terminal, parking and other capital investment decisions. Here the evidence mirrors that of the highway and transit cases. Volume-to-capacity criteria are necessarily arbitrary, indicating nothing about whether or when new investment is economically worthwhile. Case studies demonstrate that volume-to-capacity tests in practice tend to understate the level of desirable investment and fail to reveal the urgency of investment opportunities from the perspective of their contribution to productivity and growth.

When to Invest. Net Present Value and the First-Year Benefit Ratio as an Index of Optimal Timing. Though critical to economic success, the right timing for policies and investments is often overlooked in transportation investment planning. Since productivity benefits, such as fuel and time savings, often increase over time as traffic levels grow, an investment that appears worthwhile overall may draw principally on distant forecasts in order to display a strong net present value. In the early years, such projects often display very poor rates of return, to be offset by stronger returns later on. The construction of Dulles International Airport near Washington DC is a case in point. Though clearly a highly productive investment, Dulles did not begin to generate reasonable returns until 15 years after its construction. In such cases, it is economically worthwhile to hold-off implementation until the rate of return is expected to achieve minimum-requirements in the nearer term, thereby liberating capital dollars for more productive policies and investments in the meantime.

Table 1, the *first-year Benefit* test provides an unambiguous check on whether the proposed timing of a policy or investment is economically sensible in terms of net present value. Executives need to be aware that the optimum year in which to commission an investment is the start-date that maximizes its net present value. Net present value can be shown to be maximized when the benefits in the first year after commissioning an investment, divided by the total costs incurred to that date (including interest), is equal to the minimum-required rate of return. If this ratio -- called the *first-year Benefit Ratio* is more than the minimum-required rate of return, it means that delaying the project would increase its net present value. On the other hand, if the first-year benefit ratio is less than the minimum-required rate of return, the policy or investment may be said to be overdue.

The application of this test to recent major transportation investment proposals in Minneapolis-St. Paul, Vancouver, British Columbia, the federal Air Traffic Control System and others indicate that a great many infrastructure investments are significantly overdue from the viewpoint of maximizing the rate of growth (both regionally and nationally) in productivity, output and living standards. Many projects display projected rates of return in their first year of operation in excess of 100 percent.

Other measures of timing -- such as the number of years an investment needs to break-even (ie, for the value of productivity gains to match the investment cost) -- provide useful information for decision makers. The faster they pay-back the less reliant the investment's return is upon

OVERVIEW BOX 3

CASE STUDY

**Net Present Value versus Cost-Effectiveness Analysis as a Basis
for Transit Investment Decisions**

Many transit authorities, as well as the federal government, use cost-effectiveness tests to help guide investment decisions. Tests such as cost per new-rider do help in the search for investments that maximize the number of travellers attracted to transit for each dollar spent on facilities and services. Such tests do not, however, indicate which alternatives offer the highest net economic returns nor whether the economic benefits of transit projects, such as time savings and environmental gains, outweigh their costs and thus contribute to productivity and economic growth.

Tests conducted in preparing the Primer confirm that cost-effectiveness and net present value tests can yield very different economic signals to decision makers. The Case Study reported in the Table below indicates that, for the city in question, the cost-effectiveness test favors a light rail option whereas the net present value criterion indicates that an express bus approach is likely to yield a higher net economic benefit.

The Table also indicates a risk that none of the options considered are likely to yield benefits in excess of costs (all net present values being negative). This information would be unavailable with only cost-effectiveness information.

Like any forecast, however, net present values should be viewed in the context of sensitivity and risk analysis. Express Bus Option Two, for example, produces an NPV near zero, indicating a broadly satisfactory rate of return. As well, a longer assumed life for each of the options shows that the Light Rail Two alternative is likely to yield a positive Net Present Value. The Express Bus Option Two, however, remains the most economically attractive from an economic perspective.

**Economic Benefits of Alternative Transit Improvements
in a Selected Urban Area, by Alternative Decision Criteria**

Alternative	Cost-Effectiveness (Cost Per New Rider)	Net Present Value (Millions)
Transportation System Management	\$ 3.71	-\$ 5.60
Express Bus Option One	\$18.18	-\$16.40
Express Bus Option Two	\$ 3.12	-\$ 0.30
Light Rail Option One	\$ 5.86	-\$46.90
Light Rail Option Two	\$ 2.87	-\$ 8.60

relatively distant and uncertain forecasts. This is obviously an attractive trait of any prospective investment but, again, optimality requires the maximization of net present value.

Returns Associated with Industry Restructuring and Network Economies

In appraising the rate of return of many prospective transportation policy and investment possibilities it is sufficient to estimate the savings in vehicle operating costs and the value of time savings as the principal investment benefits. It is now understood however that this will only be sufficient when there is no significant change in the production processes and logistics of firms in response to the investment.

Where changes in production logistics can be expected, however, the conventional yardstick of "user-benefit" fails to measure all significant economic benefits. This raises the concern that the sum of all infrastructure projects approved according to conventional approaches to rate of return and net present value maximization will fail to achieve the level and mix of transportation investments that maximizes transportation's contribution to productivity, economic growth and living standards.

It is possible, for example, that major network improvements can lead firms to substantially restructure their logistics and distribution networks. This is because reduced congestion throughout a network improves the reliability of delivery schedules so that smaller and more frequent deliveries are made; this in-turn facilitates reduced inventory, handling and packaging costs. As shown in Overview Box 4, firms may also eliminate distribution centers, clustering fewer depots around key points in the improved transportation network. Case studies suggest that failure to account for such network economies can lead to a substantial understatement of the prospective impacts of transportation investment on productivity and economic growth.

The Primer provides a newly developed technique, called Industrial Restructuring Analysis, to help measure and quantify these impacts. Such techniques, and the questions they address, are in their infancy and executives need to approach them with care. An awareness of the question, however, should open up productive new lines of research.

Investment Appraisal, Living Standards and Sustainable Development

Infrastructure projects are often delayed, sometimes indefinitely, because of local environmental concerns. To be sure, transportation investments can create measurable environmental costs; but new methods of evaluation also reveal that the economic benefits are often far larger still, large enough in fact to cover environmental mitigation costs (insulating homes against highway or aircraft noise, or replacing wildlife habitat, for example) while still earning a strong economic return. Yet this "sustainable development" aspect of transportation infrastructure is rarely conveyed to the public through the investment appraisal process. Nor do typical appraisals include mitigation and compensation programs within the range of alternatives and implementation plans considered. As pressures mount for environmentally stable public investment planning, executives will need to present investment plans that demonstrate their scope to generate economic gains that are sufficient to cover the costs of mitigation.

OVERVIEW BOX 4

CASE STUDY

Accounting for Industrial Productivity Benefits Associated with Major Network Improvements

Sainsbury's, Britain's largest supermarket chain, considered the impact of a road network improvement on food distribution. The road improvements are seen to have two impacts. One is to reduce the driving time required for trips. The second, as a result of the faster driving time, is to permit the firm to make a major structural change in logistics, namely to reduce the number of its depots from 6 to 5. The closure of depots requires an increase in the number of miles travelled of 9.5%, but the additional cost is outweighed by the savings from closing a depot. Savings in closing the depot come from reduced inventory holdings and economies of scale in handling increased volumes of goods with one less depot.

The firm looked at the measurement of benefits in two ways. Case A, counts only the savings in driving time and associated costs, assuming that the structure of the firm's operations remains the same. Case B, considers the additional impact from the reduction in the number of depots.

Savings from Improvements in Road Network

	Per case handled
	British Pence (p)
<i>Case A</i>	
- Transport savings without restructuring	1.3
<i>Case B</i>	
- With Restructuring	
Marginal volume benefit	1.6
Stock saving	<u>0.5</u>
	2.1
<i>Less extra transport cost</i>	<u>0.5</u>
Total	1.6
- <i>Extra benefit over transport savings</i>	0.3 over 1.3p = 23%

The analysis indicates that true benefits to the firm, including the benefits of restructuring, are 23 percent higher than those captured by conventional Benefit-Cost practice which would measure only the direct benefits from faster travel time.

Formal theoretical extensions of the traditional Benefit-Cost framework developed for the Primer confirm the validity of the Sainsbury's analysis (see Technical Report). Other tests conducted in the Technical Report indicate that failure to account for productivity impacts can understate the true economic of major improvements by more than 100 percent.

The Executive's Good-Practice Check List

Although executives are in the hands of technical experts for the correct application of techniques and procedures, careful inquiry at periodic intervals throughout the evaluation process can ensure sound results. As every good manager knows, monitoring and challenging technical assumptions is critically important. It is also critical for executives to monitor and ask questions about seven key methodological attributes of any economic evaluation of transportation policies and investments, as follows:

- **Objectives.** Executives should insist that investment objectives be displayed first in terms of productivity, growth and living standards and secondarily in terms of distributional and other objectives. This promotes the search for productive transportation investments while still exposing opportunities to influence employment levels and other redistributive aims (Chapter 2).
- **Methodology.** Methods of investment appraisal should emphasize rate of return and net present value techniques. Assessments of the regional employment, income and output implications of policy and investment proposals need to be expressed as differences from the "without" investment case (ie, incrementally) in order to draw valid conclusions regarding distributional implications (Chapter 3).
- **The Base Case.** It is rarely adequate to treat the status quo as the basis of comparison for major investment proposals. Steps, including congestion pricing, to redress existing problems without the need for major capital investments can liberate scarce capital resources for even more productive transportation uses. The Base Case should represent, as closely as possible, the most efficient and productive use of existing assets, even if expenditures are required to achieve it (Chapter 4);
- **Benefits.** All benefits should be identified. Where major network improvements are contemplated (in all modes), benefits associated with industry restructuring and related logistics and productivity gains should be explored to the extent feasible (Chapter 6);
- **Costs.** All costs should be included in the economic appraisal, not just those to be financed from state and local resources. As well, all environmental costs should, to the fullest possible extent, be quantified and incorporated in the rate of return and net present value calculations (Chapter 7);
- **Discounting.** All benefits and costs must be projected over the expected service life of the *longest-lived option under review* and expressed in terms of their present-day values using the technique of discounting. Failure on either count can lead to very poor economic choices such as policies favoring annual pot-hole repair over long-term pavement reconstruction (Chapter 8);

- **Risk and Public Involvement.** The economic evaluation of public investments involves judgements, forecasts and assumptions, all of which are uncertain and subject to public controversy. Appraisals should be conducted with public involvement; they should expose all risk and uncertainty and quantify the implications for decision making to the fullest extent feasible (Chapter 9).

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MAY 5, 1993

INVESTMENT CRITERIA

SUBCOMMITTEE ON TRANSPORTATION

AND RELATED AGENCIES

COMMITTEE ON APPROPRIATIONS

U. S. HOUSE OF REPRESENTATIVES

HIGHWAY CRITERIA

STATEMENT OF PROJECT OBJECTIVES

1. Describe exactly what the project demonstrates.
2. Describe how the project's objectives will be measured.
3. Indicate if the project is included in the state's transportation improvement program. Include reasons for projects not in state plan.
4. Describe the scope of the project. For example, is it a complete project, a stand alone segment, or a segment contingent on later phases?

BASE CASE AND ALTERNATIVES STUDIED

1. Describe the base case. If the project under consideration is not approved, it is highly unlikely that in its place nothing would be done. It is more likely that smaller scale infrastructure modifications might be undertaken. Alternatively, electronic traffic control or other IVHS-type measures might be employed. Another alternative might use demand management techniques such as congestion pricing. These types of actions, in the absence of the principal project under consideration, constitute the base case.
2. Describe the alternative solutions that were considered, including the costs and benefits of maintaining the base case.
3. Describe extent of private sector involvement, especially regarding financing of the project.

EXPECTED ECONOMIC RATE OF RETURN

KEY ASSUMPTIONS

Please provide estimates for the following benefits:

1. Value of reduced congestion.
2. Value of energy conservation.
3. Value of improved air quality.
4. Value of reduced vehicle operating costs for fuel, oil, tires, depreciation, and repairs/maintenance.
5. Value of travel time savings.
6. Value of resulting safety improvements (e.g. reduced number of accidents).
7. Value of enhanced business and industry activities.
8. Value of other economic benefits, with description. For example, indicate recurring job creation resulting from the project.

Please provide estimates of the following costs on an annual cash--not accrual--basis.

1. Total cost of project, by year.
2. Total non-federal share of project cost, by year.
3. Nature of non-federal share of project cost (e.g. cash or in-kind).
4. Total cost of annual operation and maintenance expenses for the project.

5. Sources of all funds to cover annual operating expenses. (If tax, indicate whether dedicated to specific project or transportation uses in general, as applicable.)

6. Detail of total project costs by major functional category, including land/right-of-way acquisition, interest, and all other.

7. Total life cycle costs of project, by year and functional category. Include copy of life cycle cost analysis.

Please also provide the following information:

1. Current credit rating of the unit(s) of local government sponsoring the project. Indicate any changes in credit rating during the past 12 months.

2. Result of independent analysis performed on capital outlay estimate.

3. Net present value of project, defined as the present day value of project benefits less present day value of project costs. Provide the net present value as of three years after completion of the project, and for the entire life-cycle of the project.

4. The economic rate of return of the project, defined as the discount rate at which the project's net present value equals zero. Provide the estimated rate of return as of three years after completion of the project, and for the entire life-cycle of the project.

5. The benefit-cost ratio of the project, expressed as the present value of benefits divided by the present value of costs.

OTHER ECONOMIC EXPECTATIONS

1. Explain the extent and manner that IVHS features have been taken into account.
2. Provide estimated average traffic speeds, both in the base case and assuming completion of the project.
3. Provide status of environmental impact statement, including estimated completion dates of both draft and final statements.
4. Provide documentation of expressions of local opinion about the project.

FINANCIAL SUPPORT AND PERFORMANCE

1. Identify all funding already provided for project by source and year in which funds were authorized.
2. Of the funds previously authorized, identify the amount expended, obligated and committed to date.
3. Indicate if project qualifies for existing federal program funds. If project does qualify, explain why specific federal funds are requested. If project doesn't qualify, explain why not.

TRANSIT CRITERIA

STATEMENT OF PROJECT OBJECTIVES

1. Describe the scope of the project. For example, is it a complete project, a stand alone segment, or a segment contingent on later phases to reap maximum benefits?
2. Indicate the nature of the project. Is it a feasibility study, vehicle purchase, new construction, expansion of an existing facility, rehabilitation or reconstruction of an existing facility, or other?
3. Indicate if the project is included in the state's transportation improvement program. Include reasons for projects not in the state plan.
4. Indicate the estimated change in total transit ridership associated with the new transit program.

BASE CASE AND ALTERNATIVES STUDIED

1. Describe the base case. If the project under consideration is not approved, it is highly unlikely that in its place nothing would be done. It is more likely that smaller scale infrastructure modifications might be undertaken. Alternatively, electronic traffic control, more buses, or IVHS type measures might be employed. Another alternative might use demand management techniques such as congestion pricing. These types of actions, in the absence of the principal project under consideration, constitute the base case.
2. Describe the alternative solutions that were considered, including the costs and benefits of maintaining the base case.
3. Describe the extent of private sector involvement, especially regarding financing of the project.

EXPECTED ECONOMIC RATE OF RETURN

KEY ASSUMPTIONS

Please provide estimates for the following benefits:

1. Value of reduced congestion.
2. Value of energy conservation.
3. Value of improved air quality.
4. Value of costs avoided for future parking facilities. (Include number of future parking spaces eliminated.)
5. Value of travel time savings (both transit and other). Include profiles of trip times.
6. Value of reduced expenses resulting from fewer transit vehicles and consolidated operations.
7. Value of resulting safety improvements (e.g. reduced number of accidents).
8. Value of enhanced business and industry activities.
9. Value of improved land use patterns.
10. Value of other economic benefits, with description. For example, indicate recurring job creation resulting from the project.

Please provide estimates of the following costs on an annual cash--not accrual--basis.

1. Total cost of project, by year.
2. Total section 3 share of project cost, by year.
3. Total other federal share of project cost, by year.
4. Total non-federal share of project cost, by year.

5. Nature of non-federal share of project cost (e.g. cash or in-kind).
6. Source of non-federal share of project cost (e.g. dedicated tax, bonds).
7. Total local share of project cost, by year.
8. Nature of local share of project cost.
9. Source of local share of project cost, by year.
10. Total cost per new transit trip.
11. Total cost of annual operation and maintenance expenses.
12. Sources of all funds to cover annual operating expenses. (If tax, indicate whether dedicated to transit project or general transportation programs, as applicable.)
13. Detail of total project costs by major functional category, including land/right-of-way acquisition, parking facilities, other structures, vehicles, signalization and track, interest, and all other.
14. Total life cycle costs of project, by year and functional category. Include copy of life cycle analysis.

Please also provide the following information:

1. Current credit rating of the unit(s) of local government sponsoring the project. Indicate any changes in credit rating during the past 12 months.
2. Result of independent analysis performed on ridership and capital outlay estimates.

3. Net present value of project, defined as the present day value of project benefits less present day value of project costs. Provide the net present value as of three years after completion of the project, and for the life-cycle of the project.
4. The economic rate of return of the project, defined as the discount rate at which the project's net present value equals zero. Provide the estimated rate of return as of three years after completion of the project, and for the life-cycle of the project.
5. The benefit-cost ratio of the project, expressed as the present value of benefits divided by the present value of costs.

OTHER ECONOMIC EXPECTATIONS

1. Explain the extent and manner in which IVHS features have been incorporated.
2. Provide status of environmental impact statement, including estimated completion dates of both draft and final statements.
3. Provide documentation of expressions of local opinion about the project.

FINANCIAL SUPPORT AND PERFORMANCE

1. Identify all funding already dedicated to project by source and year in which funds were provided.
2. Of the funds previously authorized, identify the amount expended, obligated, and committed to date.
3. Indicate if project qualifies for existing federal program funds. If project does qualify, explain why specific federal funds are requested. If project doesn't qualify, explain why not.

AVIATION CRITERIA

STATEMENT OF PROJECT OBJECTIVES

These items are intended to provide information on the anticipated benefits and costs of the proposed project, as well as pertinent background information on the airport to be served. Projects to be covered include requests for facilities and equipment (F&E) and airport improvement program (AIP) funds. Some items may be applicable only to AIP projects.

1. Name and type of item(s) requested.
2. Airport and location.
3. Runway (if applicable).
4. Describe the scope of the project. For example, is it a complete project, a stand alone segment, or a segment contingent on later phases?

BASE CASE AND ALTERNATIVES STUDIED

1. Describe the base case. Include, at a minimum, the following information, and explain cases where the information is not applicable or not available:
 - (A). Number of aircraft operations for the past three years.
 - (B). Current average enplanements per aircraft.
 - (C). System revenue per enplaned passenger.
 - (D). Airport concession revenues per enplaned passenger.
 - (E). Maximum hourly parking utilization rate at the airport.
 - (F). Percentage of O&D and connecting passengers.

- (G). Number of hours of daily operation.
- (H). Average number of operations per hour of service.
- (I). Current aircraft delay hours at this airport/year.
- (J). Number of delay hours due to weather.
- (K). Average IFR conditions per month, expressed in number of operations and in percentage of total operations.
- (L). Current utilization per gate per day.
- (M). Current FAA airport-engineered performance standard for the predominant runway configuration at the airport:
 - (i) number of IFR operations/hour
 - (ii) number of VFR operations/hour
 - (If not available, provide air traffic control tower estimates for that runway configuration).
- (N). Current average IFR and VFR operations/hour.
- (O). ATC operational error rate at the airport for the past 12 months.
- (P). Near-midair collision rate at the airport for the past 12 months.
- (Q). A description of the actions that would be taken in the absence of the project under consideration to improve conditions at the facility. Examples could include other infrastructure improvements and alternative management techniques.

EXPECTED ECONOMIC RATE OF RETURN

KEY ASSUMPTIONS

Please provide estimates for the following benefits:

1. Growth in aircraft operations estimated for each year during the life of the project, expressed in both numbers and percentage growth.
2. That portion of the additional operations per year stated above which is directly attributable to establishment of the facility/equipment (i.e., growth that would not occur without establishment of the facility/equipment requested).

3. Reduction in aircraft delay hours attributable to the item requested one year and three years after completion.
4. Increase in utilization per gate per day resulting from the project one year and three years after completion.
5. Expected increase in acceptance rate (to be reflected in updated engineered performance standard) for the predominant runway configuration at project completion, for both IFR and VFR operations.
6. Change in ATC operational error rate resulting from the item requested one year and three years after completion.
7. Change in near midair-collision rate resulting from the item requested one year and three years after completion.
8. Increase in annual concession revenues attributable to the project.
9. Value of other economic benefits, with description. For example, provide the recurring job creation resulting from the project.

Please provide estimates of the following costs on an annual cash--not accrual--basis:

1. Project cost by fiscal year displayed by federal and non-federal funding.
2. Analysis of non-federal funding by source (e.g., PFCs, bonds)
3. Recurring operations and maintenance cost after completion.
4. Sources of all funds to cover annual operating expenses. (If tax, indicate whether dedicated to specific project or airport activities in general, as applicable.)

5. Total life-cycle costs of project by year. Include copy of life cycle cost analysis.

Please also provide the following information:

1. The benefit-cost ratio of the project, expressed as the present value of benefits divided by the present value of costs.

2. The economic rate of return of the project, defined as the discount rate at which the project's net present value equals zero. Provide the estimated rate of return as of three years after completion of the project, and for the life-cycle of the project.

3. Net present value of project, defined as the present day value of project benefits less present day value of project costs. Provide the net present value as of three years after project completion, and for the entire life-cycle of the project.

4. The value of passenger facility charges approved at the location, by fiscal year.

5. The value of passenger facility charges applied for but not yet approved, by fiscal year.

6. Indicate if the project qualifies for FAA entitlement funds for primary, cargo, or state airports funding.

7. Current credit rating of the airport. Indicate any changes in credit rating during the past 12 months.

FINANCIAL SUPPORT AND PERFORMANCE

1. Indicate all funding already dedicated to project by source and year in which funds were provided.
2. Of the funds previously authorized, identify the amount expended, obligated and committed to date.
3. Provide documentation of expressions of local opinion about the project.
4. Provide status of environmental impact statement, including estimated completion dates of both draft and final statements.



THE DIRECTOR

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503
May 21, 1993

CIRCULAR NO. A-131

TO THE HEADS OF EXECUTIVE DEPARTMENTS AND ESTABLISHMENTS

SUBJECT: Value Engineering

1. Purpose. This Circular requires Federal Departments and Agencies to use value engineering (VE) as a management tool, where appropriate, to reduce program and acquisition costs.
2. Supersession Information. This Circular supersedes and cancels OMB Circular No. A-131, Value Engineering, dated January 26, 1988.
3. Authority. This Circular is issued pursuant to 31 U.S.C. §1111.
4. Background. For the purposes of this Circular, value analysis, value management, and value control are considered synonymous with VE. VE is an effective technique for reducing costs, increasing productivity, and improving quality. It can be applied to hardware and software; development, production, and manufacturing; specifications, standards, contract requirements, and other acquisition program documentation; facilities design and construction. It may be successfully introduced at any point in the life-cycle of products, systems, or procedures. VE is a technique directed toward analyzing the functions of an item or process to determine "best value," or the best relationship between worth and cost. In other words, "best value" is represented by an item or process that consistently performs the required basic function and has the lowest total cost. In this context, the application of VE in facilities construction can yield a better value when construction is approached in a manner that incorporates environmentally-sound and energy-efficient practices and materials.

VE originated in the industrial community, and it has spread to the Federal Government due to its potential for yielding a large return on investment. VE has long been recognized as an effective technique to lower the Government's cost while maintaining necessary quality levels. Its most extensive use has been in Federal acquisition programs.

An August 1991 audit of VE in the Federal Government by the President's Council on Integrity and Efficiency concluded that more can and should be done by Federal agencies to realize the benefits of VE. Reports issued by the General Accounting Office and agency Inspectors General have also consistently concluded that greater use of this technique would result in additional savings to the Government.

5. Relationship to other management improvement processes. VE is a management tool that can be used alone or with other management techniques and methodologies to improve operations and reduce costs. For example, the total quality management process can include VE and other cost cutting-techniques, such as life-cycle costing, concurrent engineering, and design-to-cost approaches, by using these techniques as analytical tools in process and product improvement.

VE contributes to the overall management objectives of streamlining operations, improving quality, reducing costs, and can result in the increased use of environmentally-sound and energy-efficient practices and materials. The complementary relationship between VE and other management techniques increases the likelihood that overall management objectives are achieved.

6. Definitions.

a. Agency. As used in this Circular, the term "agency" means an executive department or an independent establishment within the meaning of sections 101, 102, 103(1) and 104(1), respectively, of Title 5, United States Code.

b. Life-cycle cost. The total cost of a system, building, or other product, computed over its useful life. It includes all relevant costs involved in acquiring, owning, operating, maintaining, and disposing of the system or product over a specified period of time, including environmental and energy costs.

c. Cost savings. A reduction in actual expenditures below the projected level of costs to achieve a specific objective.

e. Cost avoidance. An action taken in the immediate time frame that will decrease costs in the future. For example, an engineering improvement that increases the mean time between failures and thereby decreases operation and maintenance costs is a cost avoidance action.

d. In-house savings. Net life-cycle cost savings achieved by in-house agency staff using VE techniques.

e. Contracted savings. Net life-cycle cost savings realized by contracting for the performance of a VE study or by a Value Engineering Change Proposal submitted by a contractor.

f. Total Quality Management (TQM). A customer-based management philosophy for improving the quality of products and increasing customer satisfaction by restructuring traditional management practices. An integral part of TQM is continuous process improvement, which is achieved by using analytical techniques to determine the causes of problems. The goal is not just to fix problems but to improve processes so that the problems do not recur. Value engineering can be used as an analytical technique in the TQM process.

g. Value Engineering. An organized effort directed at analyzing the functions of systems, equipment, facilities, services, and supplies for the purpose of achieving the essential functions at the lowest life-cycle cost consistent with required performance, reliability, quality, and safety. These organized efforts can be performed by both in-house agency personnel and by contractor personnel.

h. Value Engineering Change Proposal (VECP). A proposal submitted by a contractor under the VE provisions of the Federal Acquisition Regulations (FAR) that, through a change in a project's plans, designs, or specifications as defined in the contract, would lower the project's life-cycle cost to the Government.

i. Value Engineering Proposal (VEP). An in-house agency-developed proposal, or a proposal developed by a contractor under contract to provide VE services, to provide VE studies for a Government project/program.

7. Policy. Federal agencies shall use VE as a management tool, where appropriate, to ensure realistic budgets, identify and remove nonessential capital and operating costs, and improve and maintain optimum quality of program and acquisition functions. Senior management will establish and maintain VE programs, procedures and processes to provide for the aggressive, systematic development and maintenance of the most effective, efficient, and economical and environmentally-sound arrangements for conducting the work of agencies, and to provide a sound basis for identifying and reporting accomplishments.

8. Agency responsibilities. To ensure that systemic VE improvements are achieved, agencies shall, at a minimum:

a. Designate a senior management official to monitor and coordinate agency VE efforts.

b. Develop criteria and guidelines for both in-house personnel and contractors to identify programs/projects with the most potential to yield savings from the application of VE techniques. The criteria and guidelines should recognize that the potential savings are greatest during the planning, design, and other early phases of project/program/system/product development. Agency guidelines will include:

(1) Measuring the net life-cycle cost savings from value engineering. The net life-cycle cost savings from value engineering is determined by subtracting the Government's cost of performing the value engineering function over the life of the program from the value of the total saving generated by the value engineering function.

(2) Dollar amount thresholds for projects/programs requiring the application of VE. The minimum threshold for agency projects and programs which require the application of VE is \$1 million. Lower thresholds may be established at agency discretion for projects having a major impact on agency operations.

(3) Criteria for granting waivers to the requirement to conduct VE studies, in accordance with the FAR 48.201(a).

(4) Guidance to ensure that the application of VE to construction projects/programs and other projects/programs, will include consideration of environmentally-sound and energy efficient considerations to arrive at environmentally-sound and energy efficient results.

c. Assign responsibility to the senior management official designated pursuant to section 8a above, to grant waivers of the requirement to conduct VE studies on certain programs and projects. This responsibility may be delegated to other appropriate officials.

d. Provide training in VE techniques to agency staff responsible for coordinating and monitoring VE efforts and for staff responsible for developing, reviewing, analyzing, and carrying out VE proposals, change proposals, and evaluations.

e. Ensure that funds necessary for conducting agency VE efforts are included in annual budget requests to OMB.

f. Maintain files on projects/programs/systems/products that meet agency criteria for requiring the use of VE techniques. Documentation should include reasons for granting waivers of VE studies on projects/programs which met agency criteria. Reasons for not implementing recommendations made in VE proposals should also be documented.

g. Adhere to the acquisition requirements of the FAR, including the use of VE clauses set forth in Parts 48 and 52.

h. Develop annual plans for using VE in the agency. At a minimum, the plans should identify both the in-house and contractor projects, programs, systems, products, etc., to which VE techniques will be applied in the next fiscal year, and the estimated costs of these projects. These projects should be listed by category, as required in the agency's annual report to OMB. VEP's and VECIP's should be included under the appropriate category. Annual plans will be made available for OMB review upon request.

i. Report annually to OMB on VE activities, as outlined below.

9. Reports to OMB. Each agency shall report the Fiscal Year results of using VE annually to OMB, except those agencies whose total budget is under \$10 million or whose total procurement obligations do not exceed \$10 million in a given fiscal year. The reports are due to OMB by December 31st of the calendar year, and should include the current name, address, and telephone number of the agency's VE manager.

The report format is provided in the Attachment.

Part I of the report asks for net life-cycle cost savings achieved through VE. In addition, it requires agencies to show the project/program dollar amount thresholds the agency has established for requiring the use of VE if greater than \$1 million. If thresholds vary by category, show the thresholds for all categories. Savings resulting from VE proposals and VE change proposals should be included under the appropriate categories.

Part II asks for a description of the top 20 fiscal year VE projects (or all projects if there are fewer than 20). List the projects by title and show the net life-cycle cost savings and quality improvements achieved through application of VE.

Part III requires agencies to submit a detailed schedule of year-by-year cost savings, cost avoidances and cost sharing with contractors for each program/project for which the agency is reporting cost savings or cost avoidances. The aggregate total of all schedules shall equal the totals reported in Part I.A. of the annual report.

10. Inspectors General audits. Two years after the issuance of this revised Circular, Agency Heads shall ask the Inspectors General (IGs) to audit agency value engineering programs to (1) validate the accuracy of agency reported value engineering savings and (2) assess the adequacy of agency value engineering policies, procedures and implementation of this revised Circular.

Periodically thereafter, agency IGs should audit agency reported VE savings as the need arises.

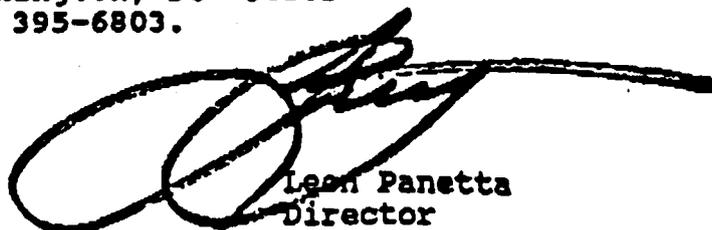
11. Related Guidance. In general, value engineering investments should have positive net present value when discounted with the appropriate interest rate, as described in OMB Circular No. A-94, section 8.c. For detailed guidance on value engineering, refer to the appropriate sections of the Federal Acquisition Regulations.

12. Effective date and Implementation. This Circular takes effect within 30 days of its publication in the Federal Register. Heads of departments and agencies are responsible for taking all necessary actions to assure effective implementation of these policies, such as disseminating this Circular to appropriate program and other staff, developing implementation strategies and initiating staff training. Since these policies must be implemented in the Federal Acquisition Regulation (FAR), agencies should not duplicate the development of implementing procurement regulations being undertaken by the Federal Acquisition Regulatory Councils. However, implementation of these policies in the FAR must be accomplished within the time period specified below, with inclusion in agency solicitations and resulting contracts, as appropriate, to occur immediately thereafter.

Pursuant to subsections 6(a) of the Office of Federal Procurement Policy Act, as amended, (41 U.S.C. 401 et seq.), the Federal Acquisition Regulatory Councils shall ensure that the policies established herein are incorporated in the FAR within 180 days from the date this Circular is published in final form in the Federal Register. Promulgation of final FAR regulations within that 180 day period shall be considered issuance in a "timely manner" as prescribed in 41 USC 405(b)."

13. Sunset review. The policies contained in this Circular will be reviewed by OMB five years from the date of issuance.

14. Inquiries. Further information about this Circular may be obtained from the Office of Management and Budget (OMB), 725 17th Street, NW, Washington, DC 20503 Telephone (202) 395-6803.


Leon Panetta
Director

Attachment

AGENCY FISCAL YEAR XXXX
ANNUAL VALUE ENGINEERING REPORT

PART I
Name, Title, Address and Phone Number of
Agency Senior Official Responsible for VE Program:

Agency VE Expenditures (\$'s invested in VE this fiscal year): \$ _____

Dollar Share of Savings Provided to Contractors: \$ _____

Dollar Thresholds for each VE category (if different from \$1 million):

TOTAL AGENCY NET LIFE - CYCLE COST SAVINGS ATTRIBUTABLE TO VE:

A. Summary of cost savings and avoidances reported by category (See B. below):

<u>Cost Savings</u>	<u>Cost Avoidance</u>	<u>Total Savings</u>	<u>Grand Total</u>
<u>In-House</u>	<u>Contractor</u>	<u>+ Avoidance</u>	<u>In-house +</u>
			<u>Contractor</u>
			<u>Savings + Avoidance</u>

B. Total Agency VE Net Life - Cycle Cost Savings and Cost Avoidances by Category:

<u>Category</u>	<u>Cost Savings</u>	<u>Cost Avoidance</u>	<u>Total Savings</u>	<u>Grand Total</u>
	<u>In-House</u>	<u>Contractor</u>	<u>+ Avoidance</u>	<u>In-house +</u>
				<u>Contractor</u>
				<u>Savings + Avoidance</u>

1. Acquisition
2. Administrative
3. Other (be specific)
 - a.
 - b.
 - c.

C. Please describe the steps you have taken to validate the reported cost savings, whether through IG audit or other measures. Attach additional sheets, if necessary.

AGENCY FISCAL YEAR XXXX
ANNUAL VALUE ENGINEERING REPORT

PART II.

VE PROJECT DESCRIPTION

List the top 20 VE projects by name. Show the VE expenditures, VE savings, and VE cost avoidances. Describe any quality or other non-quantifiable improvements resulting from VE.

<u>PROJECT TITLE*</u>	<u>In-house</u>	<u>VE Expenditures</u>	<u>In-House</u>	<u>Cost Savings</u>	<u>In-House</u>	<u>Cost Avoidance</u>
		<u>Contractor</u>		<u>Contractor</u>		<u>Contractor</u>

Description of Quality or other Non-Quantifiable Improvements:*

*Use additional sheets as necessary to include top 20 VE projects. Also, for each project listed, indicate what steps you have taken to validate the reported cost savings, whether through IG audit or other measures.

AGENCY FISCAL YEAR XXXX
ANNUAL VALUE ENGINEERING REPORT

PART III

PROGRAM/PROJECT NAME: CONSTRUCTION OF JOHN DOE BRIDGE

1994 1995 1996 1997 1998 1999 2000

1. Cost Savings:

2. Cost Avoidance:

3. Dollar Share of Savings Provided to Contractors:

4. VE Expenses Attributable to this Program/Project:
(including a pro rata share of Salary/Expenses)

5. For programs/projects not discussed in part II of the report, please discuss what steps you have taken to validate the reported cost savings, whether through IG audits or other measures. Attach additional sheets if necessary.

GAO

Report to the Chairman and Ranking
Minority Member, Committee on
Governmental Affairs, U.S. Senate

May 1992

**PROGRAM
PERFORMANCE
MEASURES**

**Federal Agency
Collection and Use of
Performance Data**



GAO/GGD-92-65



United States
General Accounting Office
Washington, D.C. 20548

General Government Division

B-247844

May 4, 1992

The Honorable John H. Glenn
Chairman, Committee on
Governmental Affairs
United States Senate

The Honorable William V. Roth
Ranking Minority Member
Committee on Governmental Affairs
United States Senate

Your Committee held a hearing in May 1991 on legislation that would require all federal agencies to develop standards and goals and to measure and report progress toward them. At that hearing, you raised questions about the current state of program performance measurement in federal agencies. In subsequent discussions with your staff, we agreed to survey major federal agencies to determine to what extent they already had developed performance standards and goals and had created at least some measures of progress toward these goals. We surveyed 103 federal agencies all of which had over 1,000 employees or over \$500 million in annual outlays.

Results in Brief

About two-thirds of the agencies in our survey said they had a single long-term strategic plan in place that defined their goals and objectives. In addition, over three-quarters of the surveyed agencies reported that they collected a wide variety of data to assess program performance. We also found that key performance measures were used for internal purposes and infrequently reported to external sources such as Congress and the Office of Management and Budget (OMB).

To validate responses and get a better understanding of how agencies were using performance measures, we visited a sample of 14 agencies. We found that most of these agencies used the information at the program level. However, such information is fundamentally different than that needed to manage or make strategic policy decisions for the agency as a whole.

On a broader scale, our survey of 103 agencies showed that only about half of the agencies with strategic plans said that they were using most or all of their existing measures to assess their progress in achieving the goals or objectives reflected in their plans. And only 9 of the 103 agencies reported having the organizational characteristics experts view as necessary to link

plans and measures, such as an office that collects performance measures and prepares regular reports on progress toward goals set in strategic plans.

Agencies we visited were using their performance measurement systems for a variety of purposes. Some were using them to ensure organizational accountability and efficiency. Others reported that they used existing performance measures to manage current operations (e.g., making budget decisions and determining individual employee performance assessments and rewards). However, few used them to help manage toward the long-term goals or standards set forth in their strategic plans.

Background

Traditional management practices involve the creation of long-term strategic plans and regular assessments of progress toward stated goals. Strategic planning is an effort to establish long-term goals and objectives that will shape and guide activities and programs to fulfill an organization's mission. Performance measures are a key tool to help managers assess progress toward the goals or objectives stated in their plans. They are also an important accountability tool to communicate agency progress to Congress and the public.

Program performance measurement is commonly defined as the regular collection and reporting of a range of data, including a program's

- inputs, such as dollars, staff, and materials;
- workload or activity levels, such as the number of applications that are in process, usage rates, or inventory levels;
- outputs or final products, such as the number of children vaccinated, number of tax returns processed, or miles of road built;
- outcomes of products or services, such as the number of cases of childhood illnesses prevented or the percentage of taxes collected; and
- efficiency, such as productivity measures or measures of the unit costs for producing a service (e.g., the staff hours it takes to process a Social Security claim or the cost to build a mile of highway).

Other data might include information on customer satisfaction, program timeliness, and service quality.

Managers can use the data that performance measures provide to help them manage in three basic ways: to account for past activities, to manage current operations, or to assess progress toward planned objectives. When

used to look at past activities, performance measures can show the accountability of processes and procedures used to complete a task, as well as program results. When used to manage current operations, performance measures can show how efficiently resources, such as dollars and staff, are being used. Finally, when tied to planned objectives, performance measures can be used to assess how effectively an agency is achieving the goals stated in its long-range strategic plan.

Having well-designed measures that are timely, relevant, and accurate is important, but it is also important that the measures be used by decision makers. While it is difficult to assess if and how measures are used, the existence of certain organizational characteristics, such as a central collection office and consolidated reports, can help ensure the use of measures. Nevertheless, while these characteristics may be important, they are not necessarily sufficient to ensure the use of performance measures. The use of performance measurement is more likely in cases where top management supports performance measurement and links the resulting measures to goals and objectives in strategic plans.

Approach

To assess the status of program performance measurement in the federal government, we surveyed 103 federal agencies with 1,000 or more employees or with annual outlays in excess of \$500 million. All but one agency returned our questionnaire. These agencies covered 87 percent of all federal employees and 92 percent of total outlays in fiscal year 1990 (see app. I for responding agencies). Respondents to the survey were generally located in their agency's planning, policy, or evaluation offices or in the office of the agency head.

We asked agencies to self-report on which, if any, of a listed variety of performance measures they used in all or part of their operations. We also asked how these measures were related to their efforts to monitor their progress toward the goals established in their strategic planning as well as their efforts to assess individual job performance. To validate the self-reported answers, we visited 11 of these agencies, as well as 3 other programs considered to have model systems that we learned about during our survey. We selected these agencies and programs because they represented a wide spectrum of the different approaches agencies were taking in developing and using performance measures. We found a variety of interpretations regarding some of the terms used in the survey, such as the term "outcomes of products or services." Nevertheless, we believe the

general results are indicative of the overall status of performance measures in federal agencies.

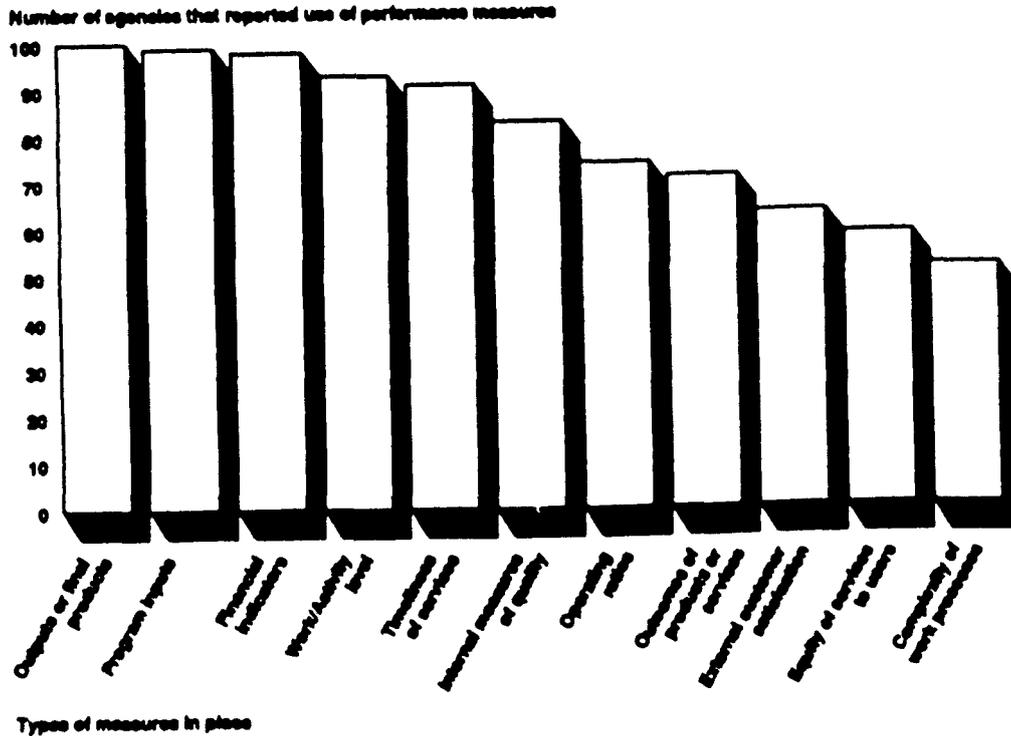
We did our work from June to December 1991 in accordance with generally accepted government auditing standards. Our results are based on interviews with selected agencies as well as survey information; we did not attempt to verify information provided by each of the 102 agencies. Appendix II contains more details regarding our scope and methodology, and appendix III is a copy of the survey sent to agencies.

Most Agencies Had Strategic Plans and Collected a Wide Variety of Measures

Most of the agencies reported that they had strategic plans and collected a wide variety of program performance measures. About two-thirds of the agencies (67) said they had a single long-term plan that contains goals, standards, or objectives for the entire agency or program. In addition, over three-quarters of the agencies (78) indicated they had long-term plans at the subcomponent level to set goals, standards, or objectives for their programs.

Nearly all agencies said they measured a range of performance, such as program inputs, work activity levels, and program outputs. Over 80 percent said they also collected internal quality and timeliness measures, and more than half measured external customer satisfaction, equity of service availability, or program outcomes. In all, over 82 percent of the agencies said they collected measures covering at least parts of their activities in 7 or more of the 11 broad categories of measures listed in the survey. Figure 1 shows the number of agencies and the different kinds of measures that the 102 responding agencies reported they use.

Figure 1: Types of Performance Measures Agencies Reported They Use



Note: The number of agencies responding was 102.

Note: Definitions of the measures in this figure appear in appendix III.

Most of the performance measurement data agencies collected were reported internally. For example, the Farmers Home Administration named 30 objectives which it measured regularly, but did not report to Congress or OMB. As a result of this limited reporting of measures, many policymakers have been unaware of much of the existing data. Moreover, managers within an agency might have also been unaware of existing measures if the data was only reported on a program level. In many cases, program level information—such as the numbers of tax returns processed—is different from what is useful at higher levels—such as the extent of noncompliance with tax laws due to confusion over the written instructions.

A Department of Labor study of federal agencies administering education and training programs reported that even in cases where program outcome data were collected, they appeared to serve no more than informational

purposes. This finding is supported more broadly by our survey results. Relatively few agencies that responded to our survey said that they reported key information to Congress or OMB. For example, of the agencies that collected information on external customer satisfaction, 44 percent reported this information to Congress and 32 percent to OMB. Likewise, of those that collected program outcome data, 68 percent reported this information to Congress and 54 percent to OMB.

Many Agencies Visited Used Performance Measures to Assess Organizational Accountability

Our interviews and a Department of Labor study of the use of employment and training performance measures in 39 federal programs indicated that measures typically were generated and used by program level units within an agency and focused on measuring work activity levels and outputs at the subcomponent level. Our interviews also revealed that in some cases, such as in grant-making agencies, performance measures were used for statutory compliance.

The following examples taken from our visits to the Federal Transit Administration (FTA), formerly the Urban Mass Transportation Administration, and the Federal Aviation Administration (FAA) show how these agencies have used performance measures to achieve accountability.

Federal Transit Administration

FTA, in the Department of Transportation, provides grants to states and localities to help develop, maintain, and operate their mass transit systems. An official said that to track its grant-making activities, FTA created a series of indexes that served as standards to assess the grant-making status among its regional offices. The indexes were based on measures of specific work activities such as the number of grants developed, grants managed, transportation improvement program reviews, and triennial reviews. While these measures were related to the efficiency and compliance efforts of the agency's grant-making activities, they were not used to assess progress toward its strategic plan or that of the Department.

Federal Aviation Administration

As a regulatory agency within the Department of Transportation, FAA said it used a system of performance measures to assess overall organizational accountability toward its mission of fostering a safe, secure, and efficient aviation system. The use of existing data provided information to be used for general management purposes instead of control of individuals or units.

FAA reported that it focused on programs and activities that promote safety by using performance indicators of ratios and comparisons. FAA used these historical trend measures to compare the targets set annually to measure agency progress. Typical indicators included year-to-year comparisons of security inspections, air traffic delays, and pilot deviations.

FAA said it delivered electronic monthly reports in an executive information system and prepared quarterly paper reports that contained concise information and were widely circulated among senior management. Managers were to use this information to get an overall sense of how FAA was doing.

Many Agencies Used Measures to Manage Operations

In order to see how well resources were being managed to accomplish tasks, many of the agencies we visited used performance measures to help make budget decisions, to assess employee performance, and to provide incentives. On our visits, we found more ties to individual employee assessment than any other management use. This was supported by survey results, which show over one-third of the agencies required the use of performance measures in senior management performance contracts. Three examples of agencies that use performance measures to manage operations are the Department of Defense (DOD), the National Archives and Records Administration, and the Job Training Partnership Act (JTPA).

Department of Defense

At the time of our visit, the Office of the Comptroller of DOD had begun to determine the unit costs of selected support activities, such as recruiting and supply management, in order to identify efficiencies and to make budget decisions. With operation and maintenance outlays of about \$85.7 billion in fiscal year 1992, "unit cost resourcing" was intended to help DOD reduce the costs of doing business by helping managers identify the costs of delivering service outputs and by helping them understand the long-term and indirect costs of producing specific outputs. With this knowledge, unit costing was intended to serve as a decision support system that could put DOD closer to budgeting a specific set of activities on the basis of what it actually costs to do the job.

According to a senior DOD official, unit cost resourcing was used as a tool to improve management with a focus on output, which requires employees to know what they produce, identifies customer-provider relationships, causes workers to examine the process for needed changes, and creates better cooperation between management and employees. According to

DOD's Comptroller's Office, these efforts called for a change in the management culture to develop different expectations of management.

National Archives and Records Administration

The work of the Archives consists of responding to requests for historical records and preserving those records. At the technician level, this labor intensive work involves repetitive tasks and takes place in a nontraditional workplace setting where supervision is difficult because staff have to search for records located in many places throughout the building and may be gone from their workplaces for hours. For these reasons, the Archives, with the support of its agency head, said it chose to measure individual performance by using industrial engineering methods. This required setting optimal standards of how long various tasks took to complete.

According to officials, operational technicians in two offices, the Office of National Archives and the Office of Federal Records Centers, started using engineered standards in 1985. The two offices that used the system covered about 11 percent of the Office of the National Archives' full-time equivalent employees and about 12 percent of the Office of Federal Records Centers' full-time equivalent employees.

Officials said technicians were expected to meet the established standards, which were given to them by management. For example, a technician might have been expected to complete 42 genealogical searches of a particular type in an 8-hour period. At the time of our visits, the Archives was in the process of writing detailed manuals describing the procedures for accomplishing tasks and how long each task should take.

The Archives's standards for routine tasks were the basis for quarterly incentive bonuses given to employees in the GS-4 to GS-6 range. When technicians reached or surpassed these standards, they were rewarded monetarily. Quarterly bonuses ranged from \$250 to \$400. Performance-based action had been taken against technicians who repeatedly failed to reach the standards.

The Archives had contracted for a series of studies to develop their engineered standards. For example, the first study in 1985 developed an engineered standard for retrieving requests for Revolutionary War Military Service records. This new standard was 63 percent higher than the traditional standard for record retrievals. In 1991, the Archives examined actual productivity figures for many of the work units covered by engineered standards and found, in most cases, significant increases in

productivity. For example, the unit that searches military records increased its productivity by 46 percent after the initial engineered standards were set and an additional 15 percent after these standards were fine tuned.

Job Training Partnership Act

Enacted in 1982, JTPA trains disadvantaged youth and adults in job skills and then helps them find employment. JTPA's Title II-A program is the first federal program with mandated performance standards as well as monetary incentives for exceeding the standards. Two examples of key measures Labor officials told us they had implemented were the proportion of persons who had ended the program and had a job 13 weeks after completing it and the average earnings of those employed 13 weeks afterwards. To allow for factors which might affect program outcomes, standards could be adjusted to reflect the characteristics of the participants and the local economy. With a focus on outcomes, the standards were applied to local programs.

The system was designed to be highly decentralized. Under the system, the national office is to approve state plans, identify national measures, set national performance standards, and allot funds to states on a formula basis. The states' role is to establish individual state plans, set performance levels for local programs, allocate funds to local programs on a formula basis, reward performers, identify technical assistance needs, and impose sanctions.

Six percent of JTPA funds were set aside at the state level for incentives and technical assistance. The incentives rewarded local programs that exceeded performance standards and those that served target groups or provided intensive services. A senior labor official stated that this method of providing incentives had improved performance.

Few Agencies Visited Used Measures to Manage for Results

Only a few of the agencies we visited seemed to use performance measures to manage toward long-term objectives. One explanation may be the weak link we saw in most agencies we visited between measures and planning. In contrast, more than half of the agencies we surveyed that said they had strategic plans said they wrote most or all of their goals in quantifiable terms and used their performance measures to assess progress toward the goals stated in their plans. However, only nine of these reported having the three organizational characteristics experts view as necessary to tie plans and measures—(1) a unified strategic plan with measurable goals, (2) an

office that collects performance measures, and (3) regular consolidated reports.

One agency we visited had these characteristics—the Office of Disease Prevention and Health Promotion (ODPHP) in the Department of Health and Human Services. Here, top management support for the creation and use of measures was seen as a critical element in the use of a measurement system.

Office of Disease Prevention
and Health Promotion

ODPHP oversees Healthy People 2000, a project aimed at increasing the healthy lifespan for Americans, decreasing health disparities among Americans, and achieving access to preventive services for all Americans within this decade. The Healthy People 2000 project was based on the results of a similar 10-year health improvement project undertaken by the ODPHP in the 1980s. The emphasis in the earlier project was to reduce mortality rates among various age groups and to reduce the number of sick days for the elderly. In 1986, ODPHP undertook a midcourse review of progress toward the 1990 objectives. According to a senior official, the review process accomplished a number of positive results including clarifying opportunities for progress and addressing the issue of accountability for failures (such as in the disparities in health improvements between various populations). On the basis of that assessment, new goals were created for continuing to improve American health care in the next decade. ODPHP set over 300 specific objectives that were divided into 22 priority areas. The health objectives reflected the need for improvement in three broad areas: health promotion, health protection, and preventive services. The responsibility for providing leadership in achieving the objectives of each priority area is to belong to a specific agency which is to organize an inter-agency team, define a leadership strategy, and ensure that data are collected to track progress.

The Assistant Secretary for Public Health is to review each priority area at least once a year. The planned and ongoing activities of each departmental subunit are to be measured against the Healthy People 2000 objectives to monitor progress in achieving the project goals.

For example, one of the stated priority areas of Healthy People 2000 is to reduce heart disease and strokes. The National Institutes of Health, through its National Heart, Lung, and Blood Institute, was named the lead agency in this effort. Two of the Institute's programs, the National High Blood Pressure Education Program and the National Cholesterol Education

Program, were to focus on program activities categorized into areas such as special populations and age groups. These activities were designed to (1) increase professional education opportunities from the results of studies, (2) increase public and patient education efforts to alert the population about the problem, and (3) teach skills to patients who have the disorders.

Some of the planned activities to help reduce heart disease and strokes included development and support of community-based programs to reduce behaviors, such as smoking, that place individuals at increased risk for disease and research aimed at developing prevention techniques for heart disease in women. These activities were designed to contribute to the broader objective of reducing heart disease deaths to no more than 100 per 100,000 people by the year 2000. Achieving this goal would represent a 26 percent decrease in the heart disease death rate between 1987 and the year 2000.

Conclusion

Many of the agencies we surveyed reported having a range of program performance measures. However, relatively few reported having the organizational characteristics that would make it more likely for them to use their performance measures to assess progress towards goals in their strategic plans. In fact, most of the agencies we visited used measures to provide internal information relating to their past activities or present operations.

As budgetary resources continue to shrink, many agencies may find that using a range of performance measures to help them better focus on achieving results envisioned in their strategic plans may be beneficial. Not only can such a link provide managers information about accountability, efficiency, and effectiveness, but it also can provide Congress and the public with information on how public resources are being used.

As arranged with the Committee, unless you publicly announce the report earlier, we plan no further distribution until 30 days from the date of this letter. At that time, we will send copies of this report to the Chairman, House Government Operations Committee; the Director, Office of Management and Budget; and the agencies that responded to our survey. We will also send copies to other interested parties and make copies available to others upon request.

Objectives of Federal Financial Reporting

Statement of Recommended Accounting Concepts

Exposure Draft

Volume 2: Complete Text

January 8, 1993

Operating Performance

Objective 2

- *Federal financial reporting should assist report users in evaluating the service efforts, costs, and accomplishments of the reporting entity; the manner in which these efforts and accomplishments have been financed; and the management of the entity's assets and liabilities.*

This objective arises from a democratic government's duty to be accountable to its citizens for managing resources and providing services economically and efficiently and for effectiveness in attaining planned goals. Also, government should be accountable for raising resources efficiently.

Because government services are not usually provided in exchange for voluntary payments or fees, expenses cannot be matched against revenue to measure "earnings" or "net income" as would be done in business accounting. Moreover, measuring directly the value added to society's welfare by government actions is difficult. Nonetheless, expenses can be matched against the provision of services year by year. The resulting cost can then be analyzed in relationship to a variety of measures of

the achievement of results.

Certain subobjectives arise from the basic objective of reporting on operating performance, as discussed below.

Federal financial reporting should enable the reader to determine:

90 ***2A. The costs of providing specific programs and activities and the composition of, and changes in, these costs.***

Examples of financial information that can help to address this objective include

- information on the costs of programs and activities;
- cost comparisons with estimates, with similar functions, with standards, and over time; and
- relevant analyses of the composition and behavior of costs, such as full and incremental costs, fixed and variable costs, direct and indirect costs, and reimbursable and other costs, where appropriate.

100 ***2B. The efforts and accomplishments associated with federal programs and the changes over time and in relation to costs.***

Examples of information that can help to address this objective include

- financial and nonfinancial indicators of service inputs, outputs, and outcomes, including comparisons with goals;

- indicators of program efficiency and effectiveness;
- work load measures and unit costs; and
- total and marginal costs and benefits, the relationship of these to budget requests, and when the benefits will be realized.

101 ***2C. The efficiency and effectiveness of the government's management of its assets and liabilities.***

This subobjective implies concern with the management of all federal assets and liabilities used by or under the control of agencies. Users of financial reports focus on the use of these resources in program operations, not solely on their financial value. Reports intended to address this objective would provide information to help users assess the effectiveness with which

- cash is used;
- loan, loan guarantee, and other receivables programs are conducted;
- inventories of supplies, materials, and similar items are maintained; and
- forfeited and other tangible assets are handled.

Other examples of information relevant to this objective might include

- the service life and replacement cost of major systems and equipment;

- **backlogs (and budgetary impact) of delayed maintenance, rehabilitation cost or replacement value of assets;**
- **the market value of forfeited and other assets, particularly those held for sale;**
- **the extent of unpaid expenses; and**
- **estimates (and ranges of estimates) of other known liabilities (such as leases or deposit and other insurance liabilities) and other exposures to loss.**

Further discussion of performance measurement and how financial reporting can contribute to reporting on performance is provided in chapter 8.

NO. 102-C | SEPTEMBER 15, 1993

Governmental Accounting Standards Series

EXPOSURE DRAFT

Proposed Statement of the Governmental Accounting Standards Board

on concepts related to

Service Efforts and Accomplishments Reporting

This Exposure Draft of a proposed Statement of Governmental Accounting Concepts is issued by the Board for public comment. Written comments should be addressed to:

Director of Research
Project No. 13-3

Comment Deadline: December 15, 1993



GOVERNMENTAL ACCOUNTING STANDARDS BOARD
OF THE FINANCIAL ACCOUNTING FOUNDATION

Proposed Statement of the Governmental Accounting Standards Board

on concepts related to

Service Efforts and Accomplishments Reporting

September 15, 1993

CONTENTS

	Paragraph Numbers
Purpose and Scope	1 - 7
The Governmental Environment and the Need for SEA Reporting . .	8 - 49
The Governmental Environment	10 - 12
Decision Making in State and Local Government	13 - 15
Information Needed for Decision Making	16 - 17
The Nature of Governmental Accountability	18 - 25
Evolution of Governmental Accountability	26 - 33
Accountability and the Link to External Financial Reporting ...	34 - 39
The Focus of Private-Sector Financial Reporting on	
Measures of Performance	40 - 45
SEA Reporting by State and Local Governmental Entities . . .	46 - 49
The Elements of SEA Measurement	50 - 53
Categories of SEA Measures	50
Explanatory Information	51 - 53
Objective and Characteristics of SEA Information	54 - 66
Objective	54 - 56
Characteristics	57 - 66
Relevance	58
Understandability	59 - 62
Comparability	63
Timeliness	64
Consistency	65
Reliability	66
Limitations of SEA Information	67
Enhancing the Usefulness of SEA Information	68

Paragraph
Numbers

Developing Reporting Standards for SEA Information	69 - 79
Need for Experimentation with SEA Measurement and	
Reporting	71 - 72
Need for Involvement of Management, Professional Groups,	
Elected Officials, and Citizens	73
Criteria to Be Met before Establishing Reporting Standards	
for SEA Measures	74 - 76
Possible Approaches to Establishing SEA Reporting Standards . .	77
Location	78
Frequency of Reporting	79
Appendix A: Background Information	80 - 88
Appendix B: Basis for Conclusions	89 - 97

Summary

This summary provides highlights of the proposed Concepts Statement (also referred to as an Exposure Draft, or ED) and serves as an introduction to the concepts being presented. The ED further develops the objective of service efforts and accomplishments (SEA) reporting and identifies its elements and characteristics. The ED provides background information on the governmental environment (paragraphs 10–12), governmental decision making (paragraphs 13–17), accountability (paragraphs 18–33), and the reporting of performance information as part of general purpose external financial reporting (GPEFR) (paragraphs 34–49).

SEA Information as Part of GPEFR for State and Local Governmental Entities

An objective of GPEFR is to provide users with information that is useful in assessing the performance of the reporting entity. Because the primary purpose of governmental entities is to maintain or improve the well-being of their citizens, information that is useful in determining how efficiently and effectively governmental entities are using resources to maintain or improve the well-being of their citizens should play an important role in GPEFR.

The SEA reporting objective as originally stated in GASB Concepts Statement No. 1, *Objectives of Financial Reporting*, is based on the Board's belief that SEA information is necessary for assessing accountability and in making informed decisions; therefore, GPEFR for governmental entities needs to include SEA information. This information will most likely be reported in a separate report. The measurement of a governmental entity's performance requires information not only on the acquisition and use of resources, but also on the outputs and outcomes of the services provided and the relationship between the use of resources and their outputs and outcomes. By focusing on a variety of financial and nonfinancial measures of inputs, outputs and outcomes, and measures that relate efforts to accomplishments, SEA reporting provides a basis for users of GPEFR to more fully assess governmental performance.

Objective, Elements, and Characteristics of SEA Reporting

The objective of SEA reporting is to provide more complete information about a governmental entity's performance than can be provided by the traditional financial statements and schedules (paragraphs 54–56). The elements of SEA reporting include (a) categories of SEA measures—measures of service efforts (input indicators), measures of service accomplishments (output

and outcome indicators), and measures that relate service efforts to service accomplishments (efficiency and cost—outcome indicators) (paragraph 50); and (b) explanatory information (paragraphs 51–53).

To promote achievement of the objective of SEA reporting, SEA information should focus primarily on measures of service accomplishments (outputs and outcomes) and measures of the relationships between service efforts and service accomplishments; SEA information also should meet the characteristics of relevance, understandability, comparability, timeliness, consistency, and reliability (paragraphs 57–66). This ED also discusses limitations of SEA measurement and reporting (paragraph 67) and how to enhance the usefulness of SEA information (paragraph 68).

Implications

Including SEA measures as part of GPEFR represents a significant modification in financial reporting practices for state and local governmental entities. In the past, SEA measures have not been included extensively in external reporting by governmental entities; however, an expanding number of governmental entities presently are developing and using SEA measures. Extensive further experimentation and analysis is needed (a) to determine whether SEA measures that meet the characteristics set forth in this proposed Concepts Statement can be developed for governmental services and (b) to explore how externally reported SEA information is used and the effects its use has on the quality, effectiveness, and efficiency of the services being reported on.

The services provided by state and local governmental entities are diverse and often complex in nature. The GASB cannot by itself determine relevant SEA measures. Therefore, in addition to accountants and others who are involved in financial management, it is essential that other management personnel (including program personnel, budget personnel, performance evaluators, and professional groups), internal auditors, and elected officials, citizens, and other users become active in developing and using SEA measures.

SEA reporting will expand the amount and types of information being gathered and reported externally; therefore, after experimentation in SEA measurement, reporting, and use, the GASB will carefully consider benefits and costs of specific SEA measures for different aspects of various services before requirements are established. If the GASB proposes to require reporting of specific SEA measures, the benefits of those measures will need to be compared to the costs of gathering, verifying, and reporting the underlying data. In assessing the benefits and costs of a specific measure, consideration will be given to such factors as its particular value in measuring accomplishments, the extent to which it has gained general acceptance, its understandability to citizen and oversight groups, and the relative benefits of other, less costly measures.

dicale potential demand for services such as general population, serv-

ice population, or lane-miles of road.
(1) *Financial information:* This information includes financial meas-
ures of expenditures/expenditures. These measures include the cost¹⁸
of salaries, employee benefits, materials and supplies, contract
services, equipment, and so forth, of providing a service. Measures
of efforts may include the amount spent for education and the
amount spent per full-time-equivalent student; the amount spent
on public transit and the amount spent on public transit per com-
muter; the amount spent on road maintenance and the amount
spent per lane-mile of road on road maintenance; and the amount
spent for crime investigations and the amount spent per capita on
crime investigations.

(2) *Nonfinancial information:*

(a) *Number of personnel:* Because personnel are the major re-
source for most government agencies, departments, programs,
and services, indicators that measure the number of full-time-
equivalent employees or employee-hours used in providing a
service often are appropriate measures of resources used.
These measures have the effect of removing wage, benefit, and
cost-of-living differences from the resource inputs, and may fa-
cilitate comparisons over time and with other organizations.
Measures may include the number of teachers in total or per
student; the number of road maintenance workers in total or
per lane-mile of road; and the number of uniformed officers
assigned to crime investigations or the number per capita as-
signed to crime investigations.

(b) *Other measures:* These may include the amount of equipment
(such as number of vehicles) or other capital assets (such as
lane-miles of road or acres of park land) used in providing a
service.

d. *Measures of accomplishments:* Accomplishment measures report
what was provided and achieved with the resources used. There are
two types of measures of accomplishments—outputs and outcomes.

¹⁸Cost, including the determination of the appropriate treatment for various classes of
indirect costs, has yet to be defined for purposes of SEA reporting. However, SEA meas-
urement will require cost information for programs, activities, and services. Develop-
ment of cost information for programs, activities, and services is a critical part of SEA
reporting for governmental entities.

THE ELEMENTS OF SEA MEASUREMENT
Categories of SEA Measures

50. Three broad categories of SEA measures have been identified in
GASB research: those that measure service efforts, those that measure
service accomplishments, and those that relate efforts to accomplish-
ments. Although a clear division cannot be made in all cases among
these categories of measures, they are helpful for understanding what an
SEA indicator is designed to measure, and they are used to identify the
categories of SEA measures for this document. SEA measures should be
reported for services the entity is responsible for providing, whether the
governmental entity provides the service itself or contracts for it.

a. *Measures of efforts:* Efforts are the amount of financial and nonfinan-
cial resources (in terms of money, material, and so forth) that are put
into a program or process. Measures of service efforts also include ra-
tios that compare financial resources with other measures that may in-

Outputs measure the quantity of services provided; outcomes measure the results of providing those outputs.

(1) *Output measures:*

- (a) *Quantity of a service provided:* These indicators measure the physical quantity of a service provided. Measures may include the number of students promoted or graduated; the number of commuters using public transit; the number of lane-miles of road repaired; and the number of crimes investigated.
- (b) *Quantity of a service provided that meets a certain quality requirement:* These indicators measure the physical quantity of a service provided that meets a test of quality. Measures may include the percentage of students graduated or promoted who have met a minimum prespecified standard of achievement; the percentage of buses meeting a prespecified on-time standard of achievement; the percentage of lane-miles of road repaired to a certain minimum satisfactory condition; and the percentage of criminal investigations performed that result in the identification of a prime suspect. In some cases, meeting a quality requirement may turn an "output" indicator into an "outcome" indicator.

(2) *Outcome measures:*

- (a) These indicators measure accomplishments or results that occur (at least partially) because of services provided.¹⁹ Results also include measures of public perceptions of outcomes. Measures may include the percentage of students achieving a specified skill-level gain in reading; the percentage of the population being served by public transportation; the percentage of lane-miles of road in excellent, good, or fair condition; and the clearance rate for serious crimes or the percentage of residents rating their neighborhood as safe or very safe.
- (b) Outcome measures are particularly useful when presented as comparisons with results from previous years, entity-established targets or goals and objectives, generally accepted norms and standards, other parts of the entity, or other, comparable jurisdictions (both public and private). Measures may include 75 percent of the students achieving a specified skill-

level gain in reading when the school district's objective is for at least 70 percent of the students to achieve a specified skill-level gain in reading or where 65 percent of the students statewide achieve a specified skill-level gain; 25 percent of the population being served by public transportation when the transit system's objective is to serve at least 35 percent of the population or where the norm for similar transit systems is that 30 percent of the public is being served; 88 percent of the lane-miles of road in excellent, good, or fair condition when the entity's objective is for at least 85 percent of the lane-miles of road to be in excellent, good, or fair condition or where an average of 80 percent of the lane-miles of road were in excellent, good, or fair condition for the previous five years; and 25 percent of serious crimes cleared by indictment when the entity's objective is to clear 35 percent or where the national average is 21 percent.

- (c) Sometimes the secondary effects of a service on the recipients, state, or community may be identified and may warrant reporting. These measures include significant indirect consequences, intended or unintended and positive or negative, that occur as a result of providing a service. Measures may include a decrease in the unemployment rate in a community as a result of a decrease in the school dropout rate (more students are staying in school and are not looking for employment); a decrease in traffic accidents because of an increase in the percentage of the population using public transit; a decrease in vehicle repair costs because of an increase in the percentage of lane-miles of road in good condition; and an increase in the reported crime rate because a new street patrol system results in more crime being reported. These measures often are difficult to identify and to relate to the actual service being provided. This occurs because of an inability to establish a definite correlation between the secondary effects and the service and because extraneous factors may affect the results.

c. *Measures that relate efforts to accomplishments:*

- (1) *Efficiency measures that relate efforts to outputs of services:* These indicators measure the resources used or cost (in dollars, employee-hours, or equipment used) per unit of output. They provide information about the production of an output at a given level of resource use and demonstrate an entity's relative efficiency when compared with previous results, internally estab-

¹⁹For many outcomes, a definite cause-and-effect relationship between the output and the outcome cannot be established because of their complex nature and factors beyond the control of the entity that affect the outcome being measured.

EXPOSURE DRAFT

lished goals and objectives, generally accepted norms or standards, or results achieved by similar jurisdictions. Measures may include the cost per full-time-equivalent student or the cost per student promoted or graduated; the cost per transit passenger or per passenger-mile; the cost per lane-mile of road repaired in total or repaired to good condition; and the cost per serious crime investigated or per arrest.

- (2) *Cost–outcome measures that relate efforts to the outcomes or results of services:* These measures report the cost per unit of outcome or result. They relate costs and results so that management, elected officials, and the public can begin to assess the value of the services provided by an entity. Cost–outcome measures may include the cost per student who achieves a specified skill-level gain in reading; the cost per transit passenger arriving at his or her stop within a specific time schedule; the cost per lane-mile of road improved or maintained in excellent, good, or fair condition; and the cost per serious crime cleared by indictment.

Explanatory Information

51. In addition to the preceding categories of SEA measures, the elements of SEA reporting also include explanatory information. Explanatory information includes both quantitative and narrative information that can help users to understand reported SEA measures, assess the entity's performance, and evaluate the significance of underlying factors that may have affected the reported performance.

52. There are two primary types of quantitative explanatory information that can be reported with SEA measures.

- a. *Factors substantially outside the control of the entity,* such as environmental and demographic characteristics. Measures may include the number of students in families below the poverty level; the density of population in the area where public transit is being provided; the percentage of trucks in vehicle traffic; and the unemployment rate.
- b. *Factors over which the entity has significant control,* such as staffing patterns. Measures may include the teacher–pupil ratio; the number of buses in service per route mile; the type of construction used for highways; and the number of police officers per capita.

EXPOSURE DRAFT

53. Narrative information provided with SEA measures can provide explanations of what the level of performance reported by the measure means, the possible effects that explanatory factors might have on performance, and actions that have been (or are being) taken to change reported performance. Explanations are particularly important when comparisons with other jurisdictions or among similar components within the same jurisdiction are reported. They are also important in conjunction with reporting secondary, unintended effects of a service.

OBJECTIVE AND CHARACTERISTICS OF SEA INFORMATION

Objective

54. The objective of SEA reporting as stated in GASB Concepts Statement 1 is founded on the Board's belief that SEA information is an essential aspect of the measurement of governmental performance, and is necessary for assessing accountability and in making informed decisions. Therefore, to be more complete, GPEFR needs to include SEA information.

55. *The objective of SEA reporting is to provide more complete information about a governmental entity's performance than can be provided by the operating statement, balance sheet, and budgetary comparison statements and schedules.* The measurement of a governmental entity's performance requires information not only on the acquisition and use of resources, but also on the outputs and outcomes of the services provided and the relationship between the use of resources and outputs and outcomes. By focusing on a variety of financial and nonfinancial measures of inputs, outputs and outcomes, and measures that relate efforts to accomplishments, SEA reporting provides additional information needed to provide a basis for users of general purpose external financial reports to more fully assess governmental performance.

56. To meet this objective, *SEA information should focus primarily on measures of service accomplishments (outputs and outcomes) and measures of the relationships between service efforts and service accomplishments (efficiency and cost–outcome).* Because the reporting of SEA information is directed at providing users with information about the results of the governmental entity's services, the measures reported should emphasize performance. The performance of governmental enti-

ties is primarily measured by output, outcome, and efficiency measures. These measures report what services the entity has provided, whether those services have achieved the objectives established, and what effects they have had upon the recipients and others. This information when compared to service efforts (inputs) also provides a basis for assessing the efficiency with which the entity or program operated.

LIMITATIONS OF SEA INFORMATION

67. SEA measures are but one component of the information used to assess accountability and make decisions, and with any reported measures of performance, there are limitations associated with using SEA information. Users of SEA information need to be aware of those limitations so that the information can be used appropriately. The following list is not meant to be all-inclusive, but is meant to provide a general understanding of the types of limitations that need to be considered:

- a. Generally, a single composite measure cannot adequately communicate the results of providing services. Therefore, it will be necessary for users to consider using several, perhaps widely disparate, measures to assess the performance of an entity or its agencies, departments, programs, and services.
- b. SEA information does not, by itself, explain why performance is at the level reported, how to improve performance, or the degree to which a service or an explanatory factor contributed to the outcome reported. Users may require additional information beyond what can be provided in the explanatory material to fully understand the relationship between an outcome and the many factors affecting that outcome. For example, the reading level of fourth-grade students may be affected not only by the school's methods of teaching reading, but also by such factors as the amount of time the students have spent reading or that parents and others have spent reading with them. For many outcomes, there may be a number of factors that affect the level of outcome.
- c. The categories of SEA measures set forth by this Concepts Statement for external reporting do not include measures of the processes or strategies being used to provide services. Nor do SEA measures provide all the information needed to determine the relationship between processes or strategies and results. However, processes and strategies undertaken, such as whether police patrol exclusively from vehicles or use a combination of vehicle and walking patrols, represent important information for understanding why outputs or outcomes are at the level reported. Measures of processes and strategies normally do not report the outputs or outcomes of an entity's operations; therefore, they have not been included as a category of SEA measurement. They may be useful, however, if reported as explanatory information.

EXPOSURE DRAFT

- d. It may be difficult to determine whether the reported SEA measures are the most relevant measures of the achievement of a goal or objective. For example, many believe that the crime clearance rate is a useful measure of a police department's performance in achieving its overall goal of crime prevention. But even that measure leaves open many questions about whether clearance of crimes actually results in fewer crimes. It is possible that other measures not directly associated with the police department, such as keeping young people in school or gainfully employed, are more closely correlated with crime rates.
- e. For some services, it may not be possible to measure the most important outcome, so the SEA measure reported may be a surrogate measure that is in some way related to the desired outcome. For example, the primary goal of a fire department may be the *prevention* of fire, loss from fires, and injuries and deaths associated with fires. But it may not be possible to measure prevention. Instead, measures such as trends in the amount of fire loss or fire spread after arrival may be used as reasonable (though not fully satisfactory) surrogates.
- f. SEA information provides data about the achievement of goals and objectives, but does not provide the information needed to assess whether the goals and objectives of an agency, department, program, or service are the most appropriate ones and the ones that most clearly reflect the values of the community.
- g. SEA information does not provide all the data needed to assist in assessing policy accountability. This assessment involves determining the relative value of a service to society or recipients, or the comparative value of two or more distinct services. For example, an entity may be faced with a situation in which it is required to allocate scarce resources to either public safety or preventive healthcare. The need for both services is well documented and understood within the community, and both programs have been operating efficiently and effectively within the constraints imposed by the level of resources provided. A decision about which program should receive additional funds depends, in large measure, on how decision makers value the results that can be achieved by each service. Information on the value of services is extremely subjective, and is therefore not recommended as part of the SEA information to be considered for GPEFR.

**FRAGILE FOUNDATIONS: A REPORT ON
AMERICA'S PUBLIC WORKS**

FINAL REPORT TO THE PRESIDENT AND THE CONGRESS

**National Council on
Public Works Improvement
February 1988**

CHAPTER II

REINVESTING IN AMERICA

The previous chapter concluded that public and private capital investments complement each other and that there is need for balance between them. This chapter looks at factors affecting the demand and supply of public works services in this light. Various dimensions of the demand for public works services suggest that such demand is increasing. Trends in infrastructure capital accumulation and spending, used as proxies for the capacity of current facilities to provide services, are then examined. These trends indicate that, although annual real per capita public works spending has been increasing over the last 25 years, public works spending has declined relative to total government spending, to the nation's total annual production of goods and services, and to the level of private investment. These trends suggest an inevitable imbalance between demand and supply that will eventually lower the level and quality of services being provided.

plants were in violation of discharge standards. They reported that about half these plants were not treating wastewater adequately because of operations deficiencies. The most prevalent problems were inadequate local operating budgets and under-trained operating staff.¹ Therefore, to the extent that they can be operated more efficiently, existing facilities can provide expanded services without additional capital investment.

The demand for services and the capacity to meet that demand determine the daily performance of individual public works systems. Monitoring performance is critical to evaluating the state of the nation's infrastructure and its ability to sustain economic activity. The next two sections examine factors that reflect and/or influence demand and supply forces. The dynamic forces underlying the performance evaluations summarized in the final section of the chapter are presented in depth in Appendix A.

PUBLIC WORKS FACILITIES AND PERFORMANCE

Infrastructure's importance lies in the services it provides: the movement of people and goods, the provision of clean water, and efficient and safe waste disposal. The question is whether these services are adequate to meet the nation's demands.

Answering this question is more complicated than focusing on the physical facilities themselves. The performance of the nation's public works is a relative, not an absolute, concept. The demand for services comes from businesses, households, and the government. Demographics, individual preferences, production techniques, mobility, and the distribution of costs all affect demand. More should be known about the influence of these factors on the demand for public works services if the performance of public works is to be measured accurately and systematically.

The supply of public works services determines how demand will be met. Supply is determined by the condition of existing facilities and how the facilities are used. For example, in 1980 the General Accounting Office reported that 50 percent of the nation's wastewater treatment

¹General Accounting Office, *Costly Wastewater Treatment Plants Fail to Perform as Expected* (Washington, DC, November 14, 1980).

²For a review of major recent needs studies and analysis of the shortcomings of this approach to public works spending, see National Council on Public Works Improvement, *The Nation's Public Works: Defining the Issues* (Washington, DC, September 1988), Chapter III.

EXHIBIT II-13
ILLUSTRATIVE MEASURES OF PERFORMANCE FOR THE NATION'S
PUBLIC WORKS, BY CATEGORY

Public Works	Physical Assets	Service Delivery	Quality of Service To Users
Highways	Lane-miles Number of bridges Vehicle registration Fleet size	Passenger miles Vehicles miles Ton-miles	Congestion or travel time Pavement condition Volume/Capacity ratio Accident rates Population with easy access to freeways
Airports	Number of aircraft Commercial seat-miles Number and type of airports	Passenger miles Enplanements Aircraft movements	Number and length of delays Accident rates Near miss rates Population with easy access
Transit	Number of buses Miles of heavy rail Subway seat-miles Bus miles	Passenger miles Percent of work trips Transit trips	Average delays Breakdown frequency Population with easy access Elderly/handicapped access Crowding: passenger miles per seat-mile
Water Supply	Water production capacity Number of water facilities Miles of water main	Compliance with MCLs Reserve capacity Finished water production Fraction of population served	Water shortages Rate of water main breaks Incidence of water-borne disease Finished water purity Loss ratios
Wastewater Treatment	Capacity (mgd) Number of plants Miles of sewer	Compliance rate Reserve capacity Infiltration/inflow Volume treated Fraction of population served	Compliance with designated stream uses (local) Sewage treatment plant downtime Sewer moratoria
Water Resources	Number of ports, waterways Reservoir storage capacity Number of dams Miles of levees, dikes	Cargo ton-miles Recreation days Flood protected acreage Irrigated acreage Kwh hydropower produced	Shipping delays Dam failure rate Power loss rate Value of irrigated agricultural product Value of flood damages averted



U.S. Department
of Transportation
**Federal Highway
Administration**
**Federal Transit
Administration**

The Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance

1993

A Summary

TABLE OF CONTENTS

	<u>Page</u>
INTRODUCTION	i
SYSTEM AND USAGE CHARACTERISTICS: HIGHWAYS, BRIDGES, AND TRANSIT . .	1
Highways	1
Functional Systems	1
Jurisdictional Responsibility	2
Highway Travel	3
Bridges	3
Transit	3
HIGHWAY AND TRANSIT FINANCE	5
Highway and Bridge	5
Transit	7
HIGHWAY AND TRANSIT CONDITIONS AND PERFORMANCE	9
Highway Operating Characteristics	9
Highway Physical Characteristics	10
Bridges	12
Highway Safety	13
Environmental Conditions and Performance	13
Transit Service Quality	14
Bus and Paratransit Condition	14
Rail Conditions	15
HIGHWAY, BRIDGE, AND TRANSIT INVESTMENT REQUIREMENTS, 1992-2011 . . .	16
Highway, Bridge and Transit Investment Analysis Procedures	16
Highway Investment Requirements Estimation Methodology, Features, and Constraints	17
Bridge Investment Requirements Estimation Methodology	18
Transit Investment Requirements Estimation Methodology	18
Travel Demand Assumptions	18
Highway and Bridge Investment Requirements, 1992-2011	18
The Backlog of Highway and Bridge Deficiencies	18
The Cost to Maintain Highway and Bridge 1991 Condition and Performance	20
Total Highway and Bridge Investment Requirements	20
The Cost to Improve Highway and Bridge Conditions and Performance	20
Current Spending Related to Highway and Bridge Investment Requirements	22
Transit Investment Requirements	23
Transit Backlog	23
The Cost to Improve Transit Conditions and Performance	23
The Cost to Maintain Transit Conditions and Performance	23
GLOSSARY	25

BOXES

<u>Box</u>		<u>Page</u>
A	REPORT CARD	ii
B	THE NATIONAL HIGHWAY SYSTEM	2
C	INVESTMENT SCENARIOS	16
D	HIGHWAY, BRIDGE, AND TRANSIT INVESTMENT REQUIREMENTS ESTIMATION PROCEDURES	19

EXHIBITS

<u>No.</u>	<u>Exhibit</u>	<u>Page</u>
1	Highway System Mileage and Travel Comparison	1
2	U.S. Transit Patronage, 1920-1990	4
3	Current Spending for Highways—All Levels of Government	5
4	Source of Funds for Highway Capital Outlay by Level of Government	6
5	Current Spending for Transit—All Levels of Government	7
6	Source of Funds for Transit Capital Outlay by Level of Government	8
7	Peak Hour Congestion	9
8	Estimated Highway Mileage by Pavement Condition, Functional System, and Year	11
9	Bridge Deficiencies, 1992	12
10	Transportation Emissions Trends, 1981—1990	13
11	Bus and Paratransit Fleet Characteristics	14
12	Investment Requirements for Highways and Bridges vs. Related Capital Outlay . .	21
13	Annual Cost to Maintain 1991 Highway and Bridge Conditions and Performance .	22
14	Summary of Annualized Transit Investment Requirements	24

INTRODUCTION

Our Nation's productivity and international competitiveness depends on fast and reliable transportation. As we move toward the 21st century, the status of our highways, bridges and transit is of paramount importance to the vitality of our economy.

Americans travel roads and highways more often than any other mode of transportation. Highways, along with the automobiles, buses and trucks they carry, have provided the United States with an efficient network for moving people and goods, carrying more than 90 percent of all travel, and three-quarters of the value of all goods and services produced. Growth and productivity in virtually every sector of the Nation's economy depend upon adequate transportation.

The United States has 3.9 million miles of public roadway, which accommodate 2.2 trillion vehicle miles of travel. Expenditures for transportation are equivalent to about 17 percent of the gross national product (GNP), with almost 83 percent of this, or about 14 percent of GNP, devoted to highway and transit transportation services.

- Highway vehicles carry more than 80 percent of domestic intercity passenger miles of travel, and they have done so since World War II.
- The trucking industry carries over 40 percent of all intercity freight tonnage, and earns 80 percent of all freight revenues.
- In urban areas, automobiles and transit account for over 92 percent of all work trips. About 87 percent of all passenger-miles of travel is highway dependent.

The U.S. population now enjoys the greatest level of mobility in our history. While this level of mobility is of great direct benefit to us as individuals, the impact of increased travel on traffic congestion and environmental quality is of growing concern.

The Congressionally required report series, *The Status of the Nation's Highways, Bridges and Transit*, provides decision makers with an ongoing appraisal of the current condition and performance of the U.S. highway and transit systems. These continual assessments provide valuable information on how highway and transit investment is used as well as the foundation for estimating investment levels needed to meet future demands of social and economic growth.

This booklet summarizes the 1993 Congressional Report, starting with a "Report Card" for highways, bridges, and transit in 1991. For the first time, the report includes information on transit and environmental impacts. In fact, the transit and highway investment assessment methodologies are linked. A portion of the forecasted increase in travel demand is accommodated not by the addition of new highway lane-miles but by an aggressive, coordinated demand management program that includes increased transit participation. This increased transit participation is included in the transit investment analysis. Future reports will expand on integrating multi-modal and environmental issues in the surface transportation investment analysis.

BOX A — REPORT CARD

Highway and Transit Characteristics

- Total public road mileage reached almost 3.9 million miles in 1991 — an increase of approximately 13,000 miles over 1989.
- Total highway travel reached almost 2.2 trillion vehicle miles in 1991 — a total increase of 3 percent over 1989. Although the recession in 1989 and 1990 significantly dampened highway travel, the travel growth rate in 1991 returned to a rate of 3.5 percent. This is consistent with the 3.5 percent average annual rate experienced since 1983.
- Transit passenger miles traveled increased by 8 percent from 1980 to 1990.

Highway and Transit Finance

- In 1991, disbursements for highway programs by all levels of government totaled \$78.3 billion, with \$3.8 billion spent for debt retirement and \$74.5 billion for current operations. This expenditure for current operations equates to 3.4 cents per mile of travel, a decline in spending of more than 50 percent in constant dollars since 1960. In nominal dollars, however, 1991 spending for current operations increased more than \$7 billion over 1989.
- Of the \$74.5 billion for current operations, \$36.1 billion were spent for highway and bridge capital improvements in 1991, compared to \$33.1 billion in 1989; \$38.3 billion were spent for noncapital purposes. The Federal share of capital investment was 41 percent in 1991, down from a high of 56 percent in 1980.
- In 1990, the cost to operate mass transit service in the United States was approximately \$14.7 billion; capital expenditures accounted for \$4.3 billion, for a total of \$19.0 billion. In 1990, fares and other revenue collected from direct transit customers covered about 43 percent of operating costs with State and local subsidies covering 51 percent and Federal subsidy covering 6 percent. The Federal share of total reported capital activity declined from 78 percent in 1980 to 60 percent in 1990.

Condition and Performance

- Pavement condition improved throughout the 1980's and continues to do so into the 1990's. However, approximately 234,500 miles are rated as "poor" or "mediocre."

- Highway performance declined through most of the 1980's, especially in the larger urbanized areas. However, between 1989 and 1991, performance stabilized, as a result of the reduced rate of urban travel growth caused by the 1989-1990 economic slowdown. In 1989, the total annual cost of congestion in the 50 largest urban areas exceeded \$39 billion.
- In 1992, about 118,500 of the Nation's 575,000 bridges were rated as structurally deficient.
- The fatalities rate on the Nation's highways continues to decrease, dropping from 2.6 fatalities per 100 million vehicle miles of travel in 1983 to a low of 1.9 in 1991. However, the total economic cost to the Nation of motor vehicle crashes in 1990 was more than \$137 billion.

Highway, Bridge, and Transit Investment Requirements

- The cost to immediately eliminate all existing backlog highway deficiencies on all major highways as of December 31, 1991, was approximately \$212 billion, \$7 billion more than the backlog in 1989.
- The cost to eliminate all backlog bridge deficiencies is approximately \$78 billion.
- The cost to eliminate the 1992 backlog of bus and rail transit deficiencies, including equipment and facilities, is estimated at \$18 billion.
- The total annual investment needed to eliminate highway and bridge backlog deficiencies and to meet additional highway and bridge infrastructure requirements for developing urban and suburban areas is \$67.3 billion through 2011. This would require an additional investment of about 1.6 cents per mile of travel.
- The total annual investment to maintain overall 1991 highway and bridge conditions and performance is \$51.6 billion through 2011. This would require an additional investment of 0.9 cents per mile of travel.
- The cost to systematically improve transit condition and performance by (1) eliminating the backlog of bus and rail deficiencies and (2) adding additional service to accommodate anticipated urban demand not included in either the highway cost to maintain or improve assessments and increase transit's market share, is \$6.6 billion annually through 2011.
- The cost to maintain transit condition and performance, including the cost to meet new statutory obligations to serve disabled Americans and improve vehicular emissions and continue recent growth, is estimated at \$3.9 billion annually through 2011.

GAO

Report to the Chairman, Committee on
Government Operations
House of Representatives

November 1993

BUDGET ISSUES

Incorporating an Investment Component in the Federal Budget





United States
General Accounting Office
Washington, D.C. 20548

Accounting and Information
Management Division

B-252951

November 9, 1993

The Honorable John Conyers, Jr.
Chairman
Committee on Government Operations
House of Representatives

Dear Mr. Chairman:

This report responds to your request for an evaluation of capital (investment) budgeting. You noted that our nation needs to simultaneously pursue the potentially conflicting goals of deficit reduction and increased federal investment and you expressed interest in alternative budget presentations which may offer the opportunity to more effectively address our nation's needs. This report examines possible definitions of investment and discusses ways in which a budget with an investment component might help decisionmakers focus on making investment decisions which can promote long-term economic growth. It also identifies questions which would need to be answered before an investment budget could be implemented.

Results in Brief

The current budget structure does not highlight for decisionmaking purposes the differences between spending for long-term investment and that for current consumption because it treats all expenditures the same. The current budget process does not encourage the Congress to make decisions about how much spending overall should be devoted to programs having a direct bearing on long-term growth and productivity.

Refining the budget presentation to focus on how the composition of spending affects the long-term economy requires agreement on which federal programs are investment in nature. Although numerous definitions of investment are possible, we concluded that the most appropriate definition would include federal spending, either direct or through grants, directly intended to enhance the private sector's long-term productivity. Such a definition distinguishes between federally owned capital that the government itself uses and investments that promote private sector growth. Thus, primary emphasis is given to activities that would lower the cost of goods and services provided and delivered by the private sector economy. Accordingly, this definition includes spending on some intangible activities such as research and development (R&D); human capital designed to increase worker productivity, particularly education

and training; and spending for physical capital to improve infrastructure, such as highways, bridges, and air traffic control systems.

Such a definition differs markedly from a capital budget designed to focus on spending intended to have future benefits for the government as an operating entity because, under our premise, "investment" would not include spending for physical capital designed to achieve federal agency programmatic goals such as spending for federal land, office buildings, and defense weapons systems because they do not directly enhance productivity in the private sector.

Our assessment of several alternatives for using an investment component to promote consideration of investment shows that establishing investment targets within a framework similar to that contained in the Budget Enforcement Act (BEA)¹ is the most promising way to use an investment component because the Congress and the administration would reach agreement on the appropriate level of investment spending. BEA discretionary caps could be changed to mandate a separate investment target (or floor) to protect against infringement from other activities.

Background

Declining levels of domestically financed investment and national savings in recent years have prompted concern that our economy may lack the capacity to grow at levels needed to provide for future generations. Federal budget deficits contribute to lower investment and savings levels. In addition, federal investment programs can also influence growth and productivity in the private economy.

Recent budget trends are not encouraging for either the deficit or federal investment. The growing portion of the budget absorbed by interest payments and consumption programs, particularly health, has squeezed the discretionary sector of the budget, which is the source of most federal investment funds. Federal outlays for physical capital, research and development, and education declined as a share of gross national product (GNP) between 1980 and 1984 and have remained relatively stable at the lower level since then. During the 1980s, both federal health spending and net interest payments on the national debt surpassed federal spending on public investment as a share of GNP.

¹The Budget Enforcement Act established spending limits for defense, domestic, and international spending in fiscal years 1991 through 1993 and for all discretionary spending in fiscal years 1994 and 1995. The spending limits were extended through 1998 by the Omnibus Budget Reconciliation Act of 1993.

Because the deficit absorbs private savings otherwise available for domestic investment, it exerts the single most important federal influence on investment. The surest way to increase national savings and investment would be to reduce this unprecedented level of federal dissaving by reducing the deficit. In our June 5, 1992, report, Budget Policy: Prompt Action Necessary to Avert Long-Term Damage to the Economy (GAO/OCC-92-2), we concluded that we have no choice but to deal with the deficit because failure to take action will result in the deficit rising to 20 percent of GNP by 2020, due primarily to rising health and retirement costs and the associated interest costs. We stated that moving from a deficit to a budget surplus is essential for improving national savings, investment, and long-term growth. Moreover, we cautioned that the objective of enhancing long-term economic growth through overall fiscal policy is not well served by a budget process which focuses on short-term spending.

The administration and some Members of the Congress have stressed the need to evaluate current levels of both public and private investment with the goal of increasing the long-term productive capacity of the economy. Concern about how the budget deals with spending that has long-term benefits has been a driving force behind capital budget proposals.

In considering capital budget proposals, it is important to recognize the dual nature of the government in this area. The government makes both (1) long- and short-term decisions regarding its own operations, and (2) decisions affecting the long-term economic health of the economy. However, this report is not meant to preclude changing the way the budget treats choices the government makes pertaining to its own operations. The government's two roles present different issues and may well demand different responses. Unfortunately, the distinction is often ignored in discussions on the merits of capital budgeting.

Objectives, Scope, and Methodology

The objectives of this review were to determine

- the types of programs or activities that should be included in the definition of "investment" for a budget with an investment component,
- how focusing on an investment component in the budget presentation could be used to help the Congress in making investment decisions, and
- what techniques, analytical tools, or devices might be used to help decisionmakers focus on making investment decisions which promote long-term economic growth.

To meet these objectives, we reviewed pertinent literature and our prior work on capital budgeting, human capital, restructured budgets, and investment spending. We also reviewed relevant studies of the Congressional Budget Office (CBO) and the Office of Technology Assessment (OTA). We reviewed the alternative budget presentations contained in the President's budgets for fiscal years 1991 through 1994 along with the Office of Management and Budget's (OMB) instructions on character classifications found in Circular A-11 "Preparation and Submission of Budget Estimates."²

To determine the most appropriate definition of investment, we developed five different definitions using OMB character classification and budget function data. The definitions ranged from the most restrictive, which contained only spending for federally owned R&D facilities and equipment, grants for physical capital, education and training, and R&D, to the most inclusive, which contained the aforementioned items plus spending for Defense and other non-Defense facilities and equipment, food and nutrition, social services, and health. We convened two panels of experts from OMB, CBO, the Congressional Research Service, OTA, academia, and other organizations having an interest or involvement in the budget process. We asked the panelists for their views on the various definitions of investment.

Based on our research and discussions with members of the panels and OMB and CBO officials, we then developed four alternative approaches for using an investment component in making budget decisions. We evaluated how each approach might assist the government in focusing on long-term economic growth and how each would impact budgetary controls and the deficit.

We performed our work in Washington, D.C., between September 1992 and July 1993.

Defining Investment for Long-Term Economic Growth

The definition of investment used for budgetary purposes is extremely important, particularly if favorable budgetary treatment is accorded investment activities.

²Character classification codes are used by OMB to report budget outlays for investment separately from noninvestment. A four-digit number identifies data on investment and noninvestment outlays. All investment activities are classified in the 1000 series, while all noninvestment activities are classified in the 2000 series.

There are many possible definitions of investment, ranging from only federally owned physical assets to all physical assets financed with federal funds, education and training, research and development, health programs, and social services. The definition of investment used for budgetary purposes depends on the purpose that a budgetary investment component is expected to serve. Because we believe that the need to enhance the nation's long-term productive capacity is among the most pressing needs facing the country today, we defined investment as federal spending, either direct or through grants, that is directly intended to enhance the private sector's long-term productivity.³

OMB used two different definitions of investment in the fiscal year 1994 budget. OMB Circular A-11 defines investment as those outlays that yield benefits largely in the future. Its definition includes (1) direct federal spending and grants to state and local governments for construction and rehabilitation of facilities, major equipment, research and development, and education and training and (2) direct federal spending for commodity inventories and the purchase and sale of land and structures for federal use.⁴ For analytical purposes, OMB assigns a distinct character classification code to each type of investment and non-investment spending. OMB used the Circular A-11 definitions and character classification codes as the basis for developing the Federal Investment Outlays summary presentation which appears in the President's 1994 budget proposal and in Special Analysis D⁵ which had been part of the budget in fiscal years prior to 1991. Fiscal year 1994 investment outlays using this definition are estimated by OMB at \$253.4 billion.

The administration also used a broader definition of investment than that contained in Circular A-11 in the fiscal year 1994 budget request. A chapter on investment proposals presented its investment program, showing increased spending of \$7 billion for fiscal year 1994 and \$113.6 billion over 4 years. This spending included outlays for investment activities as defined by Circular A-11, such as physical assets, education, and research and

³Productivity gains are achieved by reducing the amount of labor needed to provide a given level of goods and services or by increasing the goods and services produced by a given amount of labor. This is discussed in our report Federal Budget: Choosing Public Investment Programs (GAO AIMD-94-25 July 23, 1993)

⁴Prior to the 1994 budget proposal, investment was comprised of outlays for loans, other financial investments, construction and rehabilitation, major equipment, commodity inventories, research and development, education and training, collection of information, and international development.

⁵Special Analysis D, "Federal Investment Outlays," distinguished between spending for investment and spending for current operations and was included in the President's budget documents from the fiscal year 1961 through the fiscal year 1990 budget presentations.

development. It also included an increase of about \$3.7 billion for programs such as child nutrition, substance abuse and mental health services, correctional facility improvements, and food stamps, which are not classified as investment in the section on Federal Investment Outlays prepared on the basis of definitions in Circular A-11.

In a 1987 study, CBO outlined a range of definitions of investment for analytic purposes but did not endorse any specific definition. The most stringent definition applied national income accounting principles to federal accounts, thus including only physical assets (excluding defense weapons systems) financed and owned by federal agencies. The broadest definition included spending on capital grants to state and local governments, federal credit subsidies for physical investment, intangible capital (research and development), and human capital (education and training).

CBO did not include health care spending as investment in human capital because, while such spending improves the nation's general welfare and creates a healthy work force, society primarily provides health care for reasons other than to increase productivity.

Experts on the panels we convened considered a wide range of options for defining investment. Some panelists suggested including grants for infrastructure, R&D, and education and training, as well as some federally owned assets that are designed to increase long-term economic productivity. Most panelists rejected broadening the definition of investment to include social insurance and welfare programs because they are shorter-term programs whose primary purpose is consumption. Many, however, would include some preventive health programs, such as child immunization, and food and nutrition programs, such as the Special Supplemental Food Program for Women, Infants, and Children (WIC) because these programs involve current spending to reduce future spending by helping recipients lead more healthy, productive lives. The objective of WIC, for example, is to reduce health problems in women, infants, and children that are the result of inadequate diets through nutrition education and food assistance. According to some, this could increase lifetime productivity. However, other research has shown that while these types of programs improve the nation's general welfare or reduce future federal costs, these, by themselves, would not increase productivity. Rather, they contend that many other factors, such as education and training, are necessary to achieve long-term increases in productivity.

Based on these discussions, we developed a definition of investment as spending directly intended to promote the private sector's long-term economic growth. This definition includes spending for research and development, human capital, and some infrastructure. Research and development produce new technology that leads to innovative products and production processes that lower costs; human capital is increased by the education and training that improves work force skills; and infrastructure includes roads, airports, and telecommunication systems and other facilities that lower private sector cost of producing and delivering goods and services. This would exclude spending on physical assets for which the principal purpose is use in agency missions, such as federal office buildings and weapon systems, rather than enhancement of long-term economic growth.

Appendix I displays two examples of the activities based on OMB character class data that could be included in a definition of investment as spending intended to increase long-term economic growth. While both examples would be considered relatively restrictive, the second is somewhat broader than the first. Under the first example, about 8 percent (\$131 billion) of total federal outlays would be classified as investment. It includes direct federal and grant outlays for (1) R&D construction and equipment, (2) R&D, except for Defense applied research and weapons activities development research, which we believe is unlikely to be applicable to civilian use, and (3) education and training. It also includes grants to state and local governments for infrastructure, such as highways and acquisition of equipment, and a small selection of outlays for direct federal construction and acquisition of equipment, such as flood prevention and control, construction of power generating facilities, and acquisition of air traffic control equipment. Our research indicated that it was reasonable to expect that such spending would contribute to future economic growth.

Under the second example, spending on childhood immunization programs and WIC would be added to the items in the first example. These were the additional programs that some of our panelists believed were also likely to contribute to the nation's long-term productivity. Although these additions increased estimates of total investment outlays by \$4 billion, the percentage of total federal outlays classified as investment remains essentially unchanged at about 8 percent.

Investment and Current Operations Spending Differentiated Only in Supplemental Budget Displays

While we, the current administration, and some Members of the Congress have stressed the need to review proposed levels of investment, this is not an easy task. The only distinction in the federal budget presentation between spending for investment and spending for current operations has been in displays contained in alternative budget presentations, such as the Physical and Other Capital Presentation or in Special Analysis D,⁶ which accompanied the Presidents' budgets. These supplemental presentations have no effect on the executive branch's budget decision-making because they are assembled after budget formulation decisions have been made. Equally important, the current presentations do not show the entire budget so that investment can be viewed in the context of all federal spending.

Although the current presentations have provided some supplemental information to congressional decisionmakers, they are not part of the formal budget process. They have had little effect on the level of investment undertaken by the government because appropriations subcommittees provide funding by department and agency in appropriation accounts that do not distinguish between investment and consumption spending.

As discussed earlier, the President's fiscal year 1994 budget contains a separate chapter on proposed increases in investment. However, this chapter shows only proposed increases, not the total level of proposed investment spending. In addition, this chapter classifies certain activities as investment that are not included in the Federal Investment Outlays presentation elsewhere in the budget. This use of two different definitions of investment within the same budget document may create some confusion.

Without aggregate numbers and consistent definitions, it is not possible to judge whether any particular proposed budget is more or less investment-oriented than that of prior years or than alternative budget proposals. In the current budgeting environment, the total level of investment in any year is the result of many individual decisions, not a conscious choice about an appropriate overall level of investment. The creation of a comprehensive investment component within the federal budget, comprised of all federal spending that both the executive and legislative branches have agreed meets the definition of investment, would provide a framework for policymakers to evaluate and make a conscious decision about the level of spending for investment purposes.

⁶See footnote 5.

Using an Investment Component in the Federal Budget Process

An investment component in the budget process could be used in various ways. We developed four approaches that could be employed singly or in combinations that could reflect a range of possible uses, from displaying investment for analytic purposes only, to creating a new investment budget category and establishing targets for the appropriate level of investment. We examined each approach to determine both how well it might (1) help decisionmakers focus on long-term economic growth and (2) affect budgetary controls and the deficit. The four approaches are

- modifying the existing display to show federal spending as investment or noninvestment,
- using an investment component for depreciating investment activities,
- using an investment component to permit deficit financing, and
- establishing annual investment targets agreed upon by the Congress and the administration.

We determined that the fourth approach, which is an investment target within a BEA type of framework, is the most promising because it would require that the Congress and the administration agree on a definition of investment and on the appropriate levels of investment spending within an agreed-upon fiscal policy path.

The following sections discuss each approach.

Modify Existing Display of Investment Activities in the Federal Budget

This approach would categorize and display each activity in the President's budget in terms of investment and noninvestment based on the intent of the activity. Such a display would differ from OMB's current "Federal Investment Outlays" presentation (which shows only investment outlays) by showing investment levels relative to all federal spending.

Changing how investment information is displayed in the budget does not change the current situation with regard to budget control and the deficit. It would permit conscious consideration of appropriate levels of investment and noninvestment as part of the budget decision-making process, but it would not include any mechanism that would prompt decisionmakers to make specific choices between investment and consumption or to select a specific level of investment. This approach simply provides additional information for the decisionmaker.

As described previously, OMB has classified all spending in the federal budget accounts as investment or noninvestment using character

classification codes. The OMB character class coding structure could be used as the starting point in identifying investment activities based on any agreed-upon definition of investment.

In addition to displaying investment outlays as they relate to total federal spending, other additions to the investment information presented in the budget could be useful in evaluating total public investment. For example, the display could include information on the effectiveness of various investment programs; tax expenditures⁷ related to investment; deferred maintenance; and historical information about federal, state, and local spending on investment.

Data on the effectiveness of investments could show what has been accomplished or is expected to be accomplished by the investment outlays in either program or economic terms. Tax expenditures and outlay data could show the collective impact of government spending and tax policy on investment and consumption. Decisionmakers could then see both the trends and the mix of outlays and tax expenditures used to accomplish government investment objectives.

Data on deferred maintenance of physical capital could be used by policymakers to identify the amount of maintenance expenditures that are being delayed to a future period and of the decline in value of an asset due to deferred maintenance. Studies, such as CBO's 1991 study on How Federal Spending for Infrastructure and Other Public Investments Affects the Economy, have shown that maintenance is often more cost-effective than new construction.

Displaying historical data on federal, state, and local investment spending would enable decisionmakers to compare investment spending levels between different levels of government as well as with federal investment undertaken in the past. It also would provide data for analysis of total public investment spending and facilitate studies of shifts in spending between the various levels of government.

Depreciate Investment Activities

This approach would report the total up-front cost of investments in a capital portion of the budget, and the annual depreciation in an operating portion of the budget would spread the investment costs over the life of the investment. Thus, the operating budget would reflect the cost of goods and services in the period that they are used or consumed.

⁷A tax expenditure is a revenue loss attributable to a provision of the federal tax laws.

Depreciation has been a long accepted part of accounting in business organizations. Under business accounting practices, depreciation is the allocation of the costs, less salvage value, of fixed assets, including equipment, buildings, and other structures, over their useful lives. It is recorded in a business organization's financial statements to reflect the use of assets during specific operating periods in order to match costs with related revenues in measuring income and to determine the organization's profit or loss, its federal tax liability, and the depreciated value of the asset.

State governments neither budget for depreciation nor charge their operating budgets with depreciation. They often use separate capital and operating budgets because they are legally required to balance their operating budgets. Most charge the operating budget with debt service—principal and interest—when bonds are sold to finance the capital.

Depreciation is also not currently used in the federal budget, but some capital budget advocates argue for its use. Appropriations and outlays are normally recorded on a cash basis in the budget; thus the costs of programs intended to produce future benefits are recorded up front. Advocates of traditional capital budgets argue that this large up-front commitment of resources, and the resulting additions to total spending, makes investments unattractive spending decisions compared to other types of spending, especially under the current budget process with its spending caps.⁸

Depreciation is not a practical alternative for the Congress and the administration to use in making decisions on the appropriate level of spending intended to enhance the nation's long-term economic growth for several reasons. Currently, the law requires agencies to have budget authority before they can obligate or spend funds. Unless the full amount of budget authority is appropriated up front, the ability to control decisions when total resources are committed to a particular use is reduced. Appropriating only annual depreciation, which is only a fraction of the total cost of an investment, raises this control issue.

In addition to the funds control issue is the difficulty of determining an appropriate depreciation amount. Investments in human capital would be particularly difficult to depreciate because of the difficulties in measuring

⁸Given the BEA discretionary budget caps, if resources are committed up front for capital items spending for alternative discretionary items is squeezed out.

the value and appropriate period over which such human capital expenditures should be charged. Also, depreciation schedules are often arbitrary; thus, including depreciation in the budget could result in spending decisions being based on questionable data. There could be incentives to use lower depreciation rates to make the operating expenses and the deficit look smaller by extending the periods over which costs are allocated. Questions have also arisen over the issue of the federal government allocating depreciation for physical assets, such as highways, that are financed with federal funds but owned by state and local governments.

The debate over depreciation could be relevant to the government's role as an operating entity—but not to its role in increasing private economic growth. Unlike the government's investments intended to increase long-term economic growth in the private sector, assets such as buildings or computer systems are more easily measured for depreciation. And, unlike most federal investment programs, the federal government fully owns the assets it purchases for internal operations.

The Federal Accounting Standards Advisory Board (FASAB) is addressing the appropriate use of depreciation for federal accounting purposes. It is not clear what types of spending, if any, would be depreciated for these purposes. If depreciation concepts are to be used in budgeting, it would be desirable that they be developed in concert with accounting concepts.

If depreciation were to be included in the budget, various alternatives for depreciating investments are possible. We discuss some of these in appendix II.

Permit Deficit Financing of Investment Activities

This approach would permit borrowing to finance investment activities while retaining a balanced operating budget. Some advocates of intergenerational equity (which calls for spreading the costs of government benefits fairly among the generations receiving benefits) argue that only capital items, which are used for many years, should be financed by borrowing. Other proponents favor deficit financing if the rate of return for the federal investment is better than the private investment it displaces. This would be a marked contrast to current practices which do not differentiate between current consumption and long-term investments.

The majority of state governments have some form of a capital budget and use a combination of current revenues, short-term debt, and long-term

debt to finance capital expenditures. The most frequently used debt financing tool for capital assets in state governments is long-term debt. If debt financing were implemented consistent with intergenerational equity theory, the term of the borrowing would coincide with the life of the capital asset, and, as a project generated services over a number of years, the services would be paid for by the people who use them. In practice, however, states finance capital projects through a combination of taxes, user fees, federal grants, and debt financing, and some states do not link the financing method and borrowing period either to a capital asset or its useful life.

Regarding the rate of return argument, the long-term return on federal investment is less well understood than returns on private investment, and it is not subject to the same market discipline. The choice, therefore, between spending for investment and spending for consumption can be seen as the setting of priorities within an overall fiscal constraint, not as a reason for relaxing that constraint and permitting a larger deficit.

Regardless of how it were implemented, deficit financing of investment would create a problem for the integrity of any budget process. If investments can be deficit financed while other types of activities (noninvestment or operating) may not, there would be significant incentives to try to categorize operating activities as investment. Unlike the rest of the budget, activities categorized as investment would not be subject to the same pressures to reduce the deficit. Charging annual depreciation of investments to the operating budget (which would be required to be balanced) could exert some control over the amount of investment undertaken.

Establish Annual Investment Targets

The BEA established a set of caps on discretionary spending as part of the budget control process. Investment spending could be considered formally in the budget process by establishing similar aggregate targets for investment. Since we believe that a primary budgetary objective should be to reduce the deficit, a declining unified budget deficit path should be determined first. Then, within that path, a target for investment spending could be established. Policymakers could evaluate individual investment programs to determine which competing investments should be selected within the overall target.

Setting an investment target would require policymakers to evaluate the current levels of investment and consumption spending and would

encourage a conscious decision about an appropriate overall level of investment. In our view, this approach has the advantage of focusing budget decisionmakers on the overall level of investment supported in the budget without losing sight of the unified budget deficit's impact on the economy. It also has the advantage of building on the current congressional budget process as the framework for making decisions. And it does not raise the budget control problems posed by the depreciation and deficit financing options.

Given the way the budget process now operates, however, a number of implementation questions would be raised by deciding to set a target for investment. These questions include the following:

- How can a decision be made on an appropriate level of investment and how can we be assured that only worthwhile projects are funded?
- Within the current budget enforcement framework, would separate floors as well as caps be necessary to assure a minimum level of investment?
- Would trade-offs be allowed between discretionary spending for investment and mandatory programs that support consumption to permit the Congress to shift resources from consumption to investment?⁹
- How would investment and noninvestment activities be allocated to congressional committees?

These are important and difficult questions and the answers could change over time. Nevertheless, we believe working answers and procedures can be agreed upon. For example, although there is unlikely to be a single "right" number for the share of federal spending that should support investment, most agree that share should rise. The Congress and the President might start by focusing on how much the share should increase each year. Selection of a range rather than a single number could provide some historical experience that could help in answering the first two questions listed above.

The Budget Enforcement Act does not permit trade-offs between discretionary spending for investment and mandatory spending which supports consumption. It would be difficult for the Congress and the administration to make any shifts in the portion of federal spending devoted to investment without some increased flexibility to make trade-offs between discretionary and mandatory spending. However, the BEA does not offer such flexibility. How to achieve these trade-offs without destroying the existing controls in the Budget Enforcement Act is a

⁹GAO letter to the Honorable John Conyers, Jr., May 19, 1993, B-247667.

question that must be addressed in order to implement investment targets. Closely related to this is the question of how the Congress would choose to consider investment and noninvestment activities—either through allocation of the targeted amount to existing congressional committees or through some new allocation process.

Although there is no guarantee that any specific project will by itself increase productivity, there are questions that can be asked to increase the likelihood that only worthwhile projects are funded. We provided one such set of questions, a discussion of available analytical tools, and a framework for evaluating investment proposals in our recent report, Federal Budget: Choosing Public Investment Programs (GAO/AIMD-93-25, July 23, 1993).

Conclusions

The most important contributions the federal government can make to a healthy and growing economy are (1) reducing the federal deficit and (2) making wise decisions on investments that will foster long-term economic growth. However, the current budget structure does not facilitate making decisions on activities intended to promote long-term economic growth. We believe that an investment component in the federal budget could help the Congress and the President make more informed decisions regarding federal spending on noninvestment activities versus investments for the future.

However, for an investment component to be effectively used by decisionmakers, it is imperative that a definition of investment be agreed upon. While there are many possible definitions of investment, the most appropriate is one that includes only those programs directly intended to increase the long-term productive capacity of the private sector. Controversy over the definition will likely escalate if the investment component is given any type of favorable budget treatment. Proponents of any program could be motivated to define it as investment so as to obtain a favorable budget treatment. Thus, the application and integrity of the definition become very important. To develop and enforce a definition, an agreement could be reached between the executive and legislative branches similar to the agreement that was reached in defining mandatory and discretionary programs for BEA.

The most promising way to use an investment component is to establish targets for appropriate levels of investment spending similar to BEA's discretionary spending limits. Recognizing the importance of deficit

reduction to long-term growth, it would be better to make decisions on the appropriate level of investment within the context of the unified budget in order to sustain focus on reducing the deficit over an appropriate period.

We are sending copies of this report to interested Members of the Congress; the Director, Congressional Budget Office; and the Director, Office of Management and Budget. Copies will be made available to other parties upon request.

Please contact me at (202) 512-9573 if you or your staff have any questions. Major contributors to this report are listed in appendix III.

Sincerely yours,

A handwritten signature in cursive script that reads "Paul L. Posner".

Paul L. Posner
Director, Budget Issues

Public Law 103-62
103d Congress

An Act

To provide for the establishment of strategic planning and performance measurement in the Federal Government, and for other purposes.

Aug. 3, 1993
[S. 20]

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Government Performance and Results Act of 1993".

Government
Performance
and Results Act
of 1993.
31 USC 1101
note.
31 USC 1115
note.

SEC. 2. FINDINGS AND PURPOSES.

(a) **FINDINGS.**—The Congress finds that—

(1) waste and inefficiency in Federal programs undermine the confidence of the American people in the Government and reduces the Federal Government's ability to address adequately vital public needs;

(2) Federal managers are seriously disadvantaged in their efforts to improve program efficiency and effectiveness, because of insufficient articulation of program goals and inadequate information on program performance; and

(3) congressional policymaking, spending decisions and program oversight are seriously handicapped by insufficient attention to program performance and results.

(b) **PURPOSES.**—The purposes of this Act are to—

(1) improve the confidence of the American people in the capability of the Federal Government, by systematically holding Federal agencies accountable for achieving program results;

(2) initiate program performance reform with a series of pilot projects in setting program goals, measuring program performance against those goals, and reporting publicly on their progress;

(3) improve Federal program effectiveness and public accountability by promoting a new focus on results, service quality, and customer satisfaction;

(4) help Federal managers improve service delivery, by requiring that they plan for meeting program objectives and by providing them with information about program results and service quality;

(5) improve congressional decisionmaking by providing more objective information on achieving statutory objectives, and on the relative effectiveness and efficiency of Federal programs and spending; and

(6) improve internal management of the Federal Government.

SEC. 3. STRATEGIC PLANNING.

Chapter 3 of title 5, United States Code, is amended by adding after section 305 the following new section:

“§ 306. Strategic plans

“(a) No later than September 30, 1997, the head of each agency shall submit to the Director of the Office of Management and Budget and to the Congress a strategic plan for program activities. Such plan shall contain—

“(1) a comprehensive mission statement covering the major functions and operations of the agency;

“(2) general goals and objectives, including outcome-related goals and objectives, for the major functions and operations of the agency;

“(3) a description of how the goals and objectives are to be achieved, including a description of the operational processes, skills and technology, and the human, capital, information, and other resources required to meet those goals and objectives;

“(4) a description of how the performance goals included in the plan required by section 1115(a) of title 31 shall be related to the general goals and objectives in the strategic plan;

“(5) an identification of those key factors external to the agency and beyond its control that could significantly affect the achievement of the general goals and objectives; and

“(6) a description of the program evaluations used in establishing or revising general goals and objectives, with a schedule for future program evaluations.

“(b) The strategic plan shall cover a period of not less than five years forward from the fiscal year in which it is submitted, and shall be updated and revised at least every three years.

“(c) The performance plan required by section 1115 of title 31 shall be consistent with the agency's strategic plan. A performance plan may not be submitted for a fiscal year not covered by a current strategic plan under this section.

“(d) When developing a strategic plan, the agency shall consult with the Congress, and shall solicit and consider the views and suggestions of those entities potentially affected by or interested in such a plan.

“(e) The functions and activities of this section shall be considered to be inherently Governmental functions. The drafting of strategic plans under this section shall be performed only by Federal employees.

“(f) For purposes of this section the term ‘agency’ means an Executive agency defined under section 105, but does not include the Central Intelligence Agency, the General Accounting Office, the Panama Canal Commission, the United States Postal Service, and the Postal Rate Commission.”

SEC. 4. ANNUAL PERFORMANCE PLANS AND REPORTS.

(a) **BUDGET CONTENTS AND SUBMISSION TO CONGRESS.**—Section 1105(a) of title 31, United States Code, is amended by adding at the end thereof the following new paragraph:

“(29) beginning with fiscal year 1999, a Federal Government performance plan for the overall budget as provided for under section 1115.”

(b) **PERFORMANCE PLANS AND REPORTS.**—Chapter 11 of title 31, United States Code, is amended by adding after section 1114 the following new sections:

“§ 1115. Performance plans

“(a) In carrying out the provisions of section 1105(a)(29), the Director of the Office of Management and Budget shall require each agency to prepare an annual performance plan covering each program activity set forth in the budget of such agency. Such plan shall—

“(1) establish performance goals to define the level of performance to be achieved by a program activity;

“(2) express such goals in an objective, quantifiable, and measurable form unless authorized to be in an alternative form under subsection (b);

“(3) briefly describe the operational processes, skills and technology, and the human, capital, information, or other resources required to meet the performance goals;

“(4) establish performance indicators to be used in measuring or assessing the relevant outputs, service levels, and outcomes of each program activity;

“(5) provide a basis for comparing actual program results with the established performance goals; and

“(6) describe the means to be used to verify and validate measured values.

“(b) If an agency, in consultation with the Director of the Office of Management and Budget, determines that it is not feasible to express the performance goals for a particular program activity in an objective, quantifiable, and measurable form, the Director of the Office of Management and Budget may authorize an alternative form. Such alternative form shall—

“(1) include separate descriptive statements of—

“(A)(i) a minimally effective program, and

“(ii) a successful program, or

“(B) such alternative as authorized by the Director of the Office of Management and Budget, with sufficient precision and in such terms that would allow for an accurate, independent determination of whether the program activity's performance meets the criteria of the description; or

“(2) state why it is infeasible or impractical to express a performance goal in any form for the program activity.

“(c) For the purpose of complying with this section, an agency may aggregate, disaggregate, or consolidate program activities, except that any aggregation or consolidation may not omit or minimize the significance of any program activity constituting a major function or operation for the agency.

“(d) An agency may submit with its annual performance plan an appendix covering any portion of the plan that—

“(1) is specifically authorized under criteria established by an Executive order to be kept secret in the interest of national defense or foreign policy; and

“(2) is properly classified pursuant to such Executive order.

“(e) The functions and activities of this section shall be considered to be inherently Governmental functions. The drafting of performance plans under this section shall be performed only by Federal employees.

“(f) For purposes of this section and sections 1116 through 1119, and sections 9703 and 9704 the term—

“(1) ‘agency’ has the same meaning as such term is defined under section 506(f) of title 5;

“(2) ‘outcome measure’ means an assessment of the results of a program activity compared to its intended purpose;

“(3) ‘output measure’ means the tabulation, calculation, or recording of activity or effort and can be expressed in a quantitative or qualitative manner;

“(4) ‘performance goal’ means a target level of performance expressed as a tangible, measurable objective, against which actual achievement can be compared, including a goal expressed as a quantitative standard, value, or rate;

“(5) ‘performance indicator’ means a particular value or characteristic used to measure output or outcome;

“(6) ‘program activity’ means a specific activity or project as listed in the program and financing schedules of the annual budget of the United States Government; and

“(7) ‘program evaluation’ means an assessment, through objective measurement and systematic analysis, of the manner and extent to which Federal programs achieve intended objectives.

“§ 1116. Program performance reports

“(a) No later than March 31, 2000, and no later than March 31 of each year thereafter, the head of each agency shall prepare and submit to the President and the Congress, a report on program performance for the previous fiscal year.

“(b)(1) Each program performance report shall set forth the performance indicators established in the agency performance plan under section 1115, along with the actual program performance achieved compared with the performance goals expressed in the plan for that fiscal year.

“(2) If performance goals are specified in an alternative form under section 1115(b), the results of such program shall be described in relation to such specifications, including whether the performance failed to meet the criteria of a minimally effective or successful program.

“(c) The report for fiscal year 2000 shall include actual results for the preceding fiscal year, the report for fiscal year 2001 shall include actual results for the two preceding fiscal years, and the report for fiscal year 2002 and all subsequent reports shall include actual results for the three preceding fiscal years.

“(d) Each report shall—

“(1) review the success of achieving the performance goals of the fiscal year;

“(2) evaluate the performance plan for the current fiscal year relative to the performance achieved toward the performance goals in the fiscal year covered by the report;

“(3) explain and describe, where a performance goal has not been met (including when a program activity’s performance is determined not to have met the criteria of a successful program activity under section 1115(b)(1)(A)(ii) or a corresponding level of achievement if another alternative form is used)—

“(A) why the goal was not met;

“(B) those plans and schedules for achieving the established performance goal, and

“(C) if the performance goal is impractical or infeasible, why that is the case and what action is recommended;

“(4) describe the use and assess the effectiveness in achieving performance goals of any waiver under section 9703 of this title; and

“(5) include the summary findings of those program evaluations completed during the fiscal year covered by the report.

“(e) An agency head may include all program performance information required annually under this section in an annual financial statement required under section 3515 if any such statement is submitted to the Congress no later than March 31 of the applicable fiscal year.

“(f) The functions and activities of this section shall be considered to be inherently Governmental functions. The drafting of program performance reports under this section shall be performed only by Federal employees.

“§ 1117. Exemption

“The Director of the Office of Management and Budget may exempt from the requirements of sections 1115 and 1116 of this title and section 306 of title 5, any agency with annual outlays of \$20,000,000 or less.”

SEC. 5. MANAGERIAL ACCOUNTABILITY AND FLEXIBILITY.

(a) MANAGERIAL ACCOUNTABILITY AND FLEXIBILITY.—Chapter 97 of title 31, United States Code, is amended by adding after section 9702, the following new section:

“§ 9703. Managerial accountability and flexibility

“(a) Beginning with fiscal year 1999, the performance plans required under section 1115 may include proposals to waive administrative procedural requirements and controls, including specification of personnel staffing levels, limitations on compensation or remuneration, and prohibitions or restrictions on funding transfers among budget object classification 20 and subclassifications 11, 12, 31, and 32 of each annual budget submitted under section 1105, in return for specific individual or organization accountability to achieve a performance goal. In preparing and submitting the performance plan under section 1105(a)(29), the Director of the Office of Management and Budget shall review and may approve any proposed waivers. A waiver shall take effect at the beginning of the fiscal year for which the waiver is approved.

“(b) Any such proposal under subsection (a) shall describe the anticipated effects on performance resulting from greater managerial or organizational flexibility, discretion, and authority, and shall quantify the expected improvements in performance resulting from any waiver. The expected improvements shall be compared to current actual performance, and to the projected level of performance that would be achieved independent of any waiver.

“(c) Any proposal waiving limitations on compensation or remuneration shall precisely express the monetary change in compensation or remuneration amounts, such as bonuses or awards, that shall result from meeting, exceeding, or failing to meet performance goals.

“(d) Any proposed waiver of procedural requirements or controls imposed by an agency (other than the proposing agency or the Office of Management and Budget) may not be included in a

performance plan unless it is endorsed by the agency that established the requirement, and the endorsement included in the proposing agency's performance plan.

"(e) A waiver shall be in effect for one or two years as specified by the Director of the Office of Management and Budget in approving the waiver. A waiver may be renewed for a subsequent year. After a waiver has been in effect for three consecutive years, the performance plan prepared under section 1115 may propose that a waiver, other than a waiver of limitations on compensation or remuneration, be made permanent.

"(f) For purposes of this section, the definitions under section 1115(f) shall apply."

SEC. 6. PILOT PROJECTS.

(a) **PERFORMANCE PLANS AND REPORTS.**—Chapter 11 of title 31, United States Code, is amended by inserting after section 1117 (as added by section 4 of this Act) the following new section:

"§ 1118. Pilot projects for performance goals

"(a) The Director of the Office of Management and Budget, after consultation with the head of each agency, shall designate not less than ten agencies as pilot projects in performance measurement for fiscal years 1994, 1995, and 1996. The selected agencies shall reflect a representative range of Government functions and capabilities in measuring and reporting program performance.

"(b) Pilot projects in the designated agencies shall undertake the preparation of performance plans under section 1115, and program performance reports under section 1116, other than section 1116(c), for one or more of the major functions and operations of the agency. A strategic plan shall be used when preparing agency performance plans during one or more years of the pilot period.

"(c) No later than May 1, 1997, the Director of the Office of Management and Budget shall submit a report to the President and to the Congress which shall—

"(1) assess the benefits, costs, and usefulness of the plans and reports prepared by the pilot agencies in meeting the purposes of the Government Performance and Results Act of 1993;

"(2) identify any significant difficulties experienced by the pilot agencies in preparing plans and reports; and

"(3) set forth any recommended changes in the requirements of the provisions of Government Performance and Results Act of 1993, section 306 of title 5, sections 1105, 1115, 1116, 1117, 1119 and 9703 of this title, and this section."

(b) **MANAGERIAL ACCOUNTABILITY AND FLEXIBILITY.**—Chapter 97 of title 31, United States Code, is amended by inserting after section 9703 (as added by section 5 of this Act) the following new section:

"§ 9704. Pilot projects for managerial accountability and flexibility

"(a) The Director of the Office of Management and Budget shall designate not less than five agencies as pilot projects in managerial accountability and flexibility for fiscal years 1995 and 1996. Such agencies shall be selected from those designated as pilot projects under section 1118 and shall reflect a representative

Reports.

range of Government functions and capabilities in measuring and reporting program performance.

“(b) Pilot projects in the designated agencies shall include proposed waivers in accordance with section 9703 for one or more of the major functions and operations of the agency.

“(c) The Director of the Office of Management and Budget shall include in the report to the President and to the Congress required under section 1118(c)—

“(1) an assessment of the benefits, costs, and usefulness of increasing managerial and organizational flexibility, discretion, and authority in exchange for improved performance through a waiver; and

“(2) an identification of any significant difficulties experienced by the pilot agencies in preparing proposed waivers.

“(d) For purposes of this section the definitions under section 1115(f) shall apply.”

(c) PERFORMANCE BUDGETING.—Chapter 11 of title 31, United States Code, is amended by inserting after section 1118 (as added by section 6 of this Act) the following new section:

“§ 1119. Pilot projects for performance budgeting

“(a) The Director of the Office of Management and Budget, after consultation with the head of each agency shall designate not less than five agencies as pilot projects in performance budgeting for fiscal years 1998 and 1999. At least three of the agencies shall be selected from those designated as pilot projects under section 1118, and shall also reflect a representative range of Government functions and capabilities in measuring and reporting program performance.

“(b) Pilot projects in the designated agencies shall cover the preparation of performance budgets. Such budgets shall present, for one or more of the major functions and operations of the agency, the varying levels of performance, including outcome-related performance, that would result from different budgeted amounts.

“(c) The Director of the Office of Management and Budget shall include, as an alternative budget presentation in the budget submitted under section 1105 for fiscal year 1999, the performance budgets of the designated agencies for this fiscal year.

“(d) No later than March 31, 2001, the Director of the Office of Management and Budget shall transmit a report to the President and to the Congress on the performance budgeting pilot projects which shall—

Reports.

“(1) assess the feasibility and advisability of including a performance budget as part of the annual budget submitted under section 1105;

“(2) describe any difficulties encountered by the pilot agencies in preparing a performance budget;

“(3) recommend whether legislation requiring performance budgets should be proposed and the general provisions of any legislation; and

“(4) set forth any recommended changes in the other requirements of the Government Performance and Results Act of 1993, section 306 of title 5, sections 1105, 1115, 1116, 1117, and 9703 of this title, and this section.

“(e) After receipt of the report required under subsection (d), the Congress may specify that a performance budget be submitted as part of the annual budget submitted under section 1105.”

SEC. 7. UNITED STATES POSTAL SERVICE.

Part III of title 39, United States Code, is amended by adding at the end thereof the following new chapter:

**“CHAPTER 28—STRATEGIC PLANNING AND
PERFORMANCE MANAGEMENT**

***Sec.**

***2801. Definitions.**

***2802. Strategic plans.**

***2803. Performance plans.**

***2804. Program performance reports.**

***2805. Inherently Governmental functions.**

***§ 2801. Definitions**

“For purposes of this chapter the term—

“(1) ‘outcome measure’ refers to an assessment of the results of a program activity compared to its intended purpose;

“(2) ‘output measure’ refers to the tabulation, calculation, or recording of activity or effort and can be expressed in a quantitative or qualitative manner;

“(3) ‘performance goal’ means a target level of performance expressed as a tangible, measurable objective, against which actual achievement shall be compared, including a goal expressed as a quantitative standard, value, or rate;

“(4) ‘performance indicator’ refers to a particular value or characteristic used to measure output or outcome;

“(5) ‘program activity’ means a specific activity related to the mission of the Postal Service; and

“(6) ‘program evaluation’ means an assessment, through objective measurement and systematic analysis, of the manner and extent to which Postal Service programs achieve intended objectives.

***§ 2802. Strategic plans**

“(a) No later than September 30, 1997, the Postal Service shall submit to the President and the Congress a strategic plan for its program activities. Such plan shall contain—

“(1) a comprehensive mission statement covering the major functions and operations of the Postal Service;

“(2) general goals and objectives, including outcome-related goals and objectives, for the major functions and operations of the Postal Service;

“(3) a description of how the goals and objectives are to be achieved, including a description of the operational processes, skills and technology, and the human, capital, information, and other resources required to meet those goals and objectives;

“(4) a description of how the performance goals included in the plan required under section 2803 shall be related to the general goals and objectives in the strategic plan;

“(5) an identification of those key factors external to the Postal Service and beyond its control that could significantly affect the achievement of the general goals and objectives; and

“(6) a description of the program evaluations used in establishing or revising general goals and objectives, with a schedule for future program evaluations.

“(b) The strategic plan shall cover a period of not less than five years forward from the fiscal year in which it is submitted, and shall be updated and revised at least every three years.

“(c) The performance plan required under section 2803 shall be consistent with the Postal Service’s strategic plan. A performance plan may not be submitted for a fiscal year not covered by a current strategic plan under this section.

“(d) When developing a strategic plan, the Postal Service shall solicit and consider the views and suggestions of those entities potentially affected by or interested in such a plan, and shall advise the Congress of the contents of the plan.

“§ 2803. Performance plans

“(a) The Postal Service shall prepare an annual performance plan covering each program activity set forth in the Postal Service budget, which shall be included in the comprehensive statement presented under section 2401(g) of this title. Such plan shall—

“(1) establish performance goals to define the level of performance to be achieved by a program activity;

“(2) express such goals in an objective, quantifiable, and measurable form unless an alternative form is used under subsection (b);

“(3) briefly describe the operational processes, skills and technology, and the human, capital, information, or other resources required to meet the performance goals;

“(4) establish performance indicators to be used in measuring or assessing the relevant outputs, service levels, and outcomes of each program activity;

“(5) provide a basis for comparing actual program results with the established performance goals; and

“(6) describe the means to be used to verify and validate measured values.

“(b) If the Postal Service determines that it is not feasible to express the performance goals for a particular program activity in an objective, quantifiable, and measurable form, the Postal Service may use an alternative form. Such alternative form shall—

“(1) include separate descriptive statements of—

“(A) a minimally effective program, and

“(B) a successful program,

with sufficient precision and in such terms that would allow for an accurate, independent determination of whether the program activity’s performance meets the criteria of either description; or

“(2) state why it is infeasible or impractical to express a performance goal in any form for the program activity.

“(c) In preparing a comprehensive and informative plan under this section, the Postal Service may aggregate, disaggregate, or consolidate program activities, except that any aggregation or consolidation may not omit or minimize the significance of any program activity constituting a major function or operation.

“(d) The Postal Service may prepare a non-public annex to its plan covering program activities or parts of program activities relating to—

“(1) the avoidance of interference with criminal prosecution;

or

“(2) matters otherwise exempt from public disclosure under section 410(c) of this title.

“§ 2804. Program performance reports

“(a) The Postal Service shall prepare a report on program performance for each fiscal year, which shall be included in the annual comprehensive statement presented under section 2401(g) of this title.

“(b)(1) The program performance report shall set forth the performance indicators established in the Postal Service performance plan, along with the actual program performance achieved compared with the performance goals expressed in the plan for that fiscal year.

“(2) If performance goals are specified by descriptive statements of a minimally effective program activity and a successful program activity, the results of such program shall be described in relationship to those categories, including whether the performance failed to meet the criteria of either category.

“(c) The report for fiscal year 2000 shall include actual results for the preceding fiscal year, the report for fiscal year 2001 shall include actual results for the two preceding fiscal years, and the report for fiscal year 2002 and all subsequent reports shall include actual results for the three preceding fiscal years.

“(d) Each report shall—

“(1) review the success of achieving the performance goals of the fiscal year;

“(2) evaluate the performance plan for the current fiscal year relative to the performance achieved towards the performance goals in the fiscal year covered by the report;

“(3) explain and describe, where a performance goal has not been met (including when a program activity's performance is determined not to have met the criteria of a successful program activity under section 2803(b)(2))—

“(A) why the goal was not met;

“(B) those plans and schedules for achieving the established performance goal; and

“(C) if the performance goal is impractical or infeasible, why that is the case and what action is recommended; and

“(4) include the summary findings of those program evaluations completed during the fiscal year covered by the report.

“§ 2805. Inherently Governmental functions

“The functions and activities of this chapter shall be considered to be inherently Governmental functions. The drafting of strategic plans, performance plans, and program performance reports under this section shall be performed only by employees of the Postal Service.”

31 USC 1115
note.

SEC. 8. CONGRESSIONAL OVERSIGHT AND LEGISLATION.

(a) IN GENERAL.—Nothing in this Act shall be construed as limiting the ability of Congress to establish, amend, suspend, or annul a performance goal. Any such action shall have the effect of superseding that goal in the plan submitted under section 1105(a)(29) of title 31, United States Code.

(b) GAO REPORT.—No later than June 1, 1997, the Comptroller General of the United States shall report to Congress on the implementation of this Act, including the prospects for compliance by Federal agencies beyond those participating as pilot projects under sections 1118 and 9704 of title 31, United States Code.

SEC. 9. TRAINING.

The Office of Personnel Management shall, in consultation with the Director of the Office of Management and Budget and the Comptroller General of the United States, develop a strategic planning and performance measurement training component for its management training program and otherwise provide managers with an orientation on the development and use of strategic planning and program performance measurement.

31 USC 1115
note.

SEC. 10. APPLICATION OF ACT.

No provision or amendment made by this Act may be construed as—

31 USC 1115
note.

(1) creating any right, privilege, benefit, or entitlement for any person who is not an officer or employee of the United States acting in such capacity, and no person who is not an officer or employee of the United States acting in such capacity shall have standing to file any civil action in a court of the United States to enforce any provision or amendment made by this Act; or

(2) superseding any statutory requirement, including any requirement under section 553 of title 5, United States Code.

SEC. 11. TECHNICAL AND CONFORMING AMENDMENTS.

(a) AMENDMENT TO TITLE 5, UNITED STATES CODE.—The table of sections for chapter 3 of title 5, United States Code, is amended by adding after the item relating to section 305 the following:
“306. Strategic plans.”.

(b) AMENDMENTS TO TITLE 31, UNITED STATES CODE.—

(1) AMENDMENT TO CHAPTER 11.—The table of sections for chapter 11 of title 31, United States Code, is amended by adding after the item relating to section 1114 the following:

“1115. Performance plans.
“1116. Program performance reports.
“1117. Exemptions.
“1118. Pilot projects for performance goals.
“1119. Pilot projects for performance budgeting.”.

(2) AMENDMENT TO CHAPTER 97.—The table of sections for chapter 97 of title 31, United States Code, is amended by adding after the item relating to section 9702 the following:

“9703. Managerial accountability and flexibility.
“9704. Pilot projects for managerial accountability and flexibility.”.

(c) AMENDMENT TO TITLE 39, UNITED STATES CODE.—The table of chapters for part III of title 39, United States Code, is amended by adding at the end thereof the following new item:

"28. Strategic planning and performance management 2801".

Approved August 3, 1993.

LEGISLATIVE HISTORY—S. 20 (H.R. 826):

HOUSE REPORTS: No. 103-106, Pt. 1, accompanying H.R. 826 (Comm. on Government Operations).

SENATE REPORTS: No. 103-58 (Comm. on Governmental Affairs).

CONGRESSIONAL RECORD, Vol. 139 (1993):

May 25, H.R. 826 considered and passed House.

June 23, S. 20 considered and passed Senate.

July 15, considered and passed House.

WEEKLY COMPILATION OF PRESIDENTIAL DOCUMENTS, Vol. 29 (1993):

Aug. 3, Presidential remarks.



12.10. Government Performance and Results Act implementation.

(a) **Background.**—The Government Performance and Results Act (GPRA), Public Law 103-62, requires agencies to do the following:

- develop strategic plans prior to FY 1998;
- prepare annual plans setting performance goals beginning in FY 1999; and
- report annually on actual performance compared to performance goals; the first such report is due in March 2000.

Two sets of pilot projects are required over the next several years to test and demonstrate: (1) annual performance plans and reports, and (2) managerial accountability and flexibility. At the conclusion of these pilot projects, OMB and GAO separately report to Congress in 1997 on the results and assess the government's ability to begin full-scale implementation.

A third set of pilot projects on performance budgeting are required during fiscal years 1998 and 1999. OMB reports to the President and Congress in 2001 on the results of this set of pilots with recommendations on whether performance budgeting should be required.

(b) **Definitions.**—This section contains the definitions of key terms found in GPRA.

- (1) *Outcome measure* means an assessment of the results of a program activity compared to its intended purpose.
- (2) *Output measure* means the tabulation, calculation, or recording of activity or effort and can be expressed in a quantitative or qualitative manner.
- (3) *Performance goal* means a target level of performance expressed as a tangible, measurable objective, against which actual achievement can be compared, including a goal expressed as a quantitative standard, value, or rate.
- (4) *Performance indicator* means a particular value or characteristic used to measure output or outcome.
- (5) *Program activity* means a specific activity or project as listed in the program and financing

schedules of the annual budget of the United States Government.

(6) *Program evaluation* means an assessment, through objective measurement and systematic analysis, of the manner and extent to which federal programs achieve intended objectives.

(c) **Implementation Activity.**—Agencies are encouraged to begin the work necessary to include more program performance indicators and performance goals in the budget decision-making process and budget document. In this regard, the focus should be toward developing quantitative and qualitative measures of outputs and outcomes. It is emphasized that the spirit and experience of GPRA should not be limited only to the designated pilot programs. For the FY 1996 Budget, agencies are encouraged to do the following:

- increase the development and use of output and outcome based performance information in the budget decision-making process and budget justification materials;
- review all program workload and performance information used in the FY 1995 Budget and increase the use of output and outcome based measures;

It is recognized that implementation of GPRA and the development of output and outcome measures is a difficult and complex process. The efforts started this year are expected to be a first step toward development of policies, procedures, and practices which will evolve over the course of the GPRA timetable.

(d) **Performance indicators developed under the Chief Financial Officers Act.**—In the development of program performance indicators related to GPRA implementation, agencies are encouraged to review the program performance information included in their most recent financial statements pursuant to the Chief Financial Officers Act. Where appropriate, GPRA efforts this year can build on the experience under the Chief Financial Officers Act. (See additional requirements related to program performance information in section 15).

(e) **Table.**—The following sections contain guidance related to program performance information:

GUIDANCE ON PERFORMANCE INFORMATION

12.3(h)	General policies on performance indicators and performance goals.
15.2	Use of performance indicators and performance goals in budget justifications.
34.1	Performance indicators and performance goals in Budget Appendix narrative statements.

will also provide a credible base for projections of future costs and the need for budgetary resources. Upon request, agencies will provide both unit cost and marginal cost information in the manner specified by OMB representatives.

(c) **Federal credit programs.**—Agencies will ensure that estimates for all direct and guaranteed lending programs are prepared in accordance with OMB requirements (see sections 31.5, 33, OMB Circular No. A-129, and the OMB credit subsidy model and user's guide).

(d) **Government perquisites.**—Agencies will ensure that estimates reflect Administration policy to limit the use of government vehicles, government aircraft, first class air travel, executive dining facilities, and conferences, in accordance with Presidential memorandum, dated February 10, 1993.

(e) **Full-time equivalent (FTE) employment.**—Estimates will be consistent with the limitations set by the Federal Workforce Restructuring Act of 1994 (Public Law 103-226).

(f) **Administrative expense reductions.**—Estimates will reflect the effect of reductions in administrative expenses required by Executive Order No. 12837, dated February 10, 1993.

(g) **Advisory committees.**—Agencies will ensure that estimates reflect the results of the committee reviews required by Executive Order No. 12838, dated February 10, 1993, which required agencies to reduce the number and cost of non-statutory advisory committees. The reduction ceilings required by the Executive Order remain in effect, and agency estimates should reflect the continued reduced number and cost of advisory committees in their budget planning. The costs of advisory committees established by statute that are being proposed for termination will be identified separately (see section 12.2).

(h) **Performance indicators, performance goals, and management improvement.**—Agencies will ensure that estimates reflect full consideration of the Administration's commitment to improve program performance, management integrity and controls, program delivery, and financial management.

(1) **Performance indicators and performance goals.**—Agencies will ensure that their estimates reflect the use of program performance indicators and performance goals in the manner specified by OMB representatives. General submission requirements for performance indicators and performance goals are contained in section 15.

(2) **High risk areas.**—Agencies will ensure that their estimates reflect approved action plans to correct

weaknesses and deficiencies identified on OMB's high risk list. Submission requirements on high risk areas are contained in section 41.

(3) **Financial systems.**—Agencies will ensure that their estimates reflect plans to achieve a single, agency-wide, integrated financial management system and CFO plan initiatives. The scope of agency financial systems activities will include:

—core financial systems, as described in the JFMIP Core Financial System Requirements Document;

—financial and mixed systems critical to effective agency-wide financial management, financial reporting, or financial control; and

—any financial and mixed systems appearing on the high risk list in the most recent annual budget.

Submission requirements for agency financial management systems are described in section 40.

(i) **Customer service.**—Agencies will ensure that estimates reflect fully the Administration's commitment to providing the highest quality service possible to the American people. As indicated in the Executive Order 12862, it is the Administration's goal to make all aspects of the Executive Branch's management practices and operations equal to or better than the best service in the private sector.

In developing estimates, full consideration should be given to enhancement of customer service both to federal and non-federal clients, based on information obtained from customer service surveys and other sources. Estimates should also reflect implementation of customer service plans, including training and information collection needed to achieve customer service standards.

(j) **Electronic commerce.**—Agencies will ensure that estimates reflect the Administration's commitment to governmentwide implementation of an electronic commerce capability to enable the Federal Government and private vendors to electronically exchange standardized requests for quotations, quotes, purchase orders, and notices of awards. In the President's memorandum of October 26, 1993, agencies were instructed to implement a full scale federal electronic commerce system that includes electronic payments, document interchange, and supporting databases by July 1995. By January 1997, governmentwide implementation of electronic commerce for appropriate federal purchases should be completed, to the maximum extent possible.

(k) **Equal opportunity.**—Agencies will ensure that estimates reflect fully the Administration's commit-

Justifications and Other Reporting Requirements

15.1. Summary and highlight statement.

A summary and highlight statement (in the form of a transmittal letter from the head of the agency) will cover the budget submission of each agency. This narrative will summarize the highlights of the agency's budget and related major legislative proposals, identifying:

- the broad policies and strategies proposed and the total amounts of discretionary and mandatory budgetary resources and FTE requested;
- the relationship of the policies, strategies, and resources requested to the planning guidance for budgetary resources and for FTE provided by OMB;
- significant proposed differences, if any, from current Administration policies;
- the most important program performance indicators and performance goals, including those that are positive and negative with respect to performance and which are the basis for the major proposed policies;
- the major management initiatives that will be used to monitor and evaluate program efficiency and effectiveness;
- any significant proposals for changes in the current year budget, and the relationship of such changes to the budget year and outyear requests; and
- any significant proposals or changes in spending patterns for the five to ten year period beyond the budget year, and their relationship to outyear planning guidance and the policies proposed for the current and budget year.

Agencies must submit a listing of the amounts of budget authority and outlays and FTE requested for each fiscal year covered by the budget (see section 15.2(a)(3)). This list will be itemized by account showing separately proposed supplementals, pending supplementals, rescission proposals, and legislative proposals. Offsetting receipts will be deducted to arrive at the net amount of the agency request (see section 14.2(d)).

Agencies are also required to submit compliance with stated policies required under sections 11.7 (responsibilities in reporting data), 12.3 (basis for the estimates), 12.4 (required consultations), and 12.5 (estimates relating to specific objects of expenditure).

Circular No.
A-11 (1994)

15.2. Justification of programs and financing.

A written justification will be provided for each budget submission. The materials that generally are required are described in subsection (a). Specific informational requirements and formats will be determined in consultation with OMB representatives. It is expected that each agency will have agreed with OMB representatives on the form and specific content of the budget submission in the spring and summer preceding the budget submission.

The agency request should be consistent with the funding levels included in policy guidance. If the request is not consistent with policy guidance, the agency must provide a summary display of what its budget request would be at the policy guidance levels and the reasons why a budget request consistent with the guidance is not appropriate. In addition, agencies may be asked by the OMB representatives responsible for review of the agency's budget submission to identify and discuss the implications of other funding levels.

The justification should be prepared in concise, specific terms and cover all programs and activities of the agency. Tables, charts, and graphs may be used in lieu of or to supplement text. Materials should be prepared in a manner designed to provide all of the information which the agency and OMB have agreed to be necessary for OMB to understand and evaluate the agency's request and make its determinations.

(a) Materials required.—The justification materials normally should include a comparison of total program benefits and total program costs, using quantitative, objective data to the maximum extent possible, as well as qualitative or judgmental material, a comparison of the marginal benefits and the marginal costs associated with the additional funds or reduced funding proposed, and supporting information. The supporting information should take into account agency and outside (e.g., think tank, university, interest groups) program evaluations and related analytic studies, IG, and GAO and other congressional entity analyses, whether or not they agree with the proposed policy.

Performance indicators and performance goals.—Where appropriate, performance indicators and performance goals should be included to explain major program issues and financial requirements. Performance indicators should be presented in terms of out-

puts or outcomes and performance goals should be provided for short-term as well as for long-term assessment of program performance. Justifications should emphasize outputs that reflect the products and services that are provided by the program and delivered or used outside the program, as opposed to process alone. Justifications should also emphasize outcomes that reflect the results of a program. For example, a justification tied only to increasing the numbers of individuals served is of little consequence without evidence of the cost and the outcome, consistent with program goals.

If the agency has not developed performance measurement systems that provide this kind of information, other types of data may be used to indicate performance. Without performance indicators, performance goals, or some other type of performance data, however, agency requests for significant funding to continue or increase an on-going program are difficult to justify. If a new program lacks performance indicators and performance goals, the justification should indicate how the indicators, goals, and data collection are being developed; the timetable for their review with OMB representatives; when the data will become available; and on what basis the agency will assess performance of the program in the interim.

Generally, performance indicators, performance goals, and past measures of performance should be thoroughly reviewed and their continued applicability justified. In addition, agencies that prepare annual financial statements should confirm, for the budget year, continuing use of the program performance indicators used in previous years or identify alternative indicators they plan to use.

Additional requirements for information on program evaluation; infrastructure and grant programs; agency restructuring activities; an analysis of resources; and a table showing the relationship of programs to account structure are provided below. At the discretion of the agency's OMB representative, these requirements may be modified or alternative justification materials specified. Other materials also may be requested by OMB representatives.

(1) Information on program evaluation.—Program evaluation is an important aspect of program planning and monitoring, assessing program results, and determining future funding levels. In budget justification materials, agencies are required to provide information on their program evaluation activities and on their program evaluation agenda. The agenda should describe the major program evaluation activities cur-

rently underway or planned. Agencies should consult with their OMB representative in development of their multi-year evaluation plans and agenda.

(2) Information on infrastructure investment and grant programs.—Justification materials for major infrastructure investment and grant programs should include copies of investment systematic economic analyses of expected benefits and costs completed in accordance with Executive Order 12893. OMB Bulletin No. 94-16 provides additional guidance on this Executive Order, including a listing of the accounts covered by the Order.

(3) Agency restructuring or process reengineering activities.—Agencies should identify restructuring or process reengineering activities resulting from proposed and current investments in information technology that yield budgetary savings. Justification materials should indicate how these activities allow agencies to utilize existing resources better while improving program management and service delivery.

(4) Analysis of resources.—A tabular presentation should be used to identify the financial and personnel resources required at the program levels under consideration.

Resources required should be presented for PY and CY, as well as the estimated requirements for each funding option for BY through BY+4. If current year rescissions, deferrals, or supplementals are pending or proposed, these will be identified separately. A subsidiary breakdown of such items as personnel compensation, capital outlay, or other categories of special concern may also be useful.

Generally, financial data should be presented in terms of new budget authority and outlays. However, the agency's OMB representative may require additional measures, such as unobligated balances and offsetting collections.

Personnel requirements will be expressed in terms of full-time equivalents (see section 15.2). FTE requests in total are expected to be within OMB guidance and must be consistent with the agencies streamlining plan (as part of the Executive Branch statutory requirement to reduce FTE by 272,900 by FY 1999). Requests for changes to the FTE ceiling in any year must be fully justified in terms of program management requirements, and if for an increase, must fully document the analysis of agency-wide FTE that indicates why FTE ought not be moved from another function to meet the identified need.

Budgetary resources and FTE requests must be described in the context of the agency's management plan for the programs and activities. The plan should

make clear the analysis used to determine that the resources are needed in order to accomplish program and Administration goals, and that all opportunities for making more efficient and effective use of resources have been explored.

(5) Relationship of justification to account structure.—Where the major programs in the agency justification materials do not coincide with the budget account structure, a table will be prepared to show the relationship. This table should be arranged by program, with all relevant accounts and parts of accounts listed, showing budgetary resources (usually budget authority and outlays) and FTE. Programs that are mainly grants, contracts or other transfers of funds to entities other than the agency should have related S&E accounts and parts of accounts included, including allocations of overhead amounts. A format for the table is illustrated by exhibit 15A. Alternate formats may be used if agreed upon by the agencies and their OMB representative. Where helpful to explain the coverage of the table or the relationship among accounts, a short narrative should accompany the table. This requirement only applies to major programs and activities. Agencies should consult their OMB representatives to ensure that tables are only provided for appropriate activities and unnecessary paperwork is avoided.

(b) Derivation of amounts requested.

Agencies should be prepared to submit information covering the following:

- detailed analyses of workload, performance indicators, unit costs, productivity trends, the impact of capital investment proposals on productivity, changes in quality and timeliness of output, and demonstrated outcomes of past program activities; and
- the basis for distribution of funds (i.e., formulas or principles for allocation, matching, policies regarding the awarding of loans, grants, or contracts, etc.) and data on resulting geographic distribution (e.g., by State, etc.) with identification of any issues.

Productivity measurement, unit costs, and organizational performance standards should be used to the maximum extent possible in justifying staffing and other requirements.

A specific element in productivity improvement for activities of Federal staff should be the gains planned or being realized from streamlining, including reducing unnecessary overhead, creative use of technology, and elimination of low priority tasks and programs.

Circular No.
A-11 (1994)

15.3. Explanations relating to supplemental appropriation requests.

When the need for a program supplemental appropriation is forecast (see section 12.2), justification material should be prepared in accordance with section 15.2. Information should be provided indicating why the request was not included in the regular estimates for the period concerned and the reasons why it is considered essential that the additional appropriation be granted during the year. Requests for supplementals will be accompanied by proposals for offsets to be made elsewhere in the agency for both mandatory and discretionary resources, and must indicate related FTE savings or requirements and appropriate financing changes. If the estimate is approved for later transmittal (rather than in the budget), further justification of the supplemental estimate will be required when it is submitted to OMB (see section 61). The effect of requested supplementals should be shown in the appropriate portions of the justification material for the program elements affected.

15.4. Information on financial management.

Agencies will ensure that their budget justifications provide results-oriented information on financial management operations and improvement initiatives in the context of the agency's mission and programs. This discussion should include the status and plans for financial management throughout the agency, and should represent an integrated discussion of financial management planning and associated resources. (Selected information on financial management resources for agencies covered by the Chief Financial Officers (CFOs) Act of 1990 is required by section 40.) The content should be consistent with the government-wide strategies and initiatives discussed in this year's Federal Financial Management Status Report and 5-Year Plan issued by OMB.

(a) Coverage and reporting.—All agencies are required to submit the materials prescribed by section 15.4(b). There are three exceptions to this rule: Agencies not covered by the CFOs Act are not required to submit the schematics, inventory, or discussion of audited financial statements described below.

For the 23 agencies covered by the CFOs Act, the materials required by this section will fulfill the Act's requirement that each agency CFO prepare a plan to implement the government-wide financial management 5-year plan. The format in which this information is presented may be determined by the agency, unless otherwise specified by OMB.

Narrative Statements on Program and Performance

34.1. Purpose and content of narrative statements.

Narrative statements describe the performance goals, outputs, and outcomes related to an account. The statements should discuss how the budget year request supports these performance goals, outputs, and outcomes while addressing significant increases or decreases in performance or financing from the current to the budget year, including the termination of a program in the budget year.

Each account requires a narrative statement if there is ongoing activity in the current or budget year. Supplemental requests, rescission proposals, and items proposed for later transmittal also require separate narrative statements for each presentation.

Performance indicators and performance goals.—The statements should discuss both the short-range and the long-range performance goals of the program, and include data on significant performance indicators where appropriate. The statements could, for example, include performance indicators contained in the agency's annual financial statements or other appropriate indicators.

Generally, performance indicators which focus on outputs or outcomes should be used instead of workload and other process measures. Outputs should reflect the products and services which are provided by the account and delivered or used outside of the account. Outcomes should reflect the results related to the account. If the agency has not developed output or outcome focused performance measures, other measures may be used. Tables may be used to illustrate and compare these indicators for the past, current, and anticipated budget year levels.

Collections and fees.—When collections and fees credited to the account finance a sizeable proportion or dollar level of the obligations, the discussions should address the nature of the reimbursable work performed. The discussions may also provide information on other amounts collected by the program and deposited into the general fund of the Treasury when pertinent to the operations of the program.

Exemptions.—Unless otherwise requested by OMB, narrative statements are not required for (a) accounts in which there are only obligated balances for all years (e.g., consolidated schedules for expired accounts); or (b) accounts in which there are no unobligated balances in any year, no obligations or outlays are estimated in the current and budget years, and

no further appropriations will be requested. However, a brief narrative may be desirable to explain the discontinuation of an account.

34.2. Style and form of narrative statements.

Narrative statements for accounts presented in the previous year's budget will be forwarded on reprinted galleys to the agencies for editing. Narrative statements for accounts not included in the reprinted galleys (e.g., new accounts or supplemental requests) will be prepared as new print materials. More detailed instructions on reprinted galleys and new print materials are provided in section 30.

The narrative statements should be written in a concise, factual manner. The statements should be oriented toward the policies and objectives for the budget year. The history, authorizing statutes, and other legal references should not be discussed except as indicated below. However, it is appropriate to discuss significant legislation enacted since the previous budget, as well as legislative initiatives proposed in the budget. Comparative quantitative tables on both significant program, performance, and dollar data should be included.

Narrative statements may use the separate activities or subactivities listed in the program and financing schedule as the basis for the discussion. The items will be identified in side headings by the title used in the program by activities section of the program and financing schedule.

34.3. Narrative statements for major programs financed by multiple budget accounts.

Where the total financing needed to conduct a major program is not contained within a single budget account, the narrative statement of the account that finances the major portion of the program activity (i.e., the "primary" account) may include a table in the format of exhibit 34 that shows the total costs and sources of funding for the program. The table will list the primary account and any other accounts (i.e., "supplementing" accounts) that support the activity performed by the primary account.

For these purposes, major programs are those that obtain goods and services of \$50 million or more, in budget authority or outlays for the budget year, on a non-reimbursable basis from another account.

Support provided by supplementing accounts includes the non-reimbursed cost of central support services that are directly attributable to implementa-

CHAPTER II

APPLYING BENEFIT-COST ANALYSIS TO INVESTMENT OPTIONS

Task Force Two of the ACIR project to develop recommendations for a federal infrastructure investment strategy examined the literature and agency documents related to benefit-cost analysis of infrastructure investments to help spread the use of this technique and to promote common concepts for this purpose. The resulting principles and guidelines are the first selection of this chapter. Since benefit/cost analysis is a specific tool for assessing the performance and quality of infrastructure investments, this chapter should be read in conjunction with the more general discussion of investment analysis in Chapter 1.

The source documents in this chapter are divided into two sections. The first section, titled **OMB Guidance**, contains the current version of the U.S. Office of Management and Budget's Circular A-94, promulgating guidelines for applying benefit-cost analysis to federal investments. Selections in the **Agency Implementation Examples** section present portions of benefit-cost procedures and principles used by several federal agencies.



HIGH PERFORMANCE PUBLIC WORKS

**A New Federal
Infrastructure Investment Strategy
for America**



**U.S. Advisory Commission
on Intergovernmental Relations
SR-16
November 1993**

APPLYING BENEFIT-COST ANALYSIS TO INVESTMENT OPTIONS

I. OBJECTIVES

This statement proposes a strategy for using economic analysis to improve the quality of decisionmaking associated with federal infrastructure investment. This can be done by (1) expanding the use of benefit-cost analysis by agencies that deal with federal, federally assisted, or federally regulated infrastructure; (2) improving the accuracy and credibility of benefit-cost analyses prepared by these agencies; and (3) promoting greater consistency in the use of this analytical method, thus enhancing its role in comparisons of diverse programs, projects, and regulations.

11. FINDINGS

The federal government faces the urgent tasks of maintaining and improving the nation's infrastructure, during periods of fiscal stringency as well as other periods. More attention needs to be focused on improving the productivity of infrastructure investments, the methods for investment analysis, and the quality of data available to support this analysis.

A Powerful and Timely Tool. Of the various tests of merit that may be applied to infrastructure investments, benefit-cost analysis is useful and broadly applicable. It can be used to (1) develop and support initial decision strategies; (2) compare and prioritize investment options; (3) upgrade investment portfolios and reduce investment risks; and (4) evaluate post-investment decisions to help determine whether to continue, change the amount of, or redirect investment.

Definition of Benefit-Cost Analysis. Benefit-cost analysis compares the expected beneficial consequences of a proposed action to its expected adverse effects. In comparing alternative proposals, benefit-cost analysis employs a decision rule derived from concepts of economic efficiency, for example, to maximize net benefits or benefit-cost ratios. In

practice, most benefit-cost analysis attempts to consider non-monetized as well as monetized consequences, although decision rules may deal with monetized values only.

This definition of benefit-cost analysis is broad and encompasses less comprehensive forms of analysis, such as cost-effectiveness analysis and performance analysis. The following text refers specifically to standard benefit-cost analysis, although individual topics may be applicable to cost-effectiveness analysis or to other variant forms.

Historical Development. The development of benefit-cost analysis within the federal government began with the *Flood Control Act of 1936*. By the 1950s, the necessary techniques had progressed to the point where several water resources agencies were using benefit-cost analysis, interagency guidelines for its use were developed, the President endorsed general principles for applying the technique, and Congress endorsed the procedure. An interagency Water Resources Council was established in 1966, chaired by the Secretary of the Interior, and operated until 1983 as the primary instrument for improving benefit-cost methods and promoting their use among all federal water resources agencies. Benefit-cost analysis continues to be used for water resource projects through-out the government.

Since 1981, Executive Order 12291 has required benefit-cost analysis of all major federal regulations as part of the mandated regulatory impact analysis. OMB Circular A-94 establishes guidelines and discount rates to be used in benefit-cost analysis of federal programs.

Although benefit-cost concepts are well developed and widely understood and applied, practical difficulties have arisen in many cases for which the expertise, time, and funds required to perform adequate analyses have not been available. Thus, many applications of benefit-cost analysis have used short-cut methods.

Spreading the Use of Benefit Cost Analysis.

Since the 1960's, some federal agencies outside the water resources programs have chosen to apply benefit-cost analysis. In addition to the Office of Management and Budget's (OMB) regulatory impact analysis program, other current examples include the U.S. Forest Service, the Soil Conservation Service, the Federal Aviation Administration, the Federal Railroad Administration (in its railroad assistance program), and the Federal Transit Administration. In addition, Congressman Bob Carr, chairman of the Transportation Appropriations Committee, recently released a set of investment criteria for highway, transit, and airport investments emphasizing the need to consider benefit-costs as part of the justification for appropriations requests coming before that committee. Thus, many federal agencies now are using some form of benefit-cost analysis for one or more of these purposes.

However, methods are not consistent from one agency to another. Application of benefit-cost analysis is governmentwide only in the case of regulatory impact analysis (following general guidance issued by OMB). The only functional program to make routine and consistent use of benefit-cost analysis across multiple agencies is water resource development.

Diverse Applications of Benefit-Cost Analysis.

In accordance with the three federal roles in infrastructure—direct federal projects, federal-aid projects and federal regulation—benefit-cost analysis can be applied in at least three ways. Traditionally, this type of analysis was applied only to federal projects to be federally constructed, operated, and maintained. As cost-sharing came to these programs, benefit-cost analyses began to be prepared for projects with diverse sources of funding and responsibilities for ownership, operation, and/or maintenance. In 1981, Executive Order 12291 extended the use of this analytical technique to a wide variety of regulatory programs.

Now, as the federal government considers dividing its budget into "investment" and "current expense" sections, many federal aid programs for infrastructure are likely to be moved into the investment budget, where they will need to be justified on the basis of their likely future returns. For this reason and others, traditional project-by-project analysis may no longer be adequate. Programmatic analysis will be needed to help pick the most economically meritorious programs and the most efficient forms of those programs. Benefit-cost analysis is developing as one technique that may be used for this evaluation.

Also, in order to reduce some of the uncertainty about the quality of investments made by state and

local governments receiving federal aid under these infrastructure programs, federal aid recipients should perform a benefit-cost type of analysis for the investment options that they consider. Consistency of benefit-cost analyses prepared by state and local governments with federal procedures would give further assurance that these funds would be well spent by state and local governments.

Need to Improve Benefit-Cost Analysis.

Benefit-cost analysis is an imperfect tool. When the practice—as embodied in the procedures of the various federal agencies—is contrasted to underlying principles, many deficiencies can be noted. In some cases, it may be possible to use present knowledge to improve practice. In other cases, further research and development efforts, and better data, may be needed. Nevertheless, the current state of the art of benefit-cost analysis provides an effective technique for investment analysis, provided it is applied in accordance with principles and guidelines discussed below.

III. PRINCIPLES

Universal Application. All significant federal and federally assisted and regulated infrastructure proposals should be subjected to benefit-cost analysis.

Accounting Stance. Federal programs should be evaluated from the point of view of national impacts, including direct and external benefits and costs, in both the private and public sectors.

Multiple Objectives. The "best" project or program is the one that delivers the most desirable combination of net improvements with respect to economic efficiency, redistribution of income, environmental quality, intergenerational equity, and other objectives.

Decision Criteria. From an economic efficiency standpoint, which is one of several important considerations, the purpose of investment analysis is to maximize the net benefit obtained from a portfolio of investments (e.g., from a program budget).

Baseline Assumption. Benefit-cost analysis requires the establishment of a plausible baseline assumption; beneficial and adverse effects are then measured against that baseline on a with-without basis.

Optimality vs. Feasibility. Various analytical methods may be used to search for optimal projects; benefit-cost is then used to determine economic feasibility, and funding priorities.

Risk and Uncertainty. Benefit-cost analyses should present the expected values of beneficial and adverse effects as well as statements regarding the

nature and magnitude of risk or other uncertainty associated with those estimates.

Non-Monetized Effects. Benefit-cost analysis should consider all of the beneficial and adverse effects of a proposed action, regardless of whether or not those effects can be expressed in monetary units.

Discount Rate. To facilitate comparisons, benefit-cost analysis requires that future streams of benefits and costs be converted to equivalent present values by discounting.

IV. GUIDELINES FOR APPLYING BENEFIT-COST ANALYSIS

The principles listed above may not always be easy to apply. The following guidance is provided to assist in the application of this method.

Universal Application. When properly applied, benefit-cost analysis helps in the identification of the most worthy projects, and in setting priorities for implementation. This is possible within a particular program only when all projects or elements of that program are subjected to consistent analysis. But, in practice, benefit-cost analysis is applied selectively—routinely in some programs and agencies (e.g., water resource development), never in others, and occasionally elsewhere. OMB's required benefit-cost analysis guidelines for major proposed federal regulations (those likely to have an effect on the economy of \$100 million or more per year) are more broadly applicable but not specific to any particular project or program. Even though project selection may ultimately reflect non-economic as well as economic criteria, insights gained through benefit-cost analysis should be given an important role in the decision process.

All significant federal infrastructure projects, programs, and regulations should, therefore, be subjected to benefit-cost analysis, using a consistent set of standards and approaches. These standards should provide for analyses of varying complexity and level of detail, as appropriate to each situation. In some cases, the standards may provide for cost-minimization studies, cost-effectiveness analysis, or performance analysis as alternatives to a complete benefit-cost study.

Lacking universal application, benefit-cost analysis can be applied to specific programs, as it is to water resource development projects. In this case, benefit-cost analysis, at the appropriate level of complexity, should be applied to all significant infrastructure investments within each selected program. This guideline assumes that steps are taken to provide the necessary analytical capability within each affected agency if it does not exist.

Accounting Stance. In identifying and measuring benefits and costs, the analyst must choose an accounting stance: Are benefits and costs to be measured from a local, regional, or national perspective? Are only direct, program-related benefits and costs to be measured, or should external effects be considered as well? If external effects are to be considered, should they be limited to the United States, or should transboundary effects be computed? In fact, none of these effects can be omitted completely from the analysis, although some may be treated less rigorously than others.

For example, there may be a national interest in the distributional and other consequences of a program for a particular locality or region (or state or neighboring country), and it may be helpful to separate program-related effects from external effects. In some cases, such as revenue sharing and block grant programs, distributional effects may be of primary interest, with economic efficiency considerations as a secondary issue. In this case, effects should be calculated at state and regional levels, as appropriate, as well as at the national level. For projects within federal-aid programs that are decided on by a state or local government, benefit-cost analysis should be performed by the federal-aid recipient for the geographic area affected. Care should be taken in the use of state and regional multipliers to avoid double-counting benefits and costs that may simply be shifted across borders.

Multiple Objectives. Federal infrastructure projects affect the welfare of the nation in a number of ways. When economic benefits exceed costs, they increase the aggregate value of goods and services produced (promote economic efficiency). In the course of doing this, benefits and costs may be redistributed from some groups in society to others, or from one generation to another. Environmental quality may be affected, as might several other measures of social well-being. In principle, these are all joint objectives. The most desirable investment is the one that delivers the best combination of improvements with respect to all objectives. But it is difficult to determine what is "best" when some effects are difficult to monetize and the trade-offs among the different objectives are not well understood. Better methods are needed for presenting and comparing combinations of impacts.

In practice, benefit-cost analysis is most useful for determining the economic efficiency of alternatives when all effects are monetized. In the case of water resource projects, environmental quality changes, regional impacts, and effects on social well-being are assessed, but they are not given official status as objectives. Benefit-cost procedures used for other programs speak only of economic (monetized) benefits

and costs. It should be noted that the ability to monetize project effects has improved in recent years. Some environmental effects can be characterized as non-market economic goods and can be valued by methods that utilize market data for related goods (hedonic price analysis, travel cost analysis, and alternative cost analysis) or survey data (contingent valuation studies).

Pending the development of an improved capability for ranking investments according to multiple objectives, benefit-cost analysis should retain economic efficiency (e.g., maximize the benefit-cost ratio) as the primary decision rule. At the same time, standards should require the tabulation of other categories of consequences, such as income redistribution, intergenerational equity, environmental quality, regional impacts, and other social well-being effects.

Economic Decision Criteria. Where the size of the investment budget can be assumed to be fixed, total net economic benefit would be maximized by choosing a portfolio of projects with the highest benefit-cost ratios. In practice, however, the benefit-cost procedures of some agencies advocate formulating projects initially (by scaling and selecting among mutually exclusive alternatives) in the absence of budget constraints, based on a net-benefit decision rule (the present value of benefits minus costs, also known as net present worth). Next, a budget-constrained investment program is developed by ranking projects according to their benefit-cost ratios (a measure of economic efficiency). Projects also may be ranked by internal rate of return.

These approaches may require modification where projects are large relative to the available budget. In this case, a strict application of any single criterion might result in unspent funds. Further complications arise in the case of federally assisted or federally regulated infrastructure investment, where most project costs are borne by other levels of government or by the private sector.

It should be noted that the use of a benefit-cost ratio decision criterion, instead of net benefit, requires attention to the way in which benefits and costs are categorized. Current practice often groups together all positive effects under the heading of "benefits" or "beneficial effects"; all negative effects are similarly grouped and termed "costs" or "adverse effects." In fact, there is a distinction between "benefit" and "beneficial effect," as there is between "cost" and "adverse effect." Economic benefits consist of all *output-related* effects, including those which are adverse (e.g., congestion costs due to recreation use of a reservoir). Economic costs include all *input-related*

effects, including those which are beneficial (e.g., increased profits to local businesses as a result of highway construction activity). Failure to observe these distinctions biases benefit-cost ratios, but will not affect the net benefit measure

or the calculated internal rate of return. The method used in each specific application, and the reasons for choosing it, should be explained, so that those using the analysis will not be misled.

Baseline Assumption. The baseline assumption for direct federal projects and federal regulations should incorporate all future actions and conditions considered most likely to occur in the absence of federal investment. This includes the possibility of investment by state or local governments or by the private sector. The baseline assumption is rarely a status quo assumption.

Similarly, the baseline assumption for benefit-cost analysis of federal-aid expenditures decided on by state or local governments should include all future actions most likely to occur in the absence of the federal-aid recipient's proposed action, including the possibility of investments by other governments and by the private sector.

Optimality vs. Feasibility. Economic feasibility is usually defined as requiring benefits to exceed costs; it is demonstrated through benefit-cost analysis. The same analysis also permits the ranking of a specified set of investments according to economic returns, or other objectives. Selection of the "best" investment from among those considered, however, does not reveal whether some still better investment might exist. The best possible investment, according to the decision criterion used, is the optimal investment. Benefit-cost analysis can be used to search for optimal projects, but it is a crude tool for this purpose. Better methods are available, including linear programming and other mathematical optimization approaches. Further development of these methods and expanded application is needed to improve analysts' ability to identify alternatives and test for optimality.

Risk and Uncertainty. All estimates of benefits and costs of proposed investments are forecasts, and therefore inherently uncertain. Sometimes, it is possible to estimate the probability of occurrence for various outcomes to help put boundaries around the uncertainty. The methods for doing this include estimates of probabilities of various outcomes, confidence intervals, and certainty equivalents. In other cases, where nothing is known of the probability of alternative outcomes, the results are simply said to be uncertain. There has been relatively little development of methods for coping with this type of uncertainty.

Where infrastructure proposals are related to health and safety risks, risks to the environment, and risks of external financial liabilities, it may be particularly important to apply formal risk analysis methods to develop a fuller understanding of these potential cost factors. Risk analysis is not always used in conjunction with benefit-cost analysis, however. This may reflect, in part, the difficulty of performing risk analysis and communicating the results to decisionmakers and to the public.

Better methods are needed for estimating, expressing, and communicating the estimated uncertainties and risk factors incorporated into benefit-cost inputs, assumptions, and results so that decisionmakers may understand the range and likelihood of possible outcomes. One result of better characterization of risk and uncertainty should be greater attention to risk reduction through data improvement.

Non-Monetized Effects. Quantitative comparisons, determinations of economic feasibility, and rankings are facilitated by effects that can be measured in a common unit, such as money. Yet, in practice, many effects cannot be, or have not been, expressed in monetary units. As a result, conclusions are often based on monetized effects alone. Such conclusions are limited at best, seriously biased at worst. Much progress has been made in developing monetary measures for certain non-market goods, and more progress is needed. More importantly, methods must be found for evaluating investments having significant non-monetized consequences.

Benefit-cost analysis should consider all consequences of an investment, whether monetized or not. Every reasonable attempt should be made to monetize any effects which can be characterized as economic benefits or costs. Various market-based and non market-based methods are available, such as hedonic price analysis, travel cost methods, and contingent valuation surveys. These methods may be useful for some, but not all, project effects. Where monetization is not feasible, the effect should be fully described, and quantified to the degree possible.

Discount Rate. Investments should be analyzed using "real" (inflation-) estimates of benefits and costs and a "real" discount rate. Depending on its conceptual basis, the discount rate may range from several percent to as much as 10 percent. It is relatively stable over time, however, and does not vary with price inflation. Discount rates are mandated for some federal benefit-cost analysis, by legislation for water resource projects and by OMB Circular A-94 (1992) for regulatory and certain other programs.



THE DIRECTOR

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503
October 29, 1992

CIRCULAR NO. A-94
Revised
Transmittal Memorandum No. 64

TO THE HEADS OF EXECUTIVE DEPARTMENTS AND ESTABLISHMENTS

SUBJECT: Guidelines and Discount Rates for Benefit-Cost Analysis
of Federal Programs

Circular A-94 provides guidance on benefit-cost, cost-effectiveness, and lease-purchase analysis to be used by agencies in evaluating Federal activities. It includes updated guidance on the discount rates to be used in evaluating activities whose benefits and costs are distributed over time. It also contains expanded guidance on the measurement of benefits and costs, treatment of uncertainty, and related issues. This guidance must be followed in all analyses submitted to OMB in support of legislative and budget programs.

This Circular replaces and rescinds OMB Circular No. A-94, "Discount Rates to be Used in Evaluating Time-Distributed Costs and Benefits," dated March 27, 1972. It also replaces Circular No. A-104, "Evaluating Leases of Capital Assets," dated June 1, 1986, which was rescinded previously.


Richard Darman
Director

Attachment

MEMORANDUM FOR HEADS OF EXECUTIVE DEPARTMENTS AND ESTABLISHMENTS

SUBJECT: Guidelines and Discount Rates for Benefit-Cost Analysis
of Federal Programs

Table of Contents

	<u>Page</u>
1. Purpose	2
2. Rescission	2
3. Authority	2
4. Scope	2
5. General Principles	3
a. Net Present Value and Related Outcome Measures	
b. Cost-Effectiveness Analysis	
c. Elements of Benefit-Cost or Cost-Effectiveness Analysis	
6. Identifying and Measuring Benefits and Costs	5
a. Identifying Benefits and Costs	
b. Measuring Benefits and Costs	
7. Treatment of Inflation	7
a. Real or Nominal Values	
b. Recommended Inflation Assumption	
8. Discount Rate Policy	8
a. Real versus Nominal Discount Rates	
b. Public Investment and Regulatory Analyses	
c. Cost-Effectiveness, Lease-Purchase, Internal Government Investment, and Asset Sale Analyses	
9. Treatment of Uncertainty	12
a. Characterizing Uncertainty	
b. Expected Values	
c. Sensitivity Analysis	
d. Other Adjustments for Uncertainty	
10. Incidence and Distributional Effects	13
a. Alternative Classifications	
b. Economic Incidence	
11. Special Guidance for Public Investment Analysis	14
a. Analysis of Excess Burdens	
b. Exceptions	
12. Special Guidance for Regulatory Impact Analysis	14
13. Special Guidance for Lease-Purchase Analysis	15
a. Coverage	
b. Required Justification for Leases	
c. Analytical Requirements and Definitions	
14. Related Guidance	19
15. Implementation	19
16. Effective Date	19
17. Interpretation	20
Appendix A: Definitions of Terms	
Appendix B: Additional Guidance for Discounting	
Appendix C: Discount Rates for Cost-Effectiveness, Lease-Purchase, and Related Analyses	

1. **Purpose.** The goal of this Circular is to promote efficient resource allocation through well-informed decisionmaking by the Federal Government. It provides general guidance for conducting benefit-cost and cost-effectiveness analyses. It also provides specific guidance on the discount rates to be used in evaluating Federal programs whose benefits and costs are distributed over time. The general guidance will serve as a checklist of whether an agency has considered and properly dealt with all the elements for sound benefit-cost and cost-effectiveness analyses.

2. **Rescission.** This Circular replaces and rescinds Office of Management and Budget (OMB) Circular No. A-94, "Discount Rates to Be Used in Evaluating Time-Distributed Costs and Benefits," dated March 27, 1972, and Circular No. A-104, "Evaluating Leases of Capital Assets," dated June 1, 1986, which has been rescinded. Lease-purchase analysis is only appropriate after a decision has been made to acquire the services of an asset. Guidance for lease-purchase analysis is provided in Section 8.c.(2) and Section 13.

3. **Authority.** This Circular is issued under the authority of 31 U.S.C. Section 1111 and the Budget and Accounting Act of 1921, as amended.

4. **Scope.** This Circular does not supersede agency practices which are prescribed by or pursuant to law, Executive Order, or other relevant Circulars. The Circular's guidelines are suggested for use in the internal planning of Executive Branch agencies. The guidelines must be followed in all analyses submitted to OMB in support of legislative and budget programs in compliance with OMB Circulars No. A-11, "Preparation and Submission of Annual Budget Estimates," and No. A-19, "Legislative Coordination and Clearance." These guidelines must also be followed in providing estimates submitted to OMB in compliance with Executive Order No. 12291, "Federal Regulation," and the President's April 29, 1992 memorandum requiring benefit-cost analysis for certain legislative proposals.

a. Aside from the exceptions listed below, the guidelines in this Circular apply to any analysis used to support Government decisions to initiate, renew, or expand programs or projects which would result in a series of measurable benefits or costs extending for three or more years into the future. The Circular applies specifically to:

- (1) Benefit-cost or cost-effectiveness analysis of Federal programs or policies.
- (2) Regulatory impact analysis.

- (3) Analysis of decisions whether to lease or purchase.
 - (4) Asset valuation and sale analysis.
- b. Specifically exempted from the scope of this Circular are decisions concerning:
- (1) Water resource projects (guidance for which is the approved Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies).
 - (2) The acquisition of commercial-type services by Government or contractor operation (guidance for which is OMB Circular No. A-76).
 - (3) Federal energy management programs (guidance for which can be found in the Federal Register of January 25, 1990, and November 20, 1990).
- c. This Circular applies to all agencies of the Executive Branch of the Federal Government. It does not apply to the Government of the District of Columbia or to non-Federal recipients of loans, contracts or grants. Recipients are encouraged, however, to follow the guidelines provided here when preparing analyses in support of Federal activities.
- d. For small projects which share similar characteristics, agencies are encouraged to conduct generic studies and to avoid duplication of effort in carrying out economic analysis.

5. General Principles. **Benefit-cost analysis** is recommended as the technique to use in a formal economic analysis of Government programs or projects. **Cost-effectiveness analysis** is a less comprehensive technique, but it can be appropriate when the benefits from competing alternatives are the same or where a policy decision has been made that the benefits must be provided. (Appendix A provides a glossary of technical terms used in this Circular; technical terms are bolded when they first appear.)

- a. Net Present Value and Related Outcome Measures. The standard criterion for deciding whether a Government program can be justified on economic principles is **net present value** -- the discounted monetized value of expected net benefits (i.e., benefits minus costs). Net present value is computed by assigning monetary values to benefits and costs, discounting future benefits and costs using an appropriate **discount rate**, and subtracting the sum total of discounted costs from the sum total of discounted benefits. Discounting benefits and costs transforms gains and losses occurring

in different time periods to a common unit of measurement. Programs with positive net present value increase social resources and are generally preferred. Programs with negative net present value should generally be avoided. (Section 8 considers discounting issues in more detail.)

Although net present value is not always computable (and it does not usually reflect effects on income distribution), efforts to measure it can produce useful insights even when the monetary values of some benefits or costs cannot be determined. In these cases:

- (1) A comprehensive enumeration of the different types of benefits and costs, monetized or not, can be helpful in identifying the full range of program effects.
- (2) Quantifying benefits and costs is worthwhile, even when it is not feasible to assign monetary values; physical measurements may be possible and useful.

Other summary effectiveness measures can provide useful supplementary information to net present value, and analysts are encouraged to report them also. Examples include the number of injuries prevented per dollar of cost (both measured in present value terms) or a project's internal rate of return.

- b. Cost-Effectiveness Analysis. A program is cost-effective if, on the basis of life cycle cost analysis of competing alternatives, it is determined to have the lowest costs expressed in present value terms for a given amount of benefits. Cost-effectiveness analysis is appropriate whenever it is unnecessary or impractical to consider the dollar value of the benefits provided by the alternatives under consideration. This is the case whenever (i) each alternative has the same annual benefits expressed in monetary terms; or (ii) each alternative has the same annual effects, but dollar values cannot be assigned to their benefits. Analysis of alternative defense systems often falls in this category.

Cost-effectiveness analysis can also be used to compare programs with identical costs but differing benefits. In this case, the decision criterion is the discounted present value of benefits. The alternative program with the largest benefits would normally be favored.

- c. Elements of Benefit-Cost or Cost-Effectiveness Analysis.

- (1) Policy Rationale. The rationale for the Government program being examined should be clearly stated in the analysis. Programs may be justified on efficiency

grounds where they address market failure, such as public goods and externalities. They may also be justified where they improve the efficiency of the Government's internal operations, such as cost-saving investments.

- (2) **Explicit Assumptions.** Analyses should be explicit about the underlying assumptions used to arrive at estimates of future benefits and costs. In the case of public health programs, for example, it may be necessary to make assumptions about the number of future beneficiaries, the intensity of service, and the rate of increase in medical prices. The analysis should include a statement of the assumptions, the rationale behind them, and a review of their strengths and weaknesses. Key data and results, such as year-by-year estimates of benefits and costs, should be reported to promote independent analysis and review.
- (3) **Evaluation of Alternatives.** Analyses should also consider alternative means of achieving program objectives by examining different program scales, different methods of provision, and different degrees of Government involvement. For example, in evaluating a decision to acquire a capital asset, the analysis should generally consider: (i) doing nothing; (ii) direct purchase; (iii) upgrading, renovating, sharing, or converting existing Government property; or (iv) leasing or contracting for services.
- (4) **Verification.** Retrospective studies to determine whether anticipated benefits and costs have been realized are potentially valuable. Such studies can be used to determine necessary corrections in existing programs, and to improve future estimates of benefits and costs in these programs or related ones.

Agencies should have a plan for periodic, results-oriented evaluation of program effectiveness. They should also discuss the results of relevant evaluation studies when proposing reauthorizations or increased program funding.

6. **Identifying and Measuring Benefits and Costs.** Analyses should include comprehensive estimates of the expected benefits and costs to society based on established definitions and practices for program and policy evaluation. Social net benefits, and not the benefits and costs to the Federal Government, should be the basis for evaluating Government programs or policies that have effects on private citizens or other levels of Government. Social benefits and costs can differ from private benefits and

costs as measured in the marketplace because of imperfections arising from: (i) external economies or diseconomies where actions by one party impose benefits or costs on other groups that are not compensated in the market place; (ii) monopoly power that distorts the relationship between marginal costs and market prices; and (iii) taxes or subsidies.

a. Identifying Benefits and Costs. Both intangible and tangible benefits and costs should be recognized. The relevant cost concept is broader than private-sector production and compliance costs or Government cash expenditures. Costs should reflect the opportunity cost of any resources used, measured by the return to those resources in their most productive application elsewhere. Below are some guidelines to consider when identifying benefits and costs.

- (1) Incremental Benefits and Costs. Calculation of net present value should be based on incremental benefits and costs. Sunk costs and realized benefits should be ignored. Past experience is relevant only in helping to estimate what the value of future benefits and costs might be. Analyses should take particular care to identify the extent to which a policy such as a subsidy program promotes substitutes for activities of a similar nature that would occur without the policy. Either displaced activities should be explicitly recorded as costs or only incremental gains should be recorded as benefits of the policy.
- (2) Interactive Effects. Possible interactions between the benefits and costs being analyzed and other Government activities should be considered. For example, policies affecting agricultural output should reflect real economic values, as opposed to subsidized prices.
- (3) International Effects. Analyses should focus on benefits and costs accruing to the citizens of the United States in determining net present value. Where programs or projects have effects outside the United States, these effects should be reported separately.
- (4) Transfers. There are no economic gains from a pure transfer payment because the benefits to those who receive such a transfer are matched by the costs borne by those who pay for it. Therefore, transfers should be excluded from the calculation of net present value. Transfers that arise as a result of the program or project being analyzed should be identified as such, however, and their distributional effects discussed. It should also be recognized that a transfer program may have benefits that are less than the program's real

economic costs due to inefficiencies that can arise in the program's delivery of benefits and financing.

- b. **Measuring Benefits and Costs.** The principle of willingness-to-pay provides an aggregate measure of what individuals are willing to forgo to obtain a given benefit. Market prices provide an invaluable starting point for measuring willingness-to-pay, but prices sometimes do not adequately reflect the true value of a good to society. Externalities, monopoly power, and taxes or subsidies can distort market prices.

Taxes, for example, usually create an excess burden that represents a net loss to society. (The appropriate method for recognizing this excess burden in public investment analyses is discussed in Section 11.) In other cases, market prices do not exist for a relevant benefit or cost. When market prices are distorted or unavailable, other methods of valuing benefits may have to be employed. Measures derived from actual market behavior are preferred when they are available.

- (1) **Inframarginal Benefits and Costs.** Consumers would generally be willing to pay more than the market price rather than go entirely without a good they consume. The economist's concept of consumer surplus measures the extra value consumers derive from their consumption compared with the value measured at market prices. When it can be determined, consumer surplus provides the best measure of the total benefit to society from a Government program or project. Consumer surplus can sometimes be calculated by using econometric methods to estimate consumer demand.
- (2) **Indirect Measures of Benefits and Costs.** Willingness-to-pay can sometimes be estimated indirectly through changes in land values, variations in wage rates, or other methods. Such methods are most reliable when they are based on actual market transactions. Measures should be consistent with basic economic principles and should be replicable.
- (3) **Multiplier Effects.** Generally, analyses should treat resources as if they were likely to be fully employed. Employment or output multipliers that purport to measure the secondary effects of government expenditures on employment and output should not be included in measured social benefits or costs.

7. **Treatment of Inflation.** Future inflation is highly uncertain. Analysts should avoid having to make an assumption about the general rate of inflation whenever possible.

- a. **Real or Nominal Values.** Economic analyses are often most readily accomplished using real or constant-dollar values, i.e., by measuring benefits and costs in units of stable purchasing power. (Such estimates may reflect expected future changes in relative prices, however, where there is a reasonable basis for estimating such changes.) However, where future benefits and costs are given in nominal terms, i.e., in terms of the future purchasing power of the dollar, the analysis should use these values rather than convert them to constant dollars as, for example, in the case of lease-purchase analysis.

Nominal and real values must not be combined in the same analysis. Logical consistency requires that analysis be conducted either in constant dollars or in terms of nominal values. This may require converting some nominal values to real values, or vice versa.

- b. **Recommended Inflation Assumption.** When a general inflation assumption is needed, the rate of increase in the Gross Domestic Product deflator from the Administration's economic assumptions for the period of the analysis is recommended. For projects or programs that extend beyond the six-year budget horizon, the inflation assumption can be extended by using the inflation rate for the sixth year of the budget forecast. The Administration's economic forecast is updated twice annually, at the time the budget is published in January or February and at the time of the Mid-Session Review of the Budget in July. Alternative inflation estimates, based on credible private sector forecasts, may be used for sensitivity analysis.

8. **Discount Rate Policy.** In order to compute net present value, it is necessary to discount future benefits and costs. This discounting reflects the time value of money. Benefits and costs are worth more if they are experienced sooner. All future benefits and costs, including nonmonetized benefits and costs, should be discounted. The higher the discount rate, the lower is the present value of future cash flows. For typical investments, with costs concentrated in early periods and benefits following in later periods, raising the discount rate tends to reduce the net present value. (Technical guidance on discounting and a table of discount factors are provided in Appendix B.)

- a. **Real versus Nominal Discount Rates.** The proper discount rate to use depends on whether the benefits and costs are measured in real or nominal terms.

- (1) A real discount rate that has been adjusted to eliminate the effect of expected inflation should be used to discount constant-dollar or real benefits and costs. A

real discount rate can be approximated by subtracting expected inflation from a nominal interest rate.

- (2) A nominal discount rate that reflects expected inflation should be used to discount nominal benefits and costs. Market interest rates are nominal interest rates in this sense.

- b. **Public Investment and Regulatory Analyses.** The guidance in this section applies to benefit-cost analyses of public investments and regulatory programs that provide benefits and costs to the general public. Guidance related to cost-effectiveness analysis of internal planning decisions of the Federal Government is provided in Section 8.c.

In general, public investments and regulations displace both private investment and consumption. To account for this displacement and to promote efficient investment and regulatory policies, the following guidance should be observed:

- (1) **Base-Case Analysis.** Constant-dollar benefit-cost analyses of proposed investments and regulations should report net present value and other outcomes determined using a real discount rate of 7 percent. This rate approximates the marginal pretax rate of return on an average investment in the private sector in recent years. Significant changes in this rate will be reflected in future updates of this Circular.
- (2) **Other Discount Rates.** Analyses should show the sensitivity of the discounted net present value and other outcomes to variations in the discount rate. The importance of these alternative calculations will depend on the specific economic characteristics of the program under analysis. For example, in analyzing a regulatory proposal whose main cost is to reduce business investment, net present value should also be calculated using a higher discount rate than 7 percent.

Analyses may include among the reported outcomes the internal rate of return implied by the stream of benefits and costs. The internal rate of return is the discount rate that sets the net present value of the program or project to zero. While the internal rate of return does not generally provide an acceptable decision criterion, it does provide useful information, particularly when budgets are constrained or there is uncertainty about the appropriate discount rate.

- (3) Using the shadow price of capital to value benefits and costs is the analytically preferred means of capturing the effects of Government projects on resource

allocation in the private sector. To use this method accurately, the analyst must be able to compute how the benefits and costs of a program or project affect the allocation of private consumption and investment. OMB concurrence is required if this method is used in place of the base case discount rate.

c. **Cost-Effectiveness, Lease-Purchase, Internal Government Investment, and Asset Sale Analyses.** The Treasury's borrowing rates should be used as discount rates in the following cases:

- (1) **Cost-Effectiveness Analysis.** Analyses that involve constant-dollar costs should use the real Treasury borrowing rate on marketable securities of comparable maturity to the period of analysis. This rate is computed using the Administration's economic assumptions for the budget, which are published in January of each year. A table of discount rates based on the expected interest rates for the first year of the budget forecast is presented in Appendix C of this Circular. Appendix C is updated annually and is available upon request from OMB. Real Treasury rates are obtained by removing expected inflation over the period of analysis from nominal Treasury interest rates. (Analyses that involve nominal costs should use nominal Treasury rates for discounting, as described in the following paragraph.)
- (2) **Lease-Purchase Analysis.** Analyses of nominal lease payments should use the nominal Treasury borrowing rate on marketable securities of comparable maturity to the period of analysis. Nominal Treasury borrowing rates should be taken from the economic assumptions for the budget. A table of discount rates based on these assumptions is presented in Appendix C of this Circular, which is updated annually. (Constant dollar lease-purchase analyses should use the real Treasury borrowing rate, described in the preceding paragraph.)
- (3) **Internal Government Investments.** Some Federal investments provide "internal" benefits which take the form of increased Federal revenues or decreased Federal costs. An example would be an investment in an energy-efficient building system that reduces Federal operating costs. Unlike the case of a Federally funded highway (which provides "external" benefits to society as a whole), it is appropriate to calculate such a project's net present value using a comparable-maturity Treasury rate as a discount rate. The rate used may be either nominal or real, depending on how benefits and costs are measured.

Some Federal activities provide a mix of both Federal cost savings and external social benefits. For example, Federal investments in information technology can produce Federal savings in the form of lower administrative costs and external social benefits in the form of faster claims processing. The net present value of such investments should be evaluated with the 7 percent real discount rate discussed in Section 8.b. unless the analysis is able to allocate the investment's costs between provision of Federal cost savings and external social benefits. Where such an allocation is possible, Federal cost savings and their associated investment costs may be discounted at the Treasury rate, while the external social benefits and their associated investment costs should be discounted at the 7 percent real rate.

- (4) Asset Sale Analysis. Analysis of possible asset sales should reflect the following:
- (a) The net present value to the Federal Government of holding an asset is best measured by discounting its future earnings stream using a Treasury rate. The rate used may be either nominal or real, depending on how earnings are measured.
 - (b) Analyses of Government asset values should explicitly deduct the cost of expected defaults or delays in payment from projected cash flows, along with Government administrative costs. Such analyses should also consider explicitly the probabilities of events that would cause the asset to become nonfunctional, impaired or obsolete, as well as probabilities of events that would increase asset value.
 - (c) Analyses of possible asset sales should assess the gain in social efficiency that can result when a Government asset is subject to market discipline and private incentives. Even though a Government asset may be used more efficiently in the private sector, potential private-sector purchasers will generally discount such an asset's earnings at a rate in excess of the Treasury rate, in part, due to the cost of bearing risk. When there is evidence that Government assets can be used more efficiently in the private sector, valuation analyses for these assets should include sensitivity comparisons that discount the returns from such assets with the rate of interest earned by assets of similar riskiness in the private sector.

9. Treatment of Uncertainty. Estimates of benefits and costs are typically uncertain because of imprecision in both underlying data and modeling assumptions. Because such uncertainty is basic to many analyses, its effects should be analyzed and reported. Useful information in such a report would include the key sources of uncertainty; expected value estimates of outcomes; the sensitivity of results to important sources of uncertainty; and, where possible, the probability distributions of benefits, costs, and net benefits.

- a. Characterizing Uncertainty. Analyses should attempt to characterize the sources and nature of uncertainty. Ideally, probability distributions of potential benefits, costs, and net benefits should be presented. It should be recognized that many phenomena that are treated as deterministic or certain are, in fact, uncertain. In analyzing uncertain data, objective estimates of probabilities should be used whenever possible. Market data, such as private insurance payments or interest rate differentials, may be useful in identifying and estimating relevant risks. Stochastic simulation methods can be useful for analyzing such phenomena and developing insights into the relevant probability distributions. In any case, the basis for the probability distribution assumptions should be reported. Any limitations of the analysis because of uncertainty or biases surrounding data or assumptions should be discussed.
- b. Expected Values. The expected values of the distributions of benefits, costs, and net benefits can be obtained by weighting each outcome by its probability of occurrence, and then summing across all potential outcomes. If estimated benefits, costs, and net benefits are characterized by point estimates rather than as probability distributions, the expected value (an unbiased estimate) is the appropriate estimate for use.

Estimates that differ from expected values (such as worst-case estimates) may be provided in addition to expected values, but the rationale for such estimates must be clearly presented. For any such estimate, the analysis should identify the nature and magnitude of any bias. For example, studies of past activities have documented tendencies for cost growth beyond initial expectations; analyses should consider whether past experience suggests that initial estimates of benefits or costs are optimistic.

- c. Sensitivity Analysis. Major assumptions should be varied and net present value and other outcomes recomputed to determine how sensitive outcomes are to changes in the assumptions. The assumptions that deserve the most attention will depend on the dominant benefit and cost elements and the areas of greatest uncertainty of the program being

analyzed. For example, in analyzing a retirement program, one would consider changes in the number of beneficiaries, future wage growth, inflation, and the discount rate. In general, sensitivity analysis should be considered for estimates of: (i) benefits and costs; (ii) the discount rate; (iii) the general inflation rate; and (iv) distributional assumptions. Models used in the analysis should be well documented and, where possible, available to facilitate independent review.

- d. Other Adjustments for Uncertainty. The absolute variability of a risky outcome can be much less significant than its correlation with other significant determinants of social welfare, such as real national income. In general, variations in the discount rate are not the appropriate method of adjusting net present value for the special risks of particular projects. In some cases, it may be possible to estimate certainty-equivalents which involve adjusting uncertain expected values to account for risk.

10. Incidence and Distributional Effects. The principle of maximizing net present value of benefits is based on the premise that gainers could fully compensate the losers and still be better off. The presence or absence of such compensation should be indicated in the analysis. When benefits and costs have significant distributional effects, these effects should be analyzed and discussed, along with the analysis of net present value. (This will not usually be the case for cost-effectiveness analysis where the scope of Government activity is not changing.)

- a. Alternative Classifications. Distributional effects may be analyzed by grouping individuals or households according to income class (e.g., income quintiles), geographical region, or demographic group (e.g., age). Other classifications, such as by industry or occupation, may be appropriate in some circumstances.

Analysis should aim at identifying the relevant gainers and losers from policy decisions. Effects on the preexisting assignment of property rights by the program under analysis should be reported. Where a policy is intended to benefit a specified subgroup of the population, such as the poor, the analysis should consider how effective the policy is in reaching its targeted group.

- b. Economic Incidence. Individuals or households are the ultimate recipients of income; business enterprises are merely intermediaries. Analyses of distribution should identify economic incidence, or how costs and benefits are ultimately borne by households or individuals.

Determining economic incidence can be difficult because benefits and costs are often redistributed in unintended and unexpected ways. For example, a subsidy for the production of a commodity will usually raise the incomes of the commodity's suppliers, but it can also benefit consumers of the commodity through lower prices and reduce the incomes for suppliers of competing products. A subsidy also raises the value of specialized resources used in the production of the subsidized commodity. As the subsidy is incorporated in asset values, its distributional effects can change.

11. Special Guidance for Public Investment Analysis. This guidance applies only to public investments with social benefits apart from decreased Federal costs. It is not required for cost-effectiveness or lease-purchase analyses. Because taxes generally distort relative prices, they impose a burden in excess of the revenues they raise. Recent studies of the U.S. tax system suggest a range of values for the marginal excess burden, of which a reasonable estimate is 25 cents per dollar of revenue.

- a. Analysis of Excess Burdens. The presentation of results for public investments that are not justified on cost-saving grounds should include a supplementary analysis with a 25 percent excess burden. Thus, in such analyses, costs in the form of public expenditures should be multiplied by a factor of 1.25 and net present value recomputed.
- b. Exceptions. Where specific information clearly suggests that the excess burden is lower (or higher) than 25 percent, analyses may use a different figure. When a different figure is used an explanation should be provided for it. An example of such an exception is an investment funded by user charges that function like market prices; in this case the excess burden would be zero. Another example would be a project that provides both cost savings to the Federal Government and external social benefits. If it is possible to make a quantitative determination of the portion of this project's costs that give rise to Federal savings, that portion of the costs may be exempted from multiplication by the factor of 1.25.

12. Special Guidance for Regulatory Impact Analysis. Additional guidance for analysis of regulatory policies is provided in Regulatory Program of the United States Government which is published annually by OMB. (See "Regulatory Impact Analysis Guidance," Appendix V of Regulatory Program of the United States Government for April 1, 1991 to March 31, 1992.)

13. Special Guidance for Lease-Purchase Analysis. The special guidance in this section does not apply to the decision to acquire the use of an asset. In deciding that, the agency should conduct a benefit-cost analysis, if possible. Only after the decision to acquire the services of an asset has been made is there a need to analyze the decision whether to lease or purchase.

a. Coverage. The Circular applies only when both of the following tests of applicability are satisfied:

- (1) The lease-purchase analysis concerns a capital asset, (including durable goods, equipment, buildings, facilities, installations, or land) which:
 - (a) Is leased to the Federal Government for a term of three or more years; or,
 - (b) Is new, with an economic life of less than three years, and leased to the Federal Government for a term of 75 percent or more of the economic life of the asset; or,
 - (c) Is built for the express purpose of being leased to the Federal Government; or,
 - (d) Is leased to the Federal Government and clearly has no alternative commercial use (e.g., a special-purpose government installation).
- (2) The lease-purchase analysis concerns a capital asset or a group of related assets whose total fair market value exceeds \$1 million.

b. Required Justification for Leases. All leases of capital assets must be justified as preferable to direct government purchase and ownership. This can be done in one of three ways:

- (1) By conducting a separate lease-purchase analysis. This is the only acceptable method for major acquisitions. A lease represents a major acquisition if:
 - (a) The acquisition represents a separate line-item in the agency's budget;
 - (b) The agency or OMB determines the acquisition is a major one; or
 - (c) The total purchase price of the asset or group of assets to be leased would exceed \$500 million.

- (2) By conducting periodic lease-purchase analyses of recurrent decisions to lease similar assets used for the same general purpose. Such analyses would apply to the entire class of assets. OMB approval should be sought in determining the scope of any such generic analysis.
 - (3) By adopting a formal policy for smaller leases and submitting that policy to the OMB for approval. Following such a policy should generally result in the same lease-purchase decisions as would conducting separate lease-purchase analyses. Before adopting the policy, it should be demonstrated that:
 - (a) The leases in question would generally result in substantial savings to the Government that could not be realized on a purchase;
 - (b) The leases are so small or so short-term as to make separate lease-purchase analysis impractical; and
 - (c) Leases of different types are scored consistently with the instructions in Appendices B and C of OMB Circular No. A-11.
- c. **Analytical Requirements and Definitions.** Whenever a Federal agency needs to acquire the use of a capital asset, it should do so in the way that is least expensive for the Government as a whole.
- (1) **Life Cycle Cost.** Lease-purchase analyses should compare the net discounted present value of the life-cycle cost of leasing with the full costs of buying or constructing an identical asset. The full costs of buying include the asset's purchase price plus the net discounted present value of any relevant ancillary services connected with the purchase. (Guidance on the discount rate to use for lease-purchase analysis is provided in Section 8.c.)
 - (2) **Economic Life.** For purposes of lease-purchase analysis, the economic life of an asset is its remaining physical or productive lifetime. It begins when the asset is acquired and ends when the asset is retired from service. The economic life is frequently not the same as the useful life for tax purposes.
 - (3) **Purchase Price.** The purchase price of the asset for purposes of lease-purchase analysis is its fair market value, defined as the price a willing buyer could reasonably expect to pay a willing seller in a competitive market to acquire the asset.

- (a) In the case of property that is already owned by the Federal Government or that has been donated or acquired by condemnation, an imputed purchase price should be estimated. (Guidance on making imputations is provided in Section 13.c.(6).)
 - (b) If public land is used for the site of the asset, the imputed market value of the land should be added to the purchase price.
 - (c) The asset's estimated residual value, as of the end of the period of analysis, should be subtracted from its purchase price. (Guidance on estimating residual value is provided in Section 13.c.(7).)
- (4) **Taxes.** In analyzing the cost of a lease, the normal payment of taxes on the lessor's income from the lease should not be subtracted from the lease costs since the normal payment of taxes will also be reflected in the purchase cost. The cost to the Treasury of special tax benefits, if any, associated with the lease should be added to the cost of the lease. Examples of such tax benefits might include highly accelerated depreciation allowances or tax-free financing.
- (5) **Ancillary Services.** If the terms of the lease include ancillary services provided by the lessor, the present value of the cost of obtaining these services separately should be added to the purchase price. Such costs may be excluded if they are estimated to be the same for both lease and purchase alternatives or too small to affect the comparison. Examples of ancillary services include:
- (a) All costs associated with acquiring the property and preparing it for use, including construction, installation, site, design, and management costs.
 - (b) Repair and improvement costs (if included in lease payments).
 - (c) Operation and maintenance costs (if included in lease payments).
 - (d) Imputed property taxes (excluding foreign property taxes on overseas acquisitions except where actually paid). The imputed taxes approximate the costs of providing municipal services such as water, sewage, and police and fire protection. (See Section (6) below.)

- (e) **Imputed insurance premiums.** (See Section (6) below.)
- (6) **Estimating Imputed Costs.** Certain costs associated with the Federal purchase of an asset may not involve a direct monetary payment. Some of these imputed costs may be estimated as follows:
 - (a) **Purchase Price.** An imputed purchase price for an asset that is already owned by the Federal Government or which has been acquired by donation or condemnation should be based on the fair market value of similar properties that have been traded on commercial markets in the same or similar localities. The same method should be followed in estimating the imputed value of any Federal land used as a site for the asset.
 - (b) **Property Taxes.** Imputed property taxes may be estimated in two ways.
 - (i) Determine the property tax rate and assessed (taxable) value for comparable property in the intended locality. If there is no basis on which to estimate future changes in tax rates or assessed values, the first-year tax rate and assessed value (inflation adjusted for each subsequent year) can be applied to all years. Multiply the assessed value by the tax rate to determine the annual imputation for property taxes.
 - (ii) As an alternative to step (i) above, obtain an estimate of the current local effective property tax rate from the Building Owners and Managers Association's Regional Exchange Reports. Multiply the fair market value of the Government-owned property (inflation adjusted for each year) by the effective tax rate.
 - (c) **Insurance Premiums.** Determine local estimates of standard commercial coverage for similar property from the Building Owners and Managers Association's Regional Exchange Reports.
- (7) **Residual Value.** A property's residual value is an estimate of the price that the property could be sold for at the end of the period of the lease-purchase analysis, measured in discounted present value terms.

- (a) The recommended way to estimate residual value is to determine what similar, comparably aged property is currently selling for in commercial markets.
 - (b) Alternatively, book estimates of the resale value of used property may be available from industry or Government sources.
 - (c) Assessed values of similar, comparably aged properties determined for property tax purposes may also be used.
- (8) Renewal Options. In determining the term of a lease, all renewal options shall be added to the initial lease period.

14. Related Guidance.

- a. OMB Circular No. A-11, "Preparation and Submission of Annual Budget Estimates."
- b. OMB Circular No. A-19, "Legislative Coordination and Clearance."
- c. OMB Circular No. A-70, "Federal Credit Policy."
- d. OMB Circular No. A-76, "Performance of Commercial Activities."
- e. OMB Circular No. A-109, "Policies to Be Followed in the Acquisition of Major Systems."
- f. OMB Circular No. A-130, "Management of Federal Information Resources."
- g. "Joint OMB and Treasury Guidelines to the Department of Defense Covering Lease or Charter Arrangements for Aircraft and Naval Vessels."
- h. Executive Order 12291, "Federal Regulation."
- i. "Regulatory Impact Analysis Guidance," in Regulatory Program of the United States Government.
- j. "Federal Energy Management and Planning Programs; Life Cycle Cost Methodology and Procedures," Federal Register, Vol. 55, No. 17, January 25, 1990, and Vol. 55, No. 224, November 20, 1990.
- k. Presidential Memorandum of April 29, 1992, "Benefits and Costs of Legislative Proposals."

15. Implementation. Economic analyses submitted to OMB will be reviewed for conformity with items 5 to 13 in this Circular through the Circular No. A-11, budget justification and submission process, and Circular No. A-19, legislative review process.

16. Effective Date. This Circular is effective immediately.

17. Interpretation. Questions concerning interpretation of this Circular should be addressed to the Office of Economic Policy, Office of Management and Budget (202-395-5873) or, in the case of regulatory issues and analysis, to the Office of Information and Regulatory Affairs (202-395-4852).

APPENDIX A

DEFINITION OF TERMS

Benefit-Cost Analysis -- A systematic quantitative method of assessing the desirability of Government projects or policies when it is important to take a long view of future effects and a broad view of possible side-effects.

Capital Asset -- Tangible property, including durable goods, equipment, buildings, installations, and land.

Certainty-equivalent -- A certain (i.e., nonrandom) outcome that an individual values equally to an uncertain outcome. For a risk-averse individual, the certainty-equivalent for an uncertain set of benefits may be less than the mathematical expectation of the outcome; for example, an individual may value a 50-50 chance of winning \$100 or \$0 as only \$45. Analogously, a risk-averse individual may have a certainty equivalent for an uncertain set of costs that is larger in magnitude than the mathematical expectation of costs.

Cost-Effectiveness Analysis -- A systematic quantitative method for comparing the costs of alternative means of achieving the same stream of benefits or a given objective.

Consumer Surplus -- The maximum sum of money a consumer would be willing to pay to consume a given amount of a good, less the amount actually paid. It is represented graphically by the area between the demand curve and the price line in a diagram representing the consumer's demand for the good as a function of its price.

Discount Rate -- The interest rate used in calculating the present value of expected yearly benefits and costs.

Discount Factor -- The factor that translates expected benefits or costs in any given future year into present value terms. The discount factor is equal to $1/(1 + i)^t$ where i is the interest rate and t is the number of years from the date of initiation for the program or policy until the given future year.

Excess Burden -- Unless a tax is imposed in the form of a lump-sum unrelated to economic activity, such as a head tax, it will affect economic decisions on the margin. Departures from economic efficiency resulting from the distorting effect of taxes are called excess burdens, because they disadvantage society without adding to Treasury receipts. This concept is also sometimes referred to as deadweight loss.

External Economy or Diseconomy -- A direct effect, either positive or negative, on someone's profit or welfare arising as a by-product of some other person's or firm's activity. Also referred to as neighborhood or spillover effects, or externalities for short.

Incidence -- The ultimate distributional effect of a tax, expenditure, or regulatory program.

Inflation -- The proportionate rate of change in the general price level, as opposed to the proportionate increase in a specific price. Inflation is usually measured by a broad-based price index, such as the implicit deflator for Gross Domestic Product or the Consumer Price Index.

Internal Rate of Return -- The discount rate that sets the net present value of the stream of net benefits equal to zero. The internal rate of return may have multiple values when the stream of net benefits alternates from negative to positive more than once.

Life Cycle Cost -- The overall estimated cost for a particular program alternative over the time period corresponding to the life of the program including direct and indirect initial costs plus any periodic or continuing costs of operation and maintenance.

Multiplier -- The ratio between the direct effect on output or employment and the full effect, including the effects of second order rounds or spending. Multiplier effects greater than 1.0 require the existence of involuntary unemployment.

Net Present Value -- The difference between the discounted present value of benefits and the discounted present value of costs.

Nominal Values -- Economic units measured in terms of purchasing power of the date in question. A nominal value reflects the effects of general price inflation.

Nominal Interest Rate -- An interest rate that is not adjusted to remove the effects of actual or expected inflation. Market interest rates are generally nominal interest rates.

Opportunity Cost -- The maximum worth of a good or input among possible alternative uses.

Real or Constant Dollar Values -- Economic units measured in terms of constant purchasing power. A real value is not affected by general price inflation. Real values can be estimated by deflating nominal values with a general price index, such as the implicit deflator for Gross Domestic Product or the Consumer Price Index.

Real Interest Rate -- An interest rate that has been adjusted to remove the effect of expected or actual inflation. Real interest rates can be approximated by subtracting the expected or actual inflation rate from a nominal interest rate. (A precise estimate can be obtained by dividing one plus the nominal interest rate by one plus the expected or actual inflation rate, and subtracting one from the resulting quotient.)

Relative Price -- A price ratio between two goods as, for example, the ratio of the price of energy to the price of equipment.

Shadow Price -- An estimate of what the price of a good or input would be in the absence of market distortions, such as externalities or taxes. For example, the shadow price of capital is the present value of the social returns to capital (before corporate income taxes) measured in units of consumption.

Sunk Cost -- A cost incurred in the past that will not be affected by any present or future decision. Sunk costs should be ignored in determining whether a new investment is worthwhile.

Transfer Payment -- A payment of money or goods. A pure transfer is unrelated to the provision of any goods or services in exchange. Such payments alter the distribution of income, but do not directly affect the allocation of resources on the margin.

Treasury Rates -- Rates of interest on marketable Treasury debt. Such debt is issued in maturities ranging from 91 days to 30 years.

Willingness to Pay -- The maximum amount an individual would be willing to give up in order to secure a change in the provision of a good or service.

APPENDIX B

ADDITIONAL GUIDANCE FOR DISCOUNTING

1. Sample Format for Discounting Deferred Costs and Benefits

Assume a 10-year program which will commit the Government to the stream of real (or constant-dollar) expenditures appearing in column (2) of the table below and which will result in a series of real benefits appearing in column (3). The discount factor for a 7 percent discount rate is shown in column (4). The present value cost for each of the 10 years is calculated by multiplying column (2) by column (4); the present value benefit for each of the 10 years is calculated by multiplying column (3) by column (4). The present values of costs and benefits are presented in columns (5) and (6) respectively.

Year since initiation, renewal or expansion (1)	Expected yearly cost (2)	Expected yearly benefit (3)	Discount factors for 7% (4)	Present value of costs Col. 2 x Col. 4 (5)	Present value of benefits Col. 3 x Col. 4 (6)
1	\$10.00	\$ 0.00	0.9346	\$ 9.35	\$ 0.00
2	20.00	0.00	0.8734	17.47	0.00
3	30.00	5.00	0.8163	24.49	4.08
4	30.00	10.00	0.7629	22.89	7.63
5	20.00	30.00	0.7130	14.26	21.39
6	10.00	40.00	0.6663	6.66	26.65
7	5.00	40.00	0.6227	3.11	24.91
8	5.00	40.00	0.5820	2.91	23.28
9	5.00	40.00	0.5439	2.72	21.76
10	5.00	25.00	0.5083	2.54	12.71
Total				\$106.40	\$142.41

NOTE: The discount factor is calculated as $1/(1 + i)^t$ where i is the interest rate (.07) and t is the year.

The sum of column (5) is the total present value of costs and the sum of column (6) is the total present value of benefits. Net present value is \$36.01, the difference between the sum of discounted benefits and the sum of discounted costs.

2. End-of-Year and Mid-Year Discount Factors

The discount factors presented in the table above are calculated on the implicit assumption that costs and benefits occur as lump-sums at year-end. When costs and benefits occur in a steady

stream, applying mid-year discount factors is more appropriate. For instance, the first cost in the table may be estimated to occur after six months, rather than at the end of one year to approximate better a steady stream of costs and benefits occurring over the first year. Similarly, it may be assumed that all other costs and benefits are advanced six months to approximate better a continuing steady flow.

The present values of costs and benefits computed from the table above can be converted to a mid-year discounting basis by multiplying them by 1.0344 (the square root of 1.07). Thus, if the above example were converted to a mid-year basis, the present value of costs would be \$110.06, the present value of benefits would be \$147.31, and the net present value would be \$37.25.

3. Illustrative Discount Factors for a Discount Rate of 7 Percent

<u>Year since Initiation, Renewal or Expansion</u>	<u>Year-end Discount Factors</u>	<u>Mid-year Discount Factors</u>	<u>Beginning- of-year Discount Factors</u>
1	0.9346	0.9667	1.0000
2	0.8734	0.9035	0.9346
3	0.8163	0.8444	0.8734
4	0.7629	0.7891	0.8163
5	0.7130	0.7375	0.7629
6	0.6663	0.6893	0.7130
7	0.6227	0.6442	0.6663
8	0.5820	0.6020	0.6227
9	0.5439	0.5626	0.5820
10	0.5083	0.5258	0.5439
11	0.4751	0.4914	0.5083
12	0.4440	0.4593	0.4751
13	0.4150	0.4292	0.4440
14	0.3878	0.4012	0.4150
15	0.3624	0.3749	0.3878
16	0.3387	0.3504	0.3624
17	0.3166	0.3275	0.3387
18	0.2959	0.3060	0.3166
19	0.2765	0.2860	0.2959
20	0.2584	0.2673	0.2765
21	0.2415	0.2498	0.2584
22	0.2257	0.2335	0.2415
23	0.2109	0.2182	0.2257
24	0.1971	0.2039	0.2109
25	0.1842	0.1906	0.1971
26	0.1722	0.1781	0.1842
27	0.1609	0.1665	0.1722
28	0.1504	0.1556	0.1609
29	0.1406	0.1454	0.1504
30	0.1314	0.1359	0.1406

APPENDIX C

DISCOUNT RATES FOR COST-EFFECTIVENESS, LEASE PURCHASE, AND RELATED ANALYSES

Effective Dates. This appendix is updated annually at the time of the President's budget submission to Congress. This version of the appendix is valid only through February, 1993. Updates of this appendix will be available upon request from the Office of Economic Policy in OMB (202-395-3381). Copies of the appendix and the Circular may also be obtained from the OMB Publications Office (202-395-7332).

Nominal Discount Rates. Nominal interest rates based on the economic assumptions from the Fiscal Year 1993 Budget are presented in the table below. These nominal rates are to be used for discounting nominal flows, as in lease-purchase analysis.

Nominal Interest Rates on Treasury Notes and Bonds of Specified Maturities (in percent)

<u>3-Year</u>	<u>5-Year</u>	<u>7-Year</u>	<u>10-Year</u>	<u>30-Year</u>
6.1	6.5	6.7	7.0	7.1

Analyses of programs with terms different from those presented above may use a linear interpolation. For example, a four-year project can be evaluated with a 6.3 percent nominal rate. Programs with durations longer than 30 years may use the 30-year interest rate.

Real Discount Rates. Real interest rates based on the economic assumptions from the Fiscal Year 1993 Budget are presented below. These real rates are to be used for discounting real (constant-dollar) flows, as in cost-effectiveness analysis.

Real Interest Rates on Treasury Notes and Bonds of Specified Maturities (in percent)

<u>3-Year</u>	<u>5-Year</u>	<u>7-Year</u>	<u>10-Year</u>	<u>30-Year</u>
2.7	3.1	3.3	3.6	3.8

Analyses of programs with terms different from those presented above may use a linear interpolation. For example, a four-year project can be evaluated with a 2.9 percent real rate. Programs with durations longer than 30 years may use the 30-year interest rate.

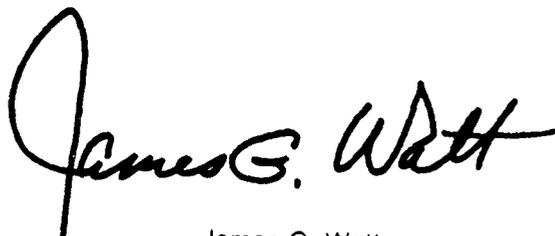
**ECONOMIC AND ENVIRONMENTAL
PRINCIPLES AND GUIDELINES
FOR WATER AND RELATED LAND RESOURCES
IMPLEMENTATION STUDIES**

Foreword

These Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies have been developed to guide the formulation and evaluation studies of the major Federal water resources development agencies. This document is the product of extensive work by experts from a variety of professions and was developed with the help of hundreds of comments from the public. It contains the best currently available methods for calculating the benefits and costs of water resources development alternatives accurately and consistently, and is intended to ensure proper and consistent planning by the covered Federal agencies. I am confident that these Principles and Guidelines will enhance our ability to identify and recommend to the Congress economically and environmentally sound water project alternatives.

In accordance with Section 103 of the Water Resources Planning Act, as amended (42 U.S.C.

1962a-2), the Water Resources Council voted on September 9, 1982, to repeal the existing Principles, Standards and Procedures (18 CFR, Parts 711, 713, 714 and 716) and to establish these Principles and Guidelines. The President approved the Principles on February 3, 1983. In accordance with Executive Order 11747 (38 FR 30993, November 7, 1973), I hereby approve the new Standards (Chapter I) and Procedures (Chapters II and III).



James G. Watt
Chairman
U.S. Water Resources Council

Economic and Environmental Principles for Water and Related Land Resources Implementation Studies

These Principles are established pursuant to the Water Resources Planning Act of 1965 (Pub. L. 89-80), as amended (42 U.S.C. 1962a-2 and d-1). These Principles supersede the Principles established in connection with promulgation of principles, standards and procedures at 18 CFR, Parts 711, 713, 714 and 716.

1. Purpose and Scope

These principles are intended to ensure proper and consistent planning by Federal agencies in the formulation and evaluation of water and related land resources implementation studies.

Implementation studies of the following agency activities are covered by these principles:

- (a) Corps of Engineers (Civil Works) water resources project plans;
- (b) Bureau of Reclamation water resources project plans;
- (c) Tennessee Valley Authority water resources project plans;
- (d) Soil Conservation Service water resources project plans.

Implementation studies are pre- or postauthorization project formulation or evaluation studies undertaken by Federal agencies.

2. Federal Objective

The Federal objective of water and related land resources project planning is to contribute to national economic development consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements.

- (a) Water and related land resources project plans shall be formulated to alleviate problems and take advantage of opportunities in ways that contribute to this objective.
- (b) Contributions to national economic development (NED) are increases in the net value of the national output of goods and services, expressed in monetary units. Contributions to NED are the direct net benefits that accrue in the planning area and the rest of the Nation. Contributions to NED include increases in the net value of those goods and services that are marketed, and also of those that may not be marketed.

3. State and Local Concerns

Federal water resources planning is to be responsive to State and local concerns. Accordingly, State and local participation is to be encouraged in all aspects of water resources planning. Federal agencies are to contact Governors or designated State agencies for each affected State before initiating studies, and to provide appropriate opportunities for State participation. It is recognized, however, that water projects which are local, regional, statewide, or even interstate in scope do not necessarily require a major role for the Federal Government; non-Federal, voluntary arrangements between affected jurisdictions may often be adequate. States and localities are free to initiate planning and implementation of water projects.

4. International Concerns

Federal water resources planning is to take into account international implications, including treaty obligations. Timely consultations with the relevant foreign government should be undertaken when a Federal water project is likely to have a significant impact on any land or water resources within its territorial boundaries.

5. Alternative Plans

Various alternative plans are to be formulated in a systematic manner to ensure that all reasonable alternatives are evaluated.

- (a) A plan that reasonably maximizes net national economic development benefits, consistent with the Federal objective, is to be formulated. This plan is to be identified as the NED plan.
- (b) Other plans which reduce net NED benefits in order to further address other Federal, State, local, and international concerns not fully addressed by the NED plan should also be formulated.
- (c) Plans may be formulated which require changes in existing statutes, administrative regulations, and established common law; such required changes are to be identified.
- (d) Each alternative plan is to be formulated in consideration of four criteria: completeness, effectiveness, efficiency, and acceptability. Appropriate mitigation of adverse effects is to be an integral part of each alternative plan.

- (e) Existing water and related land resources plans, such as State water resources plans, are to be considered as alternative plans if within the scope of the planning effort.

6. Plan Selection

A plan recommending Federal action is to be the alternative plan with the greatest net economic benefit consistent with protecting the Nation's environment (the NED plan), unless the Secretary of a department or head of an independent agency grants an exception to this rule. Exceptions may be made when there are overriding reasons for recommending another plan, based on other Federal, State, local and international concerns.

7. Accounts

Four accounts are established to facilitate evaluation and display of effects of alternative plans. The national economic development account is required. Other information that is required by law or that will have a material bearing on the decision-making process should be included in the other accounts, or in some other appropriate format used to organize information on effects.

- (a) The national economic development (NED) account displays changes in the economic value of the national output of goods and services.
- (b) The environmental quality (EQ) account displays nonmonetary effects on significant natural and cultural resources.
- (c) The regional economic development (RED) account registers changes in the distribution of regional economic activity that result from each alternative plan. Evaluations of regional effects are to be carried out using nationally consistent projections of income, employment, output, and population.
- (d) The other social effects (OSE) account registers plan effects from perspectives that are relevant to the planning process, but are not reflected in the other three accounts.

8. Discount Rate

Discounting is to be used to convert future monetary values to present values.

9. Period of Analysis

The period of analysis to be the same for each alternative plan.

10. Risk and Uncertainty

Planners shall identify areas of risk and uncertainty in their analysis and describe them clearly, so that decisions can be made with knowledge of the degree of reliability of the estimated benefits and costs and of the effectiveness of alternative plans.

11. Cost Allocation

For allocating total project financial costs among the purposes served by a plan, separable costs will be assigned to their respective purposes, and all joint costs will be allocated to purposes for which the plan was formulated. (Cost sharing policies for water projects will be addressed separately.)

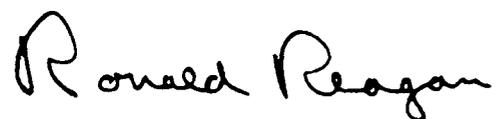
12. Planning Guidelines

In order to ensure consistency of Federal agency planning necessary for purposes of budget and policy decisions and to aid States and the public in evaluation of project alternatives, the Water Resources Council (WRC), in cooperation with the Cabinet Council on Natural Resources and Environment, shall issue standards and procedures, in the form of guidelines, implementing these Principles. The head of each Federal agency subject to this order will be responsible for consistent application of the guidelines. An agency may propose agency guidelines which differ from the guidelines issued by WRC. Such agency guidelines and suggestions for improvements in the WRC guidelines are to be submitted to WRC for review and approval. The WRC will forward all agency proposed guidelines which represent changes in established policy to the Cabinet Council on Natural Resources and Environment for its consideration.

13. Effective Date

These Principles shall apply to implementation studies completed more than 120 days after issuance of the standards and procedures referenced in Section 12, and concomitant repeal of 18 CFR, Parts 711, 713, 714, and 716.

These economic and environmental Principles are hereby approved.



February 3, 1983

Economic and Environmental Guidelines for Water and Related Land Resources Implementation Studies

Chapter I—Standards

Section I—Introduction

- 1.1.1 Purpose and Scope.
- 1.1.2 Authority.
- 1.1.3 Applicability.

Section II—The Federal Objective

Section III—Summary of the Planning Process

- 1.3.1 Introduction.
- 1.3.2 Major Steps.
- 1.3.3 Specification of the problems and opportunities associated with the Federal objective and specific State and local concerns.
- 1.3.4 Inventory and forecast of water and related land resources conditions.
- 1.3.5 Formulation of alternative plans.
- 1.3.6 Evaluation of effects.
- 1.3.7 Comparison of alternative plans.
- 1.3.8 Plan selection.

Section IV—General Planning Considerations

- 1.4.1 Federal-State relationship in planning.
- 1.4.2 International consultations.
- 1.4.3 General public participation.
- 1.4.4 Review and consultation.
- 1.4.5 Interdisciplinary planning.
- 1.4.6 Agency decisionmaking.
- 1.4.7 Planning area.
- 1.4.8 Scoping.
- 1.4.9 Forecasting.
- 1.4.10 Prices.
- 1.4.11 Discount rate.
- 1.4.12 Period of analysis.
- 1.4.13 Risk and uncertainty—sensitivity analysis.
- 1.4.14 Documentation.

Section V—Inventory and Forecast of Conditions Without a Plan

- 1.5.1 Resource conditions.
- 1.5.2 Problems and opportunities.

Section VI—Alternative Plans

- 1.6.1 General.
- 1.6.2 Formulation.
- 1.6.3 The NED plan.
- 1.6.4 Other alternative plans.

Section VII—Accounts

- 1.7.1 General.
- 1.7.2 National economic development account.
- 1.7.3 Environmental quality account.
- 1.7.4 Regional economic development account.
- 1.7.5 Other social effects account.

Section VIII—Displays

- 1.8.1 General.
- 1.8.2 Content and format.

Section IX—Cost Allocation

- 1.9.1 General.
- 1.9.2 Definitions.
- 1.9.3 Cost allocation standard.
- 1.9.4 Allocation of constituent cost.

Section X—Plan Selection

- 1.10.1 General.
- 1.10.2 Selection.

Supplement I—Risk and Uncertainty

- S1 Concepts.
- S2 Application.
- S3 Report and display.

Chapter II—National Economic Development (NED) Benefit Evaluation Procedures

Section I—General

- 2.1.1 Purpose.
- 2.1.2 Conceptual basis.
- 2.1.3 Calculating net NED benefits in average annual equivalent terms.
- 2.1.4 Definitions.

Section II—NED Benefit Evaluation Procedure—Municipal and Industrial (M&I) Water Supply

- 2.2.1 Introduction.
- 2.2.2 Conceptual basis.
- 2.2.3 Planning setting.
- 2.2.4 Evaluation procedure: General.
- 2.2.5 Evaluation procedure: Identify study area.
- 2.2.6 Evaluation procedure: Estimate future M&I water supplies.

- 2.2.7 Evaluation procedure: Project future M&I water use.
- 2.2.8 Evaluation procedure: Identify the deficit between future water supplies and use.
- 2.2.9 Evaluation procedure: Identify alternatives without Federal plan.
- 2.2.10 Evaluation procedure: Rank and display the alternative plans based on least cost analysis.
- 2.2.11 Evaluation procedure: Identify the most likely alternative.
- 2.2.12 Evaluation procedure: Compute M&I water supply annual benefits.
- 2.2.13 Evaluation procedure: Problems in application.
- 2.2.14 Report and display procedures.

Section III—NED Benefit Evaluation Procedures: Agriculture

- 2.3.1 Introduction.
- 2.3.2 Conceptual basis.
- 2.3.3 Evaluation components.
- 2.3.4 Planning setting.
- 2.3.5 Evaluation procedure: Crops.
- 2.3.6 Evaluation procedure: Damage reduction for other agricultural properties and associated agricultural enterprises.
- 2.3.7 Evaluation procedure: Off-site sediment reduction.
- 2.3.8 Evaluation procedure: Problems in application.
- 2.3.9 Evaluation procedure: Data sources.
- 2.3.10 Report and display procedures.

Section IV—NED Benefit Evaluation Procedures: Urban Flood Damage

- 2.4.1 Introduction.
- 2.4.2 Conceptual basis.
- 2.4.3 Planning setting.
- 2.4.4 Evaluation procedure: General.
- 2.4.5 Evaluation procedure: Step 1—delineate affected area.
- 2.4.6 Evaluation procedure: Step 2—determine floodplain characteristics.
- 2.4.7 Evaluation procedure: Step 3—project activities in affected area.
- 2.4.8 Evaluation procedure: Step 4—estimate potential land use.
- 2.4.9 Evaluation procedure: Step 5—project land use.
- 2.4.10 Evaluation procedure: Step 6—determine existing flood damages.
- 2.4.11 Evaluation procedure: Step 7—project future flood damages.
- 2.4.12 Evaluation procedure: Step 8—determine other costs of using floodplain.
- 2.4.13 Evaluation procedure: Step 9—collect land market value and related data.
- 2.4.14 Evaluation procedure: Step 10—compute NED benefits.
- 2.4.15 Evaluation procedure: Problems in application.
- 2.4.16 Evaluation procedure: Data sources.
- 2.4.17 Report and display procedures.

Section V—NED Benefit Evaluation Procedures: Power (Hydropower)

- 2.5.1 Introduction.
- 2.5.2 Conceptual basis.
- 2.5.3 Planning setting.
- 2.5.4 Evaluation procedure: General.
- 2.5.5 Evaluation procedure: Identify system for analysis.
- 2.5.6 Evaluation procedure: Determine need for future generation.
- 2.5.7 Evaluation procedure: Determine most likely non-Federal alternative.

- 2.5.8 Evaluation procedure: Compute benefits.
- 2.5.9 Evaluation procedure: Data sources.
- 2.5.10 Alternative Procedure: Financial Evaluation.
- 2.5.11 Report and display procedures.

Section VI—NED Benefit Evaluation Procedures: Transportation (Inland Navigation)

- 2.6.1 Introduction.
- 2.6.2 Conceptual basis.
- 2.6.3 Planning setting.
- 2.6.4 Evaluation procedure: General.
- 2.6.5 Evaluation procedure: Step 1—identify the commodity types.
- 2.6.6 Evaluation procedure: Step 2—identify the study area.
- 2.6.7 Evaluation procedure: Step 3—determine current commodity flow.
- 2.6.8 Evaluation procedure: Step 4—determine current costs of waterway use.
- 2.6.9 Evaluation procedure: Step 5—determine current cost of alternative movement.
- 2.6.10 Evaluation procedure: Step 6—forecast potential waterway traffic by commodity.
- 2.6.11 Evaluation procedure: Step 7—determine future cost of alternative modes.
- 2.6.12 Evaluation procedure: Step 8—determine future costs of waterway use.
- 2.6.13 Evaluation procedure: Step 9—determine waterway use, with and without project.
- 2.6.14 Evaluation procedure: Step 10—compute NED benefits.
- 2.6.15 Evaluation procedure: Problems in application.
- 2.6.16 Report and display procedures.

Section VII—NED Benefit Evaluation Procedures: Transportation (Deep-Draft Navigation)

- 2.7.1 Introduction.
- 2.7.2 Conceptual basis.
- 2.7.3 Planning setting.
- 2.7.4 Evaluation procedures.
- 2.7.5 Problems in application.
- 2.7.6 Report and display procedures.

Section VIII—NED Benefit Evaluation Procedures: Recreation

- 2.8.1 Introduction.
- 2.8.2 Conceptual basis.
- 2.8.3 Planning setting.
- 2.8.4 Evaluation procedure: General.
- 2.8.5 Evaluation procedure: Define the study area.
- 2.8.6 Evaluation procedure: Estimate recreation resource.
- 2.8.7 Evaluation procedure: Forecast potential recreation use in the study area.
- 2.8.8 Evaluation procedure: Determine the without-project condition.
- 2.8.9 Evaluation procedure: Forecast recreation use with project.
- 2.8.10 Evaluation procedure: Estimate value of use with the project.
- 2.8.11 Evaluation procedure: Forecast recreation use diminished with the project.
- 2.8.12 Evaluation procedure: Estimate value of recreation use diminished with the project.
- 2.8.13 Evaluation procedure: Compute net project benefits.

- 2.8.14 Report and display procedures.
- Appendix 1—Travel Cost Method
- Appendix 2—Contingent Valuation (Survey) Methods
- Appendix 3—Unit Day Value Method

Section IX—NED Benefit Evaluation Procedure: Commercial Fishing

- 2.9.1 Introduction.
- 2.9.2 Conceptual basis.
- 2.9.3 Planning setting.
- 2.9.4 Evaluation procedure: General.
- 2.9.5 Evaluation procedure: Identify the affected areas.
- 2.9.6 Evaluation procedure: Determine the without-project condition.
- 2.9.7 Evaluation procedure: Determine conditions that would exist with an alternative plan.
- 2.9.8 Evaluation procedure: Estimate NED benefits.
- 2.9.9 Problems in application.
- 2.9.10 Data sources.
- 2.9.11 Report and display procedures.

Section X—NED Benefit Evaluation Procedure: Other Direct Benefits

- 2.10.1 Introduction.
- 2.10.2 Conceptual basis.
- 2.10.3 Planning setting.
- 2.10.4 Evaluation procedure: General.
- 2.10.5 Evaluation procedure: Problems in application.
- 2.10.6 Evaluation procedure: Data sources.
- 2.10.7 Evaluation procedure: Risk and uncertainty.
- 2.10.8 Report and display procedures.

Section XI—NED Benefit Evaluation Procedures: Unemployed or Underemployed Labor Resources

- 2.11.1 Introduction.
- 2.11.2 Conceptual basis.
- 2.11.3 Planning setting.
- 2.11.4 Evaluation procedure.
- 2.11.5 Report and display procedures.
- Appendix 1—Occupational Tables

Section XII—National Economic Development (NED) Cost Evaluation Procedures

- 2.12.1 Introduction.
- 2.12.2 Conceptual basis.
- 2.12.3 Planning setting.
- 2.12.4 Evaluation procedure: General.
- 2.12.5 Evaluation procedure: Implementation outlays.
- 2.12.6 Evaluation procedure: Associated costs.
- 2.12.7 Evaluation procedure: Other direct costs.

- 2.12.8 Evaluation procedure: Problems in application.
- 2.12.9 Evaluation procedure: Data sources.
- 2.12.10 Report and display procedures.

Chapter III—Environmental Quality (EQ) Evaluation Procedures

Section I—Introduction

- 3.1.1 Purpose.
- 3.1.2 Limitations.

Section II—Definitions

- 3.2.1 Definitions.
- 3.2.2 References for terms.
- 3.2.3 Abbreviations and acronyms.

Section III—General Evaluation Requirements

- 3.3.1 Interdisciplinary planning.
- 3.3.2 Public involvement.
- 3.3.3 Integration of other review, coordination, and consultation requirements.
- 3.3.4 Documentation.
- 3.3.5 Performance objectives.

Section IV—EQ Evaluation Process

- 3.4.1 Orientation.
- 3.4.2 Define resources phase.
- 3.4.3 Identify resources activity.
- 3.4.4 Develop evaluation framework activity.
- 3.4.5 Inventory resources phase.
- 3.4.6 Survey existing conditions activity.
- 3.4.7 Forecast without-plans conditions activity.
- 3.4.8 Forecast with-plan conditions activity.
- 3.4.9 Assess effects phase.
- 3.4.10 Identify effects activity.
- 3.4.11 Describe effects activity.
- 3.4.12 Determine significant effects activity.
- 3.4.13 Appraise effects phase.
- 3.4.14 Appraise significant effects activity.
- 3.4.15 Judge net EQ effects activity.

Appendix A—Example Documentation Formats

Appendix B—Relationships Between NEPA Requirements for EIS Contents and the requirements of these procedures.

CHAPTER I—STANDARDS

Section I—Introduction

1.1.1 Purpose and Scope.

(a) These Guidelines establish standards and procedures for use by Federal agencies in formulating and evaluating alternative plans for water and related land resources implementation studies. These Guidelines implement the Principles for Water and Related Land Resources Implementation Studies.

(b) These Guidelines are for Federal administrative purposes and shall not create any substantive or procedural rights in private parties.

(c) Departures in an individual study from these Guidelines are to be documented and justified in the study report.

(d) Implementation studies are pre- or postauthorization project formulation or evaluation studies undertaken by a Federal agency. Studies for the following agency activities are covered:

(1) Corps of Engineers (Civil Works) water resources project plans.

(2) Bureau of Reclamation water resources project plans.

(3) Tennessee Valley Authority water resources project plans.

(4) Soil Conservation Service water resources project plans.

(e) These Guidelines establish the basic process for Federal agencies in carrying out implementation studies. Activities conducted pursuant to the requirements of the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321, *et. seq.*) are to be fully integrated with this process.

(f) The accounts described in these Guidelines encompass and are consistent with the concept of human environment as used in NEPA and the appropriate portions of the NEPA regulations established by the Council on Environmental Quality (CEQ) in 40 CFR Parts 1500–1508.

1.1.2 Authority.

These Guidelines are established pursuant to Section 103 of the Water Resources Planning Act (Pub. L. 89–80) and Executive Order 11747.

1.1.3 Applicability.

(a) These Guidelines apply to implementation studies completed more than 120 days after issuance of the Guidelines. Studies completed within 120 days should be concluded in accordance with the guidance applicable to them prior to issuance of these Guidelines.

(b) Preauthorization or postauthorization studies are considered completed when the appropriate planning documents have been approved by the responsible agency's field office.

(c) In the case of reevaluation studies in which there is no reformulation of the plan, the portions of this chapter dealing with plan formulation do not apply.

(d) The administrator of each Federal or Federally assisted program covered is responsible for applying these Guidelines.

Section II—The Federal Objective

(a) The Federal objective of water and related land resources planning is to contribute to national economic development consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements.

(b) Contributions to national economic development (NED) are increases in the net value of the national output of goods and services, expressed in monetary units. Contributions to NED are the direct net benefits that accrue in the planning area and the rest of the nation. Contributions to NED include increases in the net value of those goods and services that are marketed, and also of those that may not be marketed.

(c) The Federal objective for the relevant planning setting should be stated in terms of an expressed desire to alleviate problems and realize opportunities related to the output of goods and services or to increased economic efficiency.

(d) Each statement of a problem or opportunity should be expressed in terms of a desired output. Example statements are—

(1) Reduce flood losses in the Red River floodplain to increase agriculture production;

(2) Reduce the cost of agricultural production in the irrigated sector of Tolland County; and

(3) Increase the value of the recreational experience at Lake Zoar.

Section III—Summary of the Planning Process

1.3.1 Introduction.

The planning process consists of a series of steps that identifies or responds to problems and opportunities associated with the Federal objective and specific State and local concerns, and culminates in the selection of a recommended plan. The process involves an orderly and systematic approach to making determinations and decisions at each step so that the interested public and decisionmakers in the planning organization can be fully aware of: the basic assumptions employed; the data and information analyzed; the areas of risk and uncertainty; the reasons and rationales used; and the significant implications of each alternative plan.

1.3.2 Major Steps.

(a) The planning process consists of the following major steps:

(1) Specification of the water and related land resources problems and opportunities (relevant to the planning setting) associated with the Federal objective and specific State and local concerns.

(2) Inventory, forecast, and analysis of water and related land resource conditions within the planning area relevant to the identified problems and opportunities.

(3) Formulation of alternative plans.

(4) Evaluation of the effects of the alternative plans.

(5) Comparison of alternative plans.

(6) Selection of a recommended plan based upon the comparison of alternative plans.

(b) Plan formulation is a dynamic process with various steps that should be iterated one or more times. This iteration process, which may occur at any step, may sharpen the planning focus or change its emphasis as new data are obtained or as the specification of problems or opportunities changes or becomes more clearly defined.

1.3.3 Specification of the Problems and Opportunities Associated With the Federal Objective and Specific State and Local Concerns.

(a) The desire to alleviate problems and realize opportunities should be specified for the planning area in terms of the Federal objective and specific State and local concerns. The problems and opportunities should be defined so that their definition does not dictate a narrow range of alternatives.

(b) The problems and opportunities should be defined in such a way that meaningful levels of achievement can be identified. This will facilitate the formulation of alternative plans in cases in which there may be financial, environmental, technical, legislative, or administrative constraints on the total alleviation of a problem or realization of an opportunity.

(c) The problems and opportunities should be stated for both current and future conditions. Desired conditions for the future should be explicitly stated.

(d) The problems and opportunities should reflect the specific effects that are desired by groups and individuals as well as the problems and opportunities declared to be in the national interest by the Congress or the Executive Branch. This identification and detailing of problems and opportunities is the process of making explicit the range of preferences and desires of those affected by resource development. It should be understood that the initial expressions of problems and opportunities may be modified during the planning process.

1.3.4 Inventory and Forecast of Water and Related Land Resource Conditions.

The potential for alleviating problems and realizing opportunities is determined during inventorying and forecasting. The inventory and forecast of resource conditions should be related to the problems and opportunities previously identified.

1.3.5 Formulation of Alternative Plans.

Alternative plans are to be formulated in a systematic manner to insure that all reasonable alternatives are evaluated. Usually, a number of alternative plans are identified early in the planning process and become more refined through additional development and through subsequent iterations. Additional alternative plans may be introduced at any time.

1.3.6 Evaluation of Effects.

(a) *General.* The evaluation of the effects of each alternative plan consists of assessment and appraisal.

(b) *Assessment.* Assessment is the process of measuring or estimating the effects of an alternative plan. Assessment determines the difference between without-plan and with-plan conditions for each of the categories of effects.

(c) *Appraisal.*

(1) Appraisal is the process of assigning social values to the technical information gathered as part of the assessment process.

(2) Since technical data concerning benefits and costs in the NED account are expressed in monetary units, the NED account already contains a weighting of effects; therefore, appraisal is applicable only to the EQ, RED, and OSE evaluations.

(d) *Displays.* The results of the evaluation should be displayed according to the directions provided in Section VIII—Displays.

1.3.7 Comparison of Alternative Plans.

(a) The comparison of plans focuses on the differences among the alternative plans as determined in the evaluation phase.

(b) The differences should be organized on the basis of the effects in the four accounts or on a combination of the NED account and another appropriate format for other significant effects.

1.3.8 Plan Selection.

After consideration of the various alternative plans, their effects, and public comments, a plan is selected following the general guidance in Section X—Plan Selection.

Section IV—General Planning Considerations

1.4.1 Federal-State Relationship in Planning.

(a) The responsible Federal planning agency is to contact the Governor or designated agency for each affected State before initiating a study and enter into such agreements as are appropriate to carry out a coordinated planning effort.

(b) The State agency or agencies responsible for or concerned with water planning are to be provided with appropriate opportunities to participate in

defining the problems and opportunities, in scoping the study, and in review and consultation.

1.4.2 International Consultations.

When a Federal water project is likely to have a significant impact on any land or resources situated in a foreign country or to affect treaty obligations, the responsible Federal planning agency, through the Department of State, should enter into consultations with the government of the affected country, with a view to determining the international implications of the project under consideration.

1.4.3 General Public Participation.

(a) Interested and affected agencies, groups, and individuals should be provided opportunities to participate throughout the planning process. The responsible Federal planning agency should contact and solicit participation of: other Federal agencies; appropriate regional, State, and local agencies; national, regional and local groups; other appropriate groups such as affected Indian tribes; and individuals. A coordinated public participation program should be established with willing agencies and groups.

(b) Efforts to secure public participation should be pursued through appropriate means such as public hearings, public meetings, workshops, information programs, and citizen committees.

1.4.4 Review and Consultation.

Review and consultation with interested and affected agencies, groups, and individuals are needed in the planning process. Reviews are to be consistent with the requirements of applicable Federal statutes and the CEQ NEPA regulations (40 CFR Parts 1500-1508). The planning process described in these Guidelines and the CEQ and NEPA regulations are complementary.

1.4.5 Interdisciplinary Planning.

An interdisciplinary approach should be used in planning to ensure the integrated use of the natural and social sciences and the environmental design arts. The disciplines of the planners should be appropriate to the issues identified in the scoping process. The planning agency should supplement its available expertise, as necessary, with knowledgeable experts from cooperating agencies, universities, consultants, etc.

1.4.6 Agency Decisionmaking.

Decisionmaking is a dynamic process that leads to selection of a recommended plan. Decisionmaking begins at the field level and occurs at different levels through subsequent reviews and approvals as required by the agency until it reaches the level having authority to approve the project (final level). The individual in the responsible planning agency making the decisions at each level is referred to as the "agency decisionmaker." The identity of the agency decisionmaker depends upon the level of project development and review. For projects requiring congressional authorization, the final agency decisionmaker is the Secretary of the Department or head of the independent agency. For projects that do not require congressional approval, the final decisionmaker is the Secretary of the Department, head of the agency, or such other official as appropriately delegated.

1.4.7 Planning Area.

The planning area is a geographic space with an identified boundary that includes:

- (a) The area identified in the study's authorizing document;
- (b) The locations of alternative plans, often called "project areas"; and
- (c) The locations of resources that would be directly, indirectly, or cumulatively affected by alternative plans, often called the "affected area."

1.4.8 Scoping.

(a) Planning should include an early and open process termed "scoping" to identify both the likely significant issues to be addressed and the range of those issues. This process is complementary with the scoping process described in the CEQ NEPA regulations (40 CFR Parts 1500-1508). The agency should begin scoping as soon as practicable after a decision to begin planning. The scoping process should include affected Federal, State, and local agencies and other interested groups or persons. Scoping should be used as appropriate throughout planning to ensure that all significant decisionmaking factors are addressed and that unneeded and extraneous studies are not undertaken.

(b) As part of the scoping process, the agency should:

- (1) Determine the extent to which the likely significant issues will be analyzed.

(2) Define the planning area based on the problems and opportunities and the geographic areas likely to be affected by alternative plans.

(3) Identify and eliminate from detailed study any issues that are not significant or that have been adequately covered by prior study. However, important issues, even though covered by other studies, should still be considered in the analysis.

(4) Identify any current or future planning that is related to but not part of the study under consideration.

(5) Identify review and consultation requirements so that cooperating agencies (as defined in 40 CFR 1508.5) may prepare required analyses and studies concurrently with the study under consideration.

(6) Indicate the tentative planning and decision-making schedule.

(7) The scoping process should be integrated with other early planning activities.

(c) Scoping may be used to combine or narrow the number of problems and opportunities, measures, plans, effects, etc., under consideration so that meaningful and efficient analysis and choice among alternative plans can occur.

(d) Scoping should include consideration of ground water problems and opportunities, including conjunctive use of ground and surface water, and instream flow problems. Appropriate consideration should be given to existing water rights in scoping the planning effort.

1.4.9 Forecasting.

(a) Formulation and evaluation of alternative plans should be based on the most likely conditions expected to exist in the future with and without the plan. The without-plan condition is the condition expected to prevail if no action is taken. The with-plan condition is the condition expected to prevail with the particular plan under consideration.

(b) The forecasts of with- and without-plan conditions should use the inventory of existing conditions as the baseline, and should be based on consideration of the following (including direct, indirect, and cumulative effects)—

(1) National/regional projections of income, employment, output, and population prepared and published by the Department of Commerce.

(2) Other aggregate projections such as exports, land use trends, and amounts of goods and services likely to be demanded;

(3) Expected environmental conditions; and

(4) Specific, authoritative projections for small areas.

Appropriate national and regional projections should be used as an underlying forecasting framework, and inconsistencies therewith, while permissible, should be documented and justified.

(c) National projections used in planning are to be based on a full employment economy. In this context, assumption of a full employment economy establishes a rationale for general use of market prices in estimating economic benefits and costs, but does not preclude consideration of special analyses of regions with high rates of unemployment and underemployment in calculating benefits from using unemployed and underemployed labor resources.

(d) National and State environmental and health standards and regulations should be recognized and appropriately considered in scoping the planning effort. Standards and regulations concerning water quality, air quality, public health, wetlands protection, and floodplain management should be given specific consideration in forecasting the with- and without-plan condition.

(e) Other plans that have been adopted for the planning area and other current planning efforts should be considered.

(f) Forecasts should be made for selected years over the period of analysis to indicate how changes in economic and other conditions are likely to have an impact on problems and opportunities.

1.4.10 Prices.

(a) The prices of goods and services used for evaluation should reflect the real exchange values expected to prevail over the period of analysis. For this purpose, relative price relationships of outputs and inputs prevailing during, or immediately preceding, the period of planning generally represent the real price relationships expected over the life of the plan, unless specific considerations indicate real exchange values are expected to change.

(b) The general level of prices for outputs and inputs prevailing during or immediately preceding the period of planning is to be used for the entire period of analysis. In the case of agricultural planning, normalized prices prepared by the Department of Agriculture should be used.

1.4.11 Discount Rate.

Discounting is to be used to convert future monetary values to present values. Calculate present values using the discount rate established annually

for the formulation and economic evaluation of plans for water and related land resources plans.

1.4.12 Period of Analysis.

(a) The period of analysis is to be the same for each alternative plan. The period of analysis is to be the time required for implementation plus the lesser of—

(1) The period of time over which any alternative plan would have significant beneficial or adverse effects; or

(2) A period not to exceed 100 years.

(b) Appropriate consideration should be given to environmental factors that may extend beyond the period of analysis.

1.4.13 Risk and Uncertainty—Sensitivity Analysis.

(a) Plans and their effects should be examined to determine the uncertainty inherent in the data or various assumptions of future economic, demographic, social, attitudinal, environmental, and technological trends. A limited number of reasonable alternative forecasts that would, if realized, appreciably affect plan design should be considered.

(b) The planner's primary role in dealing with risk and uncertainty is to identify the areas of sensitivity and describe them clearly so that decisions can be made with knowledge of the degree of reliability of available information.

(c) Situations of risk are defined as those in which the potential outcomes can be described in reasonably well-known probability distributions such as the probability of particular flood events. Situations of uncertainty are defined as those in which potential outcomes cannot be described in objectively known probability distributions.

(d) Risk and uncertainty arise from measurement errors and from the underlying variability of complex natural, social, and economic situations. Methods of dealing with risk and uncertainty include:

(1) Collecting more detailed data to reduce measurement error.

(2) Using more refined analytic techniques.

(3) Increasing safety factors in design.

(4) Selecting measures with better known performance characteristics.

(5) Reducing the irreversible or irretrievable commitments of resources.

(6) Performing a sensitivity analysis of the estimated benefits and costs of alternative plans.

(e) Reducing risk and uncertainty may involve increased costs or loss of benefits. The advantages and costs of reducing risk and uncertainty should be considered in the planning process. Additional information on risk and uncertainty can be found in Supplement I to this chapter.

1.4.14 Documentation.

Planning studies are to be documented in a clear, concise manner that explains the basic assumptions and decisions that were made and the reasons for them. The documentation should be prepared in a manner to expedite review and decisionmaking.

Section V—Inventory and Forecast of Conditions Without a Plan

1.5.1 Resource Conditions.

(a) An inventory should be made to determine the quantity and quality of water and related land resources of the planning area and to identify opportunities for protection and enhancement of those resources. The inventory should include data appropriate to the identified problems and opportunities, as determined by scoping, and the potential for formulating and evaluating alternative plans. The inventory does not necessarily include an exhaustive listing of resources of the area. This inventory should describe the existing conditions and should be the baseline for forecasting with- and without-plan conditions.

(b) The most likely future condition without a plan should be used for evaluating the effects of alternative plans.

1.5.2 Problems and Opportunities.

(a) Inventory and forecasting should include an analysis of the identified problems and opportunities and their implications for the planning setting. Resource inventories should be limited to resources affecting the problems and opportunities or likely to be affected by the alternative plans. As alternative plans are developed or refined, the adequacy of these resource inventories should be reassessed. This analysis should be used to redefine the specific problems and opportunities associated with the Federal objective and other State and local concerns.

(b) Based on this analysis, an appraisal should be made of the potential for alleviating the problems and realizing the opportunities. The appraisal provides guidance on the possible scope and magnitude of actions needed to address each problem or opportunity. This appraisal should identify possibilities for management, development, preservation, and other opportunities for action. Resource inventories and forecasts may suggest additional problems or opportunities. These possibilities will indicate the resource capabilities relative to specific commodities, services, or environmental amenities desired by the public. By proper selection of these development or management possibilities, alternatives may be formulated for each problem or opportunity.

Section VI—Alternative Plans

1.6.1 General.

(a) An alternative plan consists of a system of structural and/or nonstructural measures, strategies, or programs formulated to alleviate specific problems or take advantage of specific opportunities associated with water and related land resources in the planning area.

(b) Alternative plans should be significantly differentiated from each other.

(c) Alternative plans should not be limited to those the Federal planning agency could implement directly under current authorities. Plans that could be implemented under the authorities of other Federal agencies, State and local entities, and nongovernment interests should also be considered.

(d) Alternative plans may either—

(1) Be in compliance with existing statutes, administrative regulations, and established common law; or

(2) Propose necessary changes in such statutes, regulations, or common law.

(e) A range of measures that can, over time, balance water demand for various purposes with water availability should be considered, including measures that will—

(1) Reduce the demand for water;

(2) Improve efficiency in use and reduce losses and waste;

(3) Improve land management practices to conserve water; and/or

(4) Increase the available supply of water.

(f) Nonstructural measures should be considered as means for addressing problems and opportunities.

(1) Nonstructural measures are complete or partial alternatives to traditional structural measures. Nonstructural measures include modifications in public policy, management practice, regulatory policy, and pricing policy.

(2) A nonstructural measure or measures may in some cases offer a complete alternative to a traditional structural measure or measures. In other cases, nonstructural measures may be combined with fewer or smaller traditional structural measures to produce a complete alternative plan.

(g) Protection of the Nation's environment is to be provided by mitigation (as defined in 40 CFR 1508.20) of the adverse effects (as defined in 40 CFR 1508.8) of each alternative plan. Accordingly, each alternative plan should include mitigation determined to be appropriate by the agency decision-maker.

(1) Appropriate mitigation to address effects on fish and wildlife and their habitat should be determined in consultation with Federal and State fish and wildlife agencies in accordance with the Fish and Wildlife Coordination Act of 1958 (16 U.S.C. 661-666(c)), or other appropriate authority.

(2) Appropriate mitigation to address other adverse effects should be determined in accordance with applicable laws, regulations and Executive Orders.

(3) Mitigation measures determined to be appropriate should be planned for concurrent implementation with other major project features, where practical.

(h) Other existing water and related land resources plans, such as State water resources plans, should be considered as alternative plans if within the scope of the planning effort.

(i) Various schedules, including staged construction, for implementing alternative plans should be considered.

1.6.2 Formulation.

(a) Alternative plans which contribute to the Federal objective should be systematically formulated. In addition to a plan which reasonably maximizes contributions to NED, other plans may be formulated which reduce net NED benefits in order to further address other Federal, State, local, and international concerns not fully addressed by the NED plan. These additional plans should be formulated in order to allow the decisionmaker the opportunity

to judge whether these beneficial effects outweigh the corresponding NED losses.

(b) In general, in the formulation of alternative plans, an effort is made to include only increments that provide net NED benefits after accounting for appropriate mitigation costs. Include appropriate mitigation of adverse environmental effects, as required by law, in all alternative plans. Increments that do not provide net NED benefits may be included, except in the NED plan, if they are cost-effective measures for addressing specific concerns.

(c) Alternative plans, including the NED plan, should be formulated in consideration of four criteria: Completeness; effectiveness; efficiency; and acceptability.

(1) Completeness is the extent to which a given alternative plan provides and accounts for all necessary investments or other actions to ensure the realization of the planned effects. This may require relating the plan to other types of public or private plans if the other plans are crucial to realization of the contributions to the objective.

(2) Effectiveness is the extent to which an alternative plan alleviates the specified problems and achieves the specified opportunities.

(3) Efficiency is the extent to which an alternative plan is the most cost effective means of alleviating the specified problems and realizing the specified opportunities, consistent with protecting the Nation's environment.

(4) Acceptability is the workability and viability of the alternative plan with respect to acceptance by State and local entities and the public and compatibility with existing laws, regulations, and public policies.

1.6.3 The NED Plan.

A plan that reasonably maximizes net national economic development benefits, consistent with the Federal objective, is to be formulated. This plan is to be identified as the national economic development plan.

1.6.4 Other Alternative Plans.

(a) Other alternative plans should be formulated to adequately explore opportunities to address other Federal, State, local, and international concerns not fully addressed by the NED plan.

(b) The number and variety of alternative plans should be governed by—

(1) The problems and opportunities associated with the water and related land resources in the study area;

(2) The overall resource capabilities of the study area;

(3) The available alternative measures; and

(4) Preferences of and conflicts among State and local entities and different segments of the public.

(c) When institutional barriers would prevent implementation of an economically attractive plan, alternative plans which include removal of those barriers should be presented where such plans are implementable.

Section VII—Accounts

1.7.1 General.

(a) Four accounts are established to facilitate evaluation and display of the effects of alternative plans. These accounts are: national economic development (NED), environmental quality (EQ), regional economic development (RED), and other social effects (OSE). These four accounts encompass all significant effects of a plan on the human environment as required by the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 *et seq.*). They also encompass social well-being as required by Section 122 of the Flood Control Act of 1970 (Pub. L. 91-611, 84 Stat. 1823). The EQ account shows effects on ecological, cultural, and aesthetic attributes of significant natural and cultural resources that cannot be measured in monetary terms. The OSE account shows urban and community impacts and effects on life, health and safety. The NED account shows effects on the national economy. The RED account shows the regional incidence of NED effects, income transfers, and employment effects.

(b) The NED account is the only required account. Other information that is required by law or that will have a material bearing on the decision-making process should be included in the other accounts (EQ, RED, and OSE) or in some other appropriate format used to organize information on effects.

(c) The same effect may be shown only once within a given account except that the OSE account may show the incidence of an effect from more than one point of view. Beyond this exception, claiming the same benefit, cost, change in a resource attribute, or effect more than once in a given account would constitute double counting.

(d) Relationships between short-term use of the human environment and the maintenance and enhancement of long-term productivity should be displayed. Any irreversible or irretrievable commitments of resources should be displayed.

(e) Effects on the values and attributes of ground water and instream flow should be displayed.

(f) Effects of an alternative plan in the displays are the differences between the forecasted conditions with the plan and forecasted conditions without the plan.

(g) Effects in the NED account are to be expressed in monetary units. EQ effects are to be expressed in appropriate numeric units or non-numeric terms. RED and OSE effects are to be expressed in monetary units, other numeric units, or non-numeric terms.

(h) Monetary values are to be expressed in average annual equivalents by appropriate discounting and annualizing techniques using the applicable discount rate.

1.7.2 National Economic Development Account.

(a) General.

(1) The NED account describes that part of the NEPA human environment, as defined in 40 CFR 1508.14, that identifies beneficial and adverse effects on the economy.

(2) Beneficial effects in the NED account are increases in the economic value of the national output of goods and services from a plan; the value of output resulting from external economies caused by a plan; and the value associated with the use of otherwise unemployed or under-employed labor resources.

(3) Adverse effects in the NED account are the opportunity costs of resources used in implementing a plan. These adverse effects include: implementation outlays, associated costs, and other direct costs.

(4) Procedures which should be used for evaluating NED effects are in Chapter II of these Guidelines.

(i) When an alternative procedure provides a more accurate estimate of a benefit, the alternative estimate may also be shown if the procedure is documented.

(ii) Steps in a procedure may be abbreviated by reducing the extent of the analysis and amount of data collected where greater accuracy or detail is clearly not justified by the cost of the plan compo-

nents being analyzed. The steps abbreviated and the reason for abbreviation should be documented.

(iii) Proposals for additions to or changes in the procedures in Chapter II may be made when an agency head determines that the new technique will improve plan formulation and evaluation. These proposals are to be submitted to the Water Resources Council for review and approval for inclusion in Chapter II. Procedures which represent changes in established policy are to be referred to the Cabinet Council on Natural Resources and Environment for its consideration.

(b) *Goods and services*: General measurement standard. The general measurement standard of the value of goods and services is defined as the willingness of users to pay for each increment of output from a plan. Such a value would be obtained if the "seller" of the output were able to apply a variable unit price and charge each user an individual price to capture the full value of the output to the user. Since it is not possible in most instances for the planner to measure the actual demand situation, four alternative techniques can be used to obtain an estimate of the total value of the output of a plan: Willingness to pay based on actual or simulated market price; change in net income; cost of the most likely alternative; and administratively established values.

(1) *Actual or simulated market price*. If the additional output from a plan is too small to have a significant effect on price, actual or simulated market price will closely approximate the total value of the output and may be used to estimate willingness to pay. If the additional output is expected to have a significant effect on market price and if the price cannot be estimated for each increment of the change in output, a price midway between the price expected with and without the plan may be used to estimate the total value.

(2) *Change in net income*. The value of the change in output of intermediate goods and services from a plan is measured by their total value as inputs to producers. The total value of intermediate goods or services to producers is properly measured as the net income received by producers with a plan compared to net income received without a plan. Net income is defined as the market value of producers' outputs less the market value of producers' inputs exclusive of the cost of the intermediate goods or services from a plan. Increased net income from reduced cost of maintaining a given level of output is considered a benefit since released resources will be available for production of other goods and services.

(3) *Cost of the most likely alternative*. The cost of the most likely alternative may be used to estimate NED benefits for a particular output if non-Federal

entities are likely to provide a similar output in the absence of any of the alternative plans under consideration and if NED benefits cannot be estimated from market price or change in net income. This assumes, of course, that society would in fact undertake the alternative means. Estimates of benefit should be based on the cost of the most likely alternative only if there is evidence that the alternative would be implemented. In determining the most likely alternative, the planner should give adequate consideration to nonstructural and demand management measures as well as structural measures.

(4) *Administratively established values*. Administratively established values are proxy values for specific goods and services cooperatively established by the water resources agencies. An example of administratively established values is the range of unit-day values for recreation.

(c) *Goods and services: Categories*. The NED account includes goods and services in the following categories:

- (1) Municipal and industrial (M&I) water supply
- (2) Agricultural floodwater, erosion and sedimentation reduction
- (3) Agricultural drainage
- (4) Agricultural irrigation
- (5) Urban flood damage reduction
- (6) Power (hydropower)
- (7) Transportation (inland navigation)
- (8) Transportation (deep draft navigation)
- (9) Recreation
- (10) Commercial fishing
- (11) Other categories of benefits for which procedures are documented in the planning report and which are in accordance with the general measurement standards in paragraph (b) of this section.

(d) *Other direct benefits*. The other direct benefits in the NED benefit evaluation are the incidental direct effects of a project that increase economic efficiency and are not otherwise accounted for in the evaluation of the plan or project. They are incidental to the purposes for which the water resources plan is being formulated. They include incidental increases in output of goods and services and incidental reductions in production costs. For example, a project planned only for flood damage reduction and hydropower purposes might reduce downstream water treatment costs; this reduction in costs would be shown as another direct benefit in the NED account.

(e) *Use of otherwise unemployed or underemployed labor resources*.

(1) The opportunity cost of employing otherwise unemployed and underemployed workers is equal to their earnings under the without plan conditions.

(2) Conceptually, the effects of the use of unemployed or underemployed labor resources should be treated as an adjustment to the adverse effects of a plan on national economic development. Since this approach leads to difficulties in cost allocation and cost sharing calculations, the effects from the use of such labor resources are to be treated as an addition to the benefits resulting from a plan.

(3) Beneficial effects from the use of unemployed or underemployed labor resources are limited to labor employed on site in the construction or installation of a plan. This limitation reflects identification and measurement problems and the requirement that national projections are to be based on a full employment economy.

(4) If the planning region has substantial and persistent unemployment and these labor resources will be employed or more effectively employed in installation of the plan, the net additional payments to the unemployed and underemployed labor resources are defined as a benefit.

(f) *Adverse NED effects: Measurement standards.*

(1) In evaluating NED costs, resource use is broadly defined to include all aspects of the economic value of the resource. This broad definition requires consideration of the direct private and public uses that producers and consumers are currently making of available resources or are expected to make of them in the future.

(2) If market prices reflect the full economic value of a resource to society, they are to be used to determine NED costs. If market prices do not reflect these values, then an estimate of the other direct costs should be included in the NED costs.

(3) NED costs may reflect allowance for the salvage value of land, equipment, and facilities that would have value at the end of the period of analysis.

(g) *NED cost categories.* For convenience of measurement and analysis, NED costs should be classified as implementation outlays, associated costs and other direct costs.

(1) *Implementation outlays.* These are the financial outlays (including operation, maintenance and replacement costs) incurred by the responsible Federal entity and by other Federal or non-Federal entities for implementation of the plan in accordance with sound management principles. These costs do not include transfer payments such as replacement housing assistance payments as specified in 42 U.S.C. 4623 and 4624.

(2) *Associated costs.* These are the costs in addition to implementation outlays for measures needed to achieve the benefits claimed during the period of analysis. For example, associated costs would include the cost of irrigation water supply laterals if they are not accounted for in the benefit estimate.

(3) *Other direct costs.* These are the costs of resources directly required for a project or plan, but for which no implementation outlays are made. These costs are uncompensated, unmitigated NED losses caused by the installation, operation, maintenance, or replacement of project or plan measures. Examples of other direct costs include increased downstream flood damages caused by channel modifications, dikes, or the drainage of wetlands, increased water supply treatment costs caused by irrigation return flows, and displaced public recreation.

1.7.3 Environmental Quality Account.

(a) *General.*

(1) The EQ account is a means of displaying and integrating into water resources planning that information on the effects of alternative plans on significant EQ resources and attributes of the NEPA human environment, as defined in 40 CFR 1507.14, that is essential to a reasoned choice among alternative plans. Significant means likely to have a material bearing on the decisionmaking process.

(2) Beneficial effects in the EQ account are favorable changes in the ecological, aesthetic, and cultural attributes of natural and cultural resources.

(3) Adverse effects in the EQ account are unfavorable changes in the ecological, aesthetic, and cultural attributes of natural and cultural resources.

(4) A suggested procedure which may be used for evaluating effects included in the EQ account appears in Chapter III of these Guidelines.

(b) *Significant EQ resources and attributes.*

(1) An EQ resource is a natural or cultural form, process, system, or other phenomenon that—

(i) Is related to land, water, atmosphere, plants, animals, or historic or cultural objects.

(ii) Has one or more EQ attributes (ecological, cultural, aesthetic).

(2) EQ attributes are the ecological, cultural, and aesthetic properties of natural and cultural resources that sustain and enrich human life.

(i) Ecological attributes are components of the environment and the interactions among all its living (including people) and nonliving components

that directly or indirectly sustain dynamic, diverse, viable ecosystems. In this category are functional and structural aspects that require special consideration because of their unusual characteristics.

(ii) Cultural attributes are evidence of past and present habitation that can be used to reconstruct or preserve human lifeways. Included in this category are structures, sites, artifacts, environments, and other relevant information, and the physical contexts in which these occur.

(iii) Aesthetic attributes are perceptual stimuli that provide diverse and pleasant surroundings for human enjoyment and appreciation. Included in this category are sights, sounds, scents, tastes, and tactile impressions, and the interactions of these sensations, of natural and cultural resources.

(3) Significant EQ resources and attributes should be identified based on institutional, public, and technical recognition.

(c) Significant effects.

(1) An effect on an EQ resource occurs whenever estimates of future with- and without-plan conditions of the resource are different.

(2) An effect may be described in terms of duration, frequency, location, magnitude, and other characteristics, such as reversibility, retrievability, and the relationships to long-term productivity, where their description is relevant and useful to decisionmaking.

(3) The significance of an effect may be established based on institutional, public, and technical recognition.

(d) *Summary.* There should be an overall summary of significant beneficial and adverse effects on EQ resources.

1.7.4 Regional Economic Development Account.

(a) General.

(1) The RED account registers changes in the distribution of regional economic activity that result from each alternative plan. Two measures of the effects of the plan on regional economies are used in the account: Regional income and regional employment.

(2) The regions used for RED analysis are those regions within which the plan will have particularly significant income and employment effects. Effects of a plan not occurring in the significantly affected regions are to be placed in a "rest of nation" category.

(3) Effects that cannot be satisfactorily quantified or described with available methods, data, and in-

formation or that will not have a material bearing on the decisionmaking process may be excluded from the RED account.

(b) Positive effects on regional economic development.

(1) *Regional income.* The positive effects of a plan on a region's income are equal to the sum of the NED benefits that accrue to that region, plus transfers of income to the region from outside the region.

(i) Regional incidence of NED benefits. Because of the definition of region used for the RED account, all or almost all of the NED benefits for the plan will accrue to that region, plus transfers of income to the region from outside the region.

(ii) Transfers. Income transfers to a region as a result of a plan include income from: implementation outlays, transfers of basic economic activity, indirect effects, and induced effects. In each case income transfers refer to increases in net income within the region rather than to increases in total expenditure.

(A) Income from implementation outlays is that portion of project outlays that becomes net income in the regional economy, exclusive of NED benefits from use of otherwise unemployed or underemployed labor resources.

(B) Income from transfers of basic economic activity is net income from economic activity that locates in the region as a direct result of differences between the with- and without-plan conditions.

(C) Income from indirect effects is regional net income resulting from expansion in the production of inputs to industries supplying increased final products and regional exports.

(D) Income from induced effects is regional net income resulting from changes in consumption expenditures generated by increases in personal income.

(2) Regional employment.

(i) The positive effects of a plan on regional employment are directly parallel to the positive effects on regional income, so that analysis of regional employment effects should be organized in the same categories using the same conceptual bases as the analysis of positive regional income effects. Regional employment associated with each of the regional income categories should be calculated and listed accordingly.

(ii) To the extent practical, planning reports should provide reasonable estimates of the composition of increased employment according to relevant service, trade, and industrial sectors, including a separate estimate for agriculture. The nature of

the employment increase to each sector should be classified as to the level of skill required—unskilled, semiskilled, and highly skilled.

(c) Negative effects on regional economic development.

(1) *Regional income.* The negative effects of a plan on a region's net income are equal to the sum of the NED costs of the plan that are borne by the region, plus transfers of income from the region to the rest of the Nation.

(i) *Regional incidence of NED costs.* The NED costs of a plan that are borne by a region should be organized in the same categories used in the cost section of the NED account. Information from the cost allocation and cost sharing analysis undertaken as a part of the planning process will be needed to estimate these direct expenditures.

(ii) *Transfers.* Income transfers from the region include net income losses from plan-induced shifts of economic activity from the region to the rest of the Nation and losses in existing transfer payments, plus any impacts that may affect the region as a result of NED costs or transfers from the region.

(2) Regional employment.

(i) The negative effects of a plan on regional employment should be organized and analyzed using the same categories and conceptual bases used for negative regional income effects (paragraph (c)(1) of this section).

(ii) The incidence of negative regional employment effects should be shown in a manner similar to that required for the positive regional employment effects.

(d) *Relationship between RED and NED effects.* Income information in the RED account should be organized in the same categories as the NED effects. The relationship between the affected regional economies and the national economy should be recognized. Since the NED account registers all effects on the national economy, any differences between the regional and national economic effects of a plan take the form of transfers from the rest of Nation. The effects of these transfers should be listed in a "rest of Nation" category. The effects in the rest of Nation category are equal to the difference between the RED effects and NED effects of a plan. This rest of nation category should be displayed in the RED account together with the RED and NED effects.

1.7.5 Other Social Effects Account.

(a) General.

(1) The OSE account is a means of displaying and integrating into water resource planning information on alternative plan effects from perspectives that are not reflected in the other three accounts. The categories of effects in the OSE account include the following: Urban and community impacts; life, health, and safety factors; displacement; long-term productivity; and energy requirements and energy conservation.

(2) Effects may be evaluated in terms of their impacts on the separate regions and communities affected.

(3) Effects on income, employment, and population distribution, fiscal condition, energy requirements, and energy conservation may be reported on a positive or negative basis. Effects on life, health, and safety may be reported as either beneficial or adverse. Other effects may be reported on either a positive/negative basis or a beneficial/adverse basis.

(4) Effects that cannot be satisfactorily quantified or described with available methods, data, and information or that will not have a material bearing on the decisionmaking process may be excluded from the OSE account.

(b) Urban and community impacts.

(1) A formal treatment of urban related impacts is not required for implementation studies. However, types and locations of significant impacts, broken down by salient population groups and geographic areas, may be reported in the OSE account.

(2) The principal types of urban and community impacts are—

(i) Income distribution;

(ii) Employment distribution, especially the share to minorities;

(iii) Population distribution and composition;

(iv) The fiscal condition of the State and local governments; and

(v) The quality of community life.

(c) *Life, health, and safety.* Effects in this category include such items as risk of flood, drought, or other disaster affecting the security of life, health, and safety; potential loss of life, property, and essential public services due to structural failure; and other environmental effects such as changes in air or water quality not reported in the NED and EQ accounts.

(d) *Displacement.* Effects in this category include the displacement of people, businesses, and farms.

(e) *Long-term productivity.* Effects in this category include maintenance and enhancement of the

productivity of resources, such as agricultural land, for use by future generations.

Section VIII—Displays

1.8.1 General.

(a) Displays are graphs, tables, drawings, photographs, summary statements, and other graphics in a format that facilitates the analysis and comparison of alternative plans. Concise, understandable displays are helpful during the planning process and provide documentation in compliance with NEPA.

(b) Displays should facilitate the evaluation and comparison of alternative plans necessary to make the following determination:

(1) The effectiveness of given plans in solving the problems and taking advantage of the opportunities identified in the planning process.

(2) What must be given up in monetary and non-monetary terms to enjoy the benefits of the various alternative plans.

(3) The differences among alternative plans.

1.8.2 Content and Format.

The content and format of the displays should be determined by the planning agency according to the following guidance:

(a) Existing and forecasted resource conditions without any of the alternative plans and the problems and opportunities related to the planning setting should be reported.

Table 1.8.2.—Effects of the Recommended Plan on Natural and Cultural Resources

Types of resources	Authorities	Measurement of effects ¹
Air quality	Clean Air Act, as amended (42 U.S.C. 1857h-7 <i>et seq.</i>).	(Enter area, in square miles, where State air quality classifications would change for each affected classification.)
Areas of particular concern within the coastal zone.	Coastal Zone Management Act of 1972, as amended (16 U.S.C. 1451 <i>et seq.</i>).	(Enter gains and losses, in appropriate units.)

Table 1.8.2.—Effects of the Recommended Plan on Natural and Cultural Resources—Continued

Types of resources	Authorities	Measurement of effects ¹
Endangered and threatened species.	Endangered Species Act of 1973, as amended (16 U.S.C. 1531 <i>et seq.</i>).	(Enter list of species affected and area of each critical habitat type gained and lost, in acres.)
Fish and Wildlife habitat.	Fish and Wildlife Coordination Act (16 U.S.C. 661 <i>et seq.</i>).	(Enter area of each habitat type gained and lost, in acres.)
Floodplains	Executive Order 11988, Floodplain Management.	(Enter area gained and lost, in acres.)
Historic and cultural properties.	National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 <i>et seq.</i>).	(Enter number and type of National Register [listed or eligible] properties affected.)
Prime and Unique farmland.	CEQ Memorandum of August 1, 1980: Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act.	(Enter area of each farmland type gained and lost, in acres.)
Water quality	Clean Water Act of 1977, as amended (42 U.S.C. 1857h-7 <i>et seq.</i>).	(Enter length in miles for water course, and area in acres for water bodies, where State water quality classifications would change for each affected classification.)
Wetlands	Executive Order 11990, Protection of Wetlands; Clean Water Act of 1977, as amended (42 U.S.C. 1857h-7 <i>et seq.</i>).	(Enter area of each wetland type gained and lost, in acres.)
Wild and Scenic Rivers.	Wild and Scenic Rivers Act, as amended (16 U.S.C. 1271 <i>et seq.</i>).	(Enter length of each river type gained and lost, in miles.)

¹ If a type of resource is not present in the planning area, enter "Not present in planning area." If a type of resource is not affected, enter "No effect."

(b) Displays regarding reasonable alternatives, including those required by NEPA, should include the following items:

(1) Measures in each plan.

(2) Effects in the NED account.

(3) Other effects, when shown in either the EQ, RED, and OSE accounts, or in some other appropriate format.

(c) For the recommended plan, an aggregate display of effects on natural and cultural resources, in the format of Table 1.8.2, should be included.

(d) A matrix should be included which shows existing or planned Federal and non-Federal projects or facilities having significant economic, environmental, or physical interactions with the recommended plan together with a brief narrative description of these interactions.

(e) Alternative actions that were considered but were not developed into plans should be described briefly. The descriptions should include the measures and effects and the reasons for not proceeding further.

Section IX—Cost Allocation

1.9.1 General.

(a) The need for cost allocation stems from pricing and cost-sharing policies that vary among purposes. Cost allocation is the process of apportioning total project financial costs among purposes served by a plan.

(b) Financial costs are implementation outlays, transfer payments such as replacement housing assistance payments as specified in 42 U.S.C. 4623 and 4624, and the market value of contributions in kind, e.g., lands.

(c) Financial costs are to be allocated to those purposes for which the plan is formulated. These purposes do not include other direct benefits (see Section 1.7.2(d)) and use of otherwise unemployed or underemployed labor resources. All purposes are to be treated comparably.

1.9.2 Definitions.

(a) Separable cost for each purpose in a plan is the reduction in financial cost that would result if that purpose were excluded from the plan. This reduction in cost includes—

(1) The financial cost of measures serving only the excluded purpose; and

(2) Reductions in the financial cost of measures serving multiple purposes. In some cases removal of a purpose would result in selection of different measures to address the remaining purposes.

(b) Joint cost is the total financial cost for a plan minus the sum of separable financial costs for all purposes.

(c) Alternative cost for each purpose is the financial cost of achieving the same or equivalent benefits with a single-purpose plan.

(d) Remaining benefit for each purpose is the amount, if any, by which the NED benefit or, when appropriate, the alternative financial cost exceeds the separable financial cost for that purpose. The use of alternative cost is appropriate when alternative financial cost for the purpose is less than the NED benefit, or when there are project purposes that do not address the NED objective.

1.9.3 Cost Allocation Standard.

Costs allocated to each purpose are the sum of the separable cost for the purpose and a share of joint cost as specified below:

(a) Joint cost may be allocated among purposes in proportion to remaining benefits.

(b) Joint cost may be allocated in proportion to the use of facilities, provided that the sum of allocated joint cost and separable cost for any purpose does not exceed the lesser of the benefit or the alternative cost for that purpose.

1.9.4 Allocation of Constituent Cost.

Cost-sharing policies for some purposes pertain to cost constituents such as construction costs, and operation and maintenance costs. Costs for each cost constituent specified in the relevant cost-sharing policy should be allocated among purposes.

Section X—Plan Selection

1.10.1 General.

The planning process leads to the identification of alternative plans that could be recommended or selected. The culmination of the planning process is the selection of the recommended plan or the decision to take no action. The selection should be based on a comparison of the effects of alternative plans. (See Section 1.6.2—Alternative Plans, Formulation.)

1.10.2 Selection.

(a) The alternative plan with the greatest net economic benefit consistent with protecting the Nation's environment (the NED plan) is to be selected unless the Secretary of a department or head of an independent agency grants an exception when there is some overriding reason for selecting another plan, based upon other Federal, State, local, and international concerns.

(b) The alternative of taking no action, i.e., selecting none of the alternative plans, should be fully considered.

(c) Plan selection is made by the agency decisionmaker for Federal and Federally-assisted plans. Agency officials and State and local sponsors may recommend selection of a plan other than the NED plan. The agency decisionmaker (the Secretary of a department or the head of an independent agency) will determine whether the reasons for selecting a plan other than the NED plan merit the granting of an exception.

(d) The basis for selection of the recommended plan should be fully reported, including considerations used in the selection process.

(e) Plans should not be recommended for Federal development if they would physically or economically preclude non-Federal plans that would likely be undertaken in the absence of the Federal plan and that would more effectively contribute to the Federal objective when comparably evaluated.

Supplement I

Risk and uncertainty—Sensitivity analysis

Uncertainty and variability are inherent in water resources planning. For example, there is uncertainty in projecting such factors as stream flows, population growth, and the demand for water. Therefore, the consideration of risk and uncertainty is important in water resources planning.

This supplement provides guidance for the evaluation of risk and uncertainty in the formulation of water resources management and development plans.

S1 Concepts.

(a) *Risk*. Situations of risk are conventionally defined as those in which the potential outcomes can be described in reasonably well known probability distributions. For example, if it is known that a river will flood to a specific level on the average of once

in 20 years, a situation of risk, rather than uncertainty, exists.

(b) *Uncertainty*. In situations of uncertainty, potential outcomes cannot be described in objectively known probability distributions. Uncertainty is characteristic of many aspects of water resources planning. Because there are no known probability distributions to describe uncertain outcomes, uncertainty is substantially more difficult to analyze than risk.

(c) *Sources of risk and uncertainty*. (1) Risk and uncertainty arise from measurement errors and from the underlying variability of complex natural, social, and economic situations. If the analyst is uncertain because the data are imperfect or the analytical tools crude, the plan is subject to measurement errors. Improved data and refined analytic techniques will obviously help minimize measurement errors.

(2) Some future demographic, economic, hydrologic, and meteorological events are essentially unpredictable because they are subject to random influences. The question for the analyst is whether the randomness can be described by some probability distribution. If there is an historical data base that is applicable to the future, distributions can be described or approximated by objective techniques.

(3) If there is no such historical data base, the probability distribution of random future events can be described subjectively, based upon the best available insight and judgment.

(d) *Degrees of risk and uncertainty*. The degree of risk and uncertainty generally differs among various aspects of a project. It also differs over time, because benefits from a particular purpose or costs in a particular category may be relatively certain during one time period and uncertain during another. Finally, the degree of uncertainty differs at different stages of the analysis—for example, between rough screening and final detailed design, when more precise analytic methods can be applied.

(e) *Attitudes*. The attitudes of decisionmakers toward risk and uncertainty will govern the final selection of projects and of adjustments in design to accommodate risk and uncertainty. In principle, the government can be neutral toward risk and uncertainty, but the private sector may not be. These differences in attitudes should be taken into account in estimating the potential success of projects.

S2 Application.

(a) *The role of the planner*. (1) The planner's primary role in dealing with risk and uncertainty is to characterize to the extent possible the different de-

degrees of risk and uncertainty and to describe them clearly so that decisions can be based on the best available information. The planner should also suggest adjustments in design to reflect various attitudes of decisionmakers toward risk and uncertainty. If the planner can identify in qualitative terms the uncertainty inherent in important design, economic, and environmental variables, these judgments can be transformed into or assigned subjective probability distributions. A formal model characterizing the relationship of these and other relevant variables may be used to transform such distributions to exhibit the uncertainty in the final outcome, which again is represented by a probability distribution.

(2) At all stages of the planning process, the planning can incorporate any changes in project features that, as a result of information gained at that stage, could lead to a reduction in risk and uncertainty at a cost consistent with improvement in project performance.

(b) Some risk and uncertainty are assumed in nearly every aspect of a water resources project. Some types of risk and uncertainty are dealt with in terms of national planning parameters—for example, ranges of population projections and other principal economic and demographic variables. Other types of risk and uncertainty are dealt with in terms of project or regional estimates and forecasts. When projects are related to other projects and programs in their risk and uncertainty aspects (e.g., interrelated hydrologic systems), reasonable attempts should be made to see that the same analyses and presumed probability distributions are used for all of them.

(c) The risk and uncertainty aspects of projects are likely to be seen and analyzed differently as planning proceeds from rough screening to detailed project proposals. An effort should be made, therefore, to relate the techniques used in characterizing and dealing with risk and uncertainty to the stage of the planning process.

(d) The resources available for analyzing aspects of risk and uncertainty should be allocated to those assessments that appear to be the most important in their effects on project and program design. Rather than assuming in advance that one or another variable is a more important source of risk and uncertainty, the planner should make a thorough effort to determine which variables will be most useful in dealing with measurement errors and natural sources of risk and uncertainty.

(e) The aspects of project evaluation that can be characterized by a probability distribution based on reasonably firm data, such as hydrologic risk, can be treated by standard methods of risk evaluation developed by Federal agencies and others.

(f) Most risk and uncertainty aspects of projects cannot be characterized by probability distributions based on well established empirical data. A first step in dealing with this problem is to describe why the project or specific aspects of it are uncertain, as well as the time periods in which different degrees of uncertainty are likely. A range of reasonably likely outcomes can then be described by using sensitivity analysis—the technique of varying assumptions as to alternative economic, demographic, environmental, and other factors, and examining the effects of these varying assumptions on outcomes of benefits and costs. In some cases and in some stages of planning, this approach, when accompanied by a careful description of the dimensions of uncertainty, will be sufficient. It can be accompanied by descriptions of design adjustments representing various attitudes toward uncertainty.

(g) It may be appropriate in some cases to characterize the range of outcomes with a set of subjective probability estimates, but the project report should make clear that the numerical estimates are subjective. Moreover, subjective probability distributions should be chosen and justified case by case, and some description of the impact on design of other subjective distributions should be given. Design alternatives reflecting various attitudes toward uncertainty may be suggested.

(h) Utility functions may be used in conjunction with assessments of uncertainty to explore design adaptations reflecting specific preferences. Public preferences, if well known, may be used to illustrate to decisionmakers what the best design would be, given the uncertainties and preferences in a particular case. If public preferences are not well known, justification could be given for the selection of various utility functions, which can be used only to illustrate the effects on design of various preferences.

(i) At each level of analysis, the planner should take into account the differences in risk and uncertainty among project purposes and costs, among various time periods, and among different stages of planning.

(j) Adjustments to risk and uncertainty in project evaluation can be characterized as general or specific. General adjustments include the addition of a premium rate to the interest, overestimation of costs, underestimation of benefits, and limitations on the period of analysis. Such general adjustments are usually inappropriate for public investment decisions because they tend to obscure the different degrees of uncertainty in different aspects of projects and programs. Specific adjustments—including explicit assessments of different degrees of risk and uncertainty in specific aspects of a project or

program and specific adjustments to them—are preferable. Additional information on methods of dealing with risk and uncertainty can be found in Section 1.4.13(d) of Chapter I.

(k) One guide to the use of the techniques discussed here is displayed in Table S-2. In general, more complex techniques are appropriate as planning proceeds from the initial development and the screening of alternatives to the analysis and presentation of the final set of alternative plans. For example, sensitivity analysis—testing the sensitivity of the outcome of project evaluation to variation in the magnitude of key parameters—may be most useful and applicable in the early stages of planning, when the concern is to understand single factors or relatively general multiple-factor relationships. Multiple-factor sensitivity analysis, in which the joint effects or correlations among underlying parameters are studied in greater depth, may be more appropriate in the detailed analytic stage than in the screening stage.

(l) Similarly, analysis of risk and uncertainty based on objective or subjective probability distributions would be more appropriate in the detailed analytic stage than in the early screening stage. Although hydrologic and economic probabilities may be used in the screening stage, the full use of independent and joint probability distributions, possibly developed from computer simulation methods, to describe expected values and variances, is more appropriately reserved for the detailed stage.

Table S-2—Planning Task and Approaches to Risk and Uncertainty

	Planning tasks		
	Screening alternatives	Detailed analysis of projects	Final presentation of alternatives
Sensitivity analysis.....	X	X	X
Use of objective and subjective probability distributions.....		X	X
Illustrative application of public preferences and decision-makers' attitudes.....		X	X

(m) Although decisionmakers' attitudes and decision rules can be used to give perspective on alternative designs throughout the planning process, they are more appropriate at the stage of displaying alternative designs.

(n) The differences among the underlying degrees of risk and uncertainty, the design adaptations to them, and the preferences of decisionmakers should be kept clear throughout the analysis. The first two depend primarily on technical expertise; the last is the set of preferences based on various attitudes toward risk and uncertainty.

S3 Report and display.

The assessment of risk and uncertainty in project evaluation should be reported and displayed in a manner that makes clear to the decisionmaker the types and degrees of risk and uncertainty believed to characterize the benefits and costs of the alternative plans considered.

NATIONAL ECONOMIC DEVELOPMENT PROCEDURES MANUAL -

**OVERVIEW MANUAL FOR CONDUCTING
NATIONAL ECONOMIC DEVELOPMENT ANALYSIS**

by

**The Greeley-Polhemus Group, Inc.
West Chester, PA**

for

**U.S. Army Corps of Engineers
Water Resources Support Center
Institute for Water Resources
Fort Belvoir, VA 22060-5586**

OVERVIEW MANUAL FOR CONDUCTING NATIONAL ECONOMIC DEVELOPMENT ANALYSIS

Table of Contents

<u>Section</u>	<u>Page</u>
PREFACE	iii
CHAPTER 1: INTRODUCTION	1
Introduction	1
Audience	1
What this Manual is Not	2
Organization of the Manual	2
CHAPTER 2: GENERAL CONCEPTS UNDERLYING NED ANALYSIS	5
Introduction	5
Scarcity--the Fundamental Economic Problem	5
Determining Benefits and Costs to the Nation	5
Economic Decision Criteria	7
Analytical Techniques	8
Streams of Benefits and Costs	8
Preview to Chapter 3	8
CHAPTER 3: NED BENEFITS	9
Introduction	9
Overview of NED Benefit Estimation	9
Willingness to Pay	9
Prices and the NED Principle	11
Demand Curve	12
Consumer Surplus	13
Profit Maximization	14
Opportunity Cost	15
Supply Curve	16

Table of Contents (Continued)

<u>Section</u>	<u>Page</u>
Producer Surplus	17
Markets and Prices	18
Supply, Demand and Social Welfare	19
Market Failure	22
Externalities	22
Public Goods	23
Some NED Principle Assumptions	23
Constant Prices (P&G Paragraph 1.4.10)	25
Full Employment (P&G Paragraph 1.4.9)	25
Risk Neutrality	25
Period of Analysis	26
Other Policy Assumptions	26
Interest Rates	26
Time Value of Money	26
What are Interest Rates Made Of?	27
Choice of Interest Rate	28
An Uncomfortable Impasse or Peaceful Coexistence?	29
Cost of the Most Likely Alternative	29
Project Benefits	29
Flood Control	30
Navigation	32
Hydropower and Water Supply	32
NED vs. RED	35
Preview to Chapter 4	36
CHAPTER 4: NED COSTS	37
Introduction	37
Economic Cost Concepts	38
Relevant Cost	38
Opportunity Costs	38
Explicit and Implicit Costs	39
Economic versus Financial Costs	39

Table of Contents (Continued)

<u>Section</u>	<u>Page</u>
Incremental and Sunk Costs	40
Total and Marginal Costs	40
NED Costs	41
Financing the Project	42
Preview to Chapter 5	43
CHAPTER 5: SELECTED TOPICS	45
Marginal Analysis	45
Maximizing Net NED Benefits	45
Marginal Thinking	45
Relevant Costs and Benefits	47
With- and Without-Project Conditions	49
Economic Rationality	49
With and Without in the Long Run	49
Value of Time Saved	50
Preview to Chapter 6	51
CHAPTER 6: SELECTED APPLICATIONS OF NED PRINCIPLES	53
Introduction	53
Financial and Economic Costs	53
Non-NED Costs	53
Cost of Land	54
When Economic Costs are Less than Financial Costs	55
Land and Fixed Assets in the With-Project Condition	56
The Basis for Land Values	57
Economic Rent	57
Location, Rent, and Flood Plain Land	57
The Flood Tax	58
Inundation Reduction Benefits	58
Intensification Benefits	58
Location Benefits	59
Restoration of Land Market Values	59

Table of Contents (Continued)

<u>Section</u>	<u>Page</u>
Short Run vs. Long Run	58
Supply and Demand in the Long Run	60
With and Without Condition	64
NED vs. RED	66
NED vs. GNP	68
GNP	68
Related Income Measures	68
GNP Benefits	69
The Real Income-Real Output Link	69
NED Analysis is Here to Stay	70
 <u>INDEX</u>	 71
 <u>APPENDICES</u>	
Appendix 1: Suggestions for Further Reading	75
Appendix 2: NED Background	79
 <u>LIST OF FIGURES</u>	
Figure 1: Individual Demand Curve	12
Figure 2: Consumer Surplus	14
Figure 3: Market Demand and Consumer Surplus	15
Figure 4: Supply Curve	17
Figure 5: Producer Surplus and Opportunity Cost	18
Figure 6: Market Supply and Demand	18
Figure 7: Maximum Net Benefits	19
Figure 8: Overproduction	21
Figure 9: Underproduction	21
Figure 10: Underproduction of Flood Control	24
Figure 11: Overproduction of Flood Control	24
Figure 12: The Risk-Adjusted Nominal Interest Rate	28
Figure 13(a): Flood Plain Benefits	31
Figure 13(b): Flood Plain Benefits	31

Table of Contents (Continued)

<u>LIST OF FIGURES (Continued)</u>		<u>Page</u>
Figure 13(c):	Flood Plain Benefits	31
Figure 14(a):	Navigation Benefits	33
Figure 14(b):	Navigation Benefits	33
Figure 14(c):	Navigation Benefits	33
Figure 15(a):	Water Supply Benefits	34
Figure 15(b):	Water Supply Benefits	34
Figure 16:	Cost Concepts	37
Figure 17:	Economic and Financial Costs	40
Figure 18:	Associated Costs Example	43
Figure 19:	Total Costs and Total Benefits	48
Figure 20:	Marginal Cost and Marginal Benefits	48
Figure 21:	Marginal Net Benefits	48
Figure 22:	Secular and Cyclical Trends	62
Figure 23:	Seasonal Trend and Random Influences	62
Figure 24:	Changes in Demand	63
Figure 25:	Changes in Supply	64
Figure 26:	Long Run Equilibrium Price	65
Figure 27:	Short Run Equilibria Prices	65
Figure 28:	Five Alternative Measures of Income	69

LIST OF TABLES

Table 1:	Initial Plan Formulation	46
Table 2:	Final Plan Formulation	46
Table 3:	Labor Costs or Labor Benefits?	56

Chapter 1: INTRODUCTION

"Contributions to national economic development (NED) are increases in the net value of the national output of goods and services, expressed in monetary units. Contributions to NED are the direct net benefits that accrue in the planning area and the rest of the nation. Contributions to NED include increases in the net value of those goods and services that are marketed, and also of those that may not be marketed."
...Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies, p. 1, March 1983

INTRODUCTION

This manual provides an overview of the national economic development (NED) principle that is essential to determine whether the Federal government will construct any water resource project. The NED principle articulates a framework to assist in making this decision. Analysts working within this framework and decision makers who must understand it are the manual's intended audience.

The NED principle is often misunderstood by analysts and a mystery to decision makers. Such misunderstanding and mystery can lead to problems in formulating projects. The manual seeks to unravel some of the mystery of the NED principle for laymen and to provide new and reignite old insights for Corps' economists and planners. By clarifying the NED principle, projects can be formulated and evaluated with greater consistency and better informed decisions can be made and understood by all interested parties.

Corps projects produce outputs. Project outputs have value because they satisfy people and contribute to their happiness. Inputs are required to produce Corps projects. Inputs have value because we have the opportunity to use them for other purposes. The challenge is deciding how to use these inputs to achieve socially valued outputs.

The NED principle articulates a very specific perspective to be used in valuing project outputs, or benefits, and project inputs, or costs. The NED principle represents the current state of a continuously evolving Federal policy on water resource projects. The NED principle is not fundamentally an economic principle. It is fundamentally a normative economic policy, i.e., one that addresses what decision makers feel *ought to be* the Corps' economic priorities. As such, it is a matter of law, policy and interpretation rather than one of economic fact or theory, although it is a policy firmly rooted in economic theory.

Benefit-cost analysis is undertaken to assure that the value of the outputs exceeds the value of the inputs. Benefit-cost analysis is not the NED principle. Benefit-cost analysis is an evaluation technique used to aid decision makers in determining the economic worth of a project. The NED principle provides the basis for identifying appropriate benefits and costs, from a Federal perspective, to include in the benefit-cost analysis.

AUDIENCE

This manual has been written for those who are involved in the development of water resource projects and who need to know how and why the NED principle can affect the scope and magnitude of such projects. It is intended for Corps and other professional planners as well as interested non-Federal parties. Though we hope it will provide an instructive introduction to the NED principle for new Corps economists and a useful refresher for experienced economists, this manual is not intended solely for economists.

WHAT THIS MANUAL IS NOT

Many of the topics introduced in this manual are the subjects of entire courses and texts in the field of economics. All readers should be aware that there is much more to the subject matter than is introduced here. This manual does not describe techniques for conducting NED analysis. These techniques are described in the National Economic Development Procedures Manuals referenced in Appendix 1. The manual tries to present as much intuition on a topic as possible, with a minimal amount of theory and technical detail. Economists will frequently recognize this as a limitation of the manual. The principles and analyses in actual practice will rarely be as simple as they are made to appear in this manual.

In some instances, economists will recognize that the manual does not provide complete descriptions of underlying assumptions or well-known exceptions to the principles and statements the manual makes. It is not the intention of this manual to teach economics. Nor is it intended to clarify the details of the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*, March 1983 (P&G). Our goal is to foster intuition about relevant economic concepts, rather than to provide a rigorous explanation of them. The non-economist reader of this manual need not be concerned about receiving an inaccurate picture of the concepts presented. The principles are not wrong; their complexities have just not been completely developed in some cases.

Perhaps most importantly, this is not a policy manual. There are many conflicts between economic theory and principles (i.e., positive economics) and the economic policies (i.e., normative economics) of the Corps of Engineers that have been developed over time as a result of legislation and other policy decisions. Where appropriate, these conflicts will be identified. This manual intends no advocacy positions on any of these conflicts. Economic theory is the domain of the economist. Economic policy, in the context of this manual, is the domain of the decision makers. Where economic theory has been compromised in favor of policy it is almost invariably done to make the task of economic analysis and evaluation more manageable within the context of project study constraints. Though Corps policy and economic

theory may diverge at times the policies are generally formulated to approximate **willingness to pay** or opportunity costs, since rational government decisions and policies may depend on the resulting estimates, even though they are imperfect.

On a closely related note, it must be pointed out that this manual does not address any of the many plan formulation issues related to the NED principle. These issues are perhaps the most difficult facing Corps and non-Federal personnel alike. What constitutes "acceptability" of a plan is a question of great importance. Designation of the **NED plan** hinges on the answer. This manual will not address this or other questions that are the domain of policy makers and planners.

In summary, the manual attempts to provide both a broader and deeper understanding of the NED principle. It does not provide an economically rigorous treatment of the issues. The manual strives for a sound intuitive understanding of the basic economic principles involved.

ORGANIZATION OF THE MANUAL

The Foreword provides a summary of the process by which this manual was developed. The manual consists of 6 chapters and 2 appendices organized into three basic parts. Chapters 2 through 5 provide an overview of the economic concepts that underlie the NED principle and, hence, economic analysis of Corps projects. Chapter 6 provides example applications of the principles and concepts introduced earlier in the manual. The manual concludes with 2 appendices that provide suggestions for further reading, additional material on the history of the NED principle, and current guidance related to it.

Chapter 2 deals with some general concepts and economic principles that are used to help improve decision making. The basic problem is that we can't do everything. Given this fact of life, economics provides some guidelines on how to look at choices and decisions to at least avoid waste, or what economists call "inefficiency". The principles of economic decision making criteria, one of which is the **benefit-cost ratio**, are introduced in this chapter.

The economic nature of **NED benefits** is the subject of Chapter 3. This chapter provides an introduction to **demand and supply** theory and presents more economic concepts than any other chapter. It addresses the question, "What are we trying to measure under the NED principle?" and takes it from the general concepts to examples of specific project purposes.

NED costs are the subject of Chapter 4. While a great deal of guidance has been written on the subject of project benefits, relatively little has been written about project costs. Costs are of paramount interest to **non-Federal partners**, and the taxonomy of costs is becoming more and more complex. Cost concepts introduced in Chapter 3 are expanded here, and different perspectives in common usage are explained.

Chapter 5 addresses a small, but significant, collection of other issues relevant to the Corps' NED principle. First among these is the value of marginal thinking. Stifle the snickers, we do not mean the value of just barely thinking, but the value of considering only those benefits and costs that are relevant to the decision problem, i.e., the marginal values. This discussion leads to consideration of the benefit maximizing requirement of the NED plan.

Chapter 5 also addresses the with- and without-project conditions with emphasis on the requirement of assuming **economic rationality** and its meaning for the with and without analyses. Imposing this assumption of rationality on the with and without analyses precludes certain illogical results that could otherwise arise during plan formulation.

Chapter 6 provides discussion of selected topics that were identified by a group of practicing Corps planners during the development of this manual. Appendix 1 contains suggestions for further reading on the topics contained in the manual as well as references to selected Corps' documents. Appendix 2 provides a brief historical summary of the evolution of the NED principle.

Chapter 2: GENERAL CONCEPTS UNDERLYING NED ANALYSIS

INTRODUCTION

Why do we need an NED objective to assist in formulating and evaluating water resource projects? Because of the fundamental economic problem—we can't do everything! This chapter explains some of the underlying economic concepts upon which NED analysis is based.

SCARCITY—THE FUNDAMENTAL ECONOMIC PROBLEM

The NED principle is a policy developed to guide Federal water resource planners in their choice of problem solutions. Choice is the fundamental business of economics. Economics is the science of making rational choices, based on a set of assumptions that have been remarkably successful in predicting behavior.

Consider a single stretch of river. It can be preserved in its natural state with restricted access. Or, it can be moderately developed for recreational uses, such as hiking, fishing, hunting, and canoeing. Or, the banks could be cleared and developed for industrial, commercial, and residential usage. Yet another alternative would be to dam the lower end of the reach and flood the entire stretch of river to provide flood protection, hydropower, water supply and recreation to thousands of people. The reach can't be used for all these purposes, so the fundamental problem becomes how, and on what basis, to decide among these competing choices.

Because all resources are scarce, we are forced to make choices when they are used. Choose more of one thing and you simultaneously are choosing less of another. Thus, every choice costs us something. If we make the best choice from among the river reach alternatives, at a minimum it costs us the opportunity to do the next best thing with the reach, this is called opportunity cost.

The process of developing a plan for the use of a water resource is an exercise in dealing with the fundamental economic problem of scarcity. The fundamental problem of scarcity is not confined to such broad issues as what to do with a unique reach of river. The concrete and steel used in a flood wall could be used in many other ways as well. Using these resources in a flood wall means they will not be available for alternative use elsewhere in, for example, an office building. Thus, the flood wall costs the Nation an opportunity to do something else with the resources. In essence, the NED principle is intended to ensure that the benefits to the Nation of the use of these resources in a project exceed the costs of the project to the Nation. In other words, the NED principle ensures that concrete and steel will be used in a flood wall only if the benefit to the Nation of using it exceeds the cost of using it. Though non-economists might be inclined to argue that concrete and steel are not "scarce" in the common usage of the word, that is precisely the point. All resources are scarce, their prices are an indication of their relative scarcity. Thus, concrete and steel, though easy to obtain are indeed scarce.

DETERMINING BENEFITS AND COSTS TO THE NATION

Water resource projects produce outputs—goods and services that have value. Producing water resource projects requires inputs—goods and services that have value. The basic question economic analysis tries to answer is, "Does the value of the project's outputs exceed the value of the inputs used to produce the project?" What could be simpler?

Any experienced planner will attest that this is much easier said than done. Nonetheless, to answer the question "Is a project worth it?" requires understanding a few simple concepts.

To understand the NED objective requires some understanding of a field of economics known as **welfare economics**. Welfare economics focuses on using resources optimally so as to achieve the maximum well-being for the individuals in society.

Evaluating Corps projects is complicated by the fact that "welfare" is not an observable variable like bushels of wheat, kilowatts of energy, or pounds of fish. The economic welfare of an individual is formally given by his or her utility level. Utility is a term that is generally synonymous with happiness or satisfaction. Thus, project outputs have value because they make people happy or provide them with satisfaction.

It is commonly accepted among economists that the only objective basis under which one can say that society is better off with a water resource project than without it, is when some people are made better off and no one is made worse off by the project. This adaptation of what has come to be known as the *Pareto principle* is not experienced in the Corps' realm of practice. Corps' project benefits are generally localized, while the Federal share of costs come from taxpayers across the country. Thus, though the residents of a protected flood plain are made better off, some taxpayers are made worse off because they receive no benefits from the project and must pay some of the costs. If even one person is made worse off, there are no objective grounds to support the project on the basis of increased utility because it is impossible to objectively compare the increased happiness of the protected beneficiaries with the decreased happiness of the taxpayers.

If economic theory stopped here, there would be no such thing as economically justified public works projects. In an effort to extend the class of issues that can be addressed by welfare economics, the *compensation principle* was developed in 1939. Again adapting the principle to water resource development, it says a project should be undertaken if potential "with-project" gains are sufficiently large that everyone could be

Decision Criteria

Criterion 1: Net Present Value

The *net present value (NPV)* method reduces a stream of benefits and costs to a single number. The flow of benefits over time is reduced to a single discounted value. Costs are likewise discounted. Discounted costs are subtracted from discounted benefits, and if the result, the NPV, is positive, the project is worth undertaking. (I.e., the winners could compensate the losers and still be better off, after we adjust for the differences in the time value of money).

The NPV is generally regarded as the best decision criterion. The requirement that a Federal project have net NED benefits is a clear adaptation of this decision criterion by the Corps. Maximizing annual net NED benefits is formally equivalent to selecting a plan with the maximum NPV.

Criterion 2: Cutoff Period

Under this criterion, a project is acceptable only if it covers all its costs by a certain time. For example, we might consider only those projects whose time-adjusted benefits exceed its costs within, say, ten years. This criterion is used most often by those concerned with cash flow issues. Local interests financing revenue bonds may be limited to projects that generate revenues within the period of the bonds. In our example it is biased against projects with substantial benefits that occur beyond ten years into the future.

Criterion 3: Pay-Back Period

Under this criterion, the project that pays back all of its costs in the shortest period of time is considered best. This

made better off by some redistribution of goods or income following implementation of the project¹.

The significant difference is that the compensation principle recognizes the existence of "winners" and "losers". It goes on to allow that if the winners gain enough from the project that they could, hypothetically, reimburse the losers, then the project is worth undertaking whether there is a reimbursement or not. Society as a whole is better off, even if some of its members are worse off.

For example, if a project costs 1,000,000 people \$1 each and 100,000 people realize \$20 in benefits each, there are clearly winners (the 100,000) and losers (the 1,000,000). However, the \$2,000,000 in benefits could be redistributed in such a way that each of the 1,000,000 gets his \$1 back so no one is made worse off and each of the 100,000 could still have \$10 each. This compensation principle provides the theoretical basis for undertaking water resource projects--society can, hypothetically, be better off.

ECONOMIC DECISION CRITERIA

For any given water resource project, we would like to know if the "winners" could hypothetically compensate the "losers", i.e., does the value of the outputs exceed the value of the inputs? There are many decision criteria suitable for answering this question (see box). The Corps uses the benefit-cost ratio (BCR) as its decision criterion. It is only one of many such criteria.

Benefit-cost analysis is used to determine if total benefits produced by the project exceed the total costs of the project. Benefits are measured as the willingness to pay for project outputs, and costs are the true opportunity costs of the project.

¹ A more accurate statement of the compensation principle is that a project is preferred to no project only if the gainers can compensate the losers in implementing the project and the losers cannot bribe the gainers into not implementing the project. The original principle developed by Kaldor and Hicks, and this refinement offered by Scitovsky, eliminates the possibility of the reversal paradox, wherein there are cases where a project is preferred to no project and no project is preferred to a project. This footnote provides the non-economist reader with an example of the type of detail you do not get from this manual!

Criterion 3: Pay-Back Period (Continued)

Criterion also discriminates against projects with benefits that occur later in the project's life. The Corps has encouraged the use of a close variation on this criterion, i.e., identification of the project year in which benefits first equal or exceed costs, since the days of the Principles and Standards (P&S) which preceded P&G (see Appendix 2 for a historical perspective on Corps economic policy).

Criterion 4: Internal Rate of Return

The discounting process requires the use of an appropriate interest rate. The internal rate of return (IRR) criterion identifies the interest rate that will yield a net present value of \$0. Thus, if money for the project can be obtained at a cost less than the IRR, the project should be undertaken (i.e., the winners can compensate the losers). If the money costs more than the IRR, the project is a money loser and would represent a net decrease in society's welfare.

Used primarily in private enterprises where decision makers must be concerned about the costs of money, use of the IRR has also been encouraged by the Corps since P&S. In the context of Corps analysis, the IRR is the rate at which the benefit-cost ratio will exactly equal one.

Criterion 5: Other Techniques

There are a variety of other techniques that are generally used less frequently than those above. *Net average rate of return* is the sum of net benefits over the life of the project divided by the number of years over which the benefits are incurred, and then by the total cost of the project. *Annual value* is formally equivalent to the NPV, except that monetary values

The Corps uses two decision criteria in its formulation process, the benefit-cost ratio and net benefits. All alternative projects must have a BCR equal to or greater than one to be considered for implementation. Under the NED principle, the best, or NED, plan is the one that maximizes net benefits. The Corps traditionally expresses all monetary values as equivalent annual values. The BCR is annual benefits divided by annual costs. Net benefits can be readily expressed as a Net Present Value (NPV) and vice versa. Other decision criteria are often reported to provide additional information.

ANALYTICAL TECHNIQUES

Apart from the decision criteria described above, there are a variety of tools and techniques for conducting economic analysis in general and NED analysis in particular. For example, while the benefit-cost ratio is a decision criterion, benefit-cost analysis is an analytical technique. This manual does not address analytical techniques. The Corps is developing a series of Procedures Manuals to describe the techniques applicable for NED analysis.

STREAMS OF BENEFITS AND COSTS

The bulk of project costs are generally incurred during the construction period. Benefits, on the other hand, typically are realized as uneven flows of income or monetary benefits that accrue over a long period of time. Decision criteria must provide a means of comparing the values of these streams of money on an equal basis.

We all recognize that a dollar today is worth more than a dollar five years from now or at any reasonable time in the future. To account for these differences in the time value of money, monetary values are "discounted", i.e., amounts of money realized in the future are expressed as equivalent amounts of money today. This topic is taken up again in Chapter 3 in the section on **interest rates**.

PREVIEW TO CHAPTER 3

This chapter has provided an introduction to the fundamental economic problem of scarcity which requires us to make choices. Decision criteria for

Criterion 5: Other Techniques (Continued)

are presented as a single average annual value (in the case of the Corps, net annual NED benefits) rather than as a single present worth value. The Corps uses annual values rather than present values, apparently as a matter of tradition. *Minimum average cost* assumes that the project that produces output with the least average cost is the most desirable project scale.

Criterion 6: Benefit-Cost Ratio

Benefit-cost analysis encompasses all the analytical work necessary to estimate a *benefit-cost ratio (BCR)*. The benefit cost ratio compares total (i.e., gross values) benefits to total costs. Once again, it is necessary that these monetary values be expressed in comparable time values. Generally, Corps projects express benefits and costs as average annual values.

Dividing benefits by costs yields a benefit-cost ratio. If the BCR is greater than one, winners could compensate losers and the project can improve social welfare. A BCR less than one means the cost of the project exceeds the benefits of the project. A BCR of exactly one means costs are just covered.

evaluating choices have been introduced. Chapter 3 provides an introduction to the basic concepts needed to identify and evaluate project benefits, and to a lesser extent, project costs.

Chapter 3: NED BENEFITS

INTRODUCTION

The P&G generally defines NED benefits as follows:

"Beneficial effects in the NED account are increases in the economic value of the national output of goods and services from a plan; the value of output resulting from external economies caused by a plan; and the value associated with the use of otherwise unemployed or under-employed labor resources..." *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*, p. 8, March 1983

This chapter concentrates on economic concepts necessary to understand the nature of NED benefits. The first sections develop critical economic concepts and relationships. By the end of the chapter, these concepts will be used to illustrate several categories of benefits in the NED account. The chapter concludes with a discussion of the differences between benefits to the Nation and benefits to the local economy.

OVERVIEW OF NED BENEFIT ESTIMATION

Anticipating what follows, we want the reader to see that, at best, measurement of NED benefits is a difficult task. Project outputs have value because they make people happy. We can't measure happiness so we use a proxy; how much would a person be willing to pay for that change in happiness? This willingness to pay can be measured rather precisely as areas under demand and supply curves. Unfortunately, the necessary demand and supply curves are not always available. When they are not, alternative techniques are used to approximate the relevant areas. At times, the tools for implementing these alternative techniques are less than perfect.

Thus, the economist has to measure what cannot be measured using concepts that cannot be observed. So he must resort to using less-than-perfect tools as proxy measures of approximate values of things that don't really exist! Not an easy task! It's understandable that so many people get so confused.

WILLINGNESS TO PAY

Willingness to pay can be measured in one of two ways, depending on how we compare the alternatives people are choosing between. One estimates the amount of money one would be willing to pay for a project, the other estimates the money one would have to receive to willingly forego a project and be as satisfied in each case. These two measures will be presented in the context of a simple flood control project with and without condition comparison.

First, to see what a project is worth we could start with the **with-project condition** and move back to the **without-project condition**. How much money could we take away from a person who is protected by a flood control project that would leave her just as well off as she was before she was protected?

Flood control increases her utility, i.e., it increases her happiness. Conceptually, it would be possible to take away some amount of income such that she would be just as happy with flood protection and less income as she was without flood control and with more income. This difference in income is one measure of her willingness to pay for flood control².

² This measure of willingness-to-pay is called *compensating variation*. It is the amount of money which, when taken away from an individual after an economic change, leaves the person just as well off as before. In other words, her utility before the project is exactly the same as her utility after the project, once the income is taken away.

For an increase in her utility, we are looking for the maximum amount she is willing to pay for the change. If the with-project condition decreased her utility for any reason, say she valued a pristine environment more than flood protection, we would be looking for the minimum amount the person would require as compensation for the change.

The second approach to estimating a project's value begins with the without-project condition and proceeds to the with-project condition. How much money would we have to give to an individual who, if the flood control project is not built, is as well off as she would have been had the project been built?

Again, flood control would increase her utility. By not providing flood control, she is deprived of utility and it would be possible to give her some amount of income that would leave her as well off as she would have been with the project. This difference in income is an alternative measure of her willingness to pay³.

For an increase in her utility, this income is the minimum compensation she would have to receive to forgo flood control. If the project decreased her utility, it is the negative of the maximum amount she would be willing to pay to avoid the project.

³ This is the *equivalent variation*, the amount of money paid to an individual which, if the economic change does not happen, leaves her as well off as if the change had occurred.

The Rational Person

Economics proceeds on the assumption that people act rationally. Perhaps this is what makes so many people suspicious of economics. If so, it is important to recall that the true test of theory is its ability to predict behavior. Experience has shown time and again that human choice is influenced in a predictable way by changes in economic incentives.

Rationality, in economics, means that individuals make choices that are consistent with achieving a set of expressed goals. The assumed goal for individuals is that they will make choices that are consistent with making themselves as "well off" as possible, subject to their available income. We assume firms will make choices that are consistent with maximizing their profits. Since profits are defined as total revenues minus total costs, profit maximization also includes cost minimization. If costs of producing are not as low as possible, profits could always be increased by cutting costs.

Corps planning is conducted in a with- and without-project context. By comparing forecasts of future conditions in a community without a project to forecasts of conditions with a project, the differences in costs incurred by and benefits accruing to the community as a result of the project are more readily identified. In order to ensure that plan alternatives are economically efficient, it is necessary to impose the condition of economically rational behavior on individuals and firms in both the with- and without-project condition. The significance of this assumption will be taken up in Chapter 5's discussion of the with- and without-project conditions.

These utility and willingness to pay concepts are equally applicable for firms as well. On the producer side of our economy, however, more well-known quantities, such as profits, substitute for utility⁴.

Economists generally measure these willingness to pay values as the areas under curves. For consumers, we measure areas, called consumer surplus, under demand curves and for firms we measure areas, called producer surplus, over supply curves. Consumer surplus is defined as the area below the demand curve and above the price line⁵. Producer surplus is defined as the area above the supply curve and below the price line. Consumer and producer surplus are discussed in greater detail later in this chapter.

PRICES AND THE NED PRINCIPLE

All the techniques used to estimate NED benefits and costs rely on the availability of prices or the ability to reasonably estimate prices if they are unavailable. If prices are so important to NED, and they are, we need to understand a little bit about them.

⁴ Actually, profits serve this function only when firms continue to operate in both scenarios, i.e., with and without the economic change. It would be technically more correct to say that quasi-rents are the quantities we should measure for firms. However, profits will do fine for our purposes here.

⁵ For individuals, the willingness to pay estimation matter is more complex. In order to avoid a protracted discussion of demand theory, we will simply suggest that an individual's welfare can be estimated by consumer surplus. In certain cases, this measure of an individual's willingness to pay can be seriously flawed. However, for a fairly wide range of circumstances, it is a reasonable estimate of an individual's willingness to pay for a change.

Exact measures of compensating and equivalent variations can be found from areas under the Hicksian or utility-constant demand curve. Hicksian demand curves are generally unobservable. The demand curves that most people are familiar with are the Marshallian, a.k.a. ordinary or income-fixed demand curves. These curves are different from the Hicksian curves. To the extent they are reasonably close to one another, the area under an ordinary demand curve will provide a reasonable estimate of the true willingness to pay.

Utility Maximization

Rational individuals are assumed, in economics, to make choices that make them as well off as they possibly can be with the income available to them. This behavior is called "utility maximizing" by economists.

A basic proposition of economics is that utility increases as the amount of goods and services consumed increases. Thus, Corps projects have value because they increase the utility of individuals by providing goods and services. While this seems reasonable, a major problem results from the fact that we cannot measure that utility.

Even if we could measure utility directly, we would still have a problem. For example, if one has to choose between providing flood control that will increase residents utility by, for argument's sake, say 100 points, and shelters for the homeless that will increase their utility by 75 points, we still cannot conclude that flood control is socially desirable. Society may well consider the homeless twice as important as those living in flood plains; then 75 points for an important group may well be worth more than 100 points to a less important group, and shelter for the homeless should be provided. The basic problem is that there is no objective way to make interpersonal comparisons of utility. If this seems unnecessarily complex to the non-economist reader, bear with us, help is on the way.

Utility gains and losses cannot be measured or compared, so an alternative measure of the fundamental satisfaction people get from goods and services must be chosen. An observable alternative for measuring the intensities of an individual's preferences for one situation versus another (e.g., with-project condition vs. without-project condition) is the amount of money the individual is willing to pay or accept to move from one situation to another. Thus, the willingness to pay principle is the foundation for the NED principle and welfare economics as practiced by the Corps.

In the following sections, supply and demand curves are introduced separately. Then we look at how the forces of supply and demand combine to produce prices. Finally, we will consider how the equilibrium price determined by supply and demand represents a social optimum.

DEMAND CURVE

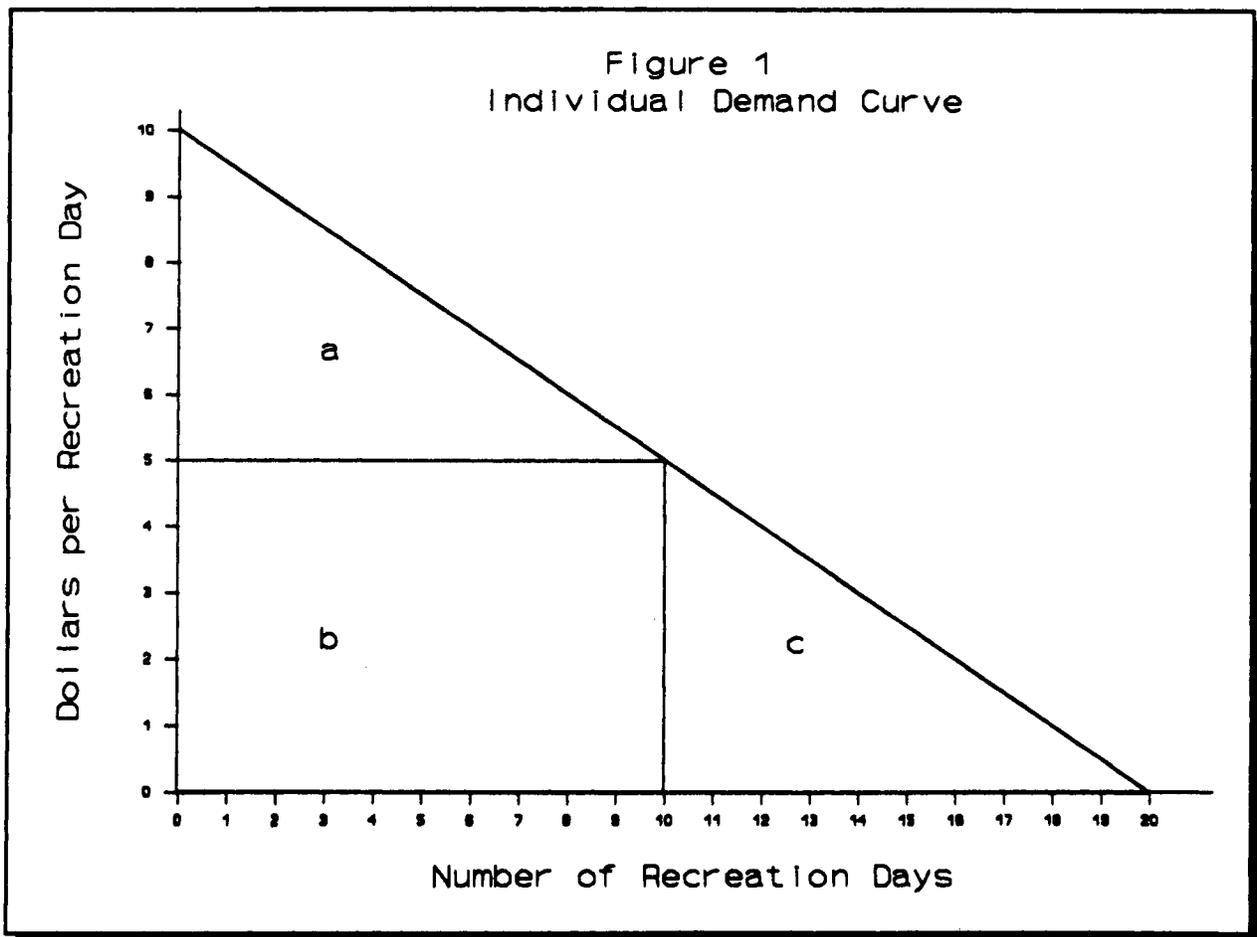
Demand is the maximum quantity of a good or service people are willing and able to purchase at various prices. The "Law of Demand" states that, all other things equal, if the price of a good goes up, the quantity purchased will go down, and vice versa.

The demand curve is sometimes referred to as a willingness to pay curve because it measures how much people are willing to pay for each additional unit of the good or service. People buy additional amounts of a good until the last unit is worth exactly what it costs.

Figure 1 shows a hypothetical consumer's demand curve for recreation days at a specific Corps project. If a \$5 user fee is in effect, the consumer will purchase 10 recreation days. The 10th recreation day is worth exactly five dollars to the consumer.

Each of the first nine recreation days is worth more than \$5 to the consumer. She would have purchased them if the price were higher than \$5. In fact, the figure shows that the consumer would still have purchased 8 of the 10 recreation days at a price of \$6. Even though the price of each day is \$5 she was willing to pay more than that for them. Willingness to pay should not be confused with price.

The area under the demand curve is an approximation of the total benefit a person derives from being able to consume a certain amount of a good. It is the person's total willingness to pay for the good. In Figure 1 total willingness to pay is \$100.



(areas a+b+c), i.e., 20 days of recreation at this site is worth a maximum of \$100 to our consumer⁶. How many days our consumer will actually buy depends on the price.

For example, our consumer won't use the site at all if the fee is \$10. She is willing-to-pay a maximum of \$9.50 for the first recreation day because the utility she gets from this one day is worth \$9.50 to her. Because the price is only \$5, and the day is worth \$9.50, she'll surely purchase it. The utility of the second day is worth \$9 to her, and it costs only \$5, so she'll clearly purchase it, and so it goes until the 10th recreation day, which is worth \$5 and costs \$5. Though she will purchase the 10th day, the 11th day is worth only \$4.50 to her and it costs \$5. She will not buy it. Her purchase rule is, like your own, if you are willing to pay an amount equal to or greater than the price, you buy. If you aren't, you pass.

CONSUMER SURPLUS

The willingness to pay interpretation of the demand curve allows us to measure how much better (worse) off a person is when the price decreases (increases). At a price of \$9.50, our consumer buys one day of recreation use. To induce the purchase of a second day, the price must be reduced to \$9. At a price of \$9, she pays \$9 for each of the two recreation days she buys even though she would have paid \$9.50 for the first day. The area under the demand curve and above the price (area a in Figure 1) represents the surplus the consumer realizes from having the lower price. This consumer surplus is only an approximation of the value of the increased utility to our consumer, but it will do well for our purposes. The area under the demand curve to the left of a quantity of 10 is \$75⁷ (areas a+b in Figure 1). This represents the total benefit of 10 recreation days to our consumer; hence, it also

⁶ Total willingness to pay is the entire area under the demand curve. It is obtained by finding the area of the triangle, i.e., $0.5(20)(\$10) = \100 .

⁷ The rectangle formed by a price of \$5 and a quantity of 10 has an area of \$50. The triangle above it has an area of \$25, for a total willingness to pay of \$75 for the 10 days of recreation.

Extensions Of The Consumer Surplus Concept

The unique characteristics of certain resources have caused some economists to question whether standard demand analysis incorporates all of the resource's value. Consumer surplus is an area under a demand curve. Demand curves reflect the willingness and ability of people to buy a resource. It has been suggested that not everyone who values a resource is both willing and able to pay for it at a given point in time.

Individuals, who are not consuming the good or service, may be willing to pay some amount of money to preserve their option to consume the service at some later date. This value, called "option value" is a value over and above the consumer surplus because these people are not included in the market demand curve. This option is important if there is some possibility that the resource will not be available at some time in the future.

Considerable controversy has developed among economists over the sign of this option value. In other words, option value may increase or decrease benefits depending on what are, for purposes of this manual, rather esoteric arguments. The empirical evidence has not been conclusive, so suffice it to say that any attempt to estimate option value or other values in addition to consumer surplus should be carefully documented.

The economics literature broadens this option value concept to include "existence value" and "bequeathment value". It has been argued that some individuals who are not consuming the resource might be willing to pay some amount of money just to know the resource exists, though they have no intention of ever consuming it. Voluntary organizations, such as the one organized to preserve the Statue of Liberty, provide evidence of existence value. People who will never visit the site contributed to its preservation. A more esoteric extension of this idea is that some people may be willing to pay some amount of money to be able to pass a unique resource on to future generations. These people, who are not and will not be consuming the resource, affix some value to a resource because of what it might mean to future generations.

represents her total willingness to pay for 10 days of recreation at this site. At a price of \$5, she pays only \$50 (area b in Figure 1) for 10 recreation days though she was willing to pay \$75. She realizes a consumer surplus of \$25, i.e., the difference between her total willingness to pay and what she actually pays or the area below the demand curve and above the price line.

If we add all the individual demand curves to get the market demand curve, we can obtain a measure of consumer surplus for all consumers by taking the area under the demand curve and above the price line. Figure 2 shows the consumer surplus for our consumer. Consumer surplus for the entire market would be measured in the same way, but the quantities of recreation days would reflect the quantity demanded by all users of this site, as shown in Figure 3.

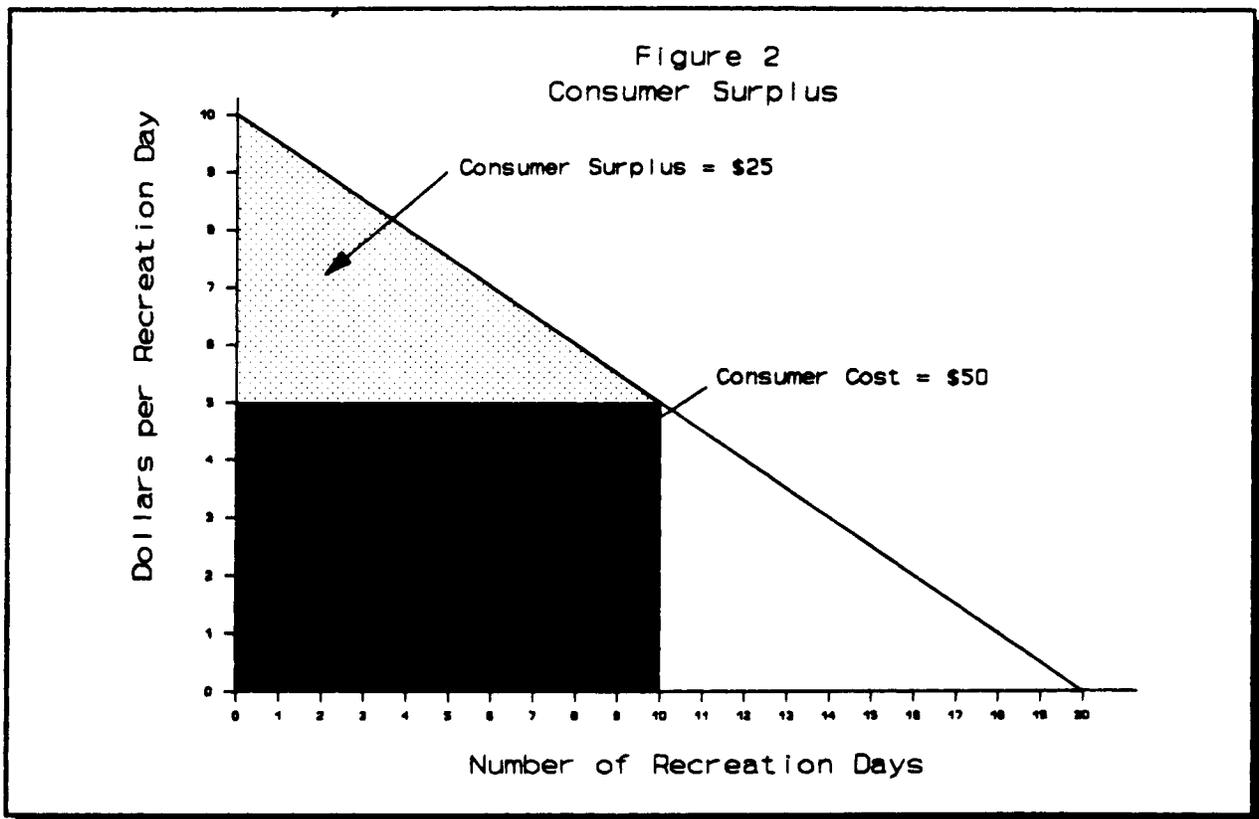
Relating this to benefits is a simple matter. The area under the individual's demand curve (\$75 in the Figure 2 example) is a measure of total benefits for the quantity of output (10 in the example). The cost of these benefits is the area below the demand curve and the price line (\$50). The consumer surplus of \$25 is, analogously, the consumer's net benefits.

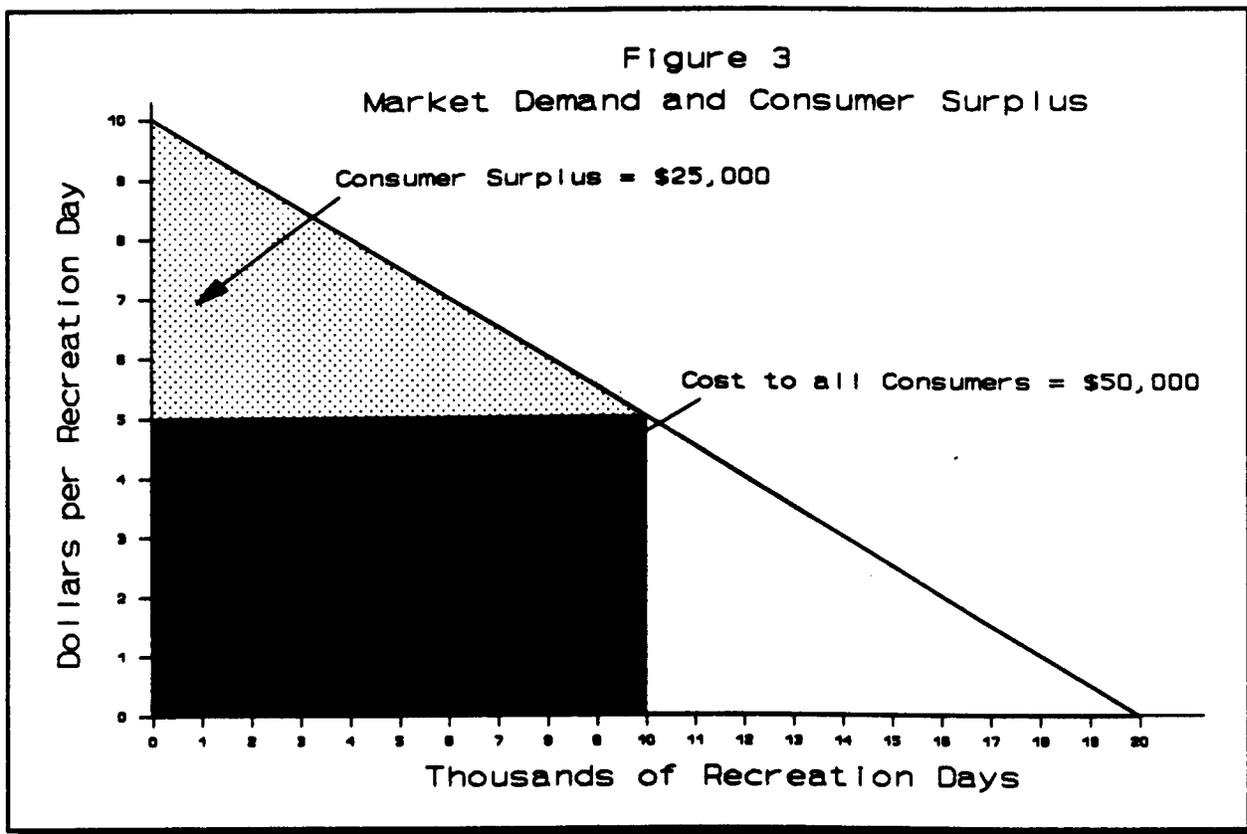
PROFIT MAXIMIZATION

Rational people are assumed to maximize their utility subject to their available budgets. When those rational people organize as firms, we can be a bit more specific about how they maximize their utility. Firms are assumed to be profit maximizers. If profit is defined as total revenues (TR) minus total costs (TC), it is impossible to maximize profits unless costs are minimized. If total revenues are fixed at any level, profit will not be as large as possible unless costs are as small as possible. Thus, profit maximization implies cost minimization.

It is a simple matter to make the jump from profit maximization to net benefit maximization. Total revenues become total benefits (TB), total costs remain total costs. The Corps becomes the rational firm and the difference between TB and TC are net benefits.

In some instances actual benefits are not known and are not estimated. For example, municipal water supply benefits are generally assumed to exceed





the costs of water supply but they are rarely estimated. In such cases benefits, though unknown, are assumed to be fixed at some level that exceeds costs. To maximize net benefits in such cases, it is necessary to minimize the costs of providing that level of water supply.

Environmental mitigation is often based on the assumption that the benefits of providing some fixed level of mitigation (TB) exceed the costs (TC) of doing so. Rational economic behavior requires the analysts to minimize the costs of providing these benefits.

Thus, cost minimizing behavior is an important subcategory of profit maximizing behavior used when the level of benefits is unknown but assumed to exceed costs.

OPPORTUNITY COST

Because we have scarcity, we have to make choices. Whenever we make a choice, it costs us

something. A choice to do one thing is a choice not to do another. Choosing to use a resource, say reservoir storage, for any one purpose costs us the opportunity to use that storage for another purpose. Thus, if storage is allocated to flood control it cannot be allocated to water supply. If water supply is the next best alternative use of the storage, the cost of the flood control storage is the value of that storage as water supply.

Price is routinely used as the measure of the cost of a good or service. While \$50 per acre-foot may be the price of water, that may not be its cost. The economic definition of cost is *that which must be foregone to use the resource in a given way*. The opportunity cost of any decision is the foregone value of the next best alternative not chosen. Fortunately, for most goods purchased in a competitive market, price is opportunity cost. Unfortunately for water resource planners, there are many goods and services used and produced by water resource projects that are not produced in competitive markets, and for which price does not exist, or price does not equal opportunity cost.

Opportunity costs are taken up in more detail in Chapter 4.

Opportunity Cost And The Real World

Some readers of this manual may have spent time working behind the counter of a fast food restaurant in the past. This may have represented the best use of their time at that point in their career, better than the paper route alternative. Few readers would now be willing to work behind that counter. This is so, not because the work lacks dignity, but because of opportunity costs. The readers' time is much more valuable in an alternative use, his current job. That allocations of resources, such as one's labor, make sense at one point in time but may not make sense later is entirely reasonable; opportunity costs change.

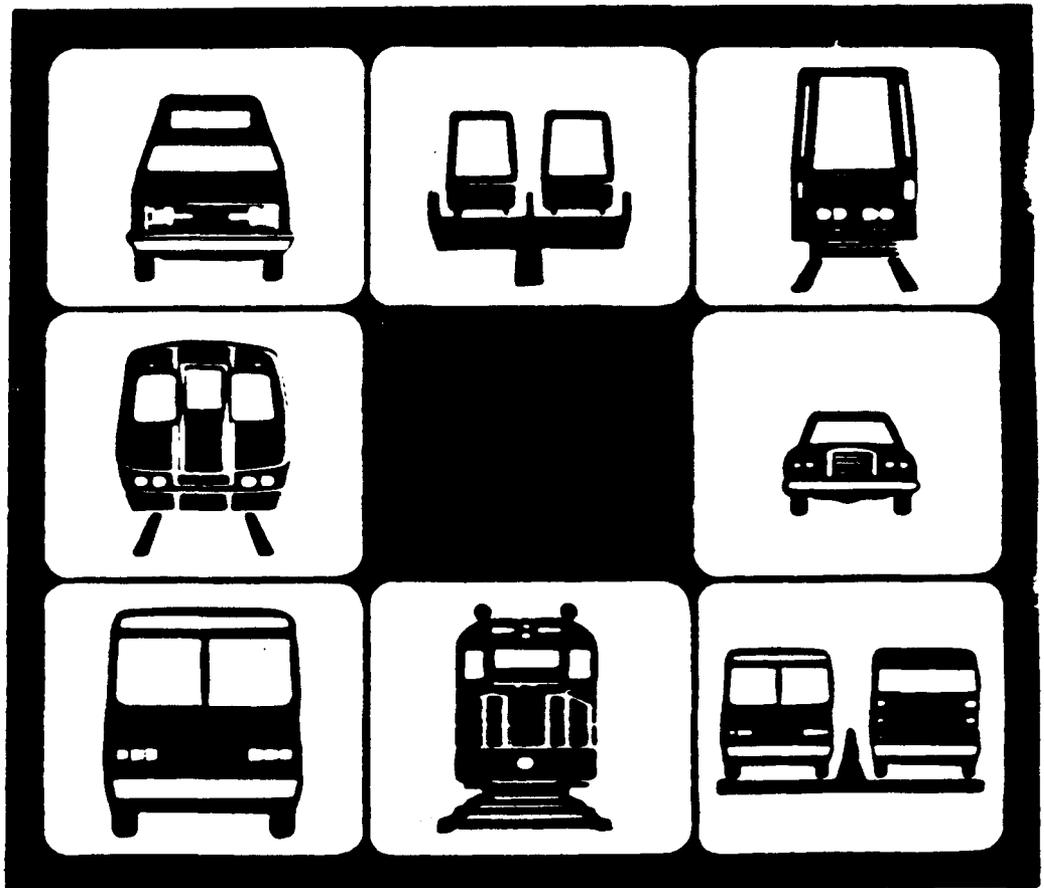
Reallocation studies provide an excellent example of the principle of opportunity costs at work. Reservoirs built long ago had their storage allocated for a specific mix of purposes. Presumably that mix of purposes was optimal at the time the project was constructed. Many of these reservoirs are being studied now to determine if the existing storage should be reallocated for a different mix of purposes. Why? Changing opportunity cost is the answer.

The cost of storage allocated to, say, flood control has gotten too high. Leaving storage dedicated to flood control precludes the opportunity to use that same storage for water supply or recreation, which may now be valued more highly than flood control. The value of resources changes over time as supply and demand for goods and services change.



U.S. Department
of Transportation
Federal Transit
Administration

Procedures and Technical Methods for Transit Project Planning



II.9. Evaluation

The nature of project planning — a detailed assessment of complex projects in several technical aspects — risks an overabundance of information that loses its usefulness in decisionmaking. Thus, the evaluation of alternatives is a critical part of the analysis, and of a Draft Environmental Impact Statement, in which the information is sifted and organized, and key differences between the alternatives are highlighted.

This chapter outlines a framework for the evaluation that attempts to structure the information in a way that can be understood by the many non-technical readers of the DEIS. It must be noted that the framework suggested here simply provides a skeleton on which the evaluation is built. The goals, objectives, evaluation criteria, and discussions that make up the evaluation are necessarily determined by local officials and staff to focus on the local decisions that must be made.

9.1 Framework

There are several possible approaches that might be considered for the evaluation of major transit alternatives. They range from a free-form discussion of the options to a very structured and elaborate analysis complete with weighting and scoring of project attributes. A review of the evaluation efforts in previous alternatives analyses suggests two conclusions. First, the lack of some basic structure for the evaluation risks a rambling, unfocused discussion that more often repeats rather than interprets the data. Second, complex "weighting and rating" schemes tend to confuse rather than illuminate the issues and are often only tenuously related to the realities of decisionmaking. As a result, UMTA recommends an approach that takes the middle ground, offering some structure for the analysis, but relying on the informed judgment of local project staff and Technical Advisory Committees to focus the evaluation on the key issues.

The approach is simply to identify and display the key evaluation measures in which the alternatives differ significantly. A summary of the alternatives and key measures can often be done in a small, one-page table. The measures are organized in a fashion that focuses the evaluation on four perspectives of the alternatives. These perspectives have been derived through a review of past project planning studies whose statements of goals and objectives typically call for four characteristics in a desirable project:

- effectiveness - that it yields benefits in terms of mobility, environmental protection, urban development, energy conservation, and so forth;
- cost-effectiveness - that the costs of the project, both capital and operating, be commensurate with its benefits;
- financial feasibility - that funds for the construction and operation of the alternative be readily available in the sense that they do not place undue burdens on the sources of those funds; and

- equity
- that the costs and benefits be distributed fairly across different population groups.

Thus, the evaluation framework is to examine each alternative from each of these three perspectives. Table 9-1 illustrates the differences between the perspectives with examples of typical goals and objectives for major transit projects. Where this structure is to be used for the evaluation, it should be reflected early on, beginning with the statement of goals and objectives for transit improvements. Where existing statements are available, they should be organized into the structure that will be used for the evaluation. Where new or revised statements of goals and objectives are prepared, the our perspectives provide a useful starting point for identifying and organizing local concerns.

It is useful to recognize that the evaluation phase of project planning — and of any assessment of complex options — is not restricted to the final phase of the analysis. Rather, it is a continuous and comprehensive process within which the technical work proceeds. The process is continuous in that there is a series of decisions that must be made throughout the analysis — alignment variations, design standards, operating policies, etc. — that together shape the nature and performance of each alternative. It is comprehensive in that the final evaluation of an alternative considers a broad range of criteria — transportation, environment, costs, finances, etc. — that require a broad perspective in the assessment of design decisions. Clearly then, the ongoing decisionmaking should be carried out with regard to its ultimate impact on the evaluation of each alternative and should be reviewed by the Technical Advisory Committee in that light.

It is also important to reemphasize that the evaluation is primarily focused on local decisionmaking. While this should be obvious, particularly for projects that are not subject to UMTA's Major Investment Policy, there have been cases in which the entire evaluation has focused on "qualifying" for Federal funding rather than on identifying transportation needs and solutions. For example, several recent alternatives analyses have produced initial drafts of evaluation chapters focused on UMTA policy, nearly to the exclusion of local considerations. This emphasis on the Federal decision is not consistent with the intent or nature of UMTA's Major Investment Policy. The policy recognizes that legitimate differences often exist between the local and Federal views of major transit projects. It specifically identifies the Federal interest in transit and outlines the standards against which funding proposals will be measured. The intention is that local officials examine the transit alternatives against their own objectives, so that, ideally, an agreement can be reached on the aspects of a project that are consistent with Federal goals (and attractive for Federal investment) and those that are primarily local objectives that should be funded locally. Therefore, the evaluation process should consider all perspectives from which the alternatives will be examined.

9.2 Effectiveness

Goals and objectives related to effectiveness both establish the reasons for which major transit improvements are being considered, and identify ancillary concerns that constrain the options. Transportation concerns — congestion,

Table 9-1. Typical Goals and Objectives, Summarized by Perspective

Effectiveness

- Reduce highway congestion.
- Focus economic development.
- Reduce automobile pollutant emissions.
- Conserve energy.

Cost-Effectiveness

- Keep operating costs at less than \$x.xx per rider systemwide.
- Provide an acceptable return in benefits on capital funds invested.

Financial Feasibility

- Maintain an xx percent recovery of operating costs from the farebox.
- Keep operating deficit less than xx percent of dedicated tax revenues.
- Keep capital program with remaining dedicated tax revenues (including bonding), plus additional funds from joint development and other value capture efforts.

Equity

- Provide improved mobility to the transit dependent.
- Obtain participation in project costs from groups benefiting from the public investment.

mobility, etc. — are the primary basis for consideration of a major action in the corridor. Other concerns — typically urban development — often are identified as motivating factors as well. Goals and objectives that constrain the options are primarily environmental concerns — noise, intrusion on parklands and historic sites, visual impacts, and so forth.

There are several considerations in the selection of evaluation measures related to the effectiveness of alternative investments:

- 1) The measures should be developed early in the analysis with appropriate input from local decisionmakers.

This review is an obvious step to ensure the relevance and usefulness of the information. The evaluation methodology should be a high priority item in the early stages of the analysis. Development of a written explanation of the evaluation process is often the catalyst for local officials to come to grips with the specific measures that are of importance for local decision making.

- 2) The measures should be comprehensive in that they address all of the stated objectives, but they should be structured to avoid simple restatements of the same benefits.

Many potential effectiveness measures are highly interrelated. In some cases, there is good reason to include measures of the same impact that portray the impact from different perspectives. For example, the increased development potential of an area may be due primarily to the improvement in transit accessibility to that site. While including both measures of accessibility and measures of development potential likely double-counts some benefits, both may be of sufficient interest to warrant their use in the effectiveness analysis. Double-counting at this point is permissible because there is no summation of total benefits in the effectiveness analysis. This is in contrast to the subsequent cost-effectiveness analysis in which a summation is necessary and double-counting would be an error. In other cases, two candidate measures can be purely redundant. For example, it is unnecessary to include both "total transit trips" and "transit trips diverted from autos" since the second measure is a direct mathematical derivation from the first.

- 3) To the extent possible, the measures should quantify the impacts rather than express subjective judgments on the nature of the impact.

Many of the important objectives of an improvement can be difficult to quantify and the consequent temptation is to use subjective evaluation measures: significant or not significant, desirable or not desirable, and so forth. However, it is usually more useful to provide measurements rather than judgments to local officials and the public. There is an adage to the effect that the relocation of a single residence for a major project is not "significant" unless it is your residence. Useful quantified measures can usually be identified for most objectives. For example, the impacts of street closings on neighborhoods can be addressed with such measures as the number of local streets closed to traffic and the number of residences and businesses relocated.

- 4) The measures should also provide the proper perspective on the magnitude of the impacts.

Many of the impacts of a transportation improvement occur in terms of numbers that are large in an absolute sense but are relatively small when placed in perspective. For example, the relocation of one million square feet of new office space to station areas may appear quite significant when presented by itself, but is more meaningful when also shown as the percentage (say three percent) of total development expected in the corridor over the study period. Similarly, pollutant reductions expressed in terms of thousands of pounds per day is misleading in terms of regionwide air quality impacts if the reduction constitutes less than 0.1 percent of total emissions in the region.

- 5) Finally, discussion of the measures should reflect the magnitude of differences in the measures compared to the likely error levels they may contain.

Varying degrees of uncertainty exist in all information used in project planning. The presentation of effectiveness measures should be accompanied by a well-written discussion that both highlights the major differences between alternatives and indicates where the differences are small given the levels of uncertainty. Minor differences in transit patronage, for example, are usually within the error of the estimates.

Within these general guidelines, the identification of specific measures of effectiveness depends only on the locally identified goals and objectives, together with the judgement of local analysts and officials on the most useful ways of portraying the effectiveness of each alternative.

9.3 Cost-Effectiveness

The definition of cost-effectiveness that has been applied to major transit projects is the extent to which an alternative returns benefits in relation to its costs. Given this definition, this evaluation criterion might more accurately be termed "efficiency." However, the longstanding use of the term "cost-effectiveness" by the transit industry, Congress, and UMTA suggests that it be retained.

Three primary issues arise in any attempt to fashion measures of cost-effectiveness:

- o the overall structure of the analysis and resulting measures;
- o the baseline against which the alternatives are compared; and
- o the measures used to quantify costs and benefits.

Over the past several years, UMTA has sifted through the various options for each of these issues and has identified an approach used to support Federal decisionmaking. Local officials may choose a different approach, so long as it is technically sound and can accurately measure project merit. In alternatives analyses, it is required that the UMTA measures be computed in addition to any

measures that may be proposed locally and approved by UMTA. The results of both approaches are presented in the environmental document produced by the study. Ideally, where local measures are developed, they build upon those used by UMTA so that both sets of measures are consistent in their structure and differ only in the set of benefits that they consider.

GUIDELINES FOR PERFORMING REGULATORY IMPACT ANALYSIS

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GUIDELINES FOR PREPARING REGULATORY IMPACT ANALYSIS

CONTENTS

1. MAIN DOCUMENT - GUIDELINES FOR PREPARING REGULATORY IMPACT ANALYSIS
2. APPENDIX A - ANALYSIS OF BENEFITS (March, 1988)
3. APPENDIX B - ANALYSIS OF COSTS (July, 1984)
4. APPENDIX C - ANALYSIS OF THE CHOICE OF DISCOUNT RATES (July, 1984)
5. SUPPLEMENT TO APPENDIX C - ANALYSIS OF THE CHOICE OF DISCOUNT RATES (1989)
6. APPENDIX D - ANALYSIS OF ECONOMIC IMPACTS (July, 1984)

GUIDELINES FOR PREPARING REGULATORY IMPACT ANALYSIS

TABLE OF CONTENTS

	<u>PAGE</u>
I. INTRODUCTION	2
II. SCHEDULES FOR OMB REVIEW	3
III. STATING THE NEED FOR AND CONSEQUENCES OF THE PROPOSAL	3
IV. CONSIDERING ALTERNATIVE APPROACHES	4
V. ASSESSING BENEFITS	5
Quantifying Health Effects	6
Carcinogens	7
Non-Carcinogens	7
Quantifying Environmental Effects	8
Valuing Health and Environmental Effects	8
Health Effects	8
Environmental Effects	9
VI. ANALYZING COSTS	10
Selecting a Cost Framework	10
Defining the Components of Cost Analysis	10
Baseline	10
Principal Costs	10
Other Costs	11
VII. EVALUATING BENEFITS AND COSTS	12
Estimating Net Benefits	12
Developing Schedules of All Benefits and Costs	13
Analysis of Intergenerational Equity	13
Economic Impact Analysis	13
Analyzing Cost-Effectiveness	14
Using the RIA in Decision Making	15

GUIDELINES FOR PREPARING REGULATORY IMPACT ANALYSIS

I. INTRODUCTION

On February 17, 1981, the President issued Executive Order 12291. According to this order, regulatory agencies must prepare regulatory impact analyses (RIAs) on all major regulations. In addition, before taking action, they must send all RIAs and proposed regulations to the Office of Management and Budget (OMB) for review.

An RIA assesses the analytical results of studies conducted during a regulation's development.¹ Each RIA should calculate the benefits and costs of a proposed regulation's full range of effects and should compare them with those of other regulatory and nonregulatory approaches. For environmental regulations, this range extends from the release of pollutants to their ultimate harmful effects on humans and the environment.

Benefits and costs should be quantified and monetized in the RIA to the extent possible. The RIA should discuss fully benefits and costs that cannot be quantified and should assess their importance relative to those that are quantified or monetized. When many benefits cannot easily be monetized, or when law requires a specific regulatory objective, cost-effectiveness analysis may be used to evaluate regulatory alternatives.

These guidelines are designed to help analysts at the U.S. Environmental Protection Agency (EPA) prepare RIAs that satisfy OMB's requirements. They generally follow the outline of OMB's guidance document, Interim Regulatory Impact Analysis Guidance, and provide information on the types of analytical procedures that can be used to satisfy the Executive Order's requirements. Specifically, they discuss the analytical techniques that may be used and the information to be developed when (1) stating the need for the proposed regulatory action; (2) examining alternative approaches to the problem; (3) quantifying benefits and costs and valuing them in dollar terms (where feasible); and (4) evaluating the findings on benefits, costs, and distributional effects.

More detailed information on benefit analysis, cost analysis, choice of discount rate, and analysis of distributional effects is provided in appendices. The appendices elaborate on many of the conceptual issues raised in the Guidelines and suggest how to proceed with the analysis.

The goal of regulatory impact analysis is to develop and organize information on benefits, costs, and economic impacts so as to clarify trade-offs among alternative regulatory options.² RIAs may vary in terms of level of detail; quantification of benefits, costs, and economic impacts; and precision of information. These differences may result because of variations in the nature and quantity of underlying data or in the adequacy of the available analytical techniques, because of resource or time constraints, or because some environmental problems or regulatory approaches are less amenable to formal analysis. However, by developing and organizing information, quantifying and monetizing benefits and costs to the extent possible, and determining distributional effects and economic impacts, the RIA should provide decision makers with a comprehensive assessment of the implications of

¹ It should incorporate all analyses required by the Regulatory Flexibility Act and the Paperwork Reduction Act (the requirements under the Paperwork Reduction Act replace EPA's requirement for a "reports impact analysis"). However, OMB no longer requires a "urban impact analysis."

² When the Agency is legally precluded from using the information provided in the RIA for regulatory decision making, the RIA should set forth the legal basis for that determination.

alternative regulatory actions.

These Guidelines have been designed for evaluating specific regulations controlling individual pollutants or particular waste streams. They are not readily applicable to regulations for generic information gathering, testing, and procedural rules. In these situations, 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 RIA.

II. SCHEDULES FOR OMB REVIEW

The Executive Order specifies when RIAs are required and establishes a schedule for rule making.³

- For every major rule⁴ with a notice of proposed rulemaking, the Agency must submit:
 - a preliminary RIA to OMB at least sixty days before publishing the notice of proposed rule making and
 - a final RIA and a final rule to OMB at least thirty days before publishing the rule as final.
- For every major nonemergency rule with no notice of proposed rule making, the Agency must submit a final RIA to OMB at least sixty days before publishing the rule as final.
- For all rules other than major rules, the Agency must submit every notice of proposed rule making and every final rule to OMB at least ten days before publication. Although a full-scale RIA will not be required, sufficient analysis must be performed to demonstrate that the rule meets the objectives of the Executive Order. At a minimum, this should include cost and economic impact (distributional effects) analyses.

III. STATING THE NEED FOR AND CONSEQUENCES OF THE PROPOSAL

An RIA should describe concisely the nature of the environmental problem as perceived by the Agency, industry, labor, and public interest groups.⁵ It should explain that the proposed regulatory action is within the Agency's statutory authority and should indicate whether specific action by the

³ OMB has no firm guidelines on deregulatory proposals. It examines each proposal separately to decide whether to waive the RIA requirement.

⁴ "Major rule" means any regulation that is likely to result in:
(1) An annual effect on the economy of \$100 million or more;
(2) A major increase in costs or prices for consumers, individual industries, Federal, State, or local government agencies, or geographic regions; or
(3) Significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of the United States-based enterprises to compete with foreign-based enterprises in domestic or export markets." [Executive Order 12291]

⁵ The Agency's public participation policy for the regulatory process also applies to RIAs.

Agency is required by statute. The RIA also should provide information on the following points:⁶

- o the market imperfections that necessitate regulatory action;
- o the pollutant creating the problem, its annual discharge mass, and its principal sources, both now and, where feasible, over the time horizon of the analysis;
- o the degree of the pollutant's current or projected impact on the environment, health and safety, and the economy;
- o current control techniques and their effectiveness; and
- o the amount or proportion (or both) of the pollutant that the proposed regulatory action would control and the resulting beneficial effects.

In stating the consequences of the proposed regulation, an RIA should discuss how, if promulgated, the regulatory proposal would:

- o improve the way the market functions (primarily through internalizing the damages from pollution) or otherwise meet the regulatory objectives, and
- o produce better results than no regulatory change, taking into account the possibility that regulation fails to achieve its stated goals (this may result from poorly designed rules, as well as from weakness in enforcement and lack of compliance).

IV. CONSIDERING ALTERNATIVE APPROACHES

The Executive Order requires that RIAs thoroughly examine the most important regulatory alternatives. It also requires RIAs to explain why the proposed approach has been selected.

In developing this part of the RIA, the analyst should first define the baseline, which will be the standard against which the incremental benefits and costs of all alternative actions will be compared. The baseline is what is likely to occur in the absence of regulation. Certain analyses, such as those dealing with new sources of pollution, may require more than one baseline because of uncertainties about what might happen without the proposed regulation.

The next step is to develop an initial set of regulatory alternatives that would mitigate or eliminate the environmental problem.⁷ An RIA should consider four major types of alternatives.

- o Alternatives to federal regulation. These include negotiated voluntary actions and market, judicial, or state or local regulatory mechanisms that could address the environmental problem.
- o Alternatives within the legislative provision's scope. These include three broad categories of alternatives: the degree of control, effective compliance dates, and

⁶ Consult the Guidelines for Evaluation Planning, developed by EPA's Office of Standards and Regulations.

⁷ Consult the Checklist of Regulatory Alternatives developed by EPA's Office of Standards and Regulations.

methods of ensuring compliance. The second category, for instance, could involve issuing related regulations jointly to allow the affected industries to modify their products or operations to comply simultaneously with all the regulations. Alternative methods of ensuring compliance could involve employing various enforcement options (e.g., on-site inspections versus periodic reporting and sharing implementation responsibilities among the different levels of government); using various compliance methods for different segments of industry or types of economic activity where costs of compliance vary sharply (e.g., different treatment for small and large firms); or allowing variances under certain conditions.

- o Market-oriented regulatory alternatives (whether or not they are explicitly authorized in the Agency's legislative mandate). These methods include using information or labeling to enable consumers or workers to evaluate hazards themselves and using economic incentives, such as fees or charges, marketable permits or offsets, changes in insurance provisions, or changes in property rights.
- o Major alternatives beyond the scope of the legislative provision under which the proposed regulation is being promulgated. These would include regulatory alternatives that controlled other routes of exposure and that possibly would be authorized under other legislation.

Often there may be a trade-off between considering more alternatives and developing more detailed, quantified, and reliable benefit and cost estimates for fewer alternatives. In each case, the choice will be subjective, taking into account the nature of the environmental problem, current government regulations and status of compliance, the amount of flexibility permitted by the law governing the regulation under consideration, the schedule of required action, and resource constraints.

V. ASSESSING BENEFITS

The benefits of decreased pollution are the resulting improvements in health and aesthetics and reductions in damages to plants, animals, and materials. To measure benefits, one must ordinarily follow a chain of events from (1) the release of pollutants by industry, households, agriculture, and municipal sources to (2) the impact of these releases on ambient quality to (3) exposures of people, plants, animals, and materials through various media (air, water, etc.) to (4) the adverse effects to (5), when feasible, what people would pay to avoid these effects. Finally, the analysis of benefits should cover the entire spectrum of benefits, from those that can be assigned a dollar value to those that can only be described qualitatively, and from those that are direct and immediate to those that are remote in distance or time.

The direct chain of events is, in itself, complex to model. Beyond that, one should take into account alternative behavior that could mitigate the effects of pollution, such as using substitute materials and obtaining medical care. Thus, because of the complexity of assessing benefits, the analysis should report not only most likely estimates but also upper- and lower-confidence limits.

Benefits should be measured relative to an assumed baseline. All underlying assumptions should be consistent, and all related information should be documented in detail and a form enabling reproduction of the analysis.

A. Quantifying Health Effects

To assess the health risks posed by a pollutant, one must have information on the nature and extent of human exposure and on the toxicity of the pollutant.⁸ Such information may be used to estimate the likely number and type of harmful effects, as well as to characterize the uncertainty underlying the estimates. Often, however, the information available may be insufficient to quantitatively assess health effects.

A comprehensive analysis of health effects would include:

- o evaluation of substances on a case-by-case basis;
- o a discussion of the likelihood that the substance may be harmful to humans and a description of the nature and duration of the harmful effects (this should be based on a weight-of-evidence evaluation of scientific information, including the results of both positive and negative studies);
- o estimation of dose-response relationships to extrapolate risk⁹ at low doses or, if the information available for noncarcinogens do not permit developing dose-response relationships, determination of a no-observed-effect-level or a related parameter (these should include a discussion of the mechanism of action and the procedures used to convert evidence from other organisms to predictions of potential human effects);
- o information on the exposure of people to the substance (this should include the number of people in and the composition of the exposed populations; the level, frequency, and duration of their exposures; and the routes of exposure);
- o an estimate of the distribution of risk to individuals or, if information available for noncarcinogens do not permit risks to be quantified, a margin of safety or recommended limit of exposure (the population and age groups with greater sensitivities should be identified where possible);
- o an estimate of the expected number of adverse health effects; and
- o a discussion of the science policy judgments and uncertainties present in all the analyses.

The Agency's ability to provide this information may vary, depending on the quality and types of data available, the nature of the harm, and the capability to predict exposures.

To the extent possible, an RIA should include information on the types of adverse effects the suspect substance causes, whether or not these effects are reversible, and whether they follow single or repeated exposures. It should predict the magnitude, pattern, and length of human exposure, along with the nature and composition of the exposed groups (including sensitive subgroups). Finally, it should combine the information on the substance's toxicity with exposure estimates to predict the

⁸ Health effects need not be quantified for some regulatory activities, such as information gathering, testing, and procedural rules.

⁹ Risk is defined as the probability of experiencing an adverse health effect from the pollutant under consideration.

effect each regulatory alternative has on improving human health.

More specific guidance on evaluating the health effects of carcinogens and noncarcinogens is provided below. It should be recognized that risk assessment policies are updated from time to time, and as changes are made these Guidelines will be modified appropriately.

1. Carcinogens

- o Carcinogenic risk assessment should be on a case-by-case basis.
- o A determination of the likelihood that a substance is a human carcinogen should be based on a weight-of-evidence judgment. All available information from human epidemiological studies and from animal studies should be evaluated, along with evidence from short-term tests, studies of comparative metabolism, structure-activity analysis and other relevant toxicological and biological analysis. The evaluation should consider the number and kind of tumorigenic responses and their statistical significance, as well as the quality of the available studies. Properly evaluated animal data may be used to predict human responses.
- o A variety of models may be used to estimate the risk of cancer at low doses, based on what is known about possible mechanisms of action and the quality of data available. Where possible, most likely estimates, as well as upper- and lower-confidence limits, should be provided. When lack of data or of scientific understanding prevent the Agency from providing a "most likely" estimate, it may use plausible upper-limit estimates of risk, so long as they are identified as such.
- o Where epidemiological data permit, the expected types of cancer should be described in terms of the disabilities they produce and their duration.

Some risk assessments will be more consistent with this guidance than others due to differences in the amount and quality of information available for specific substances, as well as uncertainties in understanding of the disease.

2. Noncarcinogens

- o Noncarcinogenic health effects, which include target organ toxicity, neurotoxicity, adverse reproductive effects, and other health effects, should be evaluated on a case-by-case basis. (These effects traditionally have been evaluated similarly to each other, but as a group in a different way from carcinogenicity.)
- o An assessment of the likelihood that the substance causes noncarcinogenic health effects should be based on a thorough evaluation of human epidemiological studies and animal studies. It should discuss the type of health effects, their severity and potential reversibility, and whether they may occur from single, repeated, or continuous exposure.
- o A judgment of the extent of potential health hazards posed by a substance (at ambient concentrations or at estimated dosages) should be based on an evaluation of human or, more commonly, experimental animal studies in which preselected uncertainty factors are applied to no observed effect levels (NOEL) or other parameters to determine the level below which human exposure should fall. Alternatively, margins of safety can be computed that express the ratio between the NOEL (or other

parameters) and estimated human exposure. Judgments about the adequacy of protection of public health can be based on such ratios. Occasionally, more complete data may be available and it may be possible to construct dose-response functions for predicting health effects at alternative exposure levels.

B. Quantifying Environmental Effects

Pollution may also result in a number of environmental effects. They include adverse effects on plants and animals, including ecological disruptions and effects on endangered species; increased soiling and materials damage; and adverse effects on recreational activities and aesthetics. The objective of a benefits assessment is to quantify these impacts in physical terms, provide measures of the uncertainty inherent in the estimates, and trace the links to human activities and values.

Where data permit, the analysis should consider the likely actions individuals may take to mitigate the effects of pollution. For instance, ozone may adversely affect agricultural productivity, but farmers may lessen the impacts by planting different crops.

The Agency's ability to provide this information will depend on the quality and types of data available, the nature of the environmental effects, and the ability to estimate the fate and transport of substances in the environment.

C. Valuing Health and Environmental Effects

The major objective of economic valuation is to transform estimates of changes in physical or biological effects into monetary estimates of benefits. This is done by using the amount individuals would pay for such changes as a measure of their value, i.e., benefits should be measured in terms of willingness to pay.

When markets exist, such as for consumer goods and services, estimating benefits in terms of willingness to pay is essentially a problem of estimating a demand curve from observed prices and quantities. But organized markets for environmental quality typically do not exist, even though people are willing to pay for environmental improvements. Thus, other techniques for valuing the health and environmental effects associated with regulatory programs must be used.

1. Health Effects

Morbidity (illness) should be valued by estimating its direct cost, unless it is feasible to use willingness to pay measures. This estimate provides a lower bound on the value of morbidity. It includes medical costs, loss of work and earnings, and impacts on future productivity. Since this procedure does not consider pain and suffering, as well as the value of time for sick people who are not in the labor force, it is likely to underestimate the benefits of reduced morbidity. It is also likely to ignore the value of reducing the incidence of very subtle health effects attributable to pollution, e.g. discomfort and impairments in cognitive development.

Mortality may be valued either directly or indirectly through the implicit valuation technique. In either approach, however, a value is not placed on saving a particular individual's life. Environmental regulations generally provide health benefits by reducing the risk that people experience adverse health effects, e.g., a regulation may reduce the probability that individuals contract cancer over their lifetimes from 1 in 1,000 to 1 in 10,000. The extent of likely improvements in health to the total population may be estimated by aggregating the expected reductions in health risks to individuals. When assessing potential life-threatening illnesses, such as cancer, the resulting measure is termed "statistical lives saved." Thus, "statistical lives saved" refers not to particular lives,

but to the sum of small reductions in risk to large numbers of people. This measure is useful for comparing the aggregate health effects likely to result from regulatory alternatives and for determining the relative cost of attaining health benefits.

If mortality is to be valued directly, a range of values can be used to determine the sensitivity of the results to alternative values. Recent studies that measure how much people need to be compensated to incur small risks provide a means for selecting such values. For example, many of these studies examine the relationship between risks in the workplace, which typically range between 1 in 100,000 and 1 in 1,000 on an annual basis, and wages. They have found that annual wages are between about \$4 and \$70 higher for jobs with 1 in 100,000 greater risk. This translates into a value for a statistical life of roughly \$400,000 to \$7,000,000 (in 1982 dollars).

Alternatively, mortality may be valued indirectly by calculating the implicit cost per statistical life saved. This is done by subtracting the monetized benefits of a regulatory alternative from its costs and dividing the result by the estimated number of statistical lives saved. When possible, the implicit cost per statistical life saved should be calculated on an incremental basis, i.e., dividing the change in costs (less benefits) between regulatory alternatives by the change in statistical lives saved. The resulting implicit value may be evaluated in light of the compensation people have been observed to require to incur small risks or the costs of other government regulations. However, when there are other important nonmonetized benefits, the implicit valuation technique will overestimate a regulation's cost per statistical life saved.

2. Environmental Effects

There are four basic methods for valuing environmental effects: direct cost, travel cost, property value, and contingent valuation. All lead to estimates of what groups are willing to pay to avoid the damages of the pollutant(s) to be regulated. (These techniques sometimes may measure both nonhealth and health effects.) However, each technique is best suited for estimating only certain types of environmental benefits.

- The direct cost method is best suited for estimating the value of the commercial effects of reduced pollution, such as reduced damage to fisheries, forests, and agriculture and increased lifetimes of building or machinery. The monetary value of these effects is estimated as the savings in costs to industry and to consumers.
- The travel cost method may be used to estimate the value of the recreational effects of reduced pollution. monetary values are estimated by developing a demand curve for recreational activities and determining how it would change because of improvements to the environment.
- The property value method may be used to estimate the value of the health, aesthetic, and recreational effects of reduced pollution. This method relates differences in property values to housing characteristics, location, and environmental characteristics to infer the values placed on environmental improvements.
- The contingent valuation method primarily has been used to estimate the value of nonmarket goods and services, such as improvements in aesthetics (gains in visibility or water clarity and reductions in odor) and the preservation of wildlife and wilderness areas. In this method people are asked what they would be willing to pay to enjoy alternative levels of environmental quality.

A more detailed discussion of techniques for valuing environmental effects is provided in the

appendix on benefits analysis.

VI. ANALYZING COSTS

EPA generates cost estimates for a number of purposes during the rule-making process. These estimates typically have been used to help determine the economic effects of regulations on the regulated community.

Performing cost analysis appropriate to the benefit-cost assessment required in RIAs should involve more than predicting the compliance costs of parties directly affected by regulation. It requires estimating total costs to society, defined as the value of goods and services lost by society resulting from the use of resources to comply with and implement a regulation, and from reductions in output. Thus, a comprehensive analysis adds up all costs society incurs. These fall into four general categories: private-sector real-resource costs, government regulatory costs, dead-weight welfare losses, and adjustment costs (these costs are described below). For most regulations, firms' real-resource costs will account for nearly all the costs to society. Thus, adapting Agency cost analyses to incorporate the total social cost concept needed for RIAs usually will require only minor adjustments.

As in benefit analyses all assumptions underlying cost analyses must be consistent and all related information should be documented in a form enabling reproduction of the analysis. To account for uncertainty, most-likely estimates of costs should be presented, along with cost ranges and statements about their likelihood.

A. Selecting a Cost Framework

The use of a static, partial-equilibrium analytical framework is the most practical means for estimating total social costs. This framework, in its most sophisticated form, is based on an analysis of supply-and-demand relationships in the directly affected markets.

When an industry is regulated, compliance requirements generally result in increased unit costs of production. This, in turn, leads to an upward shift in the industry's supply curve, which normally results in higher prices and a lower production level. Compliance costs, and net welfare losses incurred by producers and consumers because of decreased output, are measurable within this framework; other costs, described below, are not.

Each of the unconventional regulatory alternatives (such as user charges, offsets/bubbles, pollution indemnity) involves its own particular set of cost considerations. These are discussed in the appendix on cost analysis.

B. Defining the Components of Cost Analysis

1. Baseline

The first step in estimating the costs of a regulation is to determine the baseline -- what is likely to happen in the absence of the regulation. The population of the regulated community must be estimated, as well as the degree of pollution control that may occur without the regulation.

2. Principal Cost

An estimate of the total costs that regulations impose on society should begin with private real-resource costs. These are pretax compliance costs, net of any transfer payments (e.g., emission fees, licensing fees, or subsidies). Compliance costs should include costs imposed on both existing and new

sources.

Calculating the net present value of compliance costs requires adding the discounted stream of operating and maintenance costs to the initial investment costs. In many cases compliance is not required immediately, and the initial investment must be discounted.

Estimates of private real-resource costs usually rely on engineering cost estimates. They should be based on a realistic appraisal of the equipment or process changes needed to meet the requirements of each regulatory alternative. A most likely, as well as an upper- and lower-bound estimate of cost should be provided. For alternatives that do not involve engineering controls, the cost analysis components will have to be modified accordingly.

For most regulations requiring the use of pollution control technology, private real-resource costs will account for nearly all of the total cost to society, and little further effort to estimate costs is necessary. In some cases, however, other costs to society may be significant.

3. Other Costs

Although some of the following costs are difficult to predict and quantify, they should be considered when estimating total costs to society. The amount of resources devoted to such analyses should depend on the expected contribution of these costs to total costs. If certain components are likely to be small, less analytical effort should be used to measure them than when they are likely to substantially change estimated total cost.

- Government Regulatory Costs -- Federal, state, and local governments may incur costs to issue permits for affected plants, to monitor performance, and to enforce compliance.
- Dead-Weight Welfare Loss -- Net losses in consumers' and producers' surplus may occur from the decrease in output of goods and services resulting from a regulatory action. Generally these losses are a relatively small part of the total costs to society, except when there are no readily available substitutes for a product that is banned or that has its use severely restricted. Dead-weight welfare loss should be estimated within the conceptual framework discussed in the appendix on cost analysis.
- Adjustment Costs for Displaced Resources -- Regulatory action often results in dislocation of labor and other productive resources. Three types of costs may occur. First, if an industry's production decreases, some of the resources that had been required to produce the lost output fail to be used elsewhere in the economy. The value of resources that are reallocated to other markets is netted out. Second, there is a resource reallocation cost, typified by a person's spending time and money looking for a job and moving to a new location. Finally, society expends resources to operate programs to help the unemployed (this does not include transfer payments to individuals).
- Adverse Effects on Product Quality, Productivity, Innovation, and Market Structure - These effects should be quantified to the extent possible or, at a minimum, discussed qualitatively.

The analysis conducted to conform with the requirements of the Paperwork Reduction Act should be incorporated into this section of the RIA. The reporting requirements imposed on industry are a part of principal costs, while those incurred by the Agency will be in the "other costs" category.

VII. EVALUATING BENEFITS AND COSTS

The final section of an RIA should be a comprehensive evaluation having the following elements:

- estimates of the net benefits of each major alternative, based on the benefits and costs for which a dollar value can be assigned, and a discussion of nonmonetizable or unquantifiable benefits and costs;
- a schedule of all benefits and costs for each major alternative, including economic impacts and intergenerational effects; and
- the results of cost-effectiveness analysis of major alternatives, when many benefits are not easily monetized or when the law sets forth specific regulatory objectives.

A. Estimating Net Benefits

The net benefits of each major alternative may be estimated by subtracting the present value of monetary social costs (as defined in section V) from the present value of monetary social benefits (as defined in section IV). For this calculation the same baseline must be used in both the benefit and cost analyses. Plausible upper- and lower-bound estimates of net benefits should be provided, and the sensitivity of the net benefits estimate to variations in uncertain parameters (including the rate of compliance) should be examined.

The choice of discount rate is critical in calculating the present value of estimates of net benefits. OMB's Guidance requires using an annual real discount rate of 10 percent. It also states that "where it appears desirable, other discount rates also may be used to test the sensitivity of the results."

In many instances, the present value of net benefits should be calculated using an additional discount rate because a 10 percent rate may not reflect the opportunity costs associated with (1) each of the many ways of financing public investments, (2) differences in their riskiness, (3) differences in the form of the benefits and costs, and (4) differences in their distribution. Four alternative approaches are available for selecting discount rates for benefit-cost analyses of government programs and projects: shadow price of capital, opportunity cost, weighted average, and social rate of time preference. One or more of these approaches may best fit the particular economic circumstances of the regulation being considered. The appendix on discount rates provides more detail on these approaches.

The net benefit estimate should be carefully evaluated in light of all the effects that have been excluded because they could not be assigned a dollar value. Thus, immediately following a net benefit calculation, all benefits and costs that can only be quantified, as well as all benefits and costs that can only be qualitatively described, should be presented and evaluated.

The incremental benefits, costs, and net benefits of moving from one regulatory alternative to the next also should be presented. This should include a discussion of incremental changes in quantified and qualitatively described benefits and costs.

Finally, this section should discuss other potential costs and benefits that may be by-products of the proposed action. These include transfers of the pollutant problem from one exposure medium or program office jurisdiction to another, or possible exacerbation of exposures for specific groups (e.g., very sensitive populations, maximum exposure groups, or specific types of workers).

B. Developing Schedules of All Benefits and Costs

The criterion of economic efficiency used in benefit-cost analysis is not designed to assess whether the distribution of the benefits and costs of a particular regulatory action is equitable, either among different groups at a point in time or among different generations. Both E.D. 12291 and the Agency recognize that regulatory decisions should address distributional issues.

Thus, OMB's Guidance calls for schedules showing the distribution of benefits and costs. The benefit schedule should show the type of benefit, to whom it will accrue, and when it will accrue. The cost schedule should identify the type of cost (e.g., capital, recurring), who will bear it, and when and where it will be incurred. Important benefits or costs should be highlighted and their relative importance to the dollar estimate of net benefits should be assessed.

The part of the schedule showing the distribution of benefits should be based on an analysis of the distribution of health risks to the current population (developed in the section of the RIA that assesses health effects), along with an analysis of intergenerational equity. The part of the schedule showing the incidence of costs should rely on the type of economic impact analysis the Agency historically has performed.

C. Analysis of Intergenerational Equity

Considering intergenerational equity is particularly important for EPA because of the uneven distribution over time of the benefits and costs of many environmental regulations. For regulatory actions with intergenerational impacts -- time horizons exceeding the 25- to 30-year range -- the economic efficiency criterion used in benefit-cost analysis is less suitable as a guide for decision making. For example, many people consider the major issue in disposing of long-lived hazardous wastes as how to equitably distribute benefits and costs across generations.

No entirely satisfactory method exists for evaluating intergenerational effects. For analytical purposes, several alternative procedures may be helpful in portraying trade-offs in benefits and costs between generations. These would include:

- discounting benefits and costs at a lower social rate of discount, rather than at the rate of return on capital;
- indicating the number of years until net undiscounted benefits become positive and the number of years and amounts by which they remain positive; and
- directly comparing benefits to future generations with costs to the current generation.

D. Economic Impact Analysis

The economic effects to be examined can be divided into two general categories: (1) primary effects, which should be examined in every case, and (2) secondary effects, which should be examined if primary effects appear substantial or if there is reason to believe that any of the categories of impacts are likely to be important to the decision process. The primary effects consist of changes in prices (for both producers and consumers), production, industry profitability and capital availability (including plant closures), and employment. The secondary effects are influences on related markets, secondary employment, the community, the balance of trade, and energy consumption.

Although many of the secondary effects may be negative, some may be positive (such as expansions for producers of pollution control equipment or substitutes for the pollution-related

product). The appendix on economic impact analysis discusses techniques for analyzing each of these effects.

Quantifiable economic effects can be estimated from a combination of financial and market analyses. For program offices that do not have such sophisticated methods as simulation techniques, the analysis should begin by segmenting the industry into categories of plants that will be similarly affected -- e.g., according to size distribution, age, and pollution control process. Whenever possible, industrial analysis should be performed at a plant level of detail for the affected segments. Long- and short-run effects should be analyzed. Financial analysis, whether performed on an actual plant-by-plant basis or for "model plants" that represent significant industry segments, should normally be employed to address economic impact issues. Real-resource effects should be separated from transfers, so that efficiency considerations are distinct from distributional concerns.

A discounted cash flow analysis should be used to determine whether the value of projected future cash flows minus the costs of pollution control (as indicated by engineering estimates of compliance costs) is sufficient to continue operating the plant at current levels. Where data are unavailable to perform this type of analysis, a return-on-investment analysis should be performed.

Each of these analyses should assess how much of the cost increases plants will be able to pass through. They should consider both supply and demand factors. Financial analyses generally should use both a most-likely estimate of cost pass-throughs for (model) plants and a worst-case assumption of no cost pass-throughs. They also should discuss the likelihood of there being no cost pass-throughs.

E. Analyzing Cost-Effectiveness

When many benefits cannot easily be monetized, or when the law sets forth a specific regulatory objective, the RIA should present the results of a cost-effectiveness (CE) analysis. This will provide useful information to decision makers and conforms with the Executive Order's requirement to minimize the cost of achieving regulatory goals.

The cost-effectiveness of a regulatory alternative is calculated by dividing the annualized cost of the regulatory alternative by a measure of its effectiveness. That measure may range from the amount of the reduction in pollution to the ultimate improvements in human health or the environment. Each measure has advantages and disadvantages: "pounds of pollution removed" is the easiest to calculate across a broad range of regulations but ignores wide differences in pollutant toxicities and dilutions, "units of exposure avoided" may require sophisticated dispersion models, and "statistical lives saved" requires a detailed understanding of population exposure and dose-response relationships. In general, the measure of effectiveness used should be as close as possible to the final effects thought to result from the regulation.

CE analysis can be used to identify:

- o the most efficient (least-cost) way of achieving a predetermined objective, such as avoiding a given level of pollutant emissions or related health effects;¹⁰
- o policies that maximize the level of a stated type of benefit (e.g., reductions in exposure to a certain carcinogenic pollutant) for a given compliance cost; and

¹⁰ Other criteria, such as legislative requirements, enforcement problems, technological feasibility, or quantity and location of total emissions abated, may preclude selecting the least-cost solution in a regulatory decision.

- o incremental trade-offs between successively more stringent levels of control when there are no firm benchmarks that must be attained.

CE analysis does not necessarily reveal what level of control is reasonable. However, it can indicate which control measures or policies are inferior options and, thus, usually should be an integral part of benefit-cost analysis.

CE analysis also can be used to make comparisons across industries when the effects of emissions or discharges of pollutants are similar. Regulations for controlling the same pollutant in other industries can provide a general "range of reasonableness" against which the cost-effectiveness of a proposed regulation can be assessed. When properly conducted, comparative CE analysis can take a stated goal for reductions in aggregate pollution and determine which distribution of reductions in pollution across industries is least costly.

Regulations established by different program offices within the same medium should also be compared if possible. This requires using comparable measures of effectiveness. Thus, either a pound of a pollutant removed at one place must be similar to one reduced at another, or more sophisticated measures of effectiveness must be used. These would include dollars per exposure avoided or dollars per health effect prevented. When feasible, this gives a comparison of "payoffs" relative to costs across program offices.

F. Using the RIA in Decision Making

One of the purposes of E.O. 12291 is to improve the economic efficiency of government regulations. In theory, this is achieved by selecting regulatory options that maximize net social benefits. Unfortunately, determining which regulatory options are best in terms of economic efficiency often is made difficult by uncertainties in data, by inadequacies in analytical techniques, and by the presence of benefits and costs that can be quantified but not monetized or that can only be qualitatively assessed. Thus, even if the criterion of economic efficiency were the sole guide to policy decisions, the analytical results of the RIA may not always point unambiguously to a specific regulatory option as being superior.

Additionally, as recognized by E.O. 12291 and the Agency, regulatory decisions should address distributional issues. Analysis can reveal the likely distribution of benefits and costs among groups or between generations. But it cannot determine whether the distribution is equitable or how distributional issues are to be weighted relative to concerns about economic efficiency.

In view of the limitations of current analytical techniques and the range of factors that may enter into decision making, the RIA is best viewed as a document that organizes information and comprehensively assesses the effects of alternative actions and the trade-offs among them. The results should identify which regulatory alternatives are reasonable, while leaving considerable latitude to decision makers in selecting the preferred regulatory approach.

CHAPTER III

IMPROVING THE MAINTENANCE OF INFRASTRUCTURE

Task Force Three of the ACIR project to develop recommendations for a federal infrastructure investment strategy examined the literature and agency documents related to: (1) planning and managing for better maintenance and (2) public reporting of the status of maintenance. The results of this effort are presented in the first selection of this chapter.

The selections that follow are grouped under the headings of:

- **Selecting maintenance strategies;**
- **Assessing infrastructure condition;**
- **Agency examples.**

HIGH PERFORMANCE PUBLIC WORKS

**A New Federal
Infrastructure Investment Strategy
for America**

**U.S. Advisory Commission
on Intergovernmental Relations
SR-16
November 1993**

IMPROVING THE MAINTENANCE OF INFRASTRUCTURE

I. OBJECTIVES

The purpose of this statement of principles and guidelines is to provide guidance to federal agencies and their state and local partners that will enable them to ensure effective and efficient maintenance of capital assets and reduce or avoid deferring needed maintenance.

The term "maintenance" applied here is used broadly. It includes preventive and routine maintenance, minor and major repairs, rehabilitation, and even replacement costs if a component has deteriorated to a point where partial or full replacement is cost effective. Some maintenance expenditures, thus, may be funded from operating funds and some from capital funds.

The term maintenance used here excludes work aimed primarily at expanding the capacity of a facility otherwise upgrading it in order to serve needs different than or significantly greater than, those originally intended.

Federal concerns include not only capital assets that it owns and maintains but also assets obtained by other governments with federal support and assets regulated by the federal government.

The findings and recommendations contained here have two primary purposes: (1) to reduce long-term costs by identifying infrastructure maintenance early enough to avoid higher costs later, and (2) to help public officials better prioritize maintenance needs and make more informed decisions on maintenance budgets by providing them with fuller information on the implications of maintenance options.

11. FINDINGS

Importance of Maintenance. Maintaining public infrastructure assets is a major responsibility and cost of federal, state, and local governments. Dollars for maintenance compete with many other claimants for

public funds. Proper maintenance is vital if government agencies are to deliver quality services to citizens effectively and efficiently. Every capital asset suffers wear and tear of components through usage and due to the attrition caused by environmental conditions, damage by accident, and improper design or operation or inadequate maintenance. Adequate attention to maintenance needs is important in the design and construction of facilities as well as after they are operational.

Deferral of Maintenance. Maintenance of existing infrastructure—roads, bridges, water and sewer systems, or dams and reservoirs, buildings, and other public facilities—often does not receive adequate attention—whether the infrastructure is owned by federal, state, or local governments. This is especially so in times of tight budgets. Seldom, for example, are the likely cost and service consequences of not doing maintenance reported. If maintenance is deferred, this can result later in poor quality public facilities, reduced public safety, higher later repair costs, and poor service for the public—both citizens and businesses—including added vehicle wear and tear, sewer back-ups into homes, and flooded streets. In its final report to the President and the Congress in 1988 (*Fragile Foundations*), the National Council on Public Works Improvement made a strong case for reducing deferred maintenance.

Recent Initiatives Focusing on Maintenance. Recently, two major approaches have developed to deal with the too prevalent practice of deferring infrastructure maintenance. One requires the preparation of maintenance management systems as part of the planning and federal funding of state and local surface transportation projects under the Surface Transportation Efficiency Act of 1991 (ISTEA). The other is an initiative by the Governmental Accounting Standards Board (GASB) to develop guidelines for reporting information on capital assets.

GASB's work is expected to include guidelines on of reporting the condition of these assets, their ability to meet service needs, and the estimated cost (if any) to return assets to acceptable condition. GASB sets accounting standards to guide state and local governments, and it works with the Federal Accounting Standards Advisory Board (FASAB), a recently established body that recommends federal accounting standards and has also begun to consider capital expenditure accounting issues.

Under ISTEA, new construction of highways and transit facilities is no longer the central focus; good management and maintenance of existing facilities now receives emphasis. Three maintenance management systems are required before federal grants can be made. They cover pavements, bridges, and public transportation facilities and equipment. The purpose of these management systems is to develop proposals for optimal allocation of limited funds to help minimize life-cycle governmental and user costs. Analysis of maintenance needs is required, making use of inventory and condition assessment data. The analysis and resulting plans are required to be aired in public.

Other examples of maintenance planning are increasingly common among agencies directly responsible for facilities:

- The U.S. Army Corps of Engineers has a mature maintenance planning process for its navigation facilities that is directly linked to its annual budget process. It includes regular condition assessments and performance-based evaluations of facility operations in relation to the missions being performed. The process is a dynamic one that responds to changing needs. In recent years, as user fees have begun to fund a significant share of the Corps' maintenance costs, the-Corps has found itself in partnership with the Inland Waterways Users Board (IWUB) whose members pay the fees and are very sensitive to cash flow projections that reflect the relationship between revenues and expenditures. Conversely, IWUB is skeptical about traditional Corps rules based on net benefits to the national economy.
- New York City has established a regular condition survey of all its city-owned buildings and public facilities as a result of a city charter requirement enacted after the West Side Highway collapse several years ago. The survey is automated and provides well justified cost estimates of maintenance needs for the city's annual budget process.

- The U.S. Department of Energy is in the second year of a five-year effort to establish a Capital Asset Management Program (CAMP) based on condition assessments, life-cycle planning that evaluates alternative "what if" scenarios, and prioritization of maintenance needs in the context of changing departmental missions.

111. PRINCIPLES AND GUIDELINES ON MAINTENANCE

The task force recommends that federal, state, and local agencies apply the following principles and guidelines when they make decisions about the maintenance of capital assets. These principles and guidelines focus on two complementary approaches to improving the effectiveness and efficiency of maintenance: (1) planning and (2) accounting and reporting.

Planning for Maintenance

Maintenance Should Be Planned. Maintenance is too important to be just allowed to occur when the need for repairs arises. Federal, state, and local agencies should develop annual maintenance plans, with the objective of enabling the public assets to continue to deliver quality service in the most cost-effective manner.

Multiyear maintenance plans should be provided in support of the first-year plan and budget. These plans are needed to enable public officials to consider the future costs and service quality implications of various levels of maintenance, changing demands for service, and the implications of any maintenance that the plan defers. Routine maintenance as well as large-cost items, such as major repairs and rehabilitation, should be included. The plan should specify why major maintenance elements have been included, including external factors such as expected increases in the usage of facilities. In addition, intentional lack of maintenance or minimal maintenance strategies recommended because of declining demands for service or obsolescence of facilities, should be explained.

Assess Condition of Infrastructure. Agencies should regularly assess the condition of their infrastructure assets. This information is vital as an early step toward estimating maintenance needs.

Systematic, reliable, and efficient procedures should be used. Condition assessment is well developed for roads, bridges, and transit. It is less well developed for many other assets, such as water and sewer systems. Where adequate methodologies for condition assessment do not exist, research programs, new

technologies, and user review processes should be used to establish them.

Before the condition assessment, agencies will need to develop an inventory of facilities to include in the maintenance plan. The inventory should include relevant, significant characteristics of each facility (such as materials used, capacity, past loads, and past maintenance and problem history).

Infrastructure System Needs Should Be Reviewed Periodically. The planning process should also provide for periodic review of each infrastructure system for which an organization has responsibility (for example, the transportation system, the water system, and the school system). This can provide a much improved perspective on maintenance needs. For example, a bridge (or building or road or park facility) in poor condition might be found, based on information about future land use and demographic changes, not to be needed currently or in a few years—thus changing the cost-effectiveness of repair options. Obsolescence is an important consideration.

Explicitly Consider Future Maintenance Costs When Selecting New or Replacement Capital Assets, Including Low-Maintenance Design Alternatives. When procuring new facilities, or purchasing new capital equipment, or replacing or rehabilitating major components of existing capital assets, the planners and designers should consider future maintenance requirements and options to reduce future maintenance costs.

In some instances, this may lead to selection of assets with higher initial costs, but whose added cost is shown by analysis and experience to be more than compensated for by future savings on maintenance, as well as yielding more trouble-free service. For example, designing for more expensive materials in some instances can lead to less frequent repairs and reduced repair costs—and would minimize future service interruptions.

This analysis effort will require the agency to estimate such elements as future asset deterioration, the asset's service life for different maintenance options, the costs of various repair strategies, and the likely impacts of deterioration on such features as service interruptions, safety, and business impacts. The timing of the benefits and costs associated with each maintenance option should also be examined explicitly. These analyses should consider not only "immediate" performance, such as pavement rideability, water main breaks, and number of service interruptions, but also should consider other, longer-term impacts, such as safety, pollution, and costs to users of the facilities (including citizens and businesses) and costs to the local economy. If quantitative data cannot be obtained,

the best available qualitative information should be provided.

Such information, combined with information from regular condition assessments, will enable the government to make more informed decisions about the level and mix of funding needed and which maintenance-related activities to undertake and when.

Use "Value Analysis-Value Engineering." Agencies not doing so should incorporate some form of "value analysis-value engineering" and life-cycle costing into their development of maintenance strategies, at least for major repairs. This approach involves examining each element of a proposed asset, the asset as a whole, and the asset's relation to the overall service to which it contributes—to ascertain that the asset is really needed and is provided in the most cost-effective way possible.

Prioritize Maintenance Needs. Agencies should use regular condition assessments and other relevant information to prioritize maintenance needs. This information should include the importance of the asset (e.g., usage information), the likely impacts on service levels and performance, risks to health and safety, and costs to the government and users (assuming, as usually will be the case, that not all such needs can be funded right away). This will help the agency determine which maintenance actions should be undertaken and when, given funding constraints.

These priorities should consider the interrelationships of projects, for example, by combining lower priority with higher priority projects when doing so would substantially lower the overall costs while maintaining a standard of quality. This might occur, for example, if a lower priority road repair project could be combined with a higher priority underground pipe project so that the road work would need to be done only once.

Give Explicit Attention to Preventive Maintenance. As has been found often, "an ounce of prevention is worth a pound of cure." Too often, agencies have been faced with major needs to catch up on repairs, and preventive maintenance is neglected. This can lead to a never-ending cycle of playing catch-up, usually costing more and providing lower quality services to customers. Each agency should develop annual preventive maintenance work plans and budgets as a high priority. Adequate preventive maintenance planning requires a multiyear perspective, including consideration of designs based on life-cycle costs, performance, and usage of the asset as well as costs.

Communicate the Maintenance Plan Effectively. It is not enough for an agency merely to develop plans on its own without communicating with

those who will be affected. Federal, state, and local infrastructure agencies should communicate effectively about the plan with those who will be served and those who will have to act on it. This includes persons both within and outside the agency. Different communication approaches will likely be needed for the various types of users of the plan, such as department executives, cost-sharing partners, OMB, Congress, federal-aid recipients, federally regulated infrastructure agencies, the media, and the public. In most cases, communication should start early in the planning process and should be actively pursued as a two-way learning experience.

Use the Plan as a Means to an End. The goal of all infrastructure is to deliver services, and the goal of maintenance is to ensure regular, cost-effective delivery of those services. To be useful, plans must be carried out, and to be carried out, they must be manageable in scope, careful in their use of resources, and executed with commitment and persistence. Thus, the planning process should collect only the information needed and collect it only as often as needed. Planning and reporting should not become as big a job as the maintenance itself.

Accounting and Reporting for Maintenance

Report Condition of Infrastructure. Agencies should regularly report to upper management, elected officials, and the public the condition of their infrastructure assets. This reporting, using the latest available information, should occur at relevant times during the decisionmaking cycle (such as during preparation of the annual budget). The findings of the condition assessments process (discussed earlier) should be reported in a clear, understandable way.

Report Costs of Unfunded Maintenance. The costs of needed maintenance should be estimated by establishing condition standards for each capital asset and calculating the cost to return assets to an "acceptable" condition based on established standards. This amount should be reported annually to public officials and the public as part of the budget and financial reporting processes.

In many cases, no universally accepted standard may exist. Developing more than one condition level might be useful. For example, condition level might be categorized by different serviceability levels (e.g., a "minimally acceptable" and a "fully acceptable service" condition). A combination of expert and political judgment, along with citizen inputs, is likely to be needed to establish these standards. The standards, however, should be reasonably consistent over time to avoid being haphazard or manipulated.

By subtracting the amount of maintenance dollars budgeted from the cost to bring assets to acceptable condition, the agency can establish the amount that is unfunded. This cost estimate is sometimes called "unfunded maintenance" or "deferred maintenance."

As with the establishment of "acceptable" condition standards, unfunded maintenance costs might be presented for different serviceability levels, such as by reporting both the amount needed to return the assets to a "minimally acceptable" and to a "fully acceptable" level.

The cost of unfunded maintenance might also be categorized by priority/importance (e.g., high priority versus lower priority, based on each asset's usage and risk/safety/impact potential).

Report the Consequences of Unfunded Maintenance. Estimates of unfunded maintenance are important to enable management, elected officials, and citizens to obtain a more accurate picture of the financial condition of the government. The information on unfunded maintenance reported by the infrastructure agency should include not only the dollar gap but also the performance implications of the unfunded maintenance, including the risks to health and safety and likely economic losses. These estimates also indicate the magnitude of what might be a major deferred liability. The information, especially when tracked over time, also can encourage public officials to consciously and explicitly consider and take appropriate actions to correct the deficiencies and to gain support from the public for the corrections.

Agencies should include with maintenance budget requests estimates of likely consequences if the maintenance is not funded. This information should indicate the consequences of significant unfunded maintenance in terms of both cost and performance. Maintenance expenditures should be justified in the same performance terms as new construction so that these priorities can be considered in relation to one another (as well as other funding claimants).

Report Degree of Uncertainty. Agencies should identify and include in their maintenance-needs reports the extent of uncertainty in the estimates used by them in making their major maintenance decisions. Predicting the future (such as future usage and service life of a facility) is difficult at best. However, it is better to obtain the best available professional estimates on these elements than not to consider information on future costs, service lives, and performance.

The organization providing the estimates also should provide information on the key analytical assumptions made and the magnitude of the uncertainty in the estimates. This might be done, for

example, by providing ranges of estimates on the key numbers, rather than a single value. More sophisticated methods are available for estimating the magnitude of uncertainties, but these will not always be practical to use.

RESEARCH REPORT

**Infrastructure Assets:
An Assessment of
User Needs and
Recommendations for
Financial Reporting**

**Relmond P. Van Daniker
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CHAPTER 6—SUMMARY, RECOMMENDATIONS, AND FUTURE RESEARCH

Many state and local governments are facing critical problems in maintaining, rehabilitating, replacing, and expanding their infrastructure assets. Current generally accepted accounting principles permit the optional reporting of infrastructure assets information by state and local governments. The result is that few state and local governments include infrastructure assets information in their financial reports. This research study was designed to assess the needs of selected financial report users for information relating to infrastructure assets and to determine recommendations for financial reporting. This chapter is divided into two sections. The first section contains a summary of the results and a list of specific recommendations. Specific areas for future research are identified in the second section.

Summary

Five groups of individuals presumed to be governmental financial report users were selected to participate in this study: academic, investor, citizen, management, and legislator groups. A total of 677 questionnaires were returned of the 1,321 mailed to participants, which represents an overall response rate of 51 percent.

One objective of the project was to determine whether the selected participants are actual users of governmental financial reports. As shown in Table 4-3, the percentage of users ranged from 64 percent to 99 percent. Seventy-four percent of all respondents reported that they are users of governmental financial reports. As Table 4-4 indicates, the majority of respondents have 10 or more years of experience in their professions, indicating that they may be considered experienced financial report users.

Deferred Maintenance

Deferred maintenance has been identified as a major infrastructure problem. An appropriate definition for deferred maintenance, an acceptable measure of deferred maintenance, and the appropriate disclosure of deferred maintenance information in the financial report were investigated. Most respondents indicated that defining deferred maintenance as "the delayed repairs and upkeep that would be required to restore an asset to its full operating capacity" was an acceptable definition. (See

Table 4-5.) However, several suggestions were received for substituting *normal operating capacity* for *full operating capacity*. There appears to be a substantial demand for presenting deferred maintenance information in financial reports. At least 84 percent of the academic, investor, legislator, and citizen groups were in favor of presenting deferred maintenance information in the financial reports; however, only 52 percent of the management group wanted the information included in the reports. (See Table 4-6.) Among those respondents who favor disclosure, the estimated current cost of eliminating deferred maintenance was accepted as an appropriate measure. No single section of the financial report was preferred by a majority of the respondents for disclosing deferred maintenance information. There was little support, however, for disclosing the deferred maintenance information in the introductory section.

Types of Information for Infrastructure Assets

Historical cost, replacement cost, constant dollar cost, budget to actual information, financial plans information, and engineering information were evaluated for their usefulness in meeting specific reporting and accounting objectives. The following specific objectives for infrastructure assets information were adapted from the objectives set forth in NCGA Concepts Statement 1, *Objectives of Accounting and Financial Reporting for Governmental Units*:

- To provide information useful for forecasting the cost of maintaining the infrastructure assets
- To provide information useful for forecasting the cost of replacing the service potential of the infrastructure assets
- To provide information useful for forecasting the impact on short-term financial resources of planned programs relating to infrastructure assets
- To provide information useful for determining the service potential of the infrastructure assets
- To provide information useful for determining whether the service potential of the infrastructure assets has been maintained during the period
- To provide information useful for determining the cost of the infrastructure assets in a manner that facilitates analysis and valid comparisons among time periods and with other governmental units
- To provide information useful for determining whether the infrastructure assets have been managed effectively

- To provide information useful for determining whether the governmental unit has a significant deferred maintenance problem
- To provide information useful in achieving full and fair disclosure in the financial reports.

In addition to these objectives, two other objectives were considered important in evaluating the six information types: the overall usefulness of the information and the usefulness of a schedule of additions and retirements. The respondents used a seven-point scale similar to the Likert scale to indicate their evaluations of the usefulness of each piece of information for each objective.

Historical Cost

Historical cost was considered by the respondents to be of limited usefulness in meeting 7 of the 11 specific objectives. For all five user groups, the mean ratings of historical cost were 3.0 or above on only three objectives: for determining the cost of the infrastructure assets in a manner that facilitates analysis and valid comparisons among time periods and with other governmental units, in achieving full and fair disclosure in the financial report, and in preparing a schedule of additions and retirements for infrastructure assets.

The academic group generally rated the usefulness of historical cost significantly lower than did the four other groups. (See Table 4-9.) The mean ratings of those four groups were generally similar. (See Table 4-10.) In comparison with the other information types, historical cost was generally rated lowest on each objective. (See Table 5-12.) This is further reflected in the last-place ranking given to historical cost by all five groups. Respondents who are in favor of presenting historical cost information most frequently cited the financial section as the preferred location for the information. (See Table 5-15.)

Replacement Cost

Replacement cost was generally reported to be moderately useful in meeting most of the specific objectives and was rated 4.7 or above by all groups for forecasting the cost of replacing the service potential of the infrastructure assets. In comparing the five groups, management generally rated replacement cost significantly lower than did the other groups. (See Tables 4-12 and 4-13.)

In comparison with the other types of information, replacement cost was generally rated higher than constant dollar cost and historical cost but lower than engineering information. With the exception of the management group, there was substantial support for reporting replacement cost information in the financial report. (See Table 5-14.) The statistical section was chosen most frequently by those respondents who prefer presenting replacement cost information in the financial report. (See Table 5-15.)

Constant Dollar Cost

Constant dollar cost was generally rated higher than historical cost on most objectives. Constant dollar cost was evaluated to be most useful in determining the cost of the infrastructure assets in a manner that facilitates analysis and valid comparisons among time periods and with other governmental units. In a comparison of the five groups, the legislator group generally had significantly higher mean ratings. Constant dollar cost was considered to be more useful than historical cost but less useful than the four other types of information. (See Table 5-12.) In general, most of the respondents indicated that constant dollar cost information need not be disclosed in the financial reports. If constant dollar cost information is reported, the statistical section appears to be the appropriate location. (See Table 5-15.)

Budget to Actual Information

Budget to actual information was generally rated moderately useful by the five groups for all objectives except one. Budget to actual information has limited usefulness for determining the service potential of infrastructure assets. The ratings of budget to actual information on all other objectives were 3.0 or above. A comparison of all the ratings reveals that the management group generally rated budget to actual dollar information lower than did the other groups. (See Table 4-16.)

Most respondents in all groups prefer presenting budget to actual information in the financial report. (See Table 5-14.) Only 58 percent of the management group favor presenting budget to actual information in the financial report. This type of information is the only type that a majority of management favor presenting. Budget to actual information was generally rated higher than historical cost and constant dollar cost but lower than engineering information and financial plans information. Most of the respondents in the five groups indicated that the financial section

was the appropriate location for budget to actual information. (See Table 5-15.)

Financial Plans Information

Financial plans information was generally rated as being moderately useful by the five groups. Financial plans information was rated highest for forecasting the impact on short-term financial resources of planned programs relating to infrastructure assets. (See Table 4-19.) The management group generally gave financial plans information significantly lower ratings than did the four other groups. In comparison with the other types of information, financial plans information was considered to be the first or second most useful type of information to be included in financial reports for infrastructure assets. (See Table 5-12.) Half of the respondents in the management group and over 80 percent of the respondents in the other groups prefer presenting the information in financial reports. (See Table 5-14.) Generally, respondents prefer presenting the information in the statistical section.

Engineering Information

Since the engineering information used in this project was not financial in nature, the information was not evaluated on those objectives that involved costs. Engineering information was considered by all five groups to be either moderately or highly useful in meeting all objectives. Engineering information was rated 4.0 and above by all groups on all objectives, except in achieving full and fair disclosure in the financial reports. (See Table 4-22.)

The management group generally rated engineering information significantly lower than did the four other groups. Engineering information was considered the most useful of the six information types. Four of the five groups substantially supported presenting engineering information in the financial report. The management group was almost evenly divided on whether the information should be presented. (See Table 5-14.) The statistical section was the location most frequently chosen for engineering information by those respondents favoring presentation. (See Table 5-15.)

Prior-Period Information

Disclosing information in financial reports that cover prior periods can be useful in determining trends. For each of the six types of information, the issue of presenting prior-period information was addressed. The questionnaire contained specific questions regarding the number of prior periods to be presented and the location of the information in the financial report. The highest percentages of the five groups indicate that no prior-period information based on constant dollar cost needs to be disclosed in the financial reports. For the five other types of information, a majority of each group reported that some prior-period information should be presented. (See Table 5-16.) Most respondents chose five years as the appropriate number of prior periods to be disclosed. If five years of information was actually provided, the needs of those individuals who indicated fewer than five years also should be met.

If respondents want prior-period information reported in the financial reports, an appropriate location must be determined. Based on survey responses, most respondents favor presenting replacement cost, financial plans information, and engineering information in the statistical section. Respondents generally favor presenting budget to actual information in the financial section. Respondents prefer the statistical section if prior-period constant dollar cost information is presented. There was little agreement among the five groups on the location of prior-period historical cost information. The academic group favors presenting prior-period historical cost information in the financial section. The management, legislator, and citizen groups prefer the statistical section. The investor group was evenly divided between presenting the information in the financial section and in the statistical section. (See Table 5-17.)

Recommendations

Based on an analysis of the survey data, the following infrastructure assets information recommendations are made:

Deferred Maintenance

- Deferred maintenance should be defined as "delayed repairs and upkeep that would be required to restore an asset to its normal operating capacity."

- The appropriate measure of deferred maintenance is the estimated current cost of eliminating the deferred maintenance.
- Deferred maintenance information should be disclosed in the financial reports.
- Disclosure of deferred maintenance information should be in either the financial section or the statistical section, but not the introductory section, of the financial report.

Historical Cost

- Historical cost information for infrastructure assets does not need to be presented.
- If historical cost information is presented, it should be presented in the financial section of the financial report.
- If prior-period historical cost information is presented, five years of information should be presented in the financial section or the statistical section.

Replacement Cost

- Due to inconclusive findings, a specific recommendation for replacement cost is not appropriate. If replacement cost information is to be presented, it should be presented in either the financial section or the statistical section.
- If prior-period information for replacement cost is presented, a period covering five years should be shown in the statistical section.

Constant Dollar Cost

- Constant dollar cost information does not need to be presented in financial reports for infrastructure assets.
- If constant dollar cost information is presented, it should be presented in the statistical section.
- Prior-period constant dollar cost information does not need to be presented. If it is presented, five years of information should be presented in the statistical section of the financial report.

Budget to Actual Information

- Budget to actual information should be presented in the financial section of the financial report.

- Five years of prior-period budget to actual information should be presented in the financial section of the financial report.

Financial Plans Information

- Financial plans information should be presented in the statistical section of the financial report.
- Five years of prior-period financial plans information should also be presented in the statistical section.

Engineering Information

- Engineering information should be presented in the statistical section of the financial report.
- Five years of prior-period engineering information should be presented in the statistical section.

Other Findings

The results of this project highlight a demand for information in addition to traditional accounting information. Engineering information best illustrates the demand, since engineering information was rated highest on most of the objectives on which it was evaluated. An analysis of the survey responses highlight another finding—that respondents generally rated historical cost lowest. Although the limited usefulness of historical cost is not a new discovery, this research confirms the lack of relevance of historical cost information to most financial report users. This research also confirms the limited demand for constant dollar cost information. Members of the accounting profession must recognize that there are other types of information that are probably more useful to financial report users than historical cost or constant dollar cost.

Future Research

This project presents an initial study on the financial reporting of infrastructure assets in financial reports of state and local governments. The problems associated with infrastructure assets are enormous and complex and cannot be completely studied in a single research project. Certain topics have been deferred for future research. As is true with most research projects, additional ideas and topics became evident as the project progressed. Additional topics that have been identified for future research are discussed in this section.

Five groups of state and local governmental financial report users—academic, investor, citizen, legislator, and management—were surveyed. Other groups of potential and actual users of financial reports can be identified and should be considered for future research on this topic.

The 75 most populous cities were included in this survey because it was anticipated that those cities would have most of the infrastructure assets problems and would be most likely to have knowledgeable staff who would respond to the survey. There are thousands of smaller local governments—smaller cities, towns, villages, counties, and townships—that have infrastructure assets. Whether officials of smaller local governments would respond to questions on the questionnaire in a manner similar to the largest cities is an empirical question that should be researched. If smaller local governments have unique infrastructure assets problems, then additional research is necessary.

Congressional committee staff members and state legislative taxation and budgeting committee members and staff were chosen as being representative of legislative bodies in this project. This group was believed to be familiar with some of the issues and topics addressed in this project. Determining if this group is a good surrogate for all members of legislatures is an empirical question that should be investigated. Legislative bodies at the local-government level represent another category of financial reports users that should be surveyed.

As the GASB addresses the reporting of and accounting for infrastructure assets, the needs and concerns of auditors of the financial statements will need to be considered. Auditors need to determine if infrastructure assets information should be covered by the audit report. If so, then the actual method of disclosure will need to be determined.

Many of the respondents indicated a strong interest in the concept of deferred maintenance. An acceptable definition and an acceptable measure for deferred maintenance were determined. Although estimates of the current cost of eliminating the deferred maintenance problems generally were found to be acceptable, there may be other measures that are more appropriate. Additional research on alternative measures of deferred maintenance may be fruitful. Joint research between members of the engineering profession and members of the accounting profession may be particularly useful in addressing various deferred maintenance issues. In addition, research on the uses of deferred maintenance information should be conducted.

Overall, engineering information is considered highly useful for the objectives developed for this project. The replacement cycle and aging schedule were chosen to illustrate various types of engineering informa-

tion. There are many other types of engineering information that could have been provided. A joint project of the engineering profession and the accounting profession to compile and evaluate the alternative types of engineering information would represent a good starting point.

GUIDES TO MANAGING URBAN CAPITAL, vol. 4
Harry P. Hatry and George E. Peterson, Series Editors

GUIDE TO SELECTING MAINTENANCE STRATEGIES FOR CAPITAL FACILITIES

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INTRODUCTION AND SCOPE

This report focuses on the process by which local governments, especially their operating agencies, select the type and amount of maintenance for their capital facilities. This report uses the following definitions: The term *facilities* includes streets, bridges, sewer lines, water mains, public buildings, or any other major element of a jurisdiction's infrastructure system. *Facility maintenance* includes both activities typically included in the capital budget (such as the replacement, reconstruction, and rehabilitation of facilities) and more routine operation and maintenance activities such as painting, patching, emergency repairs, and trouble shooting, whose funding is contained in the operating budget. This report has the following three objectives:

1. To identify the current processes that local governments use to select the type and amount of maintenance for their capital infrastructure.
2. To provide illustrations of those processes that appear to have widespread applicability. These illustrations seldom contain ideal procedures; nevertheless they represent constructive attempts to make the determination of maintenance strategies more systematic. These illustrations are presented here to encourage more such activity.
3. To provide recommendations to local governments for ways to improve their selection of strategies for maintaining capital facilities.

In any period, good times or bad, putting public funds to their best possible use is just good government. In times when revenue resources are quite

scarce, governments have a special responsibility to use their funds for the most cost-effective purposes. This certainly applies to the maintenance of capital facilities. Governments should fund projects that provide the maximum level of service with minimum cost. The corollary is that governments should not put funds into relatively expensive maintenance approaches (e.g., rehabilitation or repair) when less expensive options (e.g., prevention or ongoing maintenance and repair) would be effective.

Agencies need to determine at least annually which facilities need some form of maintenance, what specific form of maintenance should be applied, and what total level of facility maintenance is appropriate (and can be afforded) for the year.

Unless operating agencies have a sound way to address these issues, the priorities that they recommend to central officials are likely to be faulty.

In addition, to the extent that agency proposals are backed by evidence, the government's chief administrative or executive officer and elected legislative officials should be better able to obtain support for individual proposals and for the proposed budget funding levels (those for both the capital and operating maintenance budgets). Typically, the lack of information currently provided to central officials to support proposals makes the review process highly subjective and subject to chance judgments. As a result, otherwise laudatory proposals are more susceptible to being dropped, perhaps to be replaced by less cost-effective proposals.

Agency personnel sometimes blame politicians and other elected officials for not having the courage

to press for a more expensive investment program with sizable, long-term payoffs for the community. But weak backup justification for capital project proposals puts elected officials out on a limb with little timber—in the form of backup evidence—to support their position.

Scope

This report explores procedures for examining ways to maintain capital facilities and the issues involved. It focuses on the maintenance of *existing* facilities.

The examples used in this report primarily, but not exclusively, concern roads, bridges, water distribution systems, and wastewater collection systems (i.e., sewers). This report is not organized by service, but rather by type of procedure used to identify the appropriate maintenance strategy for particular facilities. The examples used to illustrate any particular type of procedure are drawn from more than one service, for example, both roads and sewers. Most procedures appear applicable to many services, and this report tries to highlight this similarity. As a result, personnel from individual service areas may find the report less specific to their interests than they would like, but the authors hope that these readers will agree that most if not all of the principles discussed are adaptable to their own services.

This report does *not*—

- Examine procedures for assessing options related to expansion or growth of the community (although many of the issues discussed here should apply as well to growth issues).
- Examine in detail how an agency can project the *demand* for the capital facility, for example, how an agency can estimate the future average daily traffic for road systems, the future need for water and sewer capacity, or future bridge traffic. Such projections are beyond the scope of this document.
- Attempt to identify specific optimal maintenance options, but rather the process by which such options can be selected.
- Examine the detailed engineering design process, such as the process by which technical staff select a specific design for a replacement bridge.
- Examine procedures for assessing the condition of facilities. This is an important part of the process of initiating maintenance options,

but it is covered in a separate report in this series.¹

- Examine procedures for comparing and making trade-offs between facilities in different services. This topic is also covered in a separate report in this series.²

This report, it should be emphasized, deals with determining the best ways to maintain existing capital facilities—regardless of *whether these ways actually require capital funds*. This report takes the view that maintenance efforts funded from the operating budget are important options for local governments in maintaining capital facilities. Thus, the report discusses noncapital, as well as capital, budget actions for maintaining facilities.

Study Methodology

Information for this report was obtained from these sources:

1. We examined the professional literature in the public sector, especially that on roads, bridges, and water and sewer distribution systems, including publications such as the *Journal of the American Waterworks Association*, *Public Works*, and *American City and County*, which describe the activities of local and state agencies. The team also examined materials from organizations such as the Asphalt Institute, the Transportation Research Board, the U.S. Department of Transportation, and the U.S. Environmental Protection Agency, which are rich sources of information on applied research efforts.
2. We examined literature on capital budgeting, engineering economy, and operations research in academia and the public sector. Much of the academic literature focuses on private-sector issues and on present-worth, return-on-investment analyses.³ Much of this work is quite technical, and some, particularly the more recent literature, also dwells on tax issues of little interest to public-sector agencies. The public-sector literature on capital budgeting and planning has focused almost exclusively on the overall capital budgeting process and has very seldom delved into details involving the selection of detailed maintenance options.⁴
3. We used the findings from our parallel examination of central priority-setting practices.⁵ That

work included interviews with central staff in a random sample of twenty-five cities with populations between 125,000 and 500,000 plus an examination of written materials provided by twenty-two of those governments. Although that effort focused on the central review process and not the operating agency process, it nevertheless provided useful information on the type of information operating agencies give central reviewers.

4. We undertook a series of field visits and field interviews with personnel in ten local governments (Dallas, Dayton, District of Columbia, King County (Washington State), Milwaukee, Minneapolis, Montgomery County (Maryland), New York City, Savannah, and Seattle) and three special districts (Little Rock Municipal Water Works, Port Authority of New York and New Jersey, and the Washington (D.C.) Suburban Sanitary Commission). These were governments (or special districts) that a preliminary survey had indicated were using systematic approaches to capital maintenance planning and budgeting in at least some of their operating agencies. (None of these thirteen was included in the twenty-five-city sample described earlier.) We interviewed approximately 137 people in these thirteen organizations, including 51 persons in transportation agencies, 52 in water and sewer agencies, plus 34 persons in central offices of the governments. At each site, and for each operating agency, we reviewed written materials that documented or illustrated the types of procedures used to help the agency examine facility maintenance options. In the agencies responsible for roads, bridges, water distribution, and wastewater collection, we identified the procedures used to: (1) assess facility condition, (2) set priorities within the service area, and (3) examine maintenance options.
5. We also interviewed personnel from four federal agencies about their procedures for capital investment selection. These were the U.S. Army Corps of Engineers (especially active in the area of cost-benefit analysis for projects such as flood control), the Postal Service, the Veterans Administration, and the General Services Administration. These agencies have considerable resources, at least by local government standards. Those procedures that seemed particularly applicable to local governments, have been included in this report.
6. We obtained materials and suggestions from members of our project advisory group and mem-

bers of the Urban Consortium Task Force on Management, Finance, and Personnel (representing large city and county governments) on their local governments' practices.

Remaining Chapters

Chapter 2 discusses the various maintenance strategies and options that we found to be used by local governments. Chapters 3 through 5 discuss individual analytical approaches that we observed in use, at least on occasion, and present examples from the local agencies that were examined. These approaches have been categorized into three basic types: (1) procedures for setting priorities as to which particular capital facility projects will be in the operating agency's maintenance program (chapter 3); (2) "failure analyses," which relate facility failures (breakdowns) to various characteristics of the facility and its environment to identify facilities that are most at risk of "failing" (chapter 4); one subclass of this type of analysis is the "life," or "survival," study that examines the rates of deterioration of facilities; and (3) economic comparisons of various maintenance alternatives for any given type of facility, such as road pavements or water mains (chapter 5). Chapter 6 discusses the important role of new technology and the need to consider it explicitly when selecting maintenance options. Chapter 7 provides summary findings and overall recommendations.

The emphasis in this report is to present, wherever possible, examples of work that has been done by, or for, a local government, particularly work done by government employees. On occasion, the report includes examples from other levels of government and from work done by consultants, when the procedures appear to have broad applicability for local agency use.

The examples of systematic approaches to selecting among maintenance options for capital facilities in chapters 4 and 5 are *all* those found in the governments we examined. We have made no attempt to dress these examples up. Most are far from ideal procedures, but they appear to represent the current state-of-the-art as it is being applied in local governments today.

The examples are not presented in a how-to-do-it format. Most of the full procedures are too detailed and too complex to describe in a few brief paragraphs. Rather, interested agencies are encouraged to contact the agencies directly for further details.

MAINTENANCE STRATEGIES AND OPTIONS

Important questions that local governments need to address in planning and budgeting for their capital facility maintenance include the following:

- Which facility components should be “maintained” during each year?
- What particular type of maintenance treatment should be applied—preventive maintenance? emergency maintenance only? rehabilitation? replacement?

More detailed questions include these:

- What is the condition of the existing infrastructure? (As noted earlier, condition assessment procedures are covered in a separate report in this series.) How does one item of infrastructure compare with another in condition, importance, and overall need for maintenance?
- Can preventive maintenance effort reduce the amount of future, and more expensive, repairs (or replacements) while also reducing the future incidence of service disruption and citizen inconvenience? To what extent does preventive maintenance increase the “life” of capital facilities? What types and what intervals of preventive maintenance are needed to accomplish these savings?
- Conversely, are there situations in which it would be less costly *not* to undertake advance maintenance, rehabilitation, or replacement activities, but rather allow the capital items to degrade or fail—because the estimated consequences in cost, service disruption, and cit-

izen inconvenience (and associated liabilities) are low compared with the cost of advance repair.

- Are new maintenance technologies, materials, or procedures available that make new maintenance methods more cost-effective than the ones currently being used?
- Would abandonment, sale, or leasing of the facility be preferable to undertaking major rehabilitation or replacement, permitting other parts of the infrastructure to take up the load? Are the overall cost savings, compared with reduced service levels and citizen inconvenience, large enough to warrant the abandonment?
- Which maintenance approach should be used in any particular instance?
- What are the consequences if maintenance is deferred one more year (i.e., to the next budget)?

We found in use a number of basic strategies for maintaining capital facilities. These are discussed in the following section.

Basic Maintenance Strategies

In examining the operating agency practices of city and county governments, we found a number of basic general strategies in use. These strategies are first briefly identified and defined and then each is discussed in more detail. These strategies are listed in exhibit 1.

EXHIBIT 1 BASIC FACILITY MAINTENANCE STRATEGIES

1. *Only Do Crisis Maintenance.* Do only that maintenance that has to be done. This is a purely reactive approach.
2. *Worst First.* Repair (or replace) those infrastructure components of capital facilities that are in the worst condition, thus basing choices primarily on information about the condition and level of problem.
3. *Opportunistic Scheduling.* Repair or replace defective components when other related work is scheduled.
4. *Prespecified Maintenance Cycle "Standards."* Select and follow a set repair cycle; for example, resurface particular types of roads every so many years.
5. *Repair Components "At Risk."* Identify and repair those infrastructure segments most likely to have major problems in the near future, even though the current condition of the segments is not known to be a significant problem.
6. *Preventive Maintenance.* Install a systematic maintenance program to reduce the need for later, and presumably more costly and more disruptive, repairs. Such a program typically involves a scheduled program, including regular inspections and relatively light maintenance.
7. *Reduce the Demand for and Wear and Tear on the Facility.* Reduce the need for maintenance activity by reducing the demand on the facility and thus the wear and tear. A variation is to alter the original construction or rehabilitation design so as to make the item easier and less costly to repair.
8. *Economic Comparison of Alternatives.* Undertake some systematic economic analysis to decide which segments to repair and in what way. The analysis is intended to help an agency select which of the previous maintenance strategies, and what specific maintenance treatment, is most appropriate.

These strategies are not mutually exclusive; an operating agency can undertake more than one strategy. In fact, most agencies probably use some combination of these.

1. *Only Do Crisis Maintenance.* Do only that maintenance that has to be done. This is a purely reactive approach.
2. *Worst First.* Repair (or replace) those infrastructure components of capital facilities that are in the worst condition, thus basing choices primarily on information about the condition and level of problem.
3. *Opportunistic Scheduling.* Repair or replace defective components when other related work is scheduled, thus saving money. For example, repairs to sewers or water mains would wait until street repairs are scheduled.
4. *Prespecified Maintenance Cycle "Standards."* Select and follow a set repair cycle; for example, resurface particular types of roads every so many years.
5. *Repair Components "At Risk."* Identify and work on those facilities most likely to have major problems in the near future, even though the current condition of the segment is not known to be a significant problem. (Age, for example, is often used as a criterion for components at risk, but a number of recent analyses have indicated that other characteristics such as material, size, traffic volume, and soil conditions, are more important.)
6. *Preventive Maintenance.* Install a systematic preventive maintenance program to reduce the need for later, and presumably more costly and more disruptive, repairs. Such a program typically involves a scheduled program, including regular inspections and relatively light maintenance such as cleaning or flushing pipe, painting bridge components to avoid bridge corrosion, and sealing road joints to delay the need for resurfacing.
7. *Reduce the Demand for and Wear and Tear on the Facility.* This strategy is to reduce the need for maintenance activity by reducing the wear and tear on the facility through (a) designing the original construction, replacement, or rehabilitation so that the facility is subsequently easier and less costly to repair or (b) introducing fees based on amount of use to reduce the demand for the service.
8. *Economic Comparison of Alternatives.* Undertake some form of systematic trade-off analysis to de-

cide which segments to repair and in what way. The analysis is intended to help an agency select which of the previous maintenance strategies, and what specific maintenance treatment is most appropriate. This analysis would consider the cost, the number and extent of potential future service disruptions and their implications, and the various risks involved in not undertaking the repair of the segment. We rarely found this strategy to be an ongoing activity. Most often it was used highly selectively, usually for particularly costly facility maintenance projects.

The remainder of this section discusses and provides examples of each of these strategies.

Only Do Crisis Maintenance

Most operating and central personnel seemed to agree that relying solely on crisis maintenance was undesirable. This strategy is used primarily when a government at a particular time is under severe revenue constraints or when elected officials believe it is better to crack down severely on expenditures in order to lower, or at least maintain, existing tax rates.

In the immediate short run, this strategy will be the cheapest, but deferring maintenance may lead to a buildup in future maintenance requirements and, in later years, reduce service quality and increase service interruptions. The extent to which these problems occur depends on how long maintenance is deferred and the rate of deterioration.

There may, however, be situations for which it is cost-effective not to do any work until a breakdown occurs, for example, when breakdowns are unlikely to be severe, when early work is unlikely to produce much gain in service life, and when early work is expensive. Cost comparisons undertaken by New York City for its ten-year capital needs assessment indicated that, even considering liability costs, advance replacement of certain of its water mains that had relatively large rates of breaks would take in one case 280 years and in another 490 years before the investment would be recouped in the form of lower annual break repair costs. (There may be other reasons for making the replacements, but in these instances economic savings is not one of them.)

We do not, of course, recommend that crisis maintenance be the dominant maintenance strategy, but it is important to note that even this disliked strategy can in some instances be cost-effective.

Worst First

The "worst first" is a widely used strategy. Many of the agencies examined for this study used some condition assessment procedure to identify the top candidates for specific maintenance efforts, particularly in the case of roads and bridges, and somewhat less so with water and sewer systems (where condition assessment procedures are less developed).

This strategy has the advantage of being based on information that is obviously relevant to choices, information on the condition of individual facilities. In recent years, there have been many developments in obtaining information on the condition of infrastructure segments. Local governments can take advantage of these developments to improve their own conditions assessment procedures.¹

The work of the Washington Suburban Sanitary Commission (WSSC) for Prince George's and Montgomery counties (Maryland) illustrates how this strategy can be applied. WSSC undertakes special studies of problems in areas with numerous stoppages and backups during intense rainfalls. To identify the nature and source of particular problems, the WSSC uses smoke-testing, dyed-water-testing, and flow-monitoring procedures. Specific actions are developed based on this information (e.g., enforcement of the local plumbing codes to disconnect illegal inflow sources such as roof drains connected to sanitary sewers, lining of sewers, and the repair of manholes that are permitting inflow).²

Similarly, condition assessment information and failure rates are used in Little Rock and San Diego. The Little Rock waterworks regularly replaces two-inch mains whenever a street scheduled for resurfacing in the coming year has had two or more problems in the past year, and regardless of street resurfacing plans if there were three or more problems in the past year. San Diego replaces old cast iron water mains and concrete sewers that have the highest sewage stoppage and water-main break rates.³

Dependence on condition assessment information, however, can be overdone. The basic drawback of this approach is that if condition is the only criterion or the dominant criterion used to establish priorities, it can lead to misallocations of funds.

Governments using condition and failure rate information seldom compare this strategy with other possible strategies—such as by estimating the long-run future cost savings or the amount of reduced service disruption that could occur with earlier rehabilitation or replacement. Such analysis could in-

dicating that it is better to repair some facilities whose current condition is not the worst, but where early repair or preventive maintenance has larger future payoffs. Underlying the decision is the relative value of avoiding stoppages and breaks (with their costs and user inconvenience) versus the added costs of rehabilitating or replacing the items in advance of breakdown, given that some of the facilities might not break down for many years. For example, the state of Minnesota determined that it was more efficient to allocate funds to preventive maintenance on slightly deteriorated, heavily traveled bridges than to repair more highly deteriorated but less trafficked bridges (see chapter 5 for more details).

Opportunistic Scheduling

We found a surprisingly large number of agencies using opportunistic scheduling as a major part of their maintenance choice process. The key advantage is the savings in cost if one agency can wait until another agency "breaks ground." When two types of repair, such as street repair and sewer or water-main repairs, are scheduled to be undertaken at the same location at about the same time, doing them jointly means the roadway can be torn up and replaced just once. This practice not only saves money, but also reduces service disruption and consumer irritation. The local agency may also be able to take advantage of work scheduled by a private utility or private construction firm, or other public entity such as a separate public utility. Some agencies schedule television inspections of sewer lines in advance of scheduled private or public construction or utility work to determine whether sewer rehabilitation should be done during that work.

This strategy requires, or at least encourages, close coordination of scheduling between agencies, including private and external public agencies. The governments examined in this study often had some provision for such coordination, but most also thought that such coordination could be improved, for both long-term and short-term (i.e., during the year) project planning.

The main disadvantage of this strategy is the danger that the government, on the one hand, excessively defers maintenance activities for extended periods of time while waiting for such opportunities, or, on the other, makes premature marginal improvements merely to take advantage of the other activity. Moreover, the cost (and disruption) advantages of joint projects can be illusory as these projects

sometimes do not actually eliminate major steps. For example, in combining street paving with utility work, costs and disruption may not be substantially reduced if temporary street paving is still required.

We found few examples of a local government's explicitly analyzing the potential cost savings from the joint work or the consequences of deferrals while awaiting joint opportunities. Nor did we find explicit attempts to determine under what circumstances such joint scheduling would lead to better choices of which facility segments to repair or replace.

It is reasonable for local governments that have already selected priority items for repair or replacement to seek opportunities for reducing the costs and inconvenience to the public by scheduling them in conjunction with other work when that other work does not overly delay the action. It is a matter of concern, however, if scheduling completely determines priorities rather than merely affecting them.

Here are some examples of opportunistic scheduling:

Minneapolis seldom has had multiple water-main breaks in the same block and thus believes it can wait for a street to be paved before repairing or replacing mains, such as mains with inadequate flows or pressures. The city estimates that by replacing mains during street-paving projects, it saves roughly 40 percent of the overall cost of a water-main replacement project. Most of its non-emergency water-main replacements are performed in conjunction with the city's residential paving program.

Minneapolis also links sewer repairs to the street repavement program. It undertakes television inspections of sewers under streets scheduled for paving in the coming year. Sewers that are judged unlikely to last thirty years (the expected lifetime of the new road surface) are scheduled for repair or replacement just before the street is paved. The lines, however, are installed prior to the paving projects, therefore requiring temporary street patches between the completion of the sewer project and the start of the paving project. Thus, the principal gain from joint road-repaving and sewer replacement projects is a lessening of public opposition to sewer projects on newly resurfaced streets; there is no significant cost savings.

Similarly, much of Dallas's sewer and water-main replacement activity is triggered by projects requiring roadway excavation. Dallas's Department of Public Works notifies the water utilities department of scheduled street excavations. The water department checks the main-break file for possible

problems (and for proper size, given the current and planned flow). The majority of pipe replacements occur in areas being excavated for other purposes. The water utilities department also routinely examines the need for replacing sewer pipe and fifteen-year-old and older water mains underlying all impending street and storm drainage improvement projects.

Opportunistic scheduling is also central to Dayton's street resurfacing and curb/sidewalk replacement programs. Dayton programs specific streets for resurfacing one year in advance of the actual roadwork to allow time for curbs and gutters to be repaired first. Before the city instituted this practice, newly surfaced streets were frequently torn up to repair or replace curbs and sidewalks.

The City of San Diego deletes as candidates for resurfacing those streets near or adjacent to a location scheduled for later major construction. The city resurfaces the street after construction is completed since the excessive use of the street by heavy construction equipment would greatly shorten the expected life of that street.

Pre-Specified Maintenance Cycle "Standards"

Many agencies reported attempts to adhere to regular rehabilitation or replacement cycles, such as painting bridges every seven years and resurfacing roads every twenty years. Although these cycle targets are popular, agency officials also pointed out that such cycles tended to be goals that were seldom adhered to, the intervals between repairs usually being much longer than the recommended standards.

Estimation of the *average* number of years before deterioration (and thus before the need for replacement or rehabilitation) seems useful for determining future long-term maintenance needs, but does not appear helpful in dealing with near-future maintenance decisions about individual facilities. Too many factors other than time affect deterioration of facilities (whether roads, bridges, water and sewer mains, or buildings). Average lifetimes will seldom match actual lifetimes (i.e., the actual time interval before individual facilities need rehabilitation or replacement). Basing rehabilitation or replacement decisions solely on average lifetime standards would lead to extra costs because about half the facilities would be prematurely replaced, and some facilities would have to be rehabilitated anyway prior to the average cycles.

The main use of such cycles is for long-range planning rather than for establishing which specific facilities should be repaired or replaced during the next year. If the cycles are sound, an agency can deduce whether in future years there will or will not be a major buildup in repair/replacement requirements.

The validity of the cycle values is questionable. The team found that many cycle values were obtained from some national estimate, such as from a national professional association, or were based on local experience. In both cases, the research on which the values was based was often done many years previously with little or no documentation available.

The actual deterioration of individual capital items is affected by many factors—not just age. For example, lifetime and deterioration rate are much affected by weather conditions (including the number of freeze-thaw cycles and the amount of salt used for roads and bridges), soil conditions, traffic conditions, the extent and quality of maintenance, the quality of construction in the original facility, as well as other characteristics of the facility and its specific location.

A few examples of the use of cycles are given in the following paragraphs.

The City of San Diego uses a twenty-one-year cycle for resurfacing its asphalt streets. The standard calls for slurry sealing in the seventh and fourteenth years with resurfacing in the twenty-first year. City officials are not sure about the basis for the standard, which was adopted many years ago, but believe it was based on a survey of San Diego streets performed about twenty years ago. City officials reported that the standard has never been met. The standard is used to make the initial determination of which streets will receive maintenance. Over the nine-year period from 1974 to 1982, San Diego's asphalt streets have been resurfaced an average of once every thirty-one years and slurry-sealed an average of once every eleven years. (Note that San Diego streets do not experience the stresses of freezing and thawing that can cause extensive damage. Therefore, their resurfacing intervals are likely to be longer than would be appropriate in many northern and rainy locations.)

Montgomery County, Maryland, tries to resurface secondary roadways with liquid and stone on a minimum cycle of every six to eight years, and primary roads with an asphalt resurface every ten to twelve years. The county's department of transportation reported that if the roads are not properly

maintained they will “literally self-destruct so that by the 16th year, they will completely deteriorate and require rebuilding.”

In 1979, the departments of budget and public works in King County, Washington, jointly undertook an examination of the seal-coating and overlay frequency standards used in its road maintenance program. King County used a target cycle of seven years for seal coating and fifteen to twenty years for overlays.⁴ The county’s study team could not find the specific derivations for these cycles, reporting that county roads personnel indicated that these were “generally accepted goals throughout the asphalt and concrete industries as well as other jurisdictions.” The team tried to check the validity of the seven-year seal-coat life cycle but because of the unreliability of the historical information available could not.

As part of the examination, King County surveyed other local governments in the State of Washington and the other state highway departments in the United States about the interval each used for overlays and seal coating. (King County asked the other local governments about actual repair frequencies as well as their targeted intervals.) Of the thirty-two states responding to the survey, eleven had numerical frequency targets for overlays and seal coats, sixteen relied primarily on engineering judgment, and the remaining five reported some form of a more systematic procedure, such as condition ratings, for determining frequencies. The other State of Washington local governments reported having intervals for ideal repair frequencies similar to those used by King County. In all cases, however, the actual frequencies differed widely from targets. When King County asked representatives from these jurisdictions the reasons for the difference between the desired and actual frequencies, the usual response was limited funds.

The King County study team concluded that frequency intervals are guidelines only, depicting an average life expectancy of a system’s roadway surface. Their utility is only marginal in dealing with individual road segments. The study team recommended that the county road engineer should develop and implement a systematic, objective method for determining specific maintenance needs.

Repair Components “At Risk”

Repairing components at risk is a more complex procedure. It involves identifying those characteristics

(of a particular type of facility) that are most closely related to failure and, thus, to service disruptions and inconvenience to the public. This information is then used to help design a repair-replacement-rehabilitation program that emphasizes preventive maintenance (or replacement) on the particular facilities with those characteristics. These facilities may be components whose current condition is not so bad as to give them a high priority under the “worst first” maintenance strategy. In a sense, this strategy is a form of preventive maintenance (discussed later), but here the maintenance generally involves a substantial effort usually requiring capital funds, such as for rehabilitation or replacement.

The advantage of this strategy is that, if the analysis is done well, future service disruptions and inconvenience are likely to be substantially reduced. Its primary limitation is that this strategy by itself does not consider whether a replacement program is actually worth the future reductions in emergency repair costs, service disruption, and public convenience. The strategy is likely to result in major rehabilitation or replacement work for some facilities that might not have failed for many years.

New York City’s water-main replacement policy included “at risk” analysis combined with opportunistic scheduling. New York’s first strategy is to replace components at risk. Its at-risk priorities are first to replace mains that have had multiple breaks, then unlined cast-iron pipe (generally pipe laid prior to 1930), and finally six-inch mains. These priorities result partly from its study of main breaks conducted in 1980 (and discussed in chapter 4). Opportunistic scheduling is also applied, since replacements under the second and third priorities are made primarily when street reconstruction is scheduled for other purposes. The street reconstruction program provided replacements for about half the total main-replacement program; individual projects are delayed if they can be constructed under a subsequent joint highway-water project.

This type of analysis—the identification of facility characteristics that are predictive of facility failure—is of considerable importance, and thus chapter 4 has been devoted to it. Some examples are given there; however, the study team found *systematic* procedures to identify at-risk facilities to be only rarely used. Although this strategy appears to have considerable potential usefulness, some form of economic analysis (discussed later) should be used along with it before final decisions on replacement or rehabilitation of specific at-risk facilities are made.

Preventive Maintenance

The City of Dallas has defined preventive maintenance as those repairs that can "interrupt the deterioration cycle and extend the life expectancy, thus avoiding more extensive and costly maintenance."⁵ A preventive maintenance program typically consists of a scheduled program of regular inspections and relatively low-cost maintenance, such as cleaning or flushing pipe, painting bridge components to avoid bridge corrosion, and sealing road joints to delay the need for resurfacing.

The concept of preventive maintenance is highly attractive. Its very name implies that relatively low-cost actions can be taken now that will prevent larger costs from being incurred in future years. The validity of this strategy (combined with repairing components at risk) is supported by studies of the New York City water distribution system and Savannah, Georgia, water and sewer systems, each of which indicated that a significant portion of the reported sewer stoppages and water-main breaks were accounted for by recurring problems in a relatively small portion of each system. These statistics imply that a program of preventive maintenance targeted at these high-risk segments would be an effective means of reducing future system problems. The Minnesota cost-benefit analysis of bridge maintenance options (described in chapter 5) reached the same conclusion, stating that "an ounce of prevention would in fact be worth a pound of cure."

In our discussions with agency personnel, we found a surprising lack of current emphasis on preventive maintenance. Many agencies wanted to do more but felt hindered by lack of funds. It also seems likely that the agencies did more preventive maintenance than they reported, but did not think of some of the things they were doing as preventive maintenance. Nevertheless, it seems clear that most local agencies do not explicitly and systematically consider preventive maintenance opportunities. And, as already noted, preventive maintenance programs have been particularly vulnerable to cutbacks when funding gets tight.

Even preventive maintenance can be wasteful if overdone—if its cost becomes large compared with the future costs it averts (including the cost of service disruption and inconvenience). Seattle, for instance, cut its sewer and water-main cleaning programs significantly with no apparent increase in complaints or problems. An analysis of television inspections showed that mains were being cleaned too frequently

and, in some cases, the frequent cleaning was doing more harm than good. Also, less frequent cleaning was needed for some of the newer lines that were plastic and easier to keep clean.⁶ Similarly, informal studies by Minneapolis and the Little Rock Water Works indicate that water mains that are cleaned but left unlined rapidly deteriorate to their state before cleaning; thus cleaning without lining the water main was found to be wasteful.

The Port Authority of New York and New Jersey has given some explicit attention to a preventive maintenance strategy. Its 1980 "guidebook" prepared by a special Operations Standards Division Maintenance Task Force suggests a more formal procedure for designing preventive maintenance efforts, but the guide does not give specific procedures for assessing whether preventive maintenance is desirable as compared to other alternatives.⁷

The guide identifies a number of factors officials should consider when selecting capital facilities to include in the preventive maintenance program and for determining the frequency of preventive maintenance:

- The deterioration rate of the item
- The criticality of the impact on facility operations if a breakdown of the item occurs, including the likely duration of the downtime
- The age and condition of the item
- Repair versus replacement costs
- Location (accessibility, visibility, etc.)
- Severity of service, rate of wear, corrosion, etc.
- Hours of use per day, week, month, year
- Seasonal requirements
- Environmental conditions
- Energy conservation conditions
- Agency safety requirements
- Federal and state regulations and local ordinances
- Expected life of item

Examples of preventive maintenance programs are as follows:

1. *Bridges*—New York City paints its major city-owned bridges every ten years to protect the steel against corrosion. The city's department of transportation is also attempting to sell an expanded preventive maintenance program consisting of bridge painting every eight years, bridge roadway resurfacing and resealing ev-

ery ten to fifteen years (to keep salt from rusting and expanding the roadways' steel reinforcing bars), and frequent maintenance or replacement of expansion joints on non-waterway bridges.

2. *Sewers*—Savannah, Georgia, has established a preventive maintenance group to clean sewer lines with repetitive stoppages, and has shifted work responsibilities to enable its lift station maintenance division to institute a program of regular inspection, pump lubrication, back flushing, and debris removal.
3. *Sewers*—Milwaukee has instituted a program of cleaning its trunk sewers every eighteen to twenty-four months. The cleaning frequency and method are based on an evaluation of past problems, current land uses, and complaints.
4. *Water Mains*—Relying on research conducted by the Cast Iron Pipe Research Association,⁸ the Little Rock Water Works encloses all fittings, used in water-main repairs with a protective polyethylene wrap. Other cities, including Minneapolis and Dayton, have installed a cathodic protection system to protect against soil corrosion. (But Dayton has since abandoned its system as not being cost-effective.)

Reduce the Demand for and Wear and Tear on the Facility

Local officials should consider whether they can somehow affect the wear and tear on capital facilities and thus reduce future maintenance needs—without reducing service quality. This strategy could take a number of forms:

- Encouraging the public to use the facility in such a way as to reduce unnecessary or incorrect use of the facility. The expanded use of time-based or location-based user charges is one approach sometimes proposed to accomplish this objective.
- Designing capital facilities to make them less subject to wear and easier and less costly to repair. A related action is to examine basic facility design standards (e.g., standards for bridge and wastewater treatment facilities) to determine whether maintainability is considered in their derivation. The local agency,

however, may not have much control over these standards.

- Assuring quality construction so facilities do not wear as fast or break down prematurely.

An example would be switching sewer or water-main materials to longer-lasting material. (For example, when the City of San Diego replaces water mains, it is switching from cast iron to asbestos cement pipe; other cities are also switching to more durable materials). Not only the design of the component but also the quality of construction is important. Poor construction (or reconstruction) will make the component harder and costlier to maintain. Hence, more quality control of construction can reduce future maintenance needs.

Another way to reduce demand and wear and tear is for a city to actively promote increased ridership on the city's bus system, to promote carpools and vanpools, and to encourage staggered work hours. This policy itself is not unusual, but Lincoln, Nebraska, is following this policy for the explicit purpose of reducing traffic congestion and peak hour traffic in order to defer widening of streets and to reduce the wear and tear on the roads.

Economic Comparison of Alternatives

None of the strategies just described calls for an explicit examination of the costs of an action and the consequences (such as on future service levels or number of disruptions). Nor do the previous strategies explicitly indicate what particular maintenance treatment to use for a particular facility (e.g., whether to rehabilitate or replace it). The role of the strategy of an economic comparison of alternatives is to examine systematically and explicitly the other maintenance strategies and specific maintenance and repair treatment options to determine the full cost and service implications of each. This analysis considers life-cycle costs (i.e., both initial investment costs and subsequent operating and maintenance costs) and future service levels (such as the number and extent of potential future service disruptions and their implications). Such analysis might, for example, find that the best strategy for some facilities at a given time is to repair only when absolutely necessary, while for others preventive maintenance is preferable.

The major disadvantages of this approach are its cost and the scarcity of local resources to undertake such analyses, especially on a regular basis. We found that most detailed analysis of options done by

local governments was contracted. Usually the work has been done only for very expensive items such as individual bridge construction projects or area storm or sanitary sewer construction decisions. Often such studies, which can be quite costly, were funded by the federal or state governments, or both.

Because of the importance of such systematic examinations, chapter 5 has been devoted to this subject, emphasizing practical approaches that local agencies themselves can undertake.

In general, local agencies appear to be doing little of this analysis. Local agencies such as public works departments, especially in the larger governments, have professional staff, such as engineers, potentially qualified to handle such analysis. What they appear to lack is experience (and perhaps interest) in economic analysis, but many are likely to have had some exposure to such related concepts as "engineering economy."

Chapter 7 suggests some reasons why local agencies are not doing more of such analysis.

Specific Maintenance Treatment Options for Individual Capital Facilities

In any given year, a local government has a number of possible options for each of its capital facilities

(such as for individual road segments, bridges, or individual segments of its water and sewer systems). These include five basic treatment options:

1. *Do nothing*, except emergency repairs when, and if, a need for them arises
2. *Apply preventive maintenance*
3. *Rehabilitate the item*
4. *Replace the item*
5. *Abandon/sell/lease the item*

How choices among these options might be made by local agencies is the central subject of chapter 5.

Most of these treatment options are self-explanatory, but abandonment is not a common one. We did, however, find some examples of its consideration (described in chapter 5). If land or buildings that are candidates for abandonment also are potentially attractive for leasing or sale to private developers, this may become a particularly attractive option. Local governments can sometimes obtain significant revenues for many years through leasing or selling the property and through the additional property taxes.

As chapter 5 indicates, we found a number of one-time, ad hoc examples but very few instances in which an agency undertook systematic examinations of these options on a regular, routine basis.

OVERALL FINDINGS AND RECOMMENDATIONS

Overall Findings

This section lists our major overall findings.¹ The detailed findings are contained in chapters 2 through 6.

1. *Opportunity for Reducing Cost or Improving Service.* Many of the examples in chapters 5 and 6 indicate that local governments can save considerable amounts of money by choosing cost-effective options for capital facility maintenance identified by valid analyses. (Note, however, that any attempt to validate the apparent savings was beyond the scope of this effort.) Chapters 3 and 4 also indicate that local governments can identify improved maintenance strategies, which should lead to improved use of government funds.

2. *Amount of Regular Systematic Examination of Maintenance Options.* On the whole we found that local government operating agencies undertook only a small amount of regular, systematic examination of maintenance strategies and particular options. Particularly lacking were regular efforts by internal agency staffs, even though staffs appear to have many quantitatively oriented, competent members (e.g., engineers). The lack of regular, systematic analysis and selection of maintenance strategies and treatments does not mean that different design options are not considered and analyzed as part of design engineering. This activity, however, does not normally involve the analysis of specific economic or social effects for alternative maintenance options; rather, design engineering is aimed at determining the preferred design for a given infrastructure seg-

ment—a subject not within the scope of this report. A partial exception occurs with choices between rehabilitation and replacement. In such cases, design personnel in many agencies do make such decisions explicitly, but again the decisions seem to be typically based more on engineering judgment than on formal analysis of economic and service impacts.

3. *In-House versus Contract Analysis.* Most major analyses of facility maintenance that were made were done under contract, not by local government employees themselves. Most of these were special-purpose, quite costly studies, for which major funding came from the federal or state government. Studies of wastewater treatment facilities were particularly common in the large governments. The main cost of such studies was for data collection, not for the subsequent comparison of options (i.e., not for the later cost-benefit, cost-effectiveness, or cost-comparison analyses). For example in wastewater facility studies, considerable effort is required to assess the condition of the system. This effort may include television and manhole inspections, and smoke and dyed-water testing of pipes. Such studies will probably continue to be done by outside contractors, if only because of their intermittent and sporadic nature.

4. *Existence of Comparisons of Preventive Maintenance versus Repair Options.* We found no examples of local governments regularly and systematically examining trade-offs between preventive maintenance activity (such as painting bridges or cleaning sewers) and other major options such as rehabili-

tation or reconstruction. This is not to say that governments do not subjectively or qualitatively consider these trade-offs, but specific, systematic, or quantitative comparisons were lacking. There were some one-time examples (such as cost-benefit analysis undertaken by the State of Minnesota discussed in chapter 5 and some recent attention by the Department of Transportation of the Regional Municipality of Ottawa-Carleton, Canada).²

5. *Presentation of Evidence on Impacts of Deferred Maintenance.* We found no examples in which a local government appeared to have developed a strong case, indeed any case at all, for the future savings or other benefits that would be gained if a maintenance effort was undertaken rather than deferred. There are, however, some states that have done this (e.g., see the effort in Utah discussed in chapter 5).

6. *Formal Requirements for Analysis of Options by Central Offices.* We seldom found any explicit requirement for analysis of maintenance options to be included as input into the central review process. This is likely to be one reason for the lack of regular, systematic analysis of maintenance options in operating agencies.

In our random sample of twenty-five (of approximately 100) cities between 125,000 and 500,000 population, only one, Lincoln, Nebraska, had an explicit written request for analyses of alternatives (and it had just introduced this request). The Capital Improvement Program (CIP) instruction manual in Lincoln contained the following request:

It would be desirable to conduct a cost-benefit analysis for all major projects and discuss viable, less costly, alternatives that can substitute for the project or achieve the same objectives, especially for those projects exceeding \$100,000. If it is not feasible to conduct such a cost/benefit analysis, please state reason in your transmittal letter.³

This somewhat hedged requirement encourages agencies submitting project proposals for the capital improvements programs to examine alternatives and to undertake some cost-benefit analysis. As of the time this report was prepared, we had not seen any specific examples of the application of this request, which was in its first year of implementation. This request was included in the Capital Improvement Program Instruction Manual transmittal from the mayor to all department heads. At this time it is not clear whether this will become a regular part of the capital improvement program/budgeting process.

We found one other example indicating interest by a central office in establishing a formal requirement for analysis of options. Austin's research and budget department considered a series of suggestions for modifying its capital improvements program process to require selected city departments to conduct cost-benefit or cost-effectiveness analyses on their major capital improvement program requests, with the research and budget office conducting project analyses for departments without the capability to undertake such analyses.⁴ However, this has not been implemented as yet.

7. *Extent of Decentralization of the Maintenance Strategies Selection Function.* Most examination of maintenance strategies and selection of maintenance treatments is highly decentralized; operating agency management determines what analysis, if any, should be undertaken and determines priorities. There were, however, a few instances in which a central analysis office played a major role in examining maintenance options (see, e.g., Savannah's water and sewer analysis in chapter 4, and King County's road seal-coating and overlay study cited in chapter 2), but these were primarily special studies rather than continuing efforts. Another exception occurs in states such as Washington, where receiving state funding depends on submission of specific cost-benefit kinds of analyses (see chapter 5). Even in these cases, however, it is by no means clear that the local operating agencies are using the information these techniques provide in their own internal process for establishing maintenance priorities.

8. *Existence of Formal Project Rating or Ranking Procedures.* A number of city and county operating agencies have formal procedures for rating and ranking potential projects. These procedures are based primarily on condition assessment information, which in some agencies is obtained systematically and in others, subjectively and judgmentally. These efforts, however, generally do not provide explicit estimates of the improvement in service levels or reductions in future costs expected from individual projects. Nor do they generally involve any explicit examinations of alternative ways to maintain the individual facilities.

9. *Existence of Occasional Analyses Comparing Maintenance Options.* We found a variety of special, one-time studies. These included both failure rate analyses (see chapter 4) and analyses of alternatives

(see chapter 5). Most of these did not use highly sophisticated types of quantitative analysis. The lack of sophisticated quantitative analysis in itself is not a weakness; the principal concern is that these studies may be leaving out major factors that should be considered. Nevertheless, such procedures as the Dallas analyses of water-main repair versus replacement appear to have wide applicability—to many different sizes and types of agencies.

10. *Influence of Federal and State Governments.* The federal government has greatly influenced the analytical work associated with major federal programs. For example, the federal government has sponsored and, in one way or another, funded much of the effort to develop road pavement rating systems. Also, the federal biennial bridge assessment requirements meant that assessment of bridge condition by inspectors exists in many, if not most cities. The federal requirement for infiltration/inflow (I/I) analyses and sewer system evaluation studies (SSESs) prior to approving grants for new major wastewater treatment facilities has led to a number of contractor studies for local governments containing comparisons of alternatives, often using quite sophisticated analytical procedures.

In addition, state governments have had some influence, particularly in the area of bridge and street condition assessment, partly because of their role as an intermediary between the federal and local governments. Many states have developed procedures, probably with the help of federal funds, to develop pavement management systems, to assess road conditions, and to examine road maintenance alternatives. Such state procedures as those presented in this report appear adaptable to local government needs.

11. *Use of Rules of Thumb and "Standards."* We frequently found operating agencies applying various rules of thumb to maintenance decisions, such as the choice of whether to clean a pipe, reline it, or replace it. Agencies also often used rules relating to the proper intervals between repairs or replacements. We attempted to determine the basis for these rules of thumb and standards to find out what evidence supported them.

Invariably, the basis was either "professional judgment," a study done many years in the past for which the backup data were not currently available, or some state or national standard whose applicability to the jurisdiction had not been verified. Rules of thumb often were ambiguous and old, based on

assumptions that were not known to current users and might not apply to current local conditions.⁵

12. *Consideration of Technology.* We found few examples of the examination by individual local agencies of the cost-effectiveness of new maintenance techniques. We found no examples of individual local governments using formal experimentation to test new approaches, that is, employing the new technology in one sample of facilities and the older technology in another, comparable sample.

13. *Use of Sophisticated Quantitative Techniques.* We found that local government operating agency personnel rarely used complex quantitative techniques. Most of the analyses conducted internally (as indicated in chapters 3 through 6) were cost comparisons using basic statistics and on occasion including present-worth analysis (with the use of discount rates to reflect the time value of money). Present-worth analysis is somewhat complex but it has become familiar to many technical people. With the advent of pocket calculators and the ready availability of interest rate tables, present-worth calculations can be easily made.

Sophisticated statistical analyses, large-scale computer modeling (such as simulation), and a variety of mathematical and operations research techniques were seldom used in the work undertaken by local agency staff.⁶ These techniques were used on occasion, however, in some contractor studies. Contractors are probably better able to undertake such special-purpose efforts because sophisticated techniques can be used more frequently in their work (e.g., in more than one jurisdiction).

We found two local agencies that had done preliminary work using the more sophisticated techniques, but in both cases the techniques had not become operational. One example was the Montgomery County, Maryland, highway priority allocation model discussed in chapter 3. The other was a "decision-tree expected-payoff table" approach prepared by staff in the City of Minneapolis to aid in decisions on bridge rehabilitation versus replacement.⁷ Both attempts appear to have run into implementation problems related to the complexity of the procedures.

We found almost no examples of uncertainty and risk analysis in which the probabilities of various negative events occurring are estimated and the possible consequences of such events examined. Ideally, examination of uncertainty and risk would be done for each maintenance option for a facility when ma-

for potential uncertainties exist in costs, facility life, future traffic, or other factors. Such analyses are used to give officials a clearer perspective as to the nature and likelihood of the risks that are associated with specific maintenance actions (or nonactions). The major example of attention to this issue is the flood plains analysis for Dallas (see chapter 5). For each flood-control option, flood damage was estimated for rainfalls of various sizes occurring with various frequencies. The analysis indicates the amount of frequency of damage expected, given that the city chooses an alternative that protects against rainfalls of a certain size but not against larger ones.

14. *How Is the Total Dollar Allocation for Various Types of Capital Facilities Determined?* The primary factor determining total capital or operating budget maintenance allocations for an agency seemed to be the amount determined centrally to be available for the year. The numbers were heavily affected by the previous year's funding level and projections of next year's revenues. We did not find any local government in which a service's funding level was determined by a formal, systematic examination of needs, such as by providing evidence that added funds could be applied to significantly increase service quality. Although we did not find formal systematic procedures, informal give-and-take probably permits the original budget levels to be increased somewhat if an agency makes the case for meeting a need exceeding the amount initially specified (with the amount based predominantly on revenue considerations). Even those agencies having formal rating and ranking systems (such as those described in chapter 3) did not appear to use them to determine the total size of the budget.

15. *Use of Citizen Input.* In few cases did operating agencies identify explicitly what level of service was acceptable to the public or systematically obtain public input into the analysis of facility maintenance. Twelve percent of the cities in our sample of cities between 125,000-500,000 population used citizen surveys to obtain input into the central review of capital proposals, but these surveys were not used to obtain citizens ratings of the condition of individual facilities or information as to citizen expectations regarding service levels. Citizen representatives, however, were often included in the central review process for capital improvement programs.⁸

Citizen input at the operating agency level appears to come primarily from complaints. Agency personnel often cited complaints as generating the

condition of facilities and, if complaints recur, for selecting projects for the capital improvement program or capital budget. In addition, some operating agencies have formal advisory boards that review capital project committees (e.g., a park and recreation board).

16. *Why Is Systematic Examination of Maintenance Options Not More Common?* A central question is why operating agencies do not undertake more systematic examination of maintenance options. Operating agencies, particularly the larger agencies, often have a considerable number of professionals, including many who have considerable technical background and could potentially undertake such examination. The reasons why agencies do not systematically examine options appear to be as follows:

- Operating agency staff are heavily involved with emergency and operational responsibilities, and most do not have the time to undertake such examinations. Contractors usually conduct the intense examinations that are done.
- Similarly, funds for such activities are very limited in local governments. And because of the technical limitations to be noted later, resources for analysis are not believed to be a high priority.
- The data needed to make comprehensive analyses—for example, information on each facility's physical characteristics and condition—are unavailable in most operating agencies.
- The analytical tools for using such data to undertake analyses of options have substantial weaknesses, in part because the agencies have had little experience with such tools and thus have not adapted them to their needs.
- Those parts of the analysis that require projections of the future have innate weaknesses, as do any attempts to forecast the future (including stock-market projections or projections of the economy for even several months, let alone one or more years, into the future).
- Operating agency personnel, particularly at the top level, are unaccustomed to such analysis and do not perceive its use and utility.
- Higher-level officials, both chief executive officers and other elected officials, have not insisted on the information for which the analyses are needed and are inexperienced in how the

information obtained might be used, e.g., to gain public support for capital proposals.

- Even when such analyses are undertaken and are subsequently transmitted for central review, the information may not be presented clearly and concisely so that central review officials can understand the material and its implications.

Some of these problems are inherent obstacles. Many, however, can be reduced, even if only gradually. For example, data on facility condition can be obtained, the various analytical tools such as those discussed in this report can be tried and refined, and improvements can be made in the communications between operating agencies, central review personnel, and elected officials.

Recommendations

Based on our examination we make the following recommendations for local operating agencies, local central management, and state and national organizations.

Recommendations for Local Operating Agencies

L-1 *Develop a more formal process for considering and selecting maintenance needs each year.* More systematic analysis of alternatives seems needed. Condition assessment procedures (discussed in another paper in this series), priority-ranking procedures (see chapter 3), and periodic failure analysis (see chapter 4) should be combined with basic comparisons of options, including economic analysis (see chapter 5), to help select which projects should be maintained, how, and when. Procedures should be established that not only rank projects but also explicitly examine each project's impacts on future costs and service levels. Such procedures can help agency officials determine which additional projects should be funded if additional funds become available and which can best be deferred if funds are reduced.

L-2 *Review and adapt at least some of the procedures identified in chapters 3 through 6.* Although the examples are far from ideal, they do offer opportunities for improvement over what in local governments are often haphazard procedures for maintenance option selection. Highly sophisticated

quantitative techniques are not needed in order to make substantial progress.

L-3 *Place less reliance on rules of thumb and standards. When these are used, they should be reviewed and updated periodically (e.g., at least every two to three years).* In many cases, rules of thumb and standards based on old studies will become obsolete if for no reason other than that continuing changes in materials, processes, and technology can alter trade-off decisions.

Rules of thumb are needed to avoid having to do time-consuming analyses on each occasion, but rules of thumb appear to be overused. These rules should be reexamined periodically, the basis for each should be documented (to permit easier subsequent review), and each rule should be updated periodically when the review indicates that the information is out of date. Economic analyses such as those described in chapter 5 can sometimes be used to develop such rules. For example, analyses such as the Utah pavement analysis in chapter 5 could be used to identify the desirable approximate interval between overlays, which in turn, could be used to help develop annual pavement overlay schedules and budgets. The interval, however, should be periodically reviewed.

In any case, strict application of such rules may not be appropriate for individual facilities. For facilities whose maintenance can involve substantial sums of money, rules should not be used alone. Every year brings new information: prices change (often quite substantially), new information on the durability of materials and reliability of current practices becomes available, and other aspects of the local environment can change. These changes all alter the relative costs and benefits of various maintenance options.

L-4 *Explicitly consider maintainability when designing capital facilities.* Designing a facility to make it easier to maintain can be an excellent investment, even if it requires extra costs, if the analysis indicates that the investment will save more than it costs. The analysis requires a careful examination of life-cycle costs (including future operating and maintenance costs). Establish a formal "maintainability" review process to examine the design of each major new or rehabilitated facility so that trade-offs between initial investment costs and long-term operating and maintenance costs are explicitly considered.

L-5 *Coordinate the scheduling of work involving street excavation to save maintenance costs and to*

reduce service disruptions. Coordinate scheduling not only for government water, sewer, and street work, but also for work on all utilities, including telephone, electricity, and steam. Coordinate with work done by private as well as public organizations, including other public agencies such as special water, sewer, and transportation districts. But before doing additional major work at a site just because it will be torn up anyway, make sure, through analysis, that the added work is cost-effective.

L-6 *Periodically examine the potential for regularly scheduled preventive maintenance to avoid larger future costs.* Explicitly analyze the costs and benefits of preventive maintenance against other options. Such a review probably should be scheduled on major facilities at least every two to three years. Preventive maintenance includes inspections (e.g., television inspections of sewers and visual or ride-meter inspections of roads), as well as direct maintenance activities such as cleaning, painting, and basic repairs.

L-7 *To reduce overall costs and maximize the likelihood of catching problems early, use different frequencies of preventive maintenance activities; have more frequent activity on those facilities most at risk.* The frequency of preventive maintenance activities should be decided on after explicit examination of the costs and service implications of various frequencies, taking into consideration the risk-related characteristics of the facilities (see L-9).

L-8 *Consider the abandonment of marginal facilities as an option.* Abandoning marginal facilities can reduce maintenance costs. Consider selling or leasing a marginal facility to the private sector for development. But take such action only when it is found to be cost-effective.

L-9 *Periodically undertake failure analysis to identify the deterioration rate of facilities and to identify key characteristics that are related to deterioration.* As discussed in chapter 4, failure analysis has been used to establish long-range needs for facility replacement and rehabilitation. In addition, there appears to be another, perhaps more important, use: linking the failure analysis findings to an economic comparison of alternative maintenance options. The comparison could then be used to help develop optimum inspection, preventive maintenance, and rehabilitation/replacement cycles. The State of Utah's analysis of preferred intervals of pavement resurfacing is an example of what can be done (see chapter

5). The New York City procedures for analyzing water-main failures and economics, discussed in chapters 4 and 5, also indicate what can be done.

L-10 *Develop and use a more systematic way to keep track of new technologies and include them in analyses of alternatives.* Agencies should regularly consider new technologies that may enhance maintainability, reduce maintenance costs, or improve service quality. Where feasible, agencies should test such new technologies, preferably using a random-assignment, experimental approach (see chapter 5) to obtain information on the relative costs and effectiveness of the new, as compared to older, maintenance methods. Local agencies often receive reports of new techniques from research organizations or other local agencies. Useful as these are, however, they will seldom replace the need for examining the new techniques in the locality—considering local factors such as local soil conditions, weather conditions, demand conditions, and traffic conditions.

A limitation with such experiments, however, is that for technologies with major long-term consequences (such as impacts on long-term deterioration rates), the full impacts will not be available for many years. In such cases, governments will have to rely on information from research reports on tests of technologies such as those done in national testing facilities.

To reduce the need for each locality to undertake its own experimentation and testing, a number of local governments could jointly sponsor testing. Though joint testing has been done to some extent (e.g., by Public Technology, Inc., on street-patching materials), this approach has not been widely used. In any case, communities will continue to need to undertake some trials locally to test applicability of new technologies to local conditions.

L-11 *Develop an adequate process for regularly assessing facility condition.* Current information on the condition of individual facilities and historical information on both maintenance activity and facility condition are essential for making maintenance choices. Almost all the analyses described in chapters 3 through 6 used condition information. To reduce the annual cost of assessing condition, differential frequencies could be applied to different facilities depending on their risk level, as determined by analyses such as those discussed in chapter 4. (Condition assessment is the subject of another report in this series.)

L-12 Consider establishing a geographical information file (preferably computerized). Both the New York City Manhattan water-main analysis team and the Savannah condition assessment team (which provided priority-ranking information for a variety of service areas) proposed the use of a geographically coded file to enable operating agencies to maintain their records by location. Maintaining records by location would permit operating agencies to more readily track problems geographically, identifying those segments of the infrastructure where problems are recurring. If regular reports are generated on components with recurring problems, the operating agencies would become less dependent on the memories and observation of their technical staffs.

The same basic computer program could probably be adopted for use by more than one agency or more than one service. The geographic file would then also facilitate coordination of maintenance activities (such as suggested in L-5).

L-13 Be selective each year in choosing the subjects for ad hoc, in-depth, failure analyses and examinations of maintenance options. Analytical resources will be scarce, and special in-depth studies can consume considerable time and dollars (especially if they must be done by contractors). Select subjects that involve the greatest costs or have the greatest service implications and for which adequate information can be obtained in a timely way.

L-14 Use the results of the systematic examination of maintenance options to help market the choices made. One of the big advantages of systematic analyses is that they can provide strong evidence for the desirability of a particular course of action (for example, that a current investment will repay itself many times over in future savings). When the findings make such a case, these findings can be used to gain the support of elected officials, the public, and the business community (which also has direct interest in the condition of the roads, water supply, and sewer systems).

Recommendations for Central Management

C-1 Encourage, if not require, operating agencies to undertake regular, systematic examinations of maintenance options for capital facilities and to provide the findings as backup to operating agency budget proposals. Agencies should be asked to include a no-action option and to consider increased use of

preventive maintenance. (To avoid excessive and impractical demands on operating agencies, however, requirements for these examinations should not be excessive. It is not feasible to analyze thoroughly all facilities every year. Requirements should focus on the most needed substantiation for proposals such as for those proposals with the most dollar value, service impact, and the extent to which the analysis is likely to aid the decision.)

C-2 Establish a process for explicitly considering "need" and not only revenue estimates when establishing the level of annual capital and operating budget funding for maintenance activities. Obtain from operating agencies information on the effects on service levels and costs, especially for projects near the revenue cutoff line on agency priority lists (both above and below it).

C-3 Use the information from operating agency examinations of maintenance options to help market the choices made. Central management, as well as agency management, can make good use of such information. (See recommendation L-14 for further discussion.)

Recommendations for State and National Organizations

The following recommendations are for state- and national-level organizations such as state governments, the federal government, national professional groups, or other organizations with a nationwide perspective. These are tasks that seem to be most efficiently, and most effectively, sponsored at a nonlocal level because the issues cross local and state boundaries.

N-1 Review national material and process standards relevant to capital facilities to modify or delete standards that require "overbuilding" or inhibit maintainability. Include standards on maintainability. Maintainability should be explicitly considered in developing facility "standards."

N-2 Sponsor development, and regular updating, of detailed handbooks that would provide information to local agencies on typical costs and service lives for specific types of maintenance-related activities and procedures—for various environmental conditions (such as weather, soil, and traffic conditions). Handbooks could provide badly needed information to local staff to help them compare maintenance strategies and specific maintenance options.

N-3 Sponsor research, demonstrations, and evaluations of new products, materials, and processes that have the potential for reducing the facility maintenance problems of many local governments. Individual local governments seldom have the resources for such efforts. Private firms play an important role in developing products, but innovation often requires work on ideas that have less immediate payoffs than those that private firms may require. Moreover, it is not always appropriate to expect individual for-profit organizations to perform a systematic, objective demonstration and evaluation role.

Although this report focuses on what local governments themselves can do to improve maintenance of infrastructure, the issue of new technology is not solely the concern of, or under the control of, individual city or county governments. Sponsoring research, demonstration, and evaluation efforts is an important and legitimate role for the federal government or other national organizations. State governments or coalitions of local governments can help, but since products and issues clearly cross state lines, a central, national effort seems more efficient both to cover a wide spectrum of applications and to avoid the need to have multiple states repeat the same work.

N-4 Encourage educators and researchers (e.g., in engineering schools) to pay more attention to facility maintenance as a major subject area. Currently, this area appears to be a poor cousin to more "glamorous" subjects. More attention to maintenance techniques—both procedures and materials—is highly desirable, both to improve facility durability and performance and to reduce maintenance costs.

Conclusions

The American Public Works Association (APWA) included these resolutions in its 1982 "Resolutions and Policy Statements:"

Resolved: that public works administrators accept a greater responsibility for documenting and reporting the condition of public works facilities in their respective jurisdictions and for communicating the factual consequences of neglected infrastructure needs to elected officials and to the general public in such manner that better decisions can be made with respect to the allocation of fiscal resources for the protection of the enormous existing investment in public facilities. . . .

Resolved: that public and private agencies place more emphasis on the analysis and evaluation of new or existing technologies and methods to assist decision makers in choosing the most cost-effective means for constructing and maintaining public works facilities. . . .

This report substantiates the need for the activities called for in the APWA resolutions, and we heartily endorse them.

In times of scarce resources, local governments must make the best use of the resources available. Cities and counties have numerous options for improving their maintenance of capital facilities. Recommendations such as those listed here will by no means solve the many major problems facing local governments, but they can help to identify the best maintenance options and better enable them to be marketed to elected officials and the public.

NOTES

Notes to Chapter 1

1. Steve Godwin and George E. Peterson, *Guide to Assessing Capital Stock Condition*, (Washington, D.C.: The Urban Institute Press, 1984).

2. Harry Hatry, Annie Millar, and James H. Evans, *Guide to Setting Priorities for Capital Investment*, (Washington, D.C.: The Urban Institute Press, 1984).

3. For example, Eugene L. Grant, W. Grant Ireson, and Richard S. Leavenworth, *Principles of Engineering Economy*, 6th ed., (New York: The Ronald Press Company, 1976) is a basic text in the field. An example of a text on capital budgeting is John J. Clark, Thomas J. Hindelang, and Robert E. Pritchard, *Capital Budgeting: Planning and Control of Capital Expenditures* (Englewood Cliffs, N.J.: Prentice Hall, Inc., 1979).

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5. See Hatry, Millar, and Evans, *Guide to Setting Priorities for Capital Investment*.

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2. See, for example, WSSC Bureau of Maintenance, "Inflow Study for the Chevy Chase Village Sewerage Problem Area" (Washington Suburban Sanitary Commission, Hyattsville, Md., January 1981).

3. "Water Utilities" (Working Paper, City of San Diego, Calif., August 11, 1982).

4. King County Departments of Budget and Program Development and Public Works, "Road Maintenance Study: Seal Coating and Overlay." Working Paper, August 1979, Seattle, Washington.

5. "Deferred Maintenance Issue Paper" (Dallas Office of Management and Budget, Dallas, Tex., January 13, 1982), p.8.

6. Discussions with agency staff, "Deferred Maintenance Study: The Sewer Utility: A Survey Report to the Seattle City Council" (City of Seattle, Wash., September 1981).

7. Port Authority Management Services Department, "Developing a Facility Preventive Maintenance Program: OSD Guidebook No. 2" (Management Services Department, Port Authority of New York and New Jersey, New York, N.Y., April 1980). Unfortunately, the guide does not indicate *how* to consider these factors.

8. Harry Smith, "Corrosion Resistance of Cast Iron and Ductile Iron Pipe" (Cast Iron Pipe Research Association (now known as the Ductile Iron and Pipe Research Association), April 1976).

Notes to Chapter 3

1. The reader may also find useful the report in this series devoted to priority-setting systems used by central agencies (e.g., budget offices) in their review of projects proposed by operating agencies. While the focus there is on choices among services rather than within any one service, many of the procedural issues are the same. See Hatry, Millar, and Evans, *Guide to Setting Priorities for Capital Investment*.

2. The traffic ratings are for the following average daily traffic volume categories: 0-1,500; 1,500-3,600; 3,600-5,000; 5,000-8,000; 8,000-12,500; 12,500-18,500; 18,500-26,000; 26,000-35,000; and over 35,000.

3. Factor ratings are weighted by multiplying them by the following normalization factor (NF):

$$NF = \frac{1000 \times \text{Factor Weight}}{\text{Maximum Factor Rating}} \text{ (expressed as a percentage)}$$

4. Delon, Hampton and Associates, "Bridge Reconstruction Fiscal Needs Study: The District of Columbia" (Washington, D.C., District of Columbia Department of Transportation, August 1980).

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1. M. J. Rouse, "Progress in Current Research" (Water Research Centre, Swindon, England, February 1981).

2. See Edwin J. Laszewski, "Average Annual Funding Needs for Street Repaving and/or Reconstruction for Forty-Year Period 1979-2018" Milwaukee Bureau of Engineers, (Milwaukee, Wisc., August 1979).

3. See Robley Winfrey, *Statistical Analysis of Industrial Property Retirements*, Bulletin 125 revised (Ames, Iowa: Iowa State University Engineering Research Institute, 1967).

4. District of Columbia, Department of Transportation, "Street Needs 1981-1991" (Washington, D.C., July 25, 1979).

5. Betz, Converse, and Murdoch, Inc. "New York City Water Supply Infrastructure Study: Manhattan" (Plymouth Meeting, Pa., May 1980).

6. Savannah Management and Auditing Department, "Water and Sewer Operations Study" (Savannah, Ga., September 1980).

they spray at a larger, 45° angle (a 60° angle was tried but did not work). The result was more cleaning power (the nozzle now rests towards the middle of the sewer main) with less water.

5. WSSC has begun to consider the Steinscrub inline-flow regulator as a means to eliminate surcharging by reducing the peak flow. WSSC considered this option in 1981 and pointed out that it is yet to be applied in this country to sewers smaller than thirty-six inches in diameter. If successful, the Steinscrub can eliminate or reduce storm-induced sewer backups by improving the carrying capacity of a sewer system. See Washington Suburban Sanitary Commission, "Inflow Study for the Chevy Chase Village Sewage Problem Area" (WSSC Bureau of Maintenance, Hyattsville, Md., January 1981), pp. 11-12.

6. Dayton, Los Angeles, New York City, and others have ongoing leak-detection programs. A procedure for deciding whether to introduce such a program is described later in this chapter.

7. Many cities (e.g., Dayton, Minneapolis, and Seattle) use or have used cathodic protection systems. Little Rock uses a polyethylene wrap which, according to the Ductile Iron Pipe Research Association, is more effective than a cathodic protection system. See W. Harry Smith "A Report on Corrosion Resistance of Cast Iron and Ductile Iron Pipe," *Cast Iron Pipe News*, May-June 1968.

8. For example, Dayton has determined that a protective membrane called "Petromat" is quite effective at preventing a recurrence of water problems and reflective cracking in repaired potholes and other newly surfaced small areas.

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10. William L. Kingston, "A Do-it-Yourself Leak Survey Benefit-Cost Study," *Journal AWWA*, February 1979; and "Leak Detection Is Worth the Effort," *The American City and County*, November 1978.

11. The East Bay cost estimate is from Gordon L. Laverty, "Leak Detection: Modern Methods, Cost, and Benefits," *Journal AWWA*, February 1979.

12. City of Los Angeles, "1982-83 Expenditure Program: Water Operations" (Department of Water and Power, Los Angeles, Calif., February 23, 1982).

Notes to Chapter 7

1. A reminder: Throughout this report the word *maintenance* includes the full range of work that might be required to keep a facility in good condition, including both minor work (usually funded out of the operating budget) and major work (usually funded out of the capital budget).

2. See, for example, M. J. E. Sheflin, "Can We Afford Bad Roads? or Your Choice: Bad Roads at High Cost or Good Roads at Low Cost" (Ministry of Transportation and Communications, Regional Municipality of Ottawa-Carleton, Ottawa, Canada, June 1982). But even in this case we have not been able to obtain any empirical work based on analyses actually done by the government. Thus far, the agency has used information primarily derived from various research studies.

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5. A typical example was New York City's use of a guideline that the city replace any bridge for which the cost of rehabilitation exceeds 70 percent of the cost of replacement—based on guidelines from the New York State Department of Transportation. When we checked the basis for this guideline with a representative from the New York State Department of Transportation, he said that the state used a 50 percent guideline based on discussions with the Federal Highway Administration. The rationale here was that the expected life of replacement is 50 years, twice that of bridge rehabilitation projects. The New York State official knew of no analytical study supporting these estimates.

6. For water distribution systems, network analysis has been used extensively. This is primarily a procedure for system condition assessment and an approach to identifying possible pressure problems arising from new housing construction. Its use suggests that at least the large governments can potentially handle quite sophisticated procedures.

7. See Arumprakash Shirole and James T. Hill, "Systems Approach to Bridge Structure Rehabilitation or Replacement Decision-Making," *Transportation Research Record 664 Bridge Engineering*, Vol. 1 (Conference Proceedings, Transportation Research Board, Washington, D.C., Sept. 1978) pp. 22-31.

8. See Hatry, Millar, and Evans, *Guide to Setting Priorities for Capital Investment*.

GUIDES TO MANAGING URBAN CAPITAL, VOL. 2

Harry P. Hatry and George E. Peterson, Series Editors

GUIDE TO ASSESSING CAPITAL STOCK CONDITION

Stephen R. Godwin
George E. Peterson

*A study prepared by The Urban Institute
in collaboration with Public Technology, Inc.*



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DEVELOPING A COMPREHENSIVE CONDITION ASSESSMENT SYSTEM

Local officials can improve their management of capital assets by making better use of information about capital condition and performance. Local governments with disparate responsibilities in streets, bridges, and water and sewer systems clearly need to develop more systematic ways of assessing a city's physical plant. The examples in the previous sections demonstrate new developments in condition measurements, maintenance strategies, and the technology for storing and retrieving information. No single government has yet applied these developments across all functional areas to create a comprehensive inventory of infrastructure condition. As a result it is too early to convincingly assess the costs and benefits of such a system.

Local officials have good reasons to be hesitant before investing in a capital information system. Although the technological developments in storing, retrieving, and displaying information are impressive, the measures and models of capital condition and performance are less well developed. Many condition measures, though systematic, are based on visual observations or subjective ratings, or both. Models and projections of future asset life depend on engineering judgment rather than empirical evidence. The inherent subjectivity of these aspects of condition assessment limits the practical usefulness of analytical models and the information that goes into them. These limitations raise legitimate questions about how far a local government should go in designing a comprehensive information system.

At the same time, however, local officials have important reasons to consider the development of a

condition assessment system. Condition assessment measures are improving. As demonstrated in the King County example, condition ratings can be made more objective. The growing concern about the nation's infrastructure has stimulated much research in areas related to condition assessment. In addition, researchers are collecting the trend data needed to better understand asset life cycles. The state of New York, for example, is currently monitoring a set of pavements to develop a better understanding of the rate of pavement deterioration.¹ Texas has been collecting pavement distress measures for a stratified random sample of roads since 1972.²

If the existing examples of systems already in use are any guide, it should be possible for governments to develop information systems that can aid current management needs, while at the same time building an information base that would further improve capital planning and management for the future. The following section sketches the basic elements of an information system that would have immediate applications to management and capital planning. The subsequent sections suggest further extensions of such systems with potential for improved planning and more cost-effective asset management.

Elements of a Condition Assessment Information System

A relatively basic and simple system can serve two important purposes: (1) It can provide the informa-

tion needed to establish a baseline measure of the extent and condition of a government's assets. Surprisingly few local governments have this information. (2) For system managers, an information system is essential for identifying potential areas of cost savings. The case cited of Savannah's water-line replacement strategy is a good example. Once the city had determined that a small number of water lines accounted for a large percentage of the breaks, capital funds could be targeted to areas promising the greatest cost savings.

The actual data to be collected will vary across infrastructure areas, but the type of information is likely to fall into two basic categories: inventory measures and measures of condition or performance. Table 4 summarizes the types of information needed and table 5 gives examples across infrastructure areas of data that would be stored in a file.

Whether an information system would need to be automated is largely determined by the size of the inventory and the type of information collected. Dallas has a complete inventory of all 425 city building roofs that is simple enough to be maintained in a paper file.³ Conversely, the city's street network of more than 3,000 miles is much more efficiently maintained as an automated system.⁴

Application to Infrastructure Management

Maintenance managers can also use condition and performance information in day-to-day management of maintenance work forces. As noted under the discussion of water distribution systems, the Little Rock Municipal Water Works has implemented an auto-

Table 4 BASIC ELEMENTS OF AN INFORMATION SYSTEM

<i>Inventory</i>	<i>Condition/Performance</i>
Unit, e.g., street segment, bridge, pipe	Current condition rating and date
Type of material	Percentage of capacity in use on average
Location	Repair history
Physical dimensions	—Type of repair
Initial value/cost	—Cost
Responsible department	—Date
Funding source/eligibility	Trends in performance of key variables

mated system of work orders, which simplifies routine paperwork. In addition, the computer is programmed to pull relevant data off the work records to provide managers with reports of where breaks and leaks are occurring in the system. Management information is also reported on the unit cost of repairs and provides trends regarding low pressure problems. These key pieces of information for system management allow long-term trends in system performance to be observed. Knowledge about the frequency of breaks by type of pipe and by location would vastly improve the information needed for more cost-effective repair and replacement decisions.

Application to Capital Planning and Budgeting

Information systems provide information that not only has utility at the operating division level, but also has practical applications to capital planning. Even the most basic inventory and condition information provides a baseline for defining infrastructure needs. There is a tendency to assume widespread capital deterioration because of the spectacular failures of one or two major capital items. Information on the extent of the inventory and its condition will provide to planners and officials a first cut at establishing the seriousness of their city's infrastructure needs.

Once local officials have realistically defined their city's capital investment needs, they can use the same data in setting priorities in the capital improvement plan (CIP). Capital plans often have been characterized as compilations of the wish lists of municipal operating divisions. A city manager, mayor, or city council may decide that the best policy is to target capital repair funds to items in the inventory that are in the worst condition or offer the highest probability of failure and serious service disruption. Alternatively, officials may choose to target funds to capital items that are just beginning to deteriorate in order to stem decline—as the state of Minnesota did with its bridge inventory. Whatever policy a local government chooses to follow, the data that inform it are essential.

Better definitions of capital needs will also help in the distribution of scarce funds in the budget process. Such information is useful in communicating to the public and to elected officials the legitimacy of capital demands. Often the restoration of major

Table 5 ELEMENTS OF A CONDITION ASSESSMENT SYSTEM
Examples of Inventory Characteristics

	<i>Streets</i>	<i>Bridges</i>	<i>Water</i>	<i>Sewer</i>
Unit/Location	Block segment or DIME ^a coordinates	Bridge number and/or DIME coordinates or street termini	Pipe, hydrant, or valve and/or DIME coordinates or street address	Code for pipe, joint, or manhole and/or DIME coordinates or street address
Material	Flexible or rigid, and base characteristics	Material in deck, wearing surface, substructure and superstructure	Ductile or cast iron, or plastic. Type of lining, if present	Clay, brick or cast iron and type of lining, if present
Dimensions	Number and width of lanes, pavement depth, sq. yd., length	Number and width of spans, number and width of lanes, wearing surface thickness	Pipe diameter and length; valve size	Pipe diameter and length
Date of Installation	Day/Month/Year	Day/Month/Year	Day/Month/Year	Day/Month/Year
Responsible Agency	List	List	List	List
Funding Eligibility	Eligibility for state or federal funding, and type eligible for	Eligibility for state or federal funding, and type eligible for	Eligibility for state or federal funding, and type eligible for	Eligibility for state or federal funding, and type eligible for
Initial Cost	\$	\$	\$	\$
Condition Rating	Present serviceability or pounds per square inch	Sufficiency rating for deck, superstructure, and substructure	TV monitoring reports	TV monitoring reports
Performance Indicators	—	—	Breaks per 1,000 ft., leaks per 1,000 ft., Hazen-Williams Coefficient	Breaks per 1,000 ft., stoppages, flooding, peak flow, average flow
Capacity/Demand	Volume/capacity ratio, average daily traffic, % traffic heavy vehicles	Design loading, average daily traffic, % traffic heavy vehicles	Design capacity/average capacity	Manning coefficient/average flow
Repair History (for each occasion)	Date of resurfacing or rehabilitation; seal coat, and type of material	Date of deck resurfacing, and type of material; date of major repainting; date and type of rehabilitation	Date of break leak, repair, relining; type of repair and material used	Date of patching, grouting, sealing; type of repair and material used
Repair Cost	\$	\$	\$	\$
Other Key Variables	Type of bedding drainage; individual components of present serviceability rating	Condition of drainage system, joints, etc. Detour length to alternative bridge.	Type of soil and whether corrosive; proximity to other service lines, underground tunnels, etc.	Slope, bearing load characteristics, proximity to underground systems, depth underground, etc.

a. DIME = Dual Independent Map Encoding, which provides a geographic base file with detail at the block, census tract, and metropolitanwide levels.

capital items will require new local revenues. In these times of austere budgets and tax limitations, local governments quite properly will have to make a convincing case for greater capital spending. Trend data showing that an increasing percentage of the capital stock is in poor condition, revealing rapidly escalating maintenance costs, or demonstrating the probability of system failure represent the kind of information that can persuade elected officials and the public at large of the need for increased capital funding. Or individual localities may find that their capital facilities are in better condition than the national concern over infrastructure would suggest. The substitution of local information for national generalities is one of the significant benefits of systematic condition assessment.

Future Applications

As information systems are developed and managers and planners become familiar with their use, these systems can be extended to other applications.

Repair versus Replacement Decisions

In deciding whether to repair or replace an item when some failure occurs, local officials rely heavily on data that reflect trends in the performance of individual capital items. The Dallas water department has developed a standard procedure to determine when a main that has a history of breaks should be replaced.⁵ When a main shows an increase in the rate of breaks over time, the repair cost is compared with the replacement cost in a standard formula. At present this system is maintained by hand and the calculations are made whenever a departmental employee notices an increase in breaks. In a system with automated work records this process could easily be added to the programming. Then routine reports could be generated for all mains at or nearing a preestablished benchmark. The same type of analysis could also be applied to sewer lines. With this information in hand, the planning for the size of the annual capital and maintenance budget would be improved. The immediate benefit, of course, is the cost savings associated with systematic cost-benefit calculations guiding the choice of repair or replacement.

Inventory Reduction

Many older urban areas experiencing population loss may be able to save money by reducing their expensive-to-maintain and underutilized capital assets. For example, old, and often deficient, bridges may be located on roads or streets that are no longer used much because traffic patterns have changed. The repair, and even the maintenance, of these structures may not be warranted if alternative routes are available. As noted in the discussion of bridge inventory data, the federal inventory file has data coded for each bridge showing average daily traffic and length of detour if the bridge is closed. This information may highlight bridges in a local government's inventory that have low priority for repair. In cases involving a structure that serves only one or two homes or a single business, it may well be cost-effective for the local government to buy and relocate these units and take the bridge out of service. An information system with data on the condition of and demand for a facility could readily define similar items in the capital inventory.

Management Coordination

Greater coordination in the timing of infrastructure repairs can also generate cost savings. When a street is already torn up for resurfacing, public and private utilities should take the opportunity to repair or service underground systems such as water, sewer, gas, and electrical lines and avoid the cost of cutting through and replacing the pavement.⁶ The automated inventory and mapping capability (DIME-GBF) described earlier would simplify the coordination of planned repairs. By simply overlaying the streets that are planned for resurfacing and other repairs with distribution system maps, planners can identify opportunities for coordination. Utility cuts into a smooth pavement create seams in the surface which allow water to seep through into the roadbed. The expansion and contraction of the water hasten the breakup of the pavement, thereby shortening its service life.

An additional application will come when managers develop a better understanding of the factors increasing the probability of underground system failure. Pipes in relatively good condition under a street planned for resurfacing may warrant replacement if the probability of their failure is high within the upcoming five to ten years.

Economic Development

Data files of the infrastructure inventory, when merged with land use and zoning maps, would be very useful for identifying sites in a city that would be attractive for business investment. A file could identify all vacant or tax-delinquent sites suitable for clearing, list their assessed valuations, and sup-

ply information on water and sewer capacity, congestion on connecting streets, and access to rail connections and interstate interchanges. Such a file could also readily identify the adequacy of infrastructure support for all areas in a city under consideration for targeted development incentives, such as designation as an enterprise zone under state or federal programs.

New York, November 1980. U.S. Army Corps of Engineers, New York District, *New York City Water Supply, Infrastructure Study, Vol. 1, Manhattan*, May 1980.

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6. *Ibid.*, p. 18.

TR NEWS

2 State Management Systems	
Overview of ISTEA Requirements and Current Implementation	
5 Pavement Management Systems	
National Perspective on Pavement Management, 5	
Maine's Pavement Management System, 9	
Managing Pavements in Nevada, 11	
PennDOT's Pavement Management System, 14	
17 Bridge Management Systems	
22 Highway Safety Management	
26 Developing Congestion Management Systems	
29 Incorporating Intermodalism Into Transportation Planning	
30 Public Transportation Facilities and Equipment Management	
32 Research Pays Off	
Bridge-Testing Technique Receives High Rating in New York	
34 Profiles	46 Calendar
36 News Briefs	49 Bookshelf
40 TRB Highlights	New TRB Publications, 50
CRP News, 42	

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17



COVER: Under the Intermodal Surface Transportation Efficiency Act of 1991, states are required to develop and implement management systems in the areas of pavement, bridge, safety, congestion, intermodal, and public transportation and equipment in order to more effectively manage the nation's transportation systems and resources. Examined in this issue of TR News is the progress that states are making toward achieving these goals. Photograph credits (clockwise, from top right): Precast/Prestressed Concrete Institute; FHWA; Mass Transit Administration, Baltimore; Vickers-Zachary-Miller; Insurance Institute for Highway Safety; Pennsylvania Department of Transportation.

National Perspective on Pavement Management

FRANK BOTELHO

The nation's highway network represents a multibillion dollar investment that allows for the essential movement of people and goods.

Sound decisions on preventive maintenance, rehabilitation, and reconstruction of highway pavements are crucial to protecting that investment. For this reason, Pavement Management Systems (PMS) have become increasingly important and are now federally mandated on all Federal-aid highways. PMS provide valuable assistance to decision makers in determining cost-effective strategies for providing and maintaining pavements in serviceable condition.

History of PMS

Unlike other management systems that have begun in recent years, PMS were started two decades ago. Although they have made steady progress since that time, they are still new compared with other institutional functions such as planning, design, construction, maintenance, and research.

By the mid-1980s PMS were proving themselves and the benefits were being documented. By the end of the 1980s

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more than half the states were developing or implementing PMS. In 1989 the Federal Highway Administration (FHWA) issued a policy requiring all states to have a PMS that would cover principal arterials under the states' jurisdiction. It was therefore apparent to FHWA that a PMS was needed by all to ensure the cost-effective expenditure of Federal-aid funds.

The scope of federal and state involvement in PMS expanded when Congress passed the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and required all states to have a PMS that covers all Federal-aid highways. The most significant aspect of this law was the expanded network coverage. FHWA's 1989 policy covered 313,700 centerline miles and ISTEA approximately tripled that coverage, increasing it to 916,200 centerline miles. This expanded coverage translates into a need for significant coordination among state and local governments. For example, of the total of 916,200 miles covered, 365,200 are under local jurisdiction.

In December 1993, FHWA issued a regulation covering all management systems. Section 500, Subpart B, of the regulation describes the ISTEA requirements for PMS. The following items are noteworthy:

1. The regulation is nonprescriptive;
2. Federal-aid funds are eligible for the development, implementation, and annual operation of a PMS;
3. States must develop their work plan by October 1994, designed to meet the

implementation requirements;

4. Standards are included for the National Highway System (NHS);

5. The PMS for the NHS must be fully operational by October 1995;

6. The states have full flexibility to develop the standards for the PMS that cover the non-NHS routes;

7. The PMS for non-NHS routes must be fully operational by October 1997; and

8. PMS information must be used as input into the development of the metropolitan and statewide transportation plans and improvement programs.

Section 500.207, PMS Components, contains the components of a PMS for highways on NHS. There are three primary components: data collection, analyses, and update. The components under data collection include

1. *Inventory*: physical pavement features including the number of lanes, length, width, surface type, functional classification, and shoulder information;

2. *History*: project dates and types of construction, reconstruction, rehabilitation, and preventive maintenance;

3. *Condition survey*: roughness or ride, pavement distress, rutting, and surface friction;

4. *Traffic*: volume, vehicle type, and load data; and

5. *Data base*: compilation of all data files used in the PMS.

The components under analyses include

1. *Condition analysis*: ride, distress, rutting, and surface friction;

2. *Performance analysis*: pavement performance analysis and an estimate of remaining service life;

3. *Investment analysis*: an estimate of network and project level investment strategies. These include single- and multi-year period analyses and should consider life-cycle cost evaluation;

4. *Engineering analysis*: evaluation of design, construction, rehabilitation, materials, mix designs, and maintenance; and

5. *Feedback analysis*: evaluation and updating of procedures and calibration of relationships using PMS performance data and current engineering criteria.

Advantages of PMS

A PMS involves a systematic approach that supplies quantifiable engineering information to help highway engineers and administrators manage highway pavements. The total decision-making process is based on information from PMS coupled with engineering experience, budget constraints, scheduling parameters, management prerogatives, public input, political considerations, and planning and programming factors.

The purpose of a PMS is to enhance the way an agency manages and engineers the preservation of its pavement network. A PMS brings to the table "condition data," the past, present, and predicted future condition of the pavement network. Coupled with inventory, project history, and cost data, a PMS can perform a myriad of engineering, management, and investment analyses.

A PMS helps provide the engineering justification for a multiyear network-level pavement preservation program. It can be used to measure the cost-effectiveness of the preservation program and in doing so it can determine the value added to the assets. When all the information in a PMS is analyzed (including key items such as the remaining service life), an agency can determine if it is meeting its own goals. Some basic questions a PMS should answer are

- Is the network in acceptable condition according to the agency's policy?
- Is the trend in condition staying the same, improving, or declining?
- Is there a backlog, and if so, how large is it?

A PMS should explore and seize opportunities to extend the service life of pavements—a major investment in the

future of the nation's infrastructure. This goal can be accomplished by using the information in a PMS data base (i.e., performance data) to evaluate how well pavements are designed, constructed, and maintained. The quality of engineering and the materials used are of the utmost importance because these factors determine the rate at which pavements deteriorate. In general terms, a PMS should help accomplish work more efficiently and provide a way to measure how well it is carried out.

PMS Perspective

The following is an item-by-item perspective on current practices, future trends, and common hurdles in PMS.

Inventory

Most, if not all, states have an inventory of the physical features that are on the surface of the pavement (i.e., number of lanes, length, width, surface type, functional classification, and shoulder information). A number of states are lacking information on features that lie below the surface because of the time and expense involved in coring the pavement. The newest proven technology being used by the states to measure pavement layer thicknesses is ground-penetrating radar. When calibrated and using computer analysis, ground-penetrating radar can measure pavement layer thickness within plus or minus 5 percent for materials that have different dielectric constants. State-of-the-art equipment operates at highway speeds that makes it fast, safe, and cost-effective.

Project History

Most states do not have a complete project history (i.e., preventive maintenance, rehabilitation, and reconstruction data) for the NHS. Maintenance information is the weakest link. Most states have recently developed, or are in the process of developing, a PMS file for preventive maintenance activities. In cases for which it is impractical to resurrect the pavement history because of time, labor, and cost, agencies are now beginning to track the project history.



ISTEA requires that states have pavement management systems covering all Federal-aid highways, many of which are under local jurisdiction.

Roughness

The technology for measuring pavement roughness at the network level generally began with response-type devices, followed by ultrasonic and visible optical devices. The future trend is toward infrared optical and laser profile devices.

Rutting

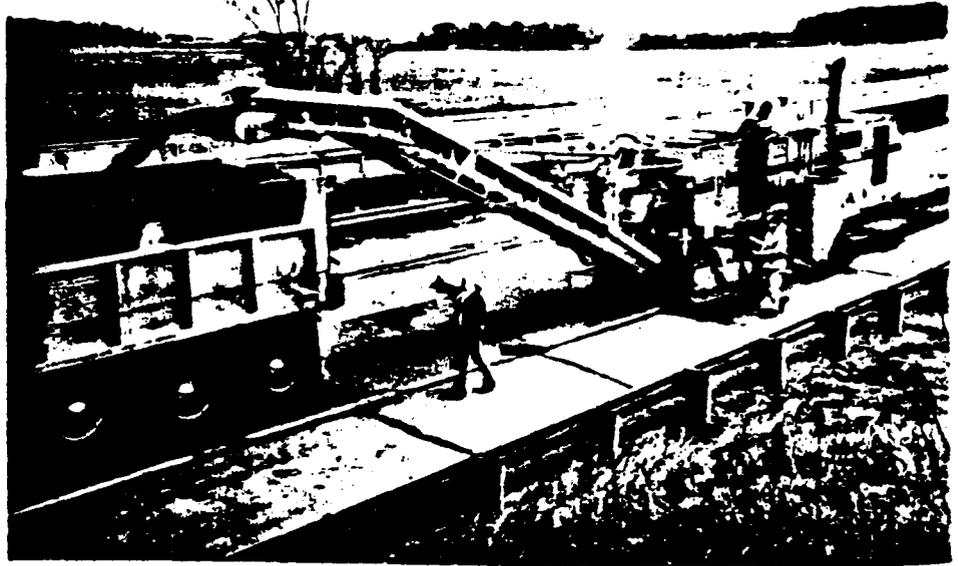
When PMS was first introduced 15 to 20 years ago, rutting was measured using straight edges and string lines. During the past 10 years, most state highway agencies (SHA) have acquired automated devices that measure rutting at highway speeds. These are typically ultrasonic devices with either three or five sensors. There are two other devices: one has 19 ultrasonic sensors and another has 11 lasers.

Cracking

In general, cracking is the distress that "drives" most PMS. For many years, cracks were measured using trained survey crews who walked or drove on the pavement. There are two types of driven surveys: slow and highway speeds (typically 40 to 50 mph). Currently, various SHAs use 35-mm film and super VHS video to photograph the surface of the pavement. The film and videos are then viewed on a monitor at an office workstation by a trained observer who performs the distress survey.

Viewing a film or video at an office workstation is safer and more convenient than conducting a walking field survey. However, pavement management engineers using walking surveys are able to detect more low-severity distresses than they can by watching a film or video survey because of its limited resolution.

A number of PMS engineers believe the optimum system is a fully automated approach that uses the science of pattern recognition. This type of system videotapes the pavement surface, enhances the images using gray scales and pattern recognition, and counts the cracks using computer software and algorithms. The obvious advantages of this type of system are high-speed data processing, safety, labor savings, and consistent data. Fully automated systems have now been developed, including one by the Texas Department of Transportation.



Pavement management systems provide valuable help in determining cost-effective strategies for providing and maintaining pavements in serviceable condition.

Structural Carrying Capacity

Only a handful of states are currently measuring the structural carrying capacity of their pavements at the network level using deflection measurements. Network-level measurements are not intended to have the same degree of accuracy as project design measurements. States that collect network-level data have shown them to be good general indicators of the overall carrying capacity of the network. These types of data and analysis can flag attention to special situations; for example when certain roads appear to have less carrying capacity than needed. Stationary deflection-measuring devices do not lend themselves to network-level PMS because the process is slow and costly. In the future, PMS will need a deflection-measuring device that operates at or near highway speeds. The deflection measurements obtained from a "rolling deflectometer," as it is known, and the pavement layer thicknesses obtained from the ground-penetrating radar, are used to compute the structural carrying capacity of the pavement.

Performance

Most states have the raw data needed to monitor and predict pavement performance, which is typically measured as condition or serviceability over a period of time. Currently half the states have performance curves, one-quarter are in the process of developing performance, and the remainder are not yet active. Excellent off-the-shelf software packages that PMS engineers can use for regression analysis are available. In the future, these software packages, coupled with today's high-speed and ever-more-powerful PCs, will enable PMS engineers to track and predict performance on a "route-specific" basis. This capability has already been proven and put into operation in at least some SHAs.

Traffic and Load Data

PMS need average daily traffic flow maps and equivalent single-axle load (ESAL) flow maps on a route-specific basis. Currently all SHAs have traffic flow maps. However, few SHAs have or can produce ESAL flow maps. Most traffic-collection procedures are geared toward collecting

traffic volumes, which are primarily used by highway engineers and planners for capacity analysis. Until PMS came along, there was no need to collect traffic data for load analysis on a route-specific basis. Unfortunately for PMS engineers, collecting load data on a route-specific basis is more expensive than the existing traffic-collection process and it is not known if the additional expense (which has not been calculated for each state) is justifiable. More study is needed on this topic. Many PMS engineers and planners believe that better traffic- and load-prediction models are needed.

Ranking Projects

The backbone and heart of a PMS is its ability to rank in priority order pavement preservation projects that are justifiable and cost-effective. The most important phrase in the new (December 1993) FHWA regulation on management systems is the requirement that PMS for NHS produce "a prioritized list of recommended candidate projects with recommended preservation treatments that span single-year and multi-year periods using life-cycle cost analysis." Currently most state PMS do not produce a multiyear ranked list of projects with recommended treatments using life-cycle cost analysis, but are expected to have this capability in the future.

Remaining Service Life

Determining "remaining service life" is a requirement in the new regulation for NHS. Currently only 10 SHAs perform this analysis, but in the future it is anticipated that most will find this an unencumbered task. It is important to monitor the long-range health of a network and this analysis enables managers and programmers to maintain a "steady state" in their multiyear workload and budget.

Relational Data Base

A PMS cannot automatically, systematically, consistently, and efficiently function without a "relational data base" because the amount and complexity of data cannot be computed manually for a typical state PMS. Currently half the SHAs have relational data bases, one-quarter are develop-

ing them, and the remainder are not active at the present time. Given the state-of-the-art capabilities in relational data-base management systems, it is anticipated that most SHAs will have relational data bases in the near future.

Uniformity

Currently there is little-to-no uniformity among the states in the way they measure, collect, and report PMS condition data. The reason is that all states developed their PMS independently. This independence, of course, has many advantages for designing a PMS to meet the needs and objectives of any agency. But states are at a disadvantage when communicating with each other about basic condition information such as roughness, rutting, and cracking. They will find a lack of uniformity, which means that they cannot communicate or help each other to enhance this area of PMS. Efforts are under way and accomplishments have been made by ASTM and the Road Profiler Users Group (RPUG) that deserve commendation. The other management systems such as bridge and safety already have national standards for data collection and reporting.

PMS will benefit if the 50 states, Puerto Rico, and the District of Columbia agree to adopt more uniform methods to collect and report condition data. Future efforts by ASTM; RPUG; Strategic Highway Research Program, Long-Term Pavement Performance; FHWA; and the American Association of State Highway and Transportation Officials' Task Force on Pavements are aimed in that direction.

In-House and Outside Resources

Pavement management is a procedure that includes a wide variety of technical components. Some of these require a high degree of technical skill to develop and implement, whereas others require a high concentration of effort to establish. Each agency should carefully and objectively weigh its in-house capabilities, and if it does not have the resources, it should seriously consider seeking assistance from a consultant or a university. In the long run, it will save a lot of time and money and result in a better final product.

Staffing

The biggest problem the states face in developing, implementing, updating, and operating a PMS is staffing. There is a significant shortage of people who understand PMS. Once employees are trained and gain some experience, they are often promoted or transferred to other jobs. For the past five years, the annual turnover rate of state PMS engineers has been approximately 25 percent. The state incentives for early retirements have fueled that rate in the past two years. Generally, most SHAs have only one person who oversees the management and daily operation of the complete PMS program, and when that person leaves, most often the PMS shuts down. This situation occurs quite frequently and because of the current budget constraints and staffing ceilings in most highway agencies, it is not likely to improve. Unfortunately there is no quick fix to this problem.

Future Implementation of PMS

In gauging the future success of implementing PMS as called for in ISTEA, organizations must first decide whether they are serious about PMS. If so, and the commitment is made to do the work, supply the resources, and use the system, then PMS use is likely to be successful.

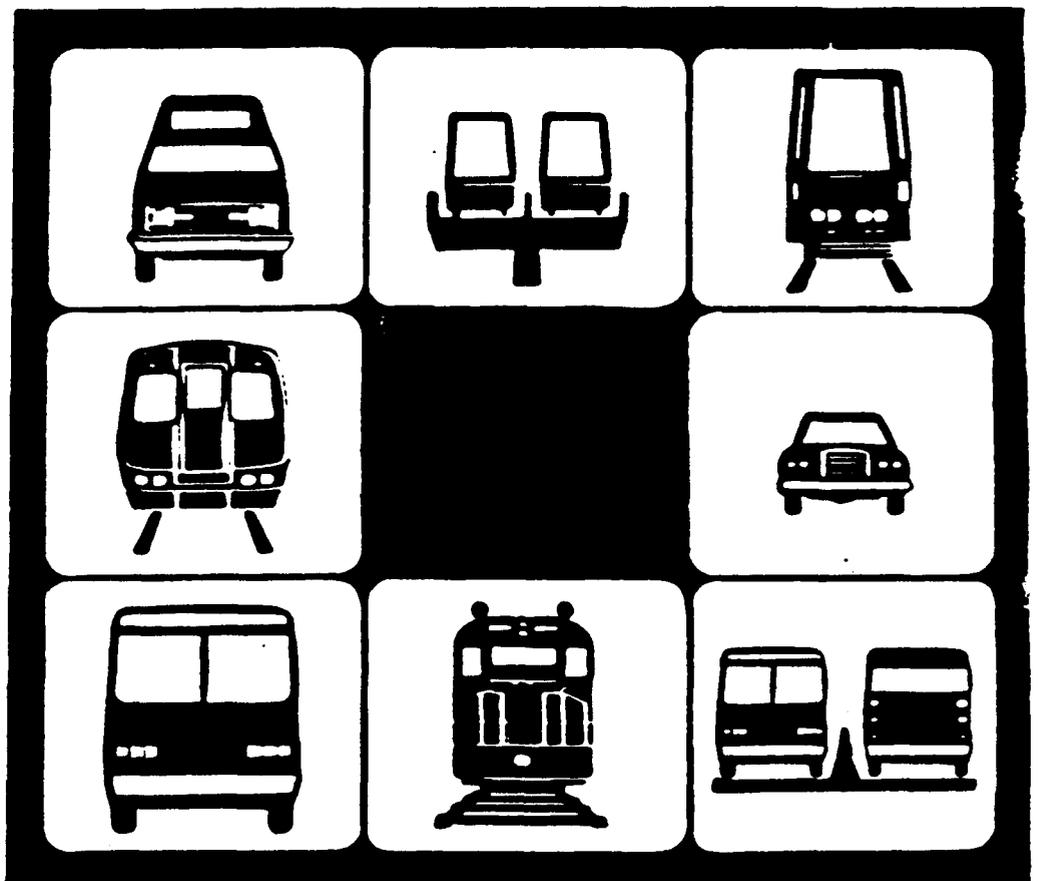
Students in the nation's colleges and universities will provide the life blood for PMS in the future. Currently 24 such institutions offer courses on PMS, but more are needed. FHWA and SHAs should support academia in providing more education about PMS and other management systems.

The largest institutional obstacle facing PMS today is acceptance by all managers and engineers in all agencies (including federal, state, and local). The reasons for this are many. The future holds more hard work for those who are serious about pavement management.



US Department
of Transportation
Federal Transit
Administration

Procedures and Technical Methods for Transit Project Planning



II.4. Operating and Maintenance Costs

A reliable estimate of the costs of operating and maintaining each alternative is crucial to an accurate assessment of its cost-effectiveness and financial implications. This chapter recommends an approach — resource build-up — that has been used in recent alternatives analyses and is a significant improvement over the method used in earlier efforts.

4.1 General Approach

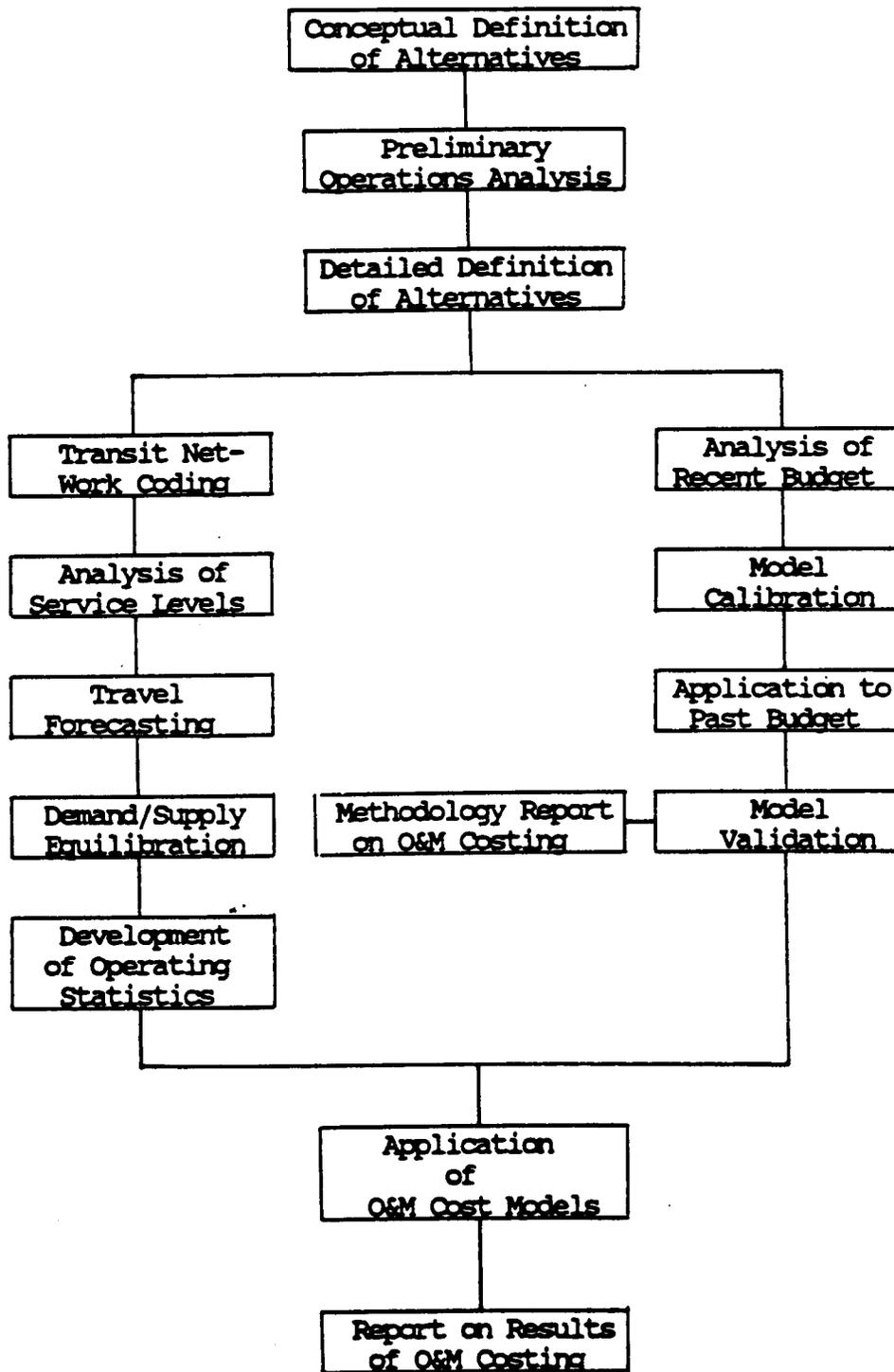
Figure 4-1 summarizes the scope and flow of the development of O&M costs. The initial phase of the work involves a preliminary operations analysis necessary to identify an operating plan for each alternative. These operating plans, together with route layouts and design standards, constitute the detailed definition of the alternatives. Work then proceeds on two fronts that are largely independent of each other. One front is the analysis of service and patronage levels necessary to develop a final operating plan for each alternative that optimizes its performance. This involves detailed coding and analysis of transit networks, patronage estimation, and the balancing of transit supply with transit demand. It culminates in the estimation of the operating statistics — vehicle-miles, vehicle-hours, peak vehicles, etc. — that drive the O&M cost models. This work is documented in reports on the travel demand analysis and need not be discussed in detail in the reports on O&M costing.

The other front is the development of the O&M cost models themselves. This effort requires a detailed budget statement and an accurate estimate of service characteristics from a recent fiscal year of the local transit operator. To the extent possible, the chosen fiscal year should be both stable — in that no significant changes in service levels, labor productivity, or ridership patterns occurred — and representative — in that service characteristics are similar to the current operation. Where the alternatives include transit modes or operating practices that are new to the local area, the effort will also require data from other urban areas where these modes and practices are in place.

The O&M cost models are calibrated simply by identifying those costs that are variable with service levels, and then attributing each variable cost item to the service characteristic to which it is most closely tied. The resulting unit costs can then be applied to variations in service characteristics caused by an alternative to estimate the O&M cost of the alternative.

Ideally, the O&M cost models should be validated by applying them to a past fiscal year in which service levels were somewhat different and examining how well the estimated costs match the actual expenditures for that year. Obvious candidates for the fiscal year selected for the validation work are those prior to major expansion or contraction of service. Difficulties may arise in obtaining cost records in the same accounting format and staffing records in sufficient detail to examine changes in labor productivity. The

Figure II-4.1. Estimating Operating and Maintenance Costs



effort should be made, however, because the validation of the cost models against an operation that is somewhat different from that in the calibration year adds substantial credibility to its estimates for the alternatives.

The methodology report on O&M costing documents the development and validation of the O&M cost models, and, where data for new modes or operating practices have been taken from other transit operators, discusses the applicability of the resulting model to the local situation.

Application of the O&M cost models is straightforward. The service requirements for each alternative — vehicle-miles, etc. — are used in the models to estimate staffing levels, labor costs, and material costs. The results are documented in the O&M cost report on a line-item basis for each alternative so that participants in the analysis can examine the source of cost difference between the options.

4.2 Resource Build-Up Models

All alternatives analyses should use a resource build-up approach in the estimation of O&M costs. Resource build-up models compute costs by estimating the labor and materials needed to provide a given level of service, and then applying projected unit costs of labor and material. In its most detailed form, a resource build-up model represents costs in a series of equations of the form

$$(4-1) \quad \text{O\&M cost} = (\text{unit of service}) \\ \quad \quad \quad \times (\text{productivity ratio: resources per unit of service}) \\ \quad \quad \quad \times (\text{resource unit cost}).$$

Units of service typically include vehicle-miles, vehicle-hours, peak vehicles, yards, stations, garages, track-miles, and passengers. They are derived from both the physical descriptions of the alternatives and from the final operating plan for each alternative derived through equilibration of travel demand with system capacity and service policies. The resource-required-per-unit-of-service is a productivity measure expressed, for example, in such terms as "mechanics per vehicle-mile" for vehicle-mechanic labor and "gallons of diesel fuel per vehicle-mile" for fuel costs. These productivity ratios are derived from local budget documents and other records of recent operating years, and, in the case of new modes, from data obtained from operators of similar services in other cities. Unit costs are expressed in such terms as "average annual wages per mechanic" and "average price per gallon of diesel fuel." They are also derived from recent budget documents, supplemented where necessary with data from other transit operations.

For new modes care must be taken when cost data are derived from the operating budgets of other agencies because some costs may be omitted. For example, when a rail system begins service at an agency, the rail operating budget will frequently not include many of the agency's administrative costs, a portion of which support the rail service. Examples of such costs

are those for scheduling, personnel, marketing, insurance, and fare collection which may not be accounted for in the rail budget. Proper allocation of these costs can be accomplished by examining how they were allocated by mode for Section 15 reporting purposes.

When cost data are used from other agencies for new modes, it is important that the appropriate mix of new and older systems are represented in developing the unit and productivity costs to be used for the new mode. The objective is to develop a process which accurately predicts long term O&M costs for the system of concern. For example, rail maintenance costs should not be derived from systems recently opened because these costs are likely lower than the long term costs. Similarly, cost data from older systems, which incur higher than normal costs due to deferred maintenance practices, should not be used exclusively. Because judgement is required in deciding these issues, it is important that the justification for using one system over another, or for using a mix of systems, is properly documented in the methodology report.

Short Term Forecasts. Productivity ratios are central to this modeling approach and describe the manner in which labor and material requirements vary with service levels. In the short term these relationships can take one of three forms — continuously variable, step-wise variable, and fixed. Continuously variable items are those for which the added cost of an additional service unit — a vehicle mile — remains the same over the entire range of service levels. Such items as diesel fuel, electric traction power, mileage-based preventative maintenance activities, and so forth, are well represented as continuously variable cost items.

Items that vary in steps have significant discontinuities in their marginal costs. A common example is the cost tied to the operation of vehicle maintenance facilities themselves (as distinct from the vehicle maintenance done within the facility). This would include the costs of utilities, janitorial staff, security, etc. that increase only when an additional facility is needed. Thus, it would be incorrect to assign these costs to a continuous variable — peak vehicles, for example — since every additional peak vehicle would incorrectly add to the cost of these items. The correct approach is to vary the facility costs with larger increments (or steps) of peak vehicles, where the step size is the number of additional peak vehicles that would require the opening of an additional maintenance facility.

Finally, fixed items are those whose marginal cost is zero over the expected range of system variables. Staffing in administrative positions — the general manager's office, personnel, legal, etc. — is likely to fall within this category.

Long Term Forecasts. While this differentiation of costs into three categories is appropriate for short range projections involving annual cash flows, it is likely that all agency costs vary continuously over the 15 to 20 year planning period of major transportation investments. This effect is consistent with economic practice which treats all operating costs as variable in the long term. The approach makes sense even in cases in which

an agency decides not to increase certain staff positions when service is expanded. The following example discusses how this applies to what frequently are considered fixed costs.

If an agency projects no increase in certain staff positions due to service increases, two possibilities are likely resulting in either a hidden cost to the agency or a real one. An expansion in service is likely to result in additional work for all agency staff. Not increasing staffing levels means that less time can be spent on duties performed prior to the system expansion. Schedulers may not fine tune schedules as frequently, or callers may have to wait longer for schedule information. Monetary costs to the agency remain the same as before the expansion but the quality of service may decline.

The costs incurred by the agency become more apparent if a second service expansion of similar magnitude to the first occurs. The cumulative effect of the two expansions could result in the hiring of several new employees, a cost partially created by the first service expansion. Making all costs continuously variable properly accounts for the costs caused by each service expansion.

Another effect of long term service expansion is an increase in real terms (net of inflation) in the salaries of department heads and other positions which would not otherwise increase in number. For example, a General Manager's salary is likely to increase in real terms as the size of the agency increases. Similarly, if the agency became significantly smaller, the General Manager's salary would likely decrease. It is difficult to predict the size of the increase or decrease, but relating the cost of these positions to a continuous service variable is a straightforward way of recognizing this effect.

UMTA requires that all agency operating costs be treated as continuously variable when computing the UMTA cost-effectiveness indicators. This approach does not preclude the assumption of fixed costs in computing cash flows for the financial analysis as explained in Section 4.7 below. This treatment of costs recognizes that the purpose of the cost-effectiveness index is to account for the benefits and costs associated with the project and not the cash flows which are of concern in the financial analysis.

Examples of Model. Table II-4.1 illustrates one approach to modeling the costs of bus maintenance and servicing for a representative transit operation. For each cost item, the third column identifies the service variable to which the cost has been assigned. The "model" itself consists of the productivity ratios and unit costs in the next two columns. Outputs from the model are the labor requirement (if any) for each category, and the estimated cost.

The table illustrates several options for portraying costs. In this example, all labor unit costs include both wages and fringe benefits. Thus the model would not be transparent in illustrating the effect of changes in the fringe ratio — a limitation likely to be quite acceptable in an

Table II-4.1. Sample Sections of a Detailed O&M Cost Model

acct	resource category	service level	resource productivity	unit cost	staff	cost (000)
010	office of director of operations	peak veh	<u>1 staff</u> 200 peak veh	<u>\$47,000</u> staffer		
	schedulers	peak veh	<u>1 staff</u> 65 peak veh	<u>\$28,700</u> staffer		
	shift supervisor	garage	<u>3 supervisors</u> garage	<u>\$38,400</u> supervisor		
	street supervisor	veh-hr	<u>1 supervisor</u> 0.14MM veh-hr	<u>\$34,100</u> supervisor		
	support staff	garage	<u>5 staff</u> garage	<u>\$22,000</u> staffer		
032	fuel	veh-mi	<u>0.31 gal</u> 1 veh-mi	<u>\$0.94</u> gal	-	
	lubrication	veh-mi	-	<u>\$0.012</u> veh-mi	-	
033	tires and tubes	veh-mi	-	<u>\$0.021</u> veh-mi		
042	office of director of maintenance	peak veh	<u>1 staff</u> 250 peak veh	<u>\$38,000</u> staffer		
	maintenance supervisors	garage	<u>3 supervisors</u> garage	<u>\$36,200</u> supervisor		
	support staff	garage	<u>2 staff</u> garage	<u>\$22,000</u> staffer		
050	service mechanics	peak veh	<u>1 serv. emp.</u> 11 peak veh.	<u>\$24,600</u> service emp.		
	cleaning	peak veh	NA	\$0.06	-	
060	bus mech. (including leadmen)	veh-mi	<u>1 mechanic</u> MM veh-mi	<u>\$29,600</u> foreman		
	parts	veh-mi	-	<u>\$0.213</u> veh-mi	-	

alternatives analysis. An alternative specification would be to use separate line items for the wages and fringes in each labor category. The added flexibility of this specification must be traded-off, however, against the relatively large number of line items that would be added to the model. A useful compromise may be to use the more detailed specification for vehicle operators only, reflecting the magnitude of this expense and the variability of operator fringes.

Also in this example, all staff positions within a fixed line item are counted and costed together. Thus, in the office of the director of operations, the model does not identify individual positions or salaries and would not be able to illustrate the effects of different staff mixes. Again, this limitation would have no effect on the usefulness of the model in an alternatives analysis, and a more detailed specification of the fixed offices could be used in situations where the staffing mix was an issue.

The table also illustrates several forms of productivity ratios. These arise from an effort to keep the ratios in meaningful units. For labor items in which there are several staff positions associated with each service unit, the numerator of the productivity ratio is greater than 1. For example, operations supervisors are represented as three positions per garage, rather than one position per 0.333 garages. The converse occurs where there are several units of service associated with one position. Service mechanic, for example, are specified at 1 position per 11 buses rather than 0.09 positions for each bus. In both examples, the two specifications are equivalent and the model would yield the same result. However, the preferred specifications yield ratios that are much more easily interpreted.

Finally, the example illustrates the difficulty in computing productivity ratios for many material line items. While some items — diesel fuel, for example — have natural productivity ratios, many do not. Maintenance parts and cleaning supplies in this case cannot be quantified in any single unit. Their productivity ratio, then, is expressed directly in terms of costs-per-service-unit (\$/vehicle-mile and \$/peak-vehicle, respectively).

4.3 Standard System of Accounts for Alternatives Analysis

One of the benefits of the resource build-up approach to O&M costing is that assumptions on productivity ratios and unit costs are made explicit and are therefore easily compared with data from other operations. To facilitate comparisons across cities, UMTA staff are compiling O&M cost models from around the country and are supplementing these models with detailed analyses of labor and material productivity from a sample of transit operations. To facilitate cost comparisons among cities, UMTA has developed a standard system of accounts for O&M cost models used in alternatives analysis. The system is a simplification of the standard accounts, shown in Table II-4.2, used for reporting UMTA Section 15 data at Level A. Table II-4.3 summarizes the standard alternatives analysis accounts and indicates their relationship to the Section 15 Level A accounts.

Table II-4.2 Section 15 Level A Accounts

Level A Account Number	Account
011	Transportation Administration
012	Revenue Vehicle Movement Control
021	Scheduling of Transportation Operations
031	Revenue Vehicle Operation
041	Maintenance Administration - Vehicles
042	Maintenance Administration - Facilities
051	Servicing Revenue Vehicles
061	Inspection and Maintenance of Revenue Vehicles
062	Accident Repairs of Revenue Vehicles
071	Vandalism Repairs of Revenue Vehicles
081	Servicing and Fuel for Service Vehicles
091	Inspection and Maintenance of Service Vehicles
101	Maintenance of Vehicle Movement Control Systems
111	Maintenance of Fare Collection and Counting Equipment
121	Maintenance of Roadway and Track
122	Maintenance of Structures, Tunnels, Bridges, and Subways
123	Maintenance of Passenger Stations
124	Maintenance of Operating Station Buildings, Grounds, and Equip
125	Maintenance of Garage and Shop Buildings, Grounds, and Equip
126	Maintenance of Communication System
127	Maintenance of General Admin. Buildings, Grounds, and Equipment
128	Accident Repairs of Buildings, Grounds, and Equipment
131	Vandalism Repairs of Buildings, Grounds, and Equipment
141	Operation and Maintenance of Electric Power Facilities
145	Preliminary Transit System Development
151	Ticketing and Fare Collection

Table II-4.2 (con't) Section 15 Level A Accounts

Level A Account Number	Account
161	System Security
162	Customer Services
163	Promotion
164	Market Research
165	Injuries and Damages
166	Safety
167	Personnel Administration
168	General Legal Services
169	General Insurance
170	Data Processing
171	Finance and Accounting
172	Purchasing and Stores
173	General Engineering
174	Real Estate Management
175	Office Management and Services
176	General Management
177	Planning
181	General Function

Table II-4.3 Standard Accounts for Alternatives Analysis

Acct	Level A Accounts	Title
010	011, 012, 021	Administration and Scheduling of Transportation Operations
031	030	Operator Wages and Fringes
032	030	Fuel and Lube
033	030	Tires and Tubes
041	041	Maintenance Administration - Vehicles
042	042	Maintenance Administration - Facilities
050	051	Servicing Revenue Vehicles
060	061, 062, 071	Inspection, Maintenance, and Repairs of Revenue Vehicles
080	081, 091	Inspection, Maintenance, and Servicing of Service Vehicles
101	101	Maintenance of Vehicle Movement Control Systems
111	111	Maintenance of Fare Collection and Counting Equipment
121	121, 122	Maintenance of Roadway, Track, and Structures
123	123	Maintenance of Passenger Stations
124	124, 125, 127, 128	Maintenance and Repairs of Buildings, Grounds, and Equipment
126	126	Maintenance of Communication System
141	141	Operation and Maintenance of Electric Power Facilities
151	151	Ticketing and Fare Collection
160	162-164, 166-168, 170-177, 181	Other General Administration
161	161	System Security
165	165	Injuries and Damages
169	169	General Insurance

The development of O&M cost models for alternatives analysis should include the assignment of all accounts from the local accounting structure to one of the standard accounts in Table II-4.2. To the extent possible, all variable line items assigned to each standard account should be associated with the same service variable so that each account can be aggregated to a one-line expression.

Table II-4.4 provides descriptions of the standard accounts. The descriptions identify the types of transit employees covered in each account and an indication of the service variable(s) to which the account is assigned. Each account includes the total labor costs (salary and fringes), clerical support for the activity, relevant training, and necessary materials. More information on the expense components of each account is presented in "Urban Mass Transportation Industry System Of Accounts and Records and Reporting System," January 10, 1977, Vol. 2, available from UMTA.



***POLICY AND PROCEDURES OPTIONS STUDY
FOR PROJECT OPERATION AND MAINTENANCE***

***NATIONAL OPERATION AND MAINTENANCE PROGRAM PLAN OF
IMPROVEMENT***

for

**OPERATIONS, CONSTRUCTION AND READINESS DIVISION
DIRECTORATE OF CIVIL WORKS
U.S. ARMY CORPS OF ENGINEERS**

by

**INSTITUTE FOR WATER RESOURCES
WATER RESOURCES SUPPORT CENTER
U.S. ARMY CORPS OF ENGINEERS**

August 1993

IWR Report 93-R-11



DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON, DC 20310-0103



REPLY TO
ATTENTION OF

30 AUG 1993

Honorable Leon E. Panetta
Director
U.S. Office of Management and Budget
Washington, D. C. 20503

Dear Mr. Panetta:

Approximately two years ago, the Army Corps of Engineers, under the direction of this office, initiated a comprehensive study with the objective of assuring that Federal expenditures for operation and maintenance of Corps projects provide justified levels of service in the least cost manner.

A report summarizing the findings and conclusions of that study is enclosed. The report also describes actions now underway to fully define and facilitate implementation of those items which will have the greatest net beneficial effect on the program. As those actions are completed, over time, we expect to propose specific policy and procedure changes, as may be appropriate.

Sincerely,

G. Edward Dickey
Acting Assistant Secretary of the Army
(Civil Works)

Enclosure



DEPARTMENT OF THE ARMY

U.S. Army Corps of Engineers
WASHINGTON, D.C. 20314-1000

16 AUG 1993

REPLY TO
ATTENTION OF:

CECW-O

MEMORANDUM FOR Acting Assistant Secretary of the Army
(Civil Works)

SUBJECT: Summary of Findings of the Policy and Procedures
Options Study for Project Operations and Maintenance

1. I am providing you with the report which summarizes the findings and conclusions of the contractor for the subject study. The report also presents the U.S. Army Corps of Engineers preliminary response to the findings and describes follow-up actions now being undertaken by the Corps to implement improvements to the Civil Works Operation and Maintenance (O&M) Program.

2. The contractor identified 101 practices where improvements can be made in the program efficiency. We have completed an initial review of the contractor's study and have assembled task groups to fully define and facilitate implementation of those policy and procedures options which are of the highest priority and which will have the greatest net beneficial effect on the O&M Program. Many of the identified improvements will require extensive Headquarters involvement developing criteria to standardize budgeting procedures, operating criteria and organizational structures and functions. Other identified improvements are more closely associated with the actual management and operation of projects. These should more readily be implemented by field offices with minimal Headquarters guidance.

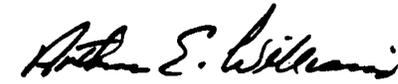
3. We have already taken some steps to implement the findings of the O&M Study. The FY 95 budget guidance has been updated to direct additional emphasis toward constraint in the growth of operations features, to encourage field offices to use the study results to implement efficiency improvements and to clarify use of Special Recreation Use Funds. The development of an automated maintenance management system recommended by the contractor has also been initiated. As the task groups develop options to improve the program in response to the contractor's findings, we will be making appropriate recommendations to you for implementation.

CECW-0

SUBJECT: Summary of Findings of the Policy and Procedures
Options Study for Project Operations and Maintenance

4. Printing of the report for distribution to members of Congress and Corps field offices will take about six weeks. The report will be sent to our field offices once copies have been furnished by you to the Office of Management and Budget and concerned committees of the Congress.

Encl


ARTHUR E. WILLIAMS
Lieutenant General, USA
Commanding

PREFACE

The emergence of operation and maintenance expenditures as the single largest individual program in the Civil Works budget provided incentive for a comprehensive review of the program. Financial pressures caused by tight budgets on the one hand, and an ever growing project inventory on the other, provided further impetus to evaluate the way the O&M business was being conducted. Towards that end, the Army Corps of Engineers, under the direction of the Assistant Secretary of the Army for Civil Works {ASA(CW)} has completed a comprehensive study of the Civil Works Operation and Maintenance (O&M) Program. The objective of the study is to assure that Federal expenditures for operation and maintenance of Corps projects provide justified levels of service in the least cost manner. The output of the study is to be policies and procedures (practicable measures) to achieve that objective.

The initial phase of the study began in June 1991 with the award of a contract to a consulting firm, Management Analysis Inc. The use of an outside contractor was deemed essential to assuring an objective as well as a comprehensive review. The Contractor was charged with reviewing the O&M program and project operations to identify options for improvement of current procedures. The Contractor's work, completed in September 1992, was directed by a full time study manager, assisted by a management group composed of staff members from Corps Headquarters and the Institute for Water Resources. A group which included selected Directors of Construction-Operations Divisions and representatives of ASA(CW) reviewed the interim and final products of the Contractor. A steering committee chaired by the Deputy Director of Civil Works and comprised of Civil Works functional element chiefs, other Headquarters representatives, and the Director, Water Resources Support Center provided oversight and general direction.

The second phase of the study, review of the Contractor's findings by the Corps and development of an implementation plan, was directed by Mr. John Elmore, Chief, Operations, Construction and Readiness Division, Directorate of Civil Works, with support from the Institute for Water Resources. The Directors of Construction-Operations for each Corps division office conducted the review and developed the initial implementation plan.

This report, prepared by the Institute for Water Resources staff, is a summary of the Contractor's study and findings and preliminary review by the Corps. The report is presented in two parts. Part I, Plan of Improvement, presents and describes actions which will be undertaken to improve the program. Part II, Study Conduct and Findings, documents the reasons for undertaking the study, how the study was conducted, and presents the study findings and conclusions for those readers who are interested in following the process that supports the need for the improvement actions. Part II presents material primarily extracted from the study Contractor's report and the findings and

conclusions are those of the Contractor. Part I presents the Corps preliminary response to those findings. That response will not be final until a series of task groups complete their work and the chief of engineers makes final recommendations to the ASA(CW) for implementation.



**NATIONAL OPERATION AND MAINTENANCE PROGRAM
PLAN OF IMPROVEMENT**

**PART I
IMPLEMENTATION PLAN**

I. DECISION PROCESS

After initial review and acceptance of the work performed by the contractor, the Corps began a process to consider study conclusions. There were four study themes - Program Development, Execution, and Monitoring; Intensive Management; Productivity of Existing Program; and Modernization and Maintenance. The Contractor identified 106 separate issues for the four study themes and presented options under each issue. Due to overlap and redundancy, that number was consolidated to 101 separate issues for further consideration. An implementation group composed of Directors of Division Construction-Operations organizations was assembled to analyze the 101 integrated issues and identify the corresponding options which could have a beneficial impact on the manner in which the Corps' operation and maintenance program is carried out. The most appropriate options in the collective opinion of the group were proposed for implementation. Although all issues developed by the Contractor are presented in this report (Part II, Section V), the implementation group developed a high priority plan (HPP) which they believed contained the options which were most practical and had the greatest potential for efficiency improvement. A summary of the group's conclusions is presented in Tables 1, 1A, and 1B. All of the remaining issues, not included in the HPP were generally considered to fall into one of three categories: 1) recommendations that were expected to have a relatively lesser impact on the cost of doing business and/or involved implementation difficulties, 2) recommendations that were limited in scope and which could be implemented on a project-by-project basis (the FY95 budget guidance encourages the districts to employ project specific recommendations that would produce operational efficiencies such that may be freed for the purpose of reducing maintenance backlogs), and 3) issues that were inherent to other on-going Corps initiatives such as the recreation study. A complete review of the rationale used by the group in developing the HPP is presented in Part I, Sections II, III and IV.

The HPP prepared by the Directors of Divisions Construction-Operations organizations was then reviewed by Corps Headquarters (HQUSACE) functional elements having an interest in the O&M program. Subsequently, the HPP was modified and four committees composed of Headquarters and field personnel were instituted for the purpose of planning formal adoption of the best options. The committees have been tasked to analyze all of the issues identified by the Contractor and, recognizing that many of the issues were in fact symptomatic of larger overarching organizational needs, consider complementary improvements, not necessarily identified by the Contractor,

but nonetheless potentially capable of contributing to a more cost-effective program. The implementation activities of the four committees are described in Part I, Section V.

II. HIGH PRIORITY PLAN

The 101 issues were grouped into three categories: 1) PROGRAMMATIC, pertaining to budget preparation, execution, reporting and monitoring; 2) GENERAL PROJECT MANAGEMENT, involving overall or Corps-wide organizational implications; and 3) FUNCTIONAL AREA, linking the delivery of specific services or agency outputs to measures that will improve productivity. The groups recommendations for the 101 issues are summarized in a Table in Part I, Section IV. Of the 62 issues which the group believes had the most merit for implementation, 43 were adjudged to be of the highest priority. The High Priority Plan for each of the three categories is described in the following paragraphs.

A. PROGRAMMATIC

The Contractor identified 21 proposed actions in the programmatic category. Of that total, options were selected that would address 13 issues. A discussion of proposed revisions to current practices is presented in the following paragraphs. Actions are underway to complete the necessary revisions this fiscal year for incorporation into the Annual Budget guidance for Fiscal Year (FY) 1996.

The group agreed that the O&M budget process could be streamlined and simplified because the value added by much of the current effort is questionable. Several actions were identified in this study which could improve management of the O&M program through changes in budget development, execution, reporting, and monitoring. Implemented together, these measures will more equitably allocate resources on a Corps-wide basis and reduce the annual budget submittal documentation for the relatively fixed requirements of projects.

The concept of these changes is to rebuild the levels 1 and 2 baseline requirements for each project in accordance with new, more stringent definitions of baseline effort reflected in a revised funding level matrix. Once definitive baseline requirements are developed Corps-wide, subsequent years' budget submittals for baseline requirements could be limited to a single baseline work package with an adjustment for inflation for each project. This could reduce by about 75% the over 20,000 work items contained in the overall Corps O&M budget submittal. Any new baseline funding demands over \$25,000 that result from new programs or policies would be accommodated by listing each as a separate line item in project budget submittal for the first three years of the program.

These changes can be implemented through appropriate revisions to the Annual Budget Engineering Circular (EC) 11-2-xxx. Implementation should begin with a work group effort in FY 93 to develop new funding level descriptions and a new funding level matrix. The new procedure of incorporating all baseline funding requirements into a single work package for each project or feature and the requirement to separately list any new baseline funding demands over \$25,000 will be effective for the FY 96 budget submittal. These changes in the budget process will greatly reduce (after the first cycle of rebuilding the baseline funding requirements) the volume of documentation that accompanies a budget submittal. The result should be a higher quality budget product by making it possible to concentrate more on the dynamic non-baseline O&M work packages both at district level during budget preparation and at division and headquarters review.

Another budget related reform that could benefit program development and execution concerns the out-year budget process. The potential exists to modify this process to provide additional utility as a mid-range planning tool for periodic and non-recurring O&M work.

The current out-year budget process includes a 10-year O&M budget projection prepared each year as part of the annual budget preparation cycle. This 10-year projection is of limited usefulness because out-year programs are submitted by project with no further breakdown beyond the total amount for each project. Additionally, specific periodic or non-recurring needs are not formally planned for beyond the Budget Year.

The O&M program, however, consists of both fixed or baseline expenditures and variable (periodic, non-recurring) expenditures. The current process for preparing the out-year programs does not provide optimal mid-range (e.g., 5-year) planning input for this variable portion of the O&M program.

To address the need for a mid-range planning tool, the Corps should prepare a detailed 5-year budget projection for periodic and non-recurring work items above a certain cost threshold. Funding constraints for the out-years' budget project would be assigned at division level in order to place some discipline in the process. However, the degree of constraint could vary by year, being less in the out-years of the 5-year projections with the final year (Budget Year +4) being unconstrained. The unconstrained year could reflect the level of Unaccomplished Maintenance and Repair (UMAR) identified as described in Section IB5. Using this concept gives dual purpose to the 5-year budget projection; as a mid-range planning tool and a means of documenting and managing the backlog of maintenance at projects. Provision for a 5-year budget projection should be made through modification to the Automated Budgeting System (ABS) to include a 5-year data requirement and revisions to the FY 96 Budget EC.

IMPLEMENTATION PLAN

The limited capability of Corps' automated financial systems is universally recognized. The two most prominent automated systems associated with O&M programming in use today are ABS and the Corps of Engineers Management Information System (COEMIS). There are serious shortcomings in turnaround time for financial reports, and with interface between the ABS and COEMIS systems. These and other related issues will supposedly be addressed by the Corps of Engineers Financial Management System (CEFMS), the successor to COEMIS that will be incrementally deployed Corps-wide over the next three years. Therefore, no recommendations for global changes in the ABS/COEMIS systems are now appropriate.

However, there are some relatively minor things that can be done with ABS that will help until more comprehensive solutions are available. Improvements should be made to facilitate automated entry of data at the project level. While some "home grown" systems have been developed for this purpose, a standard PC-based format is needed that would standardize the budget development process at the lowest level. This would eliminate the entire step currently required to manually enter these submittals into the ABS for consolidation at the district level. Data entry errors from this extra step will be eliminated, and there will be a reduction in time required to prepare the project budget submittals. A method to automate data entry into the ABS project level is now being developed as part of the Improvement of Operations Management Techniques (IOMT) research and development program. It is currently under test in the Portland District. This system should be perfected and fielded Corps-wide as soon as possible.

A further minor change is needed in the ABS to improve management oversight. Currently, ABS does not provide for a separate breakout of Supervisory and Administrative (S&A) Feature Cost Codes (FCC's) (FCC 619 for operations and 635 for maintenance), nor for the Engineering and Design (E&D) FCC (FCC 634) in the budget submittals. Rather, costs associated with these FCC's are imbedded in the budgeted amounts for the remaining operation and maintenance FCC's. These FCC's are tracked separately, however, for actual expenditures. As a result, it is difficult to make comparisons between budgeted amounts and expenditures by FCC without first backing out these S&A and E&D FCC's from the original budgeted amounts. To facilitate tracking, the S&A and E&D FCC's should be listed separately in the ABS budget submission. This will highlight costs associated with these items in the budget submittal rather than their being obscured in a multitude of work packages. Implementation of this item should be effected in FY 93 by revision to the Budget EC for FY 95 and appropriate changes to the ABS.

In the same implementation time frame and same manner, a larger field should be provided for the justification of work items in the ABS budget development system. The present field size does not allow for an adequate description of the purpose and need for many work items in the budget submittal, especially for special maintenance needs.

In the area of performance measures, among the parameters tracked at the HQUSACE Command Management Review are expenditure and obligation goals for each Corps' division and district. Currently, the O&M program is required to meet a 94% expenditure goal and a 97% obligation goal. The Contractor believes that these goals drive decisions toward inefficient allocation of resources. The group finds these goals are important in achieving high utilization of all resources available. Both the HQUSACE Operations Division and Programs Division monitor these standards, however, both apply these goals to a different funding base. In preparing the Command Management Review, Programs Division applies these standards to the "basic schedule," which reflects start of year funding expectations. Operations Division, however, applies these standards to the "current schedule," which reflects changes during the year. In the interest of consistency in applying the performance measures for expenditure and obligations, all elements should use the current schedule as the funding base. The current schedule is a realistic indication of the funds a district or division had available for expenditure during the year and thus is the better measure of program execution.

In December 1992 Programs Division, HQUSACE, issued guidance to use the current schedule against which to measure program execution for meeting expenditure and obligation goals.

Some problems have been observed in accurate recording and tracking of O&M expenditures. Part of the problem is that the FCC definitions provided in ER 37-2-10 are not adequate. Some activities do not fit under any of the existing definitions, or the definitions may not be clear. Provision should be made for specific additional sub-FCCs and accounting element definitions. Implementation of this item should be deferred until CEFMS is fielded Corps-wide, which is expected to occur by FY 96.

Some inaccuracies in recording expenditures stem from activities of multi-functional personnel--those who perform work under various FCCs on a regular basis. These personnel sometimes find it difficult to record this time appropriately. Overall, the Contractor reported that instances of non-compliance with Corps' guidance regarding the proper recording of expenditures were numerous. Additional emphasis is needed on the importance of accurately recording expenditures. HQ should issue guidance reinforcing the existing 1-hour rule. Also, Divisions should monitor District adherence to the 1-hour rule during Command/Staff visits. A recently completed Cost of Doing Business Report by the Engineer Inspector General also recommended that HQUSACE issue clear guidance on the use of the 1-hour rule. It is expected that this guidance will be issued.

The original BY budget submission, or President's budget, is prepared almost two years in advance of the actual Budget Year. During the course of these interim two years, conditions and priorities may change at the project, district and division levels. The Corps provides for two adjusted

submittals to be prepared during this interim period in order to incorporate these changes into the O&M budget request. First, an adjusted BY budget is prepared following the original President's Budget submission. Then, immediately prior to the start of the budget year, a work allowance request is prepared which is the basis for the actual funding allocated to a project for execution during the budget year.

While the original BY President's Budget submittal undergoes extensive scrutiny for compliance with funding priorities, etc., the two subsequent adjustments traditionally are subject to much less stringent review. The result, in some instances, has been that work items that fell below the funding line in the original BY submittal were reinstated without challenge in one of the adjustment cycles. This problem was addressed by the more stringent reprogramming guidance regarding unbudgeted work contained in the FY 92 and FY 93 Annual O&M Work Allowance Guidance Memos. This guidance, along with Division's closer scrutiny of District's compliance, is expected to alleviate the problem of lower priority work finding its way into the execution program.

The Corps lacks a comprehensive recapitalization program to provide for sinking funds for major modifications and improvements to existing structures. Existing recapitalization methodologies consist of the few navigation rehabilitation projects funded out of the Construction General appropriation and cost shared with the Inland Waterway Trust Fund, and participation by the Power Marketing Agencies in rehabilitation of hydropower structures. Adoption of a sinking fund concept for major maintenance and rehabilitation of Corps-owned structures is desirable. Funding could come from external sources (project beneficiaries) and/or the O&M appropriation. Implementation should emanate from HQUSACE with necessary coordination with the ASA(CW), Congress, users, and power management agencies. Legislation will be required.

The group noted considerable volatility of funding requirements for Corps dredging projects, with budgeted amounts sometimes exceeding expenditures by a significant amount. Closer correlation between budgeted amounts and expenditures on dredging projects would contribute to more efficient allocation decisions for the use of Corps' resources. Consistent, Corps-wide guidance regarding how to determine the amount to budget for dredging projects is needed. HQ should convene a group to prepare budget guidance for dredging projects and include the guidance in the dredging regulation. Guidance available for use in preparing the FY 96 budget should be the goal.

B. GENERAL PROJECT MANAGEMENT

Of the 29 issues categorized by the Contractor as "general project management," it was determined that implementation of options in four general areas was of high priority. These areas, addressing 9 specific issues in this category, are discussed in the following paragraphs.

1. Standardized Organization Structure

Districts utilize different Operations organizational structures to manage the Civil Works mission. There are also organizational structures and reporting hierarchies unique to individual projects. These varying organizational structures lead to ineffective staffing and communications, ill defined responsibilities and attendant loss of efficiency. The group believes that a standardized Corps district/project function statement and organization structure should be developed and implemented. The cost of developing the regulations and reorganizing, will be more than offset by improving communications, providing efficient staffing and establishing clear command, control and execution responsibilities. The regulations should be issued in FY 94 to be initiated in FY 95 with full implementation by the end of FY 97.

2. Corps-wide Database

The lack of an adequate standard Corps-wide database limits the Corps ability to effectively manage and accurately measure the performance of the O&M program. A typical project maintains up to 300 forms for reporting to district, division and headquarters. Each management level reviews and analyzes data to monitor activities and make managerial decisions. There is some automation; however, most work is performed manually at the project level and automated at the district. Data needs are developed functionally with limited cross function review for joint use of data. The impact of the current practice is: the same data collected in several different ways results in inefficiencies; requests are difficult to fill in a timely manner; and software incompatibility is inefficient.

The group found that data essential to proper management of the program should be determined and a standard Corps-wide database to process that data be developed. The resources required to develop the database and resolve compatibility and linkage problems are far outweighed by the advantages of such a system. The advantages of standardization and consistency will reduce resource requirements and increase management and execution efficiency. The implementation schedule should be as follows:

FY 93 - FY 94 - Determine what data is essential to effectively manage the program.

FY 95 - FY 96 - Develop and test standardized system.

FY 97 - Implement program.

3. Contracting Methods

Each individual district (and sometimes project) uses various types of contracting methods for O&M work. These variations cause inefficiencies. Additional costs are incurred and considerable time is required due to current contractual procedures, advertisement and award processes. Standardized contracts should be developed with specific reference to indefinite quantity repair and

~~multiple-site contracts~~. Standardization of contracts and execution will reduce use of resources, improve the budgeting process and enhance scheduling. It is expected that significant cost savings and reduction in procurement time can be achieved. The new contract guidance should be developed for implementation in FY 95.

4. Unaccomplished Maintenance and Repair (UMAR)

Currently, there is no standard Corps-wide system for identification and tracking of UMAR. Although UMAR has been defined and the budget EC provides for an annual update, results are inconsistent and incomplete. Many projects have an informal system of recording UMAR but the information is not reviewed and reported above the project level. As a result of the current practice, the total needs of the O&M program, both currently and historically, are not identified. Because the total universe of UMAR is not identified, any comparison or prioritization of needs would be flawed. Consequently, critical maintenance or repair could be deferred and funds expended inefficiently.

An annual project UMAR reporting procedure should be established. This procedure would effect the identification, amount and tracking of UMAR. Reporting would be accomplished utilizing consistent guidelines for developing the required information. The resultant report would provide information necessary to include in the earlier described 5-year budget projection, make cost-effective funding allocations, better manage the program, and to present a defensible position regarding the magnitude of the UMAR component of the O&M program. The implementation effort should be initiated immediately for completion by the beginning of FY 94.

C. FUNCTIONAL AREA

Following are discussions of elements from the functional area issues that were selected to warrant high priority attention. These general areas would impact 21 of the 51 issues identified by the Contractor.

1. Flood Control Levee Inspection

The Contractor suggested that a rating system be developed for the condition of Corps-built, locally operated flood protection projects with dams, dikes and levees to reduce the cost of inspections. Flood control projects with excellent histories of maintenance would only be inspected by Corps' staff biennially. Those with fair to poor records of local sponsor maintenance would receive a lower rating and would continue to be inspected annually. Further, engineers at the nearest Corps' projects could perform annual and biennial inspections of completed works rather than district staff.

These recommendations should be implemented with minor changes. Structures should be inspected after major floods regardless of maintenance histories. Also, periods between inspections could be even longer than biennially, if no flooding had occurred since the last inspection, and if previous inspections of maintenance had resulted in high ratings.

This change of policy would give the districts suitable guidance for the inspection of Corps-built, local flood protection projects and still allow a reasonable method to reduce costs with minimal added risk. Travel and inspection costs would also be reduced by having engineers from local Corps' projects perform routine inspections. The responsibility for assuring that maintenance is accomplished would be shifted more to the local sponsors, as it should be, while reducing coordination effort with Corps' inspectors.

Rewriting of the regulation to include this recommendation could be accomplished this fiscal year.

2. Hydropower Plant Remote Control

There is potential for reducing staffing and operational costs of Corps' hydropower plants by converting them, "where practical and cost-effective," to remote control. Some operational functions could then be consolidated into a regional control center. Currently, there is no Corps-wide policy or guidance addressing the criteria that should be considered when evaluating the risks, costs and benefits of remote controlled plants.

A policy should be written so that districts can systematically and uniformly determine the appropriate action when planning the future status of power plants. Thus, the districts would have institutional support for decisions should they decide to implement, or not to implement, the remote control alternatives.

While there are obvious operational cost savings for remoting power plants, there are several disadvantages that could influence a decision. The cost of plant modifications, the function of the plant other than for power production, emergency response times, and climatological differences are some of the factors which must be evaluated as a part of a risk and cost/benefit analysis. Any policy established should focus on an evaluation methodology only. The decision to study and implement a plan for remote control should be at the district level.

3. Lock Dewatering Schedules

The Contractor suggested that consistency between districts and cost-effectiveness of major maintenance activities could be enhanced if all navigation locks were dewatered on a regular, multi-year schedule.

The group believed that the dewatering of locks should be accomplished on a regular schedule, and that HQUSACE should develop a policy to establish dewatering schedules for maintenance and inspection of navigation locks at regular intervals. The policy should address the consideration of customer input, equitable and scheduled funding, and staffing.

The cost of implementation would involve the development of the policy and studies to determine the appropriate schedules for each waterway. The benefits would be derived from the customer's ability to plan around lock closures, better utilization of Corps staffing, the time and effort saved through routine planning of lock dewatering, and from the routine scheduling expenditures. The development of the policy and the schedules should be accomplished by the end of FY 94.

4. Navigation Lock Operations

The Contractor made recommendations on navigation lock procedures in three separate areas, which should be consolidated into a single regulation.

The first action is to develop a uniform policy so that vessel crews would be responsible for securing vessels in the lock chamber. Although guidance on this issue already exists, it should be reinforced and exceptions made only when lock design or safety considerations make it impractical for a vessel crew to secure its own vessel.

The second area of consideration is in staffing. Staffing could be reduced when a vessel crew is given responsibility for securing its vessel. The Contractor also identified that some Corps locks employ full time, 24-hour a day staffs, even though the locks are seasonally closed. Alternatives for assuring the security of the locks should be explored. The Contractor estimated considerable savings if alarms and fences were used for security instead of full time staff. The group believes that the estimated savings make this a worthwhile area in which to issue guidance so that the districts will be encouraged to consider alternatives.

The third area that should be addressed in a navigation lock policy is equipment. Various equipment that could be installed in these facilities has the potential to reduce costs and/or increase safety. Besides the alarms and fences discussed above, closed circuit TV could be used by lock operators to observe vessel positioning, prevent or respond to accidents or attempted theft of Corps equipment, and monitor the functioning of lock filling and emptying mechanisms. These also may allow staffing to be reduced.

The group believes these ideas should be incorporated into a regulation on navigation locks. The districts would then have guidance to review their processes with the goal of providing uniform operations throughout the Corps at the lowest costs and staffing levels.

Implementation of this issue would have to be accomplished over several years. Defining a policy could be done in FY 93. Reducing staffing by attrition and budgeting of equipment changes would not be fully implemented until FY 98.

5. Hydrographic Surveys

Hydrographic surveys required in conjunction with project maintenance and dredging activities were identified by the consultant as an area of potential management improvement. Critical in surveys is the combination of cost effectiveness, accuracy/quality and timeliness. Current practices, along with the longer term effects of having "professionalized" the Operations management staff, result in the need for and the opportunity to revise hydrographic survey policies and practices.

The primary change proposed is to clearly identify that the Operations Division is responsible for the hydrographic survey function. Clearly, this is not a unilateral decision since it will involve Contracting and Engineering elements. Equally clearly, the timeliness, coordination and quality of hydrographic surveys is most singularly the appropriate responsibility of the Operations Division. Having crews furnished from one organizational element, equipment from another source and contract administration the responsibility of yet another element decreases the responsiveness to dynamic, real world requirements. Focusing the responsibility within Operations would be consistent with the "Project Management" concept and be cost effective.

Explicitly, this proposal includes consideration of such "in-house" equipment and crews as are available; the normal "contract administration" in the field; the decisions relating to need and frequency; and survey methodology. In those cases where the Operations requirements are to be met by "contract" survey, Operations would be responsible for the scope of work definition, funding and field administration, while working with Engineering on selection and contract award and administration.

Further opportunities may be available: to upgrade field equipment and related communications techniques; to provide rapid "read-out" or "plotting"; to redirect dredging effort; conclude work; and complete and release expensive dredging plant more promptly.

Finally, a uniform "cost accounting procedure" needs to be established and enforced based on the 607.11 FCC. This will allow improved data for cost analysis and estimating purposes.

Implementation of the above will require rewriting/updating of several Engineering Regulations (ERs) and should be able to be accomplished within one calendar year from adoption of this proposal.

6. Boundary Inspection

The requirements in ER 1130-2-400 to check all boundary lines every two years and to report missing monuments annually should be modified. Corps lands abut private, commercial, or local government owned or leased land as well as the lands of other Federal agencies. The Contractor recommended that boundary lines with other Federal agencies be re-monumented every four years and that cost-sharing boundary surveys with other agencies should be explored.

The group agreed with the Contractor's evaluation and suggested even further modification. Normally, there are no problems associated with encroachments when other governmental agencies own adjacent land, or when terrain, vegetation, or other natural barriers or man-made structures allow boundaries to be easily identified. In these cases, requiring re-monumentation biennially may not be cost effective nor the best usage of staff. Flexibility should be written into the ER to allow local managers more discretion in deciding when and how boundary surveys are accomplished and emphasize the need to concentrate on areas where non-governmental land owners are adjacent to our lands. The frequency of mandatory re-monumentation needs to be evaluated and a more sensible approach taken in sharing responsibilities and costs with other agencies. This proposal can be implemented this FY by revising the ER, as appropriate. In developing this proposal the need to properly maintain existing lines should be emphasized.

7. Communications Programs

Each District (sometimes each Project Office) individually develops interpretive programs. Many are very well done and could have wide, multiple application. The option proposed was the development of "generic" programs by HQUSACE for use throughout the Corps. The group found that the "generic" programs would be relatively expensive to develop and less popular than field-generated programs. Accordingly, existing examples of excellence should be shared. Further, this concept should be expanded beyond the interpretive program to include all Operations programs from hydropower through recreation to water safety. A mechanism that allows the identification, cataloging, and visibility of field-generated programs on a nationwide basis is needed.

The proposal is that a contractor develop a system for getting an abstract of existent programs in the field, and establish an electronic "catalogue" to be available through Corps Mail. The "catalogue" would initially include: title; abstract; point of contact at origin of program; availability; format; and cost information. This procedure would allow a much broader exchange, reduce redundancy and promote excellence. Eventually, an "issues" communication in conjunction with field "programs" could be utilized to improve communications throughout our organization. Implementation would span about two years.

8. Periodic Inspections

Current regulations require periodic inspections of Corps' projects on a regular five-year basis. The purpose of the inspection is to assure structural integrity and identify any other problems that may threaten the safety of the project. The district's Engineering Division is responsible for assembling the group of experts who will inspect the project. The cost of the inspection is charged to the O&M account for the project.

There is concern that, in some instances, inspections have been conducted on a more frequent basis and the size of the inspection team has been too large. These actions increase the O&M cost of the project and outweigh the concomitant benefit. Districts should assure that the inspection period conforms with current guidance and closely monitor the size and composition of the inspection teams.

III PEER REVIEW

The group, in analyzing the Contractor's findings, recognized that inconsistent and incorrect application of some policies and procedures was costly and confusing. More centralized control would be one option to address this problem. The group believed that a better approach would be to correct the problem where and when it exists rather than exercising greater central control.

That approach would establish a HQUSACE led "Peer Review Team" to review, on a periodic basis, field processes and practices. The team would follow the model of the established Military Construction's Design Construction Evaluation (DCE) teams. The team, led by HQUSACE staff, would be composed primarily of field staff, whose findings would be reported to the District Commander. The team would perform significant on-site training as well as bring major items to the attention of the facility command. The size of the team and the "review period" should be closely monitored to assure that the process is not excessively costly. This process would provide an opportunity to the headquarters' staff to assure that the full range of USACE developed policies were being implemented, and facilitate feedback from the field staff. The dialogue would provide "value added" in both directions (field-headquarters). Guidance to implement peer review is currently being developed by HQUSACE. Although the concept as described above remains intact, details such as team composition and procedures may differ.

U.S. Department of Energy
Washington, D.C.

ORDER

DOE 4320.2A

2-10-94

SUBJECT: CAPITAL ASSET MANAGEMENT PROCESS

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1. **PURPOSE.** To establish policy and responsibilities for the management of Department of Energy (DOE) assets; for prioritization of asset resource requirements; for implementing the Condition Assessment Survey (CAS); and for preparing the Capital Asset Management Process (CAMP) Report.
 2. **CANCELLATION.** DOE 4320.2, CAPITAL ASSET MANAGEMENT PROGRAM, of 3-13-92.
 3. **SCOPE.** This Order applies to assets DOE owns, leases, or controls for production, operation, research, development, or demonstration; except for the exclusions stated below or as otherwise provided by statute or by separate delegation of authority from the Secretary of Energy. The provisions of this Order apply to all Departmental Elements and to covered contractors to the extent implemented under a contract or other agreement. A covered contractor is a seller of supplies or services under a management and operating contract. All paragraphs of this Order are to be applied to covered contracts except paragraph 8.
 4. **EXCLUSIONS.**
 - a. This Order does not apply to assets entirely controlled and maintained by the General Services Administration (GSA), and the Naval Petroleum Reserves in California.
 - b. Executive Order 12344, (Order), Title 10 Code of Federal Regulations (CFR) 445.1 et seq., reprinted in Title 42 United States Code (U.S.C.) § 7158 note, establishes the responsibilities and authority of the Director, Naval Nuclear Propulsion Program, Office of Nuclear Energy, over all facilities and activities that comprise the joint Navy-DOE program. In view of the unique nature of Naval nuclear propulsion applications, the Director shall determine the appropriate maintenance and repair criteria applicable to this program's property and activities. Such determination shall include consideration of appropriate parts of the criteria set forth in this Order. Public Law (P.L.) 98-525, Title XVI, § 1634, directs that provisions of this Order pertaining to the Naval Nuclear Propulsion Program shall remain in force until changed by law.
 - c. In accordance with Section 302 of the Department of Energy Organization Act of 1977 (P.L. 95-91, 91 Stat. 578), the Secretary operates and maintains the Power Marketing Administrations (PMA) electric power transmission systems by
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and through the PMA Administrator. The PMAs have maintenance management programs in place that are geared to the special needs of utility operations, responsive to coordinated multi-utility system requirements, and in conformance with prudent utility practices. Administrators shall determine the appropriate maintenance management program for their facilities including consideration of appropriate parts of the criteria set forth by this Order.

5. REFERENCES AND DEFINITIONS. See Attachment 1.
6. POLICY. Assets shall be managed in a manner demonstrating good stewardship, sufficient to ensure facility preservation and to ensure safe, secure, environmentally sound, and cost-effective operations. Assets shall be maintained in accordance with policies and practices that reflect Departmental standards and national priorities. In addition, prioritization of asset projects shall be objectively determined on the basis of sound, traceable engineering and industry practices, and management judgment.
7. OBJECTIVES.
 - a. Provide a credible, standardized and auditable process that is objectively and consistently applied DOE-wide to assess asset conditions, identify and prioritize corrective actions, allocate resources, and establish schedules. Implement this process in a cost-effective manner in full consultation with the appropriate Secretarial Officers and related parties.
 - b. Ensure responsibility, authority, and accountability for management of DOE assets are clearly defined and appropriately assigned.
 - c. Identify asset maintenance and technical support requirements.
 - d. Provide asset management tools such as CAS, Life Cycle Plans (LCPs), the Project Prioritization Process, and the Site CAMP Report. These tools serve to effectively and efficiently plan and budget projects consistent with anticipated missions.
 - e. Provide asset managers with a comprehensive look at the condition of their asset inventory and serve as a vehicle to effectively plan and prioritize projects.
 - f. Ensure assets needed to meet future and assigned missions are sustained in appropriate condition.
 - g. Provide a mechanism to develop Site CAMP Reports that document the results of the process described in this Order. The Site CAMP Reports support budget requests and are not budget documents in and of themselves.

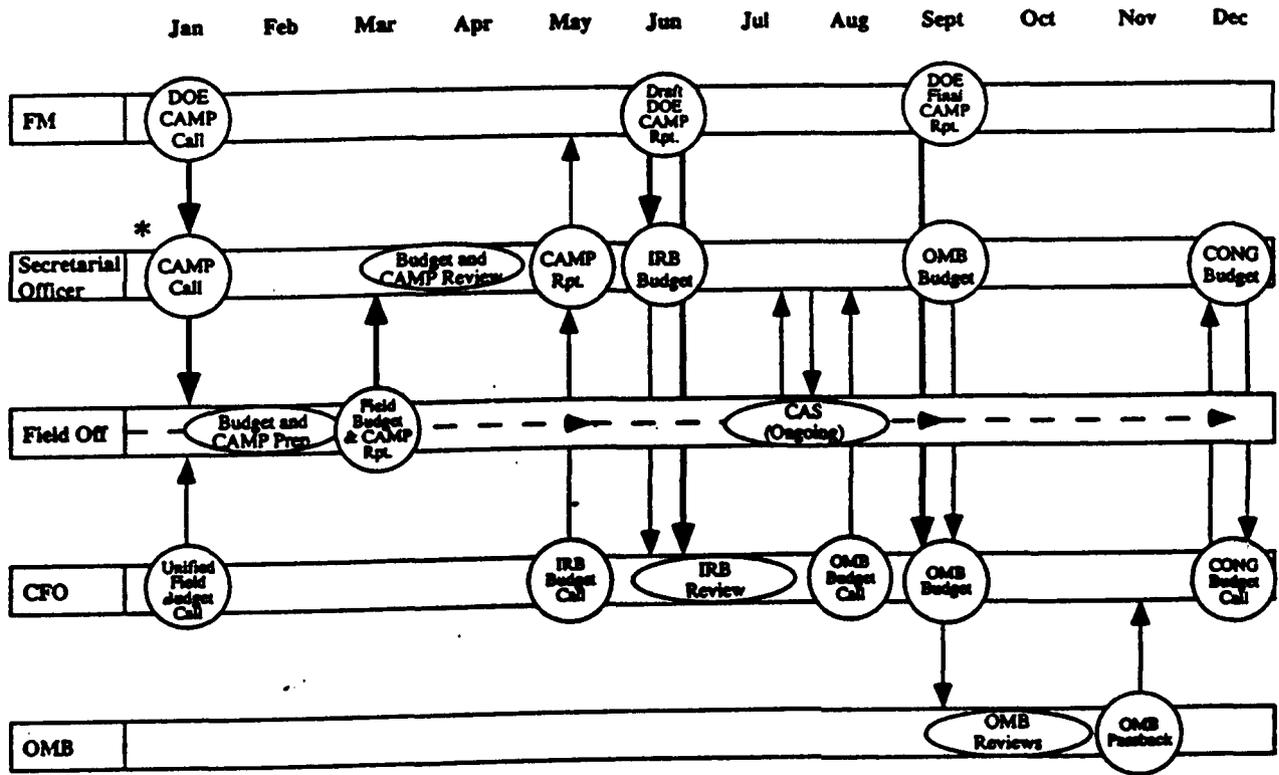
CHAPTER I

ELEMENTS OF THE CAPITAL ASSET MANAGEMENT PROCESS

1. INTRODUCTION. CAMP is a credible, consistent, auditable, and technically sound process for the Department to forecast, plan, and prioritize requirements for assets. CAMP provides an objective, rational basis for allocating budgeted resources for maintenance, repair, modification, reuse, and eventual replacement of assets required to meet site missions. CAMP is an effective and efficient mechanism that ensures compliance with applicable laws, regulations, and standards. The following paragraphs discuss each of the key elements of CAMP in a general, chronological order. A flow diagram illustrating the annual CAMP cycle is shown on Attachment I-1.
2. PROCESS ELEMENTS. CAMP is an integrated process and requires the performance of each of the following elements:
 - a. Assign Capital Assets. Assign each asset to an appropriate functional unit (FU). No asset may be assigned to more than one FU. The FU is the reporting level used by the Department in CAMP. This allows comparison of assets on a Departmentwide basis. Appropriate Secretarial Officers and sites may manage at levels other than FUs as desired. (See Chapter III.)
 - b. Receive Headquarter's Guidance. Heads of Headquarters Elements send multiyear strategic mission statements and program direction and guidance to the field at least annually. Additional guidance will also be provided in the annual CAMP Call. The CAMP Site Report shall incorporate this guidance. (See Chapter III.)
 - c. Develop Life-Cycle Plans. As appropriate, develop LCPs for assets based on life-cycle requirements to meet missions and prioritize projects to meet those requirements. These LCPs become part of the justification for the new projects. (See Chapter III.)
 - d. Identify Deficiencies/Requirements. The Condition Assessment Survey (CAS) identifies site asset deficiencies. CAS is also used as a tool to help meet the facilities inspection requirements of DOE 4330.4B, MAINTENANCE MANAGEMENT PROGRAM. The data captured from CAS is directly read into the Condition Assessment Information System (CAIS).
 - e. Evaluate Alternatives. Develop and evaluate alternatives for meeting the identified requirements. Alternatives may include, but are not limited to, maintenance, repair, modification, reuse, or replacement of existing assets, or construction of new assets. (See Chapter III.)

- f. Identify Projects. If the preferred alternative is identified as a project, develop rationale, scope, cost, and schedule.
- g. Prioritize Projects. Prioritize the projects by ranking scores to ensure the most cost-effective application of limited resources to meet the most critical needs. Sites shall validate, compare, and normalize initial project rating scores across the entire site without respect to the source or availability of funding. (See Chapter IV.)
- h. Prepare Site CAMP Report. Prepare the Site CAMP Report in accordance with the format and schedule provided in the CAMP Call. The Site CAMP Reports support budget requests but are not budget documents in and of themselves.

CAMP ANNUAL CYCLE OF EVENTS



*NOTE: Secretarial Officers may issue internal CAMP calls on a different schedule.

CHAPTER II
CONDITION ASSESSMENT SURVEY

1. INTRODUCTION. The Condition Assessment Survey (CAS) is a systematic inspection process to determine asset conditions. This Chapter provides general information on CAS and the basic method for implementing CAS throughout the Department. The relationship to the Site CAMP Report is discussed in detail in Chapter III of this Order. Programmatic objectives of DOE 4330.4B, MAINTENANCE MANAGEMENT PROGRAM, call for facility condition inspections and Condition Assessment Surveys. CAS shall be performed within the context of this Chapter.
2. OBJECTIVE. The primary objective of CAS is to assist all DOE sites in assessing the condition of their assets. CAS is based on a set of consensus standards, methods, and technologies to conduct the surveys and to collect and disseminate the survey and inspection information. The information is assembled in a database (the Condition Assessment Information System (CAIS)) that provides basic information necessary for the maintenance and asset management programs. CAIS data is also used to compile the Site CAMP Report.
3. MAINTENANCE PROJECTIONS. Appropriate levels of maintenance can be projected for assets nearing the end of their useful lives. The identification of assets projected for disposal can trigger requests for planning support and design funding for replacement. Managers can use CAIS to project current deficiency data into the future. CAIS can assist in developing annual funding profiles for maintenance, repair, rehabilitation, or replacement of assets.
4. IMPLEMENTATION. The effective implementation of CAS depends on the following:

The systematic application of consistent standards for inspection,

Proper use of a graded approach agreed to by the specific site Operations Office and the appropriate Management and Operating (M&O) contractors,

The formation and training of inspection teams,

The application of quality assurance procedures,

The use of a flexible database, and

The exercise of consistent management oversight.

The following paragraphs outline DOE's approach to the implementation of CAS through the CAS Manuals:

- a. CAS Manuals. The CAS Manuals contain detailed information for field implementation of CAS. These Manuals provide a foundation for checklists and other information in CAIS to assist field inspectors in determining the condition of existing assets relative to industry standards. CAS manuals delineate standards and procedures for CAS inspection. They are designed to ensure that one site does not determine an asset as deficient when another site declares a like asset with similar problems as adequate. CAS standards and procedures shall be periodically updated in accordance with DOE 1300.2A, DEPARTMENT OF ENERGY STANDARDS PROGRAM. CAS Manuals may be augmented with such documents as DOE 6430.1A, GENERAL DESIGN CRITERIA, current OSHA and environmental regulations, specialized industry standards such as those defined by the Institute of Nuclear Power Operations, standards published by nationally recognized professional organizations, etc.
- b. Frequency of Inspections. The CAS Manuals recommend frequency of inspections by type of asset.
- c. Use of CAIS. The implementation of CAS requires the use of CAIS, database management software designed to store and manipulate basic levels of inspection data. The Associate Deputy Secretary for Field Management supports and maintains CAIS.
- d. Quality Assurance. CAS incorporates a quality assurance (QA) program to certify the credibility of the CAS process, and to ensure that routine inspections are performed by site personnel that reflect current standards and procedures. The Associate Deputy Secretary for Field Management shall maintain a QA program for CAS. The standards and procedures used shall be periodically evaluated against state-of-the-art engineering practice, procedures, and requirements to determine both the accuracy and applicability of the Department's CAS process.
- e. Inspector Training. The inspectors shall be trained in the use of DOE standards and procedures for developing consistent and accurate inspection results, and the use of special tools, equipment and software.
- f. Formation of Specialized Inspection Teams. Certain assets unique to DOE may require highly specialized techniques and equipment to perform periodic inspections. To minimize the cost of these anticipated frequent inspections, DOE may establish teams of specialists to inspect these assets at DOE sites. Variables that may affect the decision to use such teams include, but are not limited to, the following examples:
 - (1) Nuclear facility versus non-nuclear facility.
 - (2) The safety significance of nuclear facility systems.
 - (3) Active facility versus partially active or inactive facility.

- (4) Short-term versus long-term facility mission.
 - (5) Modernization or Decontamination and Decommissioning plans.
 - (6) Lack of CAS standards.
- g. Data From Other Inspection Systems. CAIS should be used to incorporate the results of other specialized inspection programs that may contribute to the identification of asset related deficiencies. Some examples are: OSHA inspections, preventive maintenance program findings, safety reviews, etc.
- h. Facility Information Centralization. CAIS is recommended as a central repository for facility information at the sites.
5. RESULTS. A systematically applied CAS assesses the condition of assets and their remaining useful life. CAS facilitates time-phased budgeting of maintenance, repair, rehabilitation, or replacement. CAS produces the following results:
- a. Identification of deficiencies found during the CAS inspection process that are classified as requiring recurring maintenance and that require the use of annually appropriated operating funds to correct.
 - b. Identification of repairs that require the use of operating or line item funds to correct.
 - c. Identification of technical or functional deficiencies for which maintenance or repair is not an acceptable solution, and therefore requiring modification, expansion, rehabilitation, improvement, etc., normally considered to be capital improvements to correct.
 - d. Identification of technical or functional deficiencies that require the complete replacement of the asset using General Plant Projects (GPP), Capital Equipment (CE), or Line Item (LI) funds, etc.

CHAPTER IV

CAPITAL ASSET MANAGEMENT PROCESS PRIORITIZATION

1. **INTRODUCTION.** Consistency throughout the Department in the prioritization, preparation, and submission of asset management resource requirements is a key element of the Capital Asset Management Process (CAMP). To achieve the desired consistency, all sites shall adopt the CAMP prioritization process discussed in this Chapter. The prioritization process is designed to rate and rank each project. The priority lists shall be updated annually. This process shall be used as a tool to help prioritize projects on a sitewide, Field, and Headquarters (HQ) level.
2. **BACKGROUND.** The CAMP prioritization process is a systematic, structured, and consistent method for determining the preferred order for allocating limited resources to solve problems. This process prioritizes the problems (events, conditions, situations, requirements, etc.) that projects are intended to address. Other methods and techniques are used to assess the appropriateness or readiness of a project; examples are: value engineering, justification reviews, and project validations. For the purposes of this chapter, problems and projects can be thought of as interchangeable in the prioritization process.
 - a. **Development Basis.** The CAMP prioritization process was developed on the basis of risk management and reflects the values and culture of the Department. The prioritization criteria consist of the two elements of risk--consequence and probability. They are combined in the criteria statements and are influenced by the terminology and expressions commonly used by the people who work with the various rating criteria categories. The scores represent the risk-consequence and probability of occurrence based on the descriptions under each rating criteria. The rating criteria were developed and positioned based on Departmental intentions and public expectations, appropriate standard industrial practices, and represent the desired level of operational conduct (see Attachment IV-1).
 - b. **Universality.** The CAMP prioritization process is universal, encompassing four major categories: (1) health and safety; (2) environment/waste management; (3) safeguards and security; and (4) programmatic. The process provides for expansion, change, and improvements. Further, it can easily accommodate ratings derived from other prioritization systems, as long as the ratings reflect the same values and culture. The rating criteria and scoring process are contained in the Attachments to this Chapter and shall be maintained by HQ. Any changes to the prioritization process will be transmitted with the annual CAMP Call.
3. **APPROACH.** The problem-rating criteria within each of the four major categories and their subcategories are aligned along a scoring scale so that they represent the same severity or priority. Therefore, any rating score in one category or subcategory represents the same problem severity

as the same numerical rating score in any other category. This alignment of criteria is crucial to achieve an equivalent, integrated ranking between dissimilar problems or projects.

- a. Steps. The CAMP prioritization process consists of four steps: (1) rating; (2) scoring; (3) initial ranking; and (4) final ranking. It is vital that bias be minimized. To this end, ratings are normalized in each step of the consolidation review process (i.e., from facility, to site, to Operations Office, to HQ Program Office). This ensures consistency, equitable application of ratings, and fair and accurate comparisons and rankings. The process for developing a total score for each problem/project gives greatest emphasis to the most severe rating, but also recognizes that some problems have multiple dimensions. The process therefore should duly reflect their contributions.
- b. Severity Rating Scale. The problem severity ratings span a scale from 20 to 80. The scale could have been infinite, but the two ends were collapsed for ease of use.
- c. Benchmark Criteria. To assist in assigning major category ratings, benchmark criteria are given for a number of subcategories under each major category. Subcategory benchmark criteria are shown in Attachment IV-1. The subcategories enable project sponsors to rate problems with reference to specific technical and managerial benchmarks, as a guide to accurate rating. The probability and frequency languages used in the benchmark rating criteria for all four major categories and their respective subcategories are outlined in Attachment IV-2.
- d. Sample. A sample of an application of the rating and ranking process is presented in Attachment IV-3.
- e. Initial Ranking. Rank initially in descending order according to total rating score. The highest rating score, therefore, is the highest ranked priority. (Note: As previously stated, the benchmarks are defined so that a numeric rating on any scale denotes problem severity equal to the severity of the same numeric rating on any other scale.) For instance, a problem rating of 52 in the Programmatic Category is as important as a problem rating of 52 on the Health & Safety Category, by design. However, where two or more problems have identical overall problem ratings, their initial rankings shall be determined through a tie breaker by giving priority to each major category in the following order: Health & Safety; Environment/Waste Management; Safeguards and Security; and Programmatic.
- f. Final Ranking.
 - (1) Projects proposed to address the prioritized problems for out-years are seldom thoroughly defined at the time the 5-year plan is prepared and are best ranked according to the severity ratings of the problems they are to address. Once CDRs are completed, project cost, scope, and results are better defined.

Nevertheless, projects should continue to be ranked primarily according to problem severity throughout the planning period. Management review of the initial ranking is important to ensure all considerations are reflected in the final ranking. Techniques such as pair-wise comparisons are useful. Supplemental information to adjust rankings may include cost, problem improvement or severity reduction (rating reduction effected by the project), scope, readiness of a project, etc. Whether and how supplemental information modifies an installation's initial ranking is left to local discretion.

- (2) Rankings may be done for all the problems/projects in the 5-year planning period and then organized into individual fiscal year rankings or ranked initially by year. Because of budget formulation considerations (e.g., funding limitations, project readiness, consolidation of like projects, etc.), actual project budget submissions could result in modifying the order of the yearly rankings.

CATEGORY/SUBCATEGORY BENCHMARK CRITERIA

Major Category Rating Criteria				
Score	I. Health & Safety	II. Environment	III. Safeguards & Security	IV. Programmatic
10	Acceptable risk; minor incidents unlikely	In compliance; working towards ALARA	Minor problems unlikely	Minor problems unlikely
20	Minor incidents slightly likely	Consistently in compliance; violations extremely unlikely	Routinely secure with acceptable risk	Adequate with acceptable risk
30	Minor incidents moderately likely; serious incidents unlikely	Routinely in compliance; low-impact violations are the exception; no offsite concern	Routinely secure with some minor problems	Adequate with some minor problems
40	Minor incidents moderately likely; serious incidents slightly likely	Occasional violations of moderate consequence	Modest threat to classified information, technology, and parts (moderately likely)	Adequacy in question with many minor problems
50	Minor incidents likely; serious incidents moderately likely	Frequent problems of moderate consequence; occasional serious problems; moderate offsite concern	Serious threat to classified information, technology, property, and parts (moderately likely)	Mission accomplishment at moderate risk
60	Serious incidents likely; fatalities unlikely	Consistently have problems of moderate consequence; frequent serious problems	Serious threat to SNM/tritium or personnel (moderately likely)	Mission accomplishment at high risk
70	Serious incidents highly likely; fatalities moderately likely	Highly likely large and uncontrolled contamination/release to offsite areas with lasting serious environmental impact	Extreme threat to SNM or personnel (moderately likely); extreme threat to classified information, technology, property, and parts (highly likely)	Critical/strategic mission accomplishment severely impacted or shut down
80	Highly likely life-threatening situation		Extreme threat to SNM or personnel (highly likely)	

CATEGORY/SUBCATEGORY BENCHMARK CRITERIA
(cont.)

HEALTH & SAFETY RATING CRITERIA SUBCATEGORIES									
Score	Regulatory Compliance	Best Management Practices	Special Action/Team Findings	Technological Base (R&D)	Industrial Hygiene	Industrial Safety	Fire Protection	Health Physics	Criticality
10	Always in compliance with high margin	No concerns			Extremely effective program to limit exposure ALARA	No concerns, with rare minor incidents	Very low probability of worker injury	No exposure to public or employees	Event essentially impossible
20	In compliance, but upcoming problems slightly likely	No intervention at present, but upcoming action possible	TSA Priority 3; Tiger Team Priority 4	Develop new technology in support of mission and national objectives; long-term probability of success and/or high risk	Very effective program to limit exposure below standards	Few concerns, with occasional minor incidents	Property loss extremely unlikely or of trivial value		Deviation - minor change from approved conditions or procedures (Category 1)
30	Consistently in compliance with occasional minor deviation	Some minor concerns/recommendations		Develop new approaches, techniques, and methods to improve operations	Routine acceptable performance in maintaining exposure at/below standards	Meeting established internal objectives	Standard industrial protection, with acceptable risk; some property losses expected	Moderate exposure to the public slightly likely (1-5 REM/yr); exposure to workers up to 1 REM/yr; moderately likely	Infraction - significant change from approved conditions or procedures but no realistic way to cause a criticality (Category 2)
40	Frequent minor violations	Many minor concerns/recommendations	Tiger Team Priority 3	Develop new methods to improve/enhance health & safety capability and efficiency; intermediate probability of success and/or low risk	Prevent against frequent violation of exposure standards only through administrative controls	Minor injuries exceed goals	Events with minor injury likely		Event with probability approximately 10^{-8}
50	Frequently in compliance, but serious violations occasionally occur	Some significant concerns/recommendations; Violation of internal standards;	Tiger Team Priority 2	Develop new methods to improve/enhance health & safety capabilities and efficiency; short-term probability of success and/or low risk	Frequent violation of exposure standards - no controls available	Minor injuries frequent, or occasional serious injuries	Serious injury moderately likely; Standard industrial protection; occasional significant property loss	Continuous low-level exposure to the public likely (0.01-1 REM/yr); high exposure to workers slightly likely (10-100 REM/yr)	
60	Serious violations frequent, or some continuing minor deviations, shutdown possible	Mandated fixes and schedules due to significant problems; likely suspension of operations pending action	TSA Priority 2	Develop necessary methods, processes and techniques in support of critical health & safety objectives; short-term probability of success and/or low risk	Potential substantial danger to site personnel through exposure; near-term action required	Serious injuries frequent	Serious injury likely; significant property losses routine	Excessive exposure to the public slightly likely (5-100 REM/yr); worker exposure above regulatory limits likely (5-10 REM/yr)	Violation - continuation of activity would significantly increase probability of criticality (Category 3)
70	Serious, life-threatening violations (on site personnel); shutdown assured		TSA Priority 1 Tiger Team Priority 1		Substantial danger to personnel, fatalities possible	Fatalities possible	Fatalities possible	Moderate exposure to the public likely (1-5 REM/yr); worker fatality slightly likely	Event credible with possibility 10^{-6}
80	Highly likely life-threatening situation				Highly likely life-threatening situation	Highly likely life-threatening situation	Highly likely life-threatening situation	Highly likely life-threatening situation	Criticality or near criticality (Categories 4 and 5)

CATEGORY/SUBCATEGORY BENCHMARK CRITERIA
(cont.)

Score	Regulatory Compliance	Best Management Practice	Special Action/Team Findings	Technological (R&D)	Liquid Waste (Waste Management)	Solid Waste (Waste Management)	Airborne Pollutants (Waste Management)	Waste Minimization	Environmental Restoration	Corrective Activities
10	No violations	No concerns	No concerns	No concerns	No concerns	No concerns	Process generates minimum waste using best engineering practice	Process generates waste	Decontamination and remedial actions/D&D needed to reduce risk, or maintain mission continuity	
20	Constantly in compliance, upcoming action possible	No intervention	Priority 4 Tiger Team	Develop new technology in support of mission and national storage requirements	Effective transport/ storage requirements	Consistently meets requirements	Consistently meets requirements relative to little decomposition and waste	no present (D&D) at sites with imperatives		
30	Constantly in compliance, recommendations	Some minor concerns/recommendations	Develop new approaches, and methodologies to improve operations	Develop new methodologies to improve operations	Occasional discharge exceeding material goals	Emissions current with permitted levels, but hard to maintain	Process generates more waste than actions/D&D needed to reduce risk, or maintain mission continuity			
40	Frequent minor violations	Many minor concerns/recommendations	Priority 3 Tiger Team	Develop new methodologies to improve health & safety capabilities and efficiency; some immediate concerns/recommendations	Violation of inadequacy of permitted discharge of permitted storage/handling levels by a small amount	Occasional inadequacy of permitted storage/handling levels by a small amount	Process generates waste	Remedial actions/D&D needed		
50	Frequently in compliance, contractor standards; but serious suspension of operations likely occur	Violation of contractor standards; improves/enhances health & safety capabilities and efficiency; short term probability of success and/or low risk	Priority 2 Tiger Team	Develop new methodologies to improve/enhance health & safety capabilities and efficiency; short term probability of success and/or low risk	Many or immediate violations	System capacity frequently exceeded, by a large amount	Process generates excessive waste	Out-of-compliance with requirements, but no signed agreement		
60	Serious violations and schedules due to frequent problems; likely suspension of operations pending action	Violations of necessary methodologies, adequate storage/handling/transport/ packaging objects: short term probability of success and/or low risk	Develop necessary methodologies, adequate storage/handling/transport/ packaging objects: short term probability of success and/or low risk	Lack of necessary methodologies, adequate storage/handling/transport/ packaging objects: short term probability of success and/or low risk			Process generates waste that exceeds regulatory limits	Actions required as part of a signed agreement		
70	Low with potential serious civilian problems	Violation of serious civilian problems	Priority 1 Tiger Team				Emissions high on occasion such that severe environmental impacts are inevitable	Actions needed within 1 year to prevent significant risks from near-term actions/D&D		
80							Emissions high (not life-threatening) impact is inevitable			
90							Emissions (threatening) (not life-threatening) impact is inevitable			

II. ENVIRONMENT/WASTE MANAGEMENT RATING CRITERIA SUBCATEGORIES

CATEGORY/SUBCATEGORY BENCHMARK CRITERIA
(cont.)

III. SAFEGUARDS & SECURITY RATING CRITERIA SUBCATEGORIES									
Score	Compliance with Orders, Regulations, Policies (SSA)	Best Management Practices	Special Action/Team Findings	Technological Base (R&D)	S&M Accountability	Protection of S&M	Protection of Class. Info., Technology, and Parts (NON-S&M)	Protection of Property From Theft & Loss (NON-S&M, NON-CLASSIFIED)	Protection from Hostile Action
10	In compliance, no problems				Always meets standards	Substantially exceeds protection requirements		Loss extremely rare and of trivial value	No chance for exposure to danger
20	Consistently in compliance, with some minor deviations	No intervention at present, but upcoming action possible	Satisfactory overall (I&E)	Develop new technology in support of mission and national objectives; long-term probability of success and/or high risk	Consistently meets standards	Very secure - only remote, likely scenarios could succeed		Some small losses expected	
30	Routinely in compliance with some minor deviations	Some minor concerns/recom mandations		Develop new technology, approaches, techniques, and methods to improve operations	Minor problems, but compensatory measures available	Theft or diversion possibilities acceptably countered	Theft or diversion possibilities normally countered	Standard industrial protection	Safe and secure; normal concerns
40	Frequently in compliance, but serious violations occasionally occur for classified info., technology and parts	Many minor concerns/recom mandations	Marginal - classified information, technology, parts (I&E)	Develop new methods to improve/enhance S&S capabilities and efficiency; intermediate possibility of success and/or medium risk	Frequent problems, but compensatory measures available			Occasional significant loss; frequent minor loss	
50	Serious violations frequent for classified information, technology, and parts, or many continuing violations	More significant concerns/recom mandations	Unsatisfactory - classified information, technology, parts (I&E)	Develop new methods to improve/enhance S&S capabilities and efficiency; short-term probability of success and/or risk	Accountability difficult within reasonable response time, but resolution moderately likely	Theft or diversion possibilities that evade initial detection systems		Occasional major loss	
60	Frequently in compliance, but S&M violations occasionally occur	Mandated fines and schedules due to significant problems; likely suspension of operations pending action	Marginal - S&M (I&E)	Develop necessary methods to support critical S&S objectives, short-term probability of success and/or low risk	Serious problems; accountability uncertain within reasonable response time	Cannot reasonably assure protection	Loss of classified information, technology, or parts is likely (intentional or unintentional)		Cannot reasonably assure protection, serious injury possible
70	Many serious violations for classified information, technology, and parts; Many S&M violations pervasive lack of compliance with S&M regulations		Unsatisfactory - S&M (I&E)		Numerous S&M violations	Reasonable scenarios possible, deviation or theft pathways apparent			Terrorist attack or hostage situation likely with fatalities possible
80	Extreme threat to S&M or personnel (highly likely)								

CATEGORY/SUBCATEGORY BENCHMARK CRITERIA
(cont.)

IV. PROGRAMMATIC RATING CRITERIA							
Score	Compliance with Orders, Initiatives, and Directives	Best Management Practice	Technological Base (R&D)	Capability	Capacity	Quality	Physical Condition
10	Exceeds requirements	No concerns		State of the art to meet known future requirements	Exceeds requirements to support mission	Able to meet requirements; minor improvements possible	Like-new condition
20	In compliance, but upcoming problems slightly likely	No intervention at present, but upcoming action possible; IROR \geq 20X	Develop new technology in support of mission and national objective; long-term probability of success and/or high risk	Process adequate to meet program mission requirements, but improvements warranted	viable for mission	Able to meet requirements; minor improvements possible	Good - performs to original specs with routine preventive maintenance; downtime does not affect operation/mission
30	Consistently in compliance, with occasional minor deviations	Some minor concerns/recommendations; IROR \geq 50X	Develop new approaches, techniques, and methodologies to improve operations			Able to meet requirements; some significant improvements required	Adequate - meets mission, but cannot perform to all original specs, some corrective maintenance necessary
40		IROR $>$ 75X; Some significant concerns/recommendations	Develop new methodologies to improve/enhance mission capability and efficiency; intermediate probability of success and/or medium risk	Can meet mission with problems likely	Viable for mission on schedule with overtime; problems moderately likely	Able to meet requirements; many significant improvements required	Fair - occasional substandard operation; repetitive corrective maintenance; can meet mission with minor problems
50	Frequently in compliance, but serious violations occasionally occur	Violation of internal standards; suspension of operations daily; IROR \geq 100X	Develop new methodologies to improve/enhance mission capability and efficiency; short-term probability of success and/or low risk	Can meet mission with difficulty	On schedule with significant overtime	Unable to meet some requirements	Poor - consistent substandard performance; operations/mission threatened
60	Serious violations frequent, or many continuing minor deviations; shutdown possible	Mandated fixes and schedules due to significant problems; likely suspension of operations pending action	Develop necessary methodologies, processes, and techniques in support of critical programmatic objectives; short-term probability of success and/or low risk	Cannot meet mission; or unique capability in jeopardy	Inadequate capacity to support minimum requirements of mission	Unable to meet most requirements	Severely deteriorated; mission assignment at high risk
70				Critical/strategic mission capability does not exist			Critical/strategic facilities inoperable
80							



THE CITY OF NEW YORK
OFFICE OF THE MAYOR
NEW YORK, N.Y. 10007

MEMORANDUM

To: The City Council
The Comptroller
The City Planning Commission

From: David N. Dinkins *[Signature]*

Date: October 7, 1993

Re: The City's Capital Plant Condition and Maintenance Estimates

In accordance with Section 1110-a of the City Charter, I am transmitting herewith a summary of the maintenance schedules for the "major portions" of the City's physical plant as defined in that section for the fiscal year 1994. The Charter requires each Agency Head to submit to the Mayor a condition assessment and maintenance schedule necessary to preserve the structural integrity for each of their capital assets with a replacement cost of at least \$10 million and a useful life in excess of ten years. The summary that I am transmitting relates to those maintenance schedules. This is the fourth condition assessment and maintenance schedule report for which approximately twenty-five percent of the assets in the city wide inventory were reinspected. The detailed information relating to each specific asset is available for your review at the Office of Management and Budget.

Included in the summary is a description of the latest methodology used to compile the condition assessment and maintenance schedules. This summary, together with the details of the maintenance schedules and condition assessments, provides the City with a comprehensive assessment of the condition of its major assets, the projected costs necessary to restore these assets to a state of good repair and schedules detailing the maintenance required to maintain the assets' structural integrity. It does not address priorities or relative importance of any particular asset or its condition to the City now, or in the future. A separate document will be published in the Spring of 1994 comparing total funding recommended in the fiscal year 1994 report with agencies' planned expense program for 1995 and capital program for 1995 through 1998.

Background

The November 1988 amendments to the City Charter (Sec. 1110-a) included a requirement that the City compile an inventory of the major portions of its physical plant. Under Phase I, this detailed inventory was delivered on October 1, 1989. Major portions of the physical plant are defined by the Charter to include all assets or asset systems with a replacement cost of ten million dollars or greater, and a useful life in excess of ten years. The Charter amendments also require each agency to assess the condition of their assets and prepare maintenance schedules for those assets. The condition assessments and the maintenance schedules are required to be published each year.

Assets leased to the Transit Authority, the New York City Water Finance Authority and to certain other public benefit corporations are excluded from the above Charter reporting requirements. Excluded also are all properties owned by the City as a result of in-rem proceedings. For the City University, only assets of the Community Colleges are included.

In Phase II, fiscal year 1991, New York City published the first city-wide comprehensive review of asset condition and assessment of costs necessary to restore and maintain these assets in a "state of good repair." Fiscal year 1992 marked the beginning of a program under Phase III for all of the assets to be regularly resurveyed over a four year period. The publication this year, Year 3 of Phase III, continues to update conditions and maintenance schedules for approximately 25 percent of the assets that were resurveyed during the past year as well as reports rolled forward one year for those assets not resurveyed.

Detailed condition reports and maintenance schedules (i.e. Agency Reports) were previously provided to agencies for their reviews and sign-off. This executive report summarizes all cost data from the agency condition and report schedules. A separate document (i.e. Agency Reconciliation) will be published in Spring of 1994 to illustrate the comparison of funding recommended in this year's report with agencies' planned capital and expense activities.

II***Items Excluded from Study***

While the study is comprehensive, consistent with the previous report, a number of items and considerations were excluded from the condition review and costing estimates. Frequently they were not considered directly related to the structural integrity of the asset as defined by the Charter. These include but are not limited to:

- Most equipment (fixed and moveable)
- Special operating systems within assets
- Aesthetic considerations
- Landscaping and outdoor elements
- Statuary or ornamental edifices
- Components not readily observable or accessible by field engineers
- Fire alarm and security systems
- Handicapped access requirements
- Information obtained through testing or probing
- Asbestos identification and removal
- Programmatic needs not related to structural integrity
- Efficiency improvements
- Swing space costs/phasing costs, or premium time costs on as-needed basis
- Components deficient in code or local law compliance but do not impact on the integrity of the asset
- Assets known to be scheduled for near-term total replacement

It should be noted that in surveying piers and bulkheads underwater surveys were not carried out. Therefore the condition reports for piers and bulkheads do not include potential repairs that can only be determined by underwater surveys. Care must be exercised in interpreting the reports of superficial repairs, such as sinkholes and loss of backfill, which could be symptoms of more serious underwater deterioration.

Overview

This year's report marks the third year of a transition in project responsibilities and report production from our consultants to City agencies. Surveys performed by City agencies were as follows: Buildings, Piers/Bulkheads - Department of General Services; Bridges, Streets and Highways - Department of Transportation. Our consultants were responsible for overall quality control and training of City inspection teams, in addition to conducting some building and bridge surveys. Overall project management and report production was transferred from the consultants to the Office of Management and Budget (OMB).

Phase I (Fiscal Year 1990)

The initial inventory (Phase I) represented a compilation of each Agency Head's submission to the Mayor complying with the Charter requirements. Two professional appraisal firms identified and appraised nearly 2,000 physical assets having replacement values greater than ten million dollars as well as useful lives greater than ten years. Copies of the individual agency transmittals of the final inventory (Phase I Reports) and additional descriptive data on each asset are available for inspection at the agency and/or OMB.

Phase II (Fiscal Year 1991)

Phase II represented the initial engineering survey of 100 percent of the assets that were identified and appraised in Phase I. The inventory was translated into an asset database with engineering and cost information. Individual agency reports at the detailed asset and component level were produced by the consultants and reviewed with each agency. In addition, special systems reports were developed for unique asset types, i.e., fire alarm system, traffic signal system.

In addition to the buildings and structures in the inventory, the City maintains almost 6,000 miles of roadways. Each block of the City's streets received a condition rating based on a 10-point street assessment system developed and operated by the New York City Department of Transportation.

Phase III (Fiscal Year 1992 and beyond)

The City Charter requires that a report be issued on an annual basis. To economically meet this requirement, each year approximately 25 percent of the City-wide assets will be physically resurveyed. Their respective conditions and maintenance schedules are updated in the report such that over a period of four years, each asset will receive a new survey using improved survey instruments and techniques.

The City will also assume the consultants' responsibilities in stages over the four years of Phase III. To date, four City survey teams have been trained to use a common project methodology and are currently performing resurveys. In addition, inspection for the Streets and Highway System have been performed by the City's engineers since the inception of the project. During the coming year, additional City engineers will be trained in the project methodology and survey procedures. City surveyors, in conjunction with the consultants, also take part in project reviews to improve and fine-tune the current project methodology.

Enhancements this year in the reporting of building assets include:

- Unit cost review for architectural, electrical, and mechanical disciplines to better reflect agency experience including recent market condition
- Capability to add staging factors for different agencies
- Observation expanded to include additional text, area affected, severity, and location where appropriate
- Review of selected models to enhance the accuracy of component quantities
- Additional components and types to clarify material description

The bridge inspection methodology has been expanded this year to include span specific condition surveys for bridges. A new pen-based hand-held computer employing the latest technology has been introduced for the collection of span specific condition information. Likewise, the bridge component quantities are derived from a more detailed span level. The span specific information is summarized in the published Agency Report for each bridge and this summary comprises the report for any bridge surveyed in fiscal year 1994 and thereafter.

General industry-wide inflation in labor cost is found to have been counter-balanced by increased competition in the present economic climate. Replacement items which last year were projected to be in "year 11" of the 10-year window will be shown as costed items this year. Due to the above implementation of a more detailed methodology, there could be changes in the reports for assets which did not receive a resurvey this year.

The report continues to reflect changes in the asset inventory every year. At the beginning of this survey year, each agency was requested to provide any additions, deletions or changes to the inventory of assets. Included in this group of assets are an additional 36 smaller bridges. These changes will be reflected in the report as the assets are surveyed.

IV

Report Context

The asset condition and maintenance schedule report is not a budget document, but rather a broad, unrestrained analysis of a sub-set of general needs. It will serve as a planning tool and resource in addressing overall City-wide funding requirements. The report does not attempt in any manner to balance the City's asset and infrastructure requirements against other important City needs, nor does it attempt to make any funding recommendations between the needs of different agencies. There is a general prioritization presented both within individual assets and agencies of the relative importance of various repair and maintenance items in terms of preserving the assets.

Due to the complexity of the analysis, the large scale of the project, the amount of estimation required, and the necessary methodology constraints, there are inherent limitations to the level of accuracy possible at the detailed asset and component level.

In this context it should be noted that the actual cost for a project may vary substantially from the amount estimated in this report when a detailed scope of work and cost estimate is completed. Agencies will not be restricted to any asset specific number contained in the reports when planning and developing their budget requests. It is further understood that there will be work items (i.e., programmatic) excluded from this study which may require additional expenditures.

V**Report Organization****Asset Classes**

This Executive Summary focuses on three major reports: REPORT SCHEDULES BY CLASS OF ASSETS (section VI), REPORT SCHEDULES BY AGENCY (section VII), and CITY-WIDE SUMMARY SCHEDULE (section VIII). The first report is organized by agency and project type (capital budget designation) and includes "asset class" within project type. Asset classes (See, Table A) are meaningful groupings of similar asset types. The second report provides agency-wide information and its total is used in the Agency Reconciliation document for comparisons purposes. The third report summarizes City-wide information presented in the previous two reports.

Maintenance Schedules

Repairs, replacement and major maintenance costs are all presented at the detailed component level in the Agency Reports. Repairs are defined as reconstruction/renovation. These three cost categories are also summarized by asset, project type and agency. For expediency and City-wide reporting purposes, this report presents the three cost categories by their generally likely appropriate expense budget and capital budget classification. The rules for classifying individual items are as follows:

Cost Item	Budget Classification
Repairs/Replacements greater than \$15,000	Capital
Repairs/Replacements less than \$15,000	Expense
Major Maintenance	Expense

There are a few "Major Maintenance" items that are of a large scale capital nature (i.e., Some programs for piers/bulkheads and bridges) that have been projected as capital expenditures for the purposes of this report and have been included as such within the schedules in sections VI, VII, and VIII.

Projected Repair Years

- Expense Budget - *Items of need are shown over the next four years*
- Capital Budget - *Items of need are shown over the next ten years grouped by periods of four and six years*

It should be noted that for reporting purposes all repairs/replacements that were noted as needing attention (i.e., "now" or in "6-24 months") are presented in the funding need figures for FY 95. This in essence reflects the amounts estimated to "catch up" and bring all assets to a "state of good repair". In reality, if funding was available to do everything it would be beyond the ability of City agencies to plan, design, and implement the work within a single year. The actual work which can be funded will operationally have to be spread out over a number of years.

Priorities For Repair

Based on the engineering prioritization developed at the component level in the agency asset reports, this report further classifies the dollar needs at a higher level priority grouping. The priorities, in general, reflect a logical funding of cost items in relationship to their importance in maintaining the structural integrity of the assets. The priority codes are as follows:

- Category A, B, C or D

Table B demonstrates how the detailed repair prioritizations developed for different asset types have been categorized into the four City-wide Priority Codes.

Priorities for Replacement and Major Maintenance

In the City-wide report, component replacements and major maintenance are also assigned a Category A, B, C rating. While the priority assignment process is very similar to that of repair, it is less complex. Each component has been assigned a priority related to its relative importance to the structural integrity of the asset. The degree of failure or percentage of repair need which is a key factor in the repair prioritization does not enter into consideration. (see, Exhibit B)

Condition Information

The summary maintenance schedules presented in this City-wide executive report represents the need requirements as developed from the condition surveys of individual assets. Actual condition data on any particular asset is contained in the Agency Reports. A typical example of an Agency Report section and a detailed discussion of the project methodology is contained in the technical notes of this report. (See, Exhibit C)

Professional Certification

The Charter requires a statement by a registered Professional Engineer (PE) or Registered Architect (RA) regarding the reasonableness of the repair/replacement and maintenance schedules for each agency's assets. Our engineering consultants signed the statements on behalf of all City agencies for the Phase II report (with the exception of the Street and City owned Arterial System, which were inspected and certified by Department of Transportation).

Certifications this year for piers/bulkheads and most buildings were provided by the Department of General Services. Those for bridges were provided by the Department of Transportation and the consultants. The Street and City Owned Arterial System portion of the report was again certified by Department of Transportation. The rest of the resurveys were accomplished and certified by the consultants. In addition, the consultants were also responsible for quality control reviews of all resurveys accomplished this year with the exception of the streets and highway system.

Table A
City-wide Asset Classes by Agency

New York, Queens, Brooklyn Public Libraries		Health and Hospitals Corporation	
Libraries	6	Hospital Buildings	133
Board of Education		Department of General Services	
Primary Schools	722	Court Buildings	17
Intermediate/Junior High Schools	187	Public Office Buildings	18
High Schools	124	Piers/Bulkheads	23
Administrative Buildings	12	Terminals/Markets	4
City University		Department of Transportation	
Community College Buildings	80	Bridges/Waterways	27
Police Department		Highway Bridges and Tunnels	55
Precinct Houses	75	Highway Facilities	45
Police Buildings Non-Precinct	9	Streets and City Owned Arterials	
Fire Department		Pier Facilities	6
Fire Buildings	17	Parking Facilities	10
Fire Alarms/ERS Systems		Traffic Signal Systems	
Department of Corrections		Street Lighting Systems	
Rikers Island Facilities	21	Ferry Terminal Facilities	13
Correction Facilities	6	Piers/Bulkheads	8
Ferries/Barges	3	Ferries/Barges	5
Human Resources Administration		Department of Parks and Recreation	
Shelters	44	Large Park Facilities	260
Non-Shelters	16	Major Park Facilities	112
Department of Cultural Affairs		Regional park Facilities	301
Museum/Gallery Facilities	60	Stadium Facilities	6
Cultural Facilities	208	Vehicle Maint./Storage Facilities	7
Department of Juvenile Justice		Department of Sanitation	
Juvenile Justice Buildings	1	Transfer Stations	20
Department of Health		Vehicle Maint./Storage Facilities	16
Clinics	19	Incinerators	3
Department of Business Services		Fresh Kill Facilities	18
Terminals/Markets	84	Piers/Bulkheads	13
Piers/Bulkheads	74		

Table B
Cross Reference of City-Wide Priority Categories to
Detailed Asset Type Priority Codes

		Detailed Asset Type Priority Codes										
		Buildings	Piers & Bulkheads	Park Vessels	Park Walls	Arches	Boardwalks	DOT Bridges	Special Systems			
City-Wide Priority Codes									DOT Traffic & Lighting	Park Utilities	Fire Dept. Communications	Streets & City Owned Arterials
		A	1, 2, 3, 4	1, 2, 3, 4	1	1	1	1	1	All	All Electrical	All
B	5, 6	5, 6	2	2	2	2	2		All Water & Sewer		Primary Streets & Secondary Streets	
C	7, 8, 9, 10	7, 8, 9, 10	3	3	3	3	3				Local Streets	
D	<ul style="list-style-type: none"> • All miscellaneous non-surveyed "sample" and "average" cost method assets • Streets & Roads in Parks 										Step Streets	

Note: Priority Codes are not meant to apply across asset types
 * See Exhibit A for listing of the different asset type priority codes

LEGEND OF CITY-WIDE ASSET REPORTING CATEGORIES

Abbreviation	<i>Description</i>
Building categories:	
Ext. Arch.	<i>Exterior Architecture</i>
Int. Arch.	<i>Interior Architecture</i>
Electrical	<i>Electrical Components</i>
Mechanical	<i>Mechanical Components</i>
Elevators	<i>Elevator Components</i>
Misc.	<i>Miscellaneous Small Non-Surveyed Sub-Assets</i>
 Non-Building categories:	
Piers	<i>Piers Assets</i>
Bulkheads	<i>Bulkheads Assets</i>
Bridges	<i>Vehicular and Pedestrian Bridges</i>
Systems	<i>Special Systems (e.g., Street Lighting, Fire/ERS Systems)</i>
Park Walls	<i>Park's Walls</i>
Boardwalks	<i>Park's Boardwalks</i>
Park-W/S	<i>Park's Water and Sewer Utilities</i>
Park-Elec.	<i>Park's Electrical Utilities</i>
Primary	<i>Primary Streets</i>
Secondary	<i>Secondary Streets</i>
Local	<i>Local Streets</i>
Arterials	<i>Arterial Highways</i>
Step. Strs.	<i>Step Streets</i>

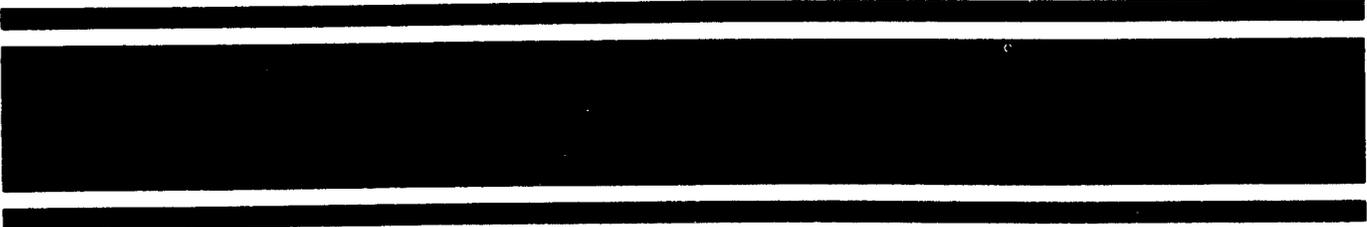
CHAPTER IV

MAKING FEDERAL REGULATION OF INFRASTRUCTURE MORE EFFECTIVE, EFFICIENT, AND EQUITABLE

Task Force Four of the ACIR project to develop recommendations for a federal infrastructure investment strategy examined the literature and agency documents related to ways of strengthening the analysis of regulatory impacts, providing greater flexibility in the compliance process, and providing greater federal aid where necessary. The results are set forth in the first selection of this chapter.

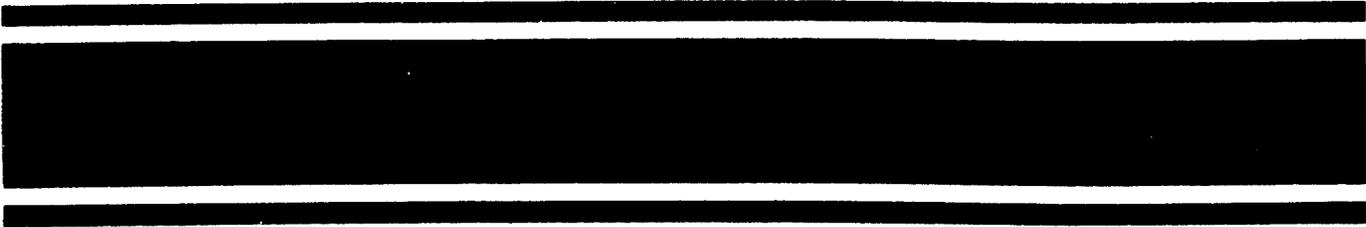
The selections which follow are organized into two sections. The first section, entitled **Regulatory Analysis**, includes the Presidential Executive Orders entitled "Regulatory Planning and Review" and "Enhancing the Intergovernmental Partnership", guidance to federal agencies on assessing the burden of proposed regulations from OMB's Office of Information and Regulatory Affairs (OIRA), and an overview of the *Paperwork Reduction Act*.

The second section, **Regulatory Flexibility**, contains overviews and text of laws that present more flexible regulatory alternatives, including the **Regulatory Flexibility Act** and **Negotiated Rulemaking Act**, as well as illustrations of alternative environmental regulatory policies, such as pollutant trading and pollution reduction incentives.



HIGH PERFORMANCE PUBLIC WORKS

**A New Federal
Infrastructure Investment Strategy
for America**



**U.S. Advisory Commission
on Intergovernmental Relations
SR-16
November 1993**

**MAKING FEDERAL REGULATION OF INFRASTRUCTURE
MORE EFFECTIVE, EFFICIENT, AND EQUITABLE**

I. OBJECTIVES

The purpose of this statement of principles and guidelines is to help establish a more accountable, equitable, effective, and efficient approach to federal regulation of infrastructure. These improvements should be based on a stronger and more equal intergovernmental partnership.

This new approach is necessary because, in many cases, state and local governments are co-regulators in partnership with the federal government, as well as regulated parties themselves. Much of the success in meeting the federal regulatory objectives depends on a strong state and local partnership.

II. FINDINGS

Federal regulations affecting state and local governments have increased dramatically in recent years, with important implications for the nation's infrastructure programs. Although the goals and accomplishments of many regulations are salutary, these federal regulations and mandates—both singly and in combination—are generating serious problems for state and local governments. Such problems can negatively affect the construction and maintenance of the nation's infrastructure in both direct and indirect ways. In particular:

- Certain federal mandates impose heavy fiscal burdens on state and local governments, and the combined costs of all federal mandates have been growing faster than federal aid. Such mandated costs are projected to continue growing at a rate that will threaten other important policy objectives unless remedial actions are taken. For example, the Environmental Protection Agency estimates that local government spending on environmental projects will need to increase by over 50 percent

between now and the year 2000 just to meet the costs of existing and pending regulations. In some localities, user fees for environmental systems are expected to double or quadruple during this time period.

- Costs of this magnitude threaten to distort local budgets and priorities, squeezing resources for other vital public services like education, law enforcement, and public health.
- Federal regulations and mandates can have non-fiscal effects that are as important as their financial impacts. These include lengthy delays in the construction, maintenance, or expansion of public facilities, the prescription of inefficient and inflexible procedures that are poorly adapted to local circumstances, the blurring of public accountability, and unnecessary conflict with the institutional and representational responsibilities of state and local governments.
- Such consequences reflect weaknesses in the federal regulatory and policymaking processes, which too often fail to recognize the cumulative effects of mandates, support overly ambitious goals without providing adequate administrative and financial resources, fail to establish clear priorities or define appropriate performance standards, and lack responsiveness to differing local needs and preferences.
- These problems ultimately undermine the federal government's ability to achieve its regulatory goals, and they perpetuate a system that, by routinely promising more than it can deliver, invites public cynicism and disaffection.
- Policies and measures undertaken to ameliorate such problems have shown some signs of effectiveness in certain instances, but have been ineffective overall.

III. PRINCIPLES

In order to minimize regulatory problems while still accomplishing regulatory objectives, Congress and the federal agencies should adhere to the following principles when enacting or promulgating new regulations or revising existing statutes and rules:

1. **Effective regulation in an intergovernmental framework requires mutual cooperation and genuine partnership among the federal, state, and local governments.**
2. **Limited resources at all levels of government require that Congress and the federal agencies clearly define their regulatory objectives, establish appropriate standards of performance, and seek the most efficient and scientifically sound methods of achieving their regulatory goals.**
3. **Congress should design, and agencies should administer, regulatory programs in ways that promote effective, flexible implementation and continuous improvement in achieving required outcomes. Among other things, this requires recognizing differences in state and local institutional structures, resources, conditions, and servicing responsibilities, and opportunities to offer incentives and use market mechanisms to help achieve required outcomes.**
4. **Citizens have a right to be treated fairly and equitably in the regulatory process. Protecting this right requires careful balancing between uniform protection of fundamental rights, deference to local democratic processes, public participation and accountability in the regulatory process, and freedom from unreasonable regulatory burdens.**

IV. GUIDELINES FOR IMPLEMENTING INTERGOVERNMENTAL REGULATORY PRINCIPLES

1. Intergovernmental Partnership: Accomplishing federal regulatory objectives frequently requires active cooperation from state and local governments. To achieve such cooperation, federal regulators should recognize that states and localities have independent constitutional responsibilities, possess widely varying fiscal and institutional resources, confront different problems and conditions, and are accountable to their own citizens and democratic processes.

Within this institutional framework, inflexible and burdensome mandates are counterproductive. They

invite unnecessary conflict rather than cooperative problem solving, and they impose uniform, ill-fitting solutions on communities where adaptations to varying local conditions are needed. To avoid such problems, we recommend that the following guidelines be applied whenever regulations are enacted or promulgated:

- Proposed regulations should be limited to cases of demonstrated need and widely recognized national purposes. Congress and regulatory agencies should be expected to clearly document the existence of a significant market failure or a problem of national scope that state or local governments are unable or unwilling to address through independent action or voluntary cooperation. They also should explore nonregulatory options before concluding that regulation is required.
- If a need for regulatory intervention has been documented, Congress and federal agencies should give serious consideration to a full range of regulatory options and select the least burdensome mechanism capable of achieving the objective. In addition, Congress should refrain from enacting rigid and inflexible provisions that direct the rulemaking process. Federal agencies should not regulate more prescriptively than required by law.
- As an integral part of considering such regulatory options, Congress and federal agencies should actively consult with prospective state and local implementors to elicit their perspectives on feasible procedures and requirements and to build a foundation for effective cooperation. Consultation periods should be long enough to generate well-considered and documented responses.
- In order to promote effective implementation further, Congress and federal agencies should conduct and regularly update a detailed, systematic inventory of all regulatory demands and costs placed on state and local governments. Such cumulative requirements, as well as the existing responsibilities and services of state and local governments, should be taken into account when considering additional regulatory requirements.
- An effective intergovernmental partnership also requires that Congress and federal agencies support the development and

adequate funding of applied demonstration and compliance assistance programs, to promote education, training, technical assistance, and information sharing among all partners in the regulatory implementation process.

2. **Efficiency:** Because society's resources are limited, the benefits of public regulation must be optimized by employing resources as efficiently as possible. To help accomplish this objective, we recommend that Congress and regulatory agencies consider the following procedures:

- Both the need for and the specific standards included in environmental, health, and safety legislation and regulations should be based on—and, when appropriate, revised in response to—the generally accepted findings of well-established, peer-reviewed science. If existing scientific knowledge is inadequate, regulatory agencies should promote research that will remedy such deficiencies before issuing permanent standards or requirements.
- Agencies should make greater use of risk analysis to help them evaluate competing threats to public health and safety, and exposures to financial liabilities, and should select the most serious problems for priority attention.
- Once problems are prioritized, federal regulators and policymakers should be required to consider a full range of regulatory alternatives. In particular, Congress and federal agencies should give special consideration to innovative and potentially more cost-effective regulatory approaches, such as greater use of market incentives, tiered standards for jurisdictions of different sizes, and expanded use of properly designed performance standards (with quantifiable measures of outcomes) in place of rigid technical requirements. The search for alternatives should be made in consultation with affected parties.
- Once regulatory options have been identified, agencies should subject these alternatives to careful economic analysis in order to assure that direct and indirect costs, as well as benefits, are fully considered when selecting the most efficient alternative.

3. **Effectiveness:** Ambitious regulatory goals and standards are of little consequence if they cannot be effectively implemented and sustained. Experience shows that when regulations are too complex, they

generate confusion, delays, and noncompliance. When regulations are too expensive, they generate opposition and circumvention. When they are unnecessary or inappropriate, they generate conflict, cynicism, and avoidance. Consequently, effective regulatory programs must be designed from the start with a recognition of which units and levels of government will be implementing the standards, what resources they have available, and what legitimate alternative demands are competing for those resources. To help accomplish such recognition, it is recommended that:

- Congress and federal agencies engage in early, active and full consultation with state and local governments, independent technical and professional organizations, and other appropriate entities that will be involved in or responsible for implementing federal rules. One particularly promising method of doing this is to make greater use of negotiated rulemaking, which brings together implementing agencies and affected parties to negotiate the text of a proposed rule. Experience has shown that this process tends to generate more practical rules, greater commitment and acceptance, a wider range of technical options, and less subsequent litigation and delay.
- The federal agencies and Congress should provide maximum regulatory flexibility to state and local partners, and other regulated entities, using performance-based goals to allow for variations in the severity of regulatory problems, wide differences in jurisdictional capabilities, the use of innovation, and experimentation with alternative compliance strategies. Legislatively, Congress can often provide additional flexibility in federally funded infrastructure programs by replacing narrow categorical programs with broad, performance-based assistance such as the surface transportation block grant. Administratively, federal agencies should comply fully with the Regulatory Flexibility Act, which requires that federal agencies give special attention to the needs and resources of small communities and other small entities when formulating regulatory standards and procedures.
- Finally, effective implementation does not occur in a vacuum. Procedures and requirements that appear to be feasible in isolation may be unworkable within the framework of competing regulations and total responsibilities. For example, environmental

and infrastructure problems typically have multimedia, multimodal, multiagency, and multigovernmental dimensions. Accordingly, Congress and federal agencies should recognize and be accountable for the full range of regulatory responsibilities that are imposed on state and local governments, so that federal goals can be prioritized and feasible standards and procedures can be devised.

4. Fairness, Equity, and Accountability:

Variation and flexibility are not appropriate policies in all instances. All citizens, regardless of where they reside, are guaranteed equal protection under the law. Fundamental standards of human health and safety do not vary from one locale to another. Nor can local actions be permitted that impose negative consequences on citizens in neighboring jurisdictions.

At the same time, equality and fairness must be balanced with other constitutionally protected values, such as freedom, privacy, and local democratic processes. Moreover, common standards often can be achieved through cooperative and parallel actions, without the need for a uniform rule. Finally, federal policymakers should recognize that excessive uniformity and unreasonable regulatory burdens can give rise to perverse, unfair or inequitable results. For example, the costs and benefits of uniform requirements may vary enormously from one jurisdiction to another, and the threats to health or safety may vary just as widely.

To balance these competing values and objectives, Congress and the federal agencies should:

- Restrict the issuance of uniform requirements and standards to the minimum level necessary to assure the protection of basic rights.
- Assure that regulatory burdens and responsibilities are fairly distributed in terms of region, jurisdiction, and the ability to pay.
- Write regulations in plain, non-legalistic language that can be readily understood by affected parties, and make these regulations easily available to the affected parties.
- Carefully monitor and oversee the performance of existing rules and regulations on a predictable and routine basis, in order to promote public accountability, evaluate accomplishments, assure effective implementation, assess evolving needs and priorities, and promote continuous improvement.

- Consider the ability of local governments, tax-payers, and the various classes of infrastructure users to pay for federal mandates.

THE WHITE HOUSE

Office of the Press Secretary

For Immediate Release

September 30, 1993

EXECUTIVE ORDER

12866

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REGULATORY PLANNING AND REVIEW

The American people deserve a regulatory system that works for them, not against them: a regulatory system that protects and improves their health, safety, environment, and well-being and improves the performance of the economy without imposing unacceptable or unreasonable costs on society; regulatory policies that recognize that the private sector and private markets are the best engine for economic growth; regulatory approaches that respect the role of State, local, and tribal governments; and regulations that are effective, consistent, sensible, and understandable. We do not have such a regulatory system today.

With this Executive order, the Federal Government begins a program to reform and make more efficient the regulatory process. The objectives of this Executive order are to enhance planning and coordination with respect to both new and existing regulations; to reaffirm the primacy of Federal agencies in the regulatory decision-making process; to restore the integrity and legitimacy of regulatory review and oversight; and to make the process more accessible and open to the public. In pursuing these objectives, the regulatory process shall be conducted so as to meet applicable statutory requirements and with due regard to the discretion that has been entrusted to the Federal agencies.

Accordingly, by the authority vested in me as President by the Constitution and the laws of the United States of America, it is hereby ordered as follows:

Section 1. Statement of Regulatory Philosophy and Principles. (a) The Regulatory Philosophy. Federal agencies should promulgate only such regulations as are required by law, are necessary to interpret the law, or are made necessary by compelling public need, such as material failures of private markets to protect or improve the health and safety of the public, the environment, or the well-being of the American people. In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and benefits shall be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nevertheless essential to consider. Further, in choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach.

(b) The Principles of Regulation. To ensure that the agencies' regulatory programs are consistent with the philosophy set forth above, agencies should adhere to the following principles, to the extent permitted by law and where applicable:

(1) Each agency shall identify the problem that it intends to address (including, where applicable, the failures of private markets or public institutions that warrant new agency action) as well as assess the significance of that problem.

(2) Each agency shall examine whether existing regulations (or other law) have created, or contributed to, the problem that a new regulation is intended to correct and whether those regulations (or other law) should be modified to achieve the intended goal of regulation more effectively.

(3) Each agency shall identify and assess available alternatives to direct regulation, including providing economic incentives to encourage the desired behavior, such as user fees or marketable permits, or providing information upon which choices can be made by the public.

(4) In setting regulatory priorities, each agency shall consider, to the extent reasonable, the degree and nature of the risks posed by various substances or activities within its jurisdiction.

(5) When an agency determines that a regulation is the best available method of achieving the regulatory objective, it shall design its regulations in the most cost-effective manner to achieve the regulatory objective. In doing so, each agency shall consider incentives for innovation, consistency, predictability, the costs of enforcement and compliance (to the government, regulated entities, and the public), flexibility, distributive impacts, and equity.

(6) Each agency shall assess both the costs and the benefits of the intended regulation and, recognizing that some costs and benefits are difficult to quantify, propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs.

(7) Each agency shall base its decisions on the best reasonably obtainable scientific, technical, economic, and other information concerning the need for, and consequences of, the intended regulation.

(8) Each agency shall identify and assess alternative forms of regulation and shall, to the extent feasible, specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt.

(9) Wherever feasible, agencies shall seek views of appropriate State, local, and tribal officials before imposing regulatory requirements that might significantly or uniquely affect those governmental entities. Each agency shall assess the effects of Federal regulations on State, local, and tribal governments, including specifically the availability of resources to carry out those mandates, and seek to minimize those burdens that uniquely or significantly affect such governmental entities, consistent with achieving regulatory objectives. In addition, as appropriate, agencies shall seek to harmonize Federal regulatory actions with related State, local, and tribal regulatory and other governmental functions.

(10) Each agency shall avoid regulations that are inconsistent, incompatible, or duplicative with its other regulations or those of other Federal agencies.

(11) Each agency shall tailor its regulations to impose the least burden on society, including individuals, businesses of differing sizes, and other entities (including small communities and governmental entities), consistent with obtaining the regulatory objectives, taking into account, among other things, and to the extent practicable, the costs of cumulative regulations.

(12) Each agency shall draft its regulations to be simple and easy to understand, with the goal of minimizing the potential for uncertainty and litigation arising from such uncertainty.

Sec. 2. Organization. An efficient regulatory planning and review process is vital to ensure that the Federal Government's regulatory system best serves the American people. (a) **The Agencies.** Because Federal agencies are the repositories of significant substantive expertise and experience, they are responsible for developing regulations and assuring that the regulations are consistent with applicable law, the President's priorities, and the principles set forth in this Executive order.

(b) **The Office of Management and Budget.** Coordinated review of agency rulemaking is necessary to ensure that regulations are consistent with applicable law, the President's priorities, and the principles set forth in this Executive order, and that decisions made by one agency do not conflict with the policies or actions taken or planned by another agency. The Office of Management and Budget (OMB) shall carry out that review function. Within OMB, the Office of Information and Regulatory Affairs (OIRA) is the repository of expertise concerning regulatory issues, including methodologies and procedures that affect more than one agency, this Executive order, and the President's regulatory policies. To the extent permitted by law, OMB shall provide guidance to agencies and assist the President, the Vice President, and other regulatory policy advisors to the President in regulatory planning and shall be the entity that reviews individual regulations, as provided by this Executive order.

(c) **The Vice President.** The Vice President is the principal advisor to the President on, and shall coordinate the development and presentation of recommendations concerning, regulatory policy, planning, and review, as set forth in this Executive order. In fulfilling their responsibilities under this Executive order, the President and the Vice President shall be assisted by the regulatory policy advisors within the Executive Office of the President and by such agency officials and personnel as the President and the Vice President may, from time to time, consult.

Sec. 3. Definitions. For purposes of this Executive order: (a) "Advisors" refers to such regulatory policy advisors to the President as the President and Vice President may from time to time consult, including, among others: (1) the Director of OMB; (2) the Chair (or another member) of the Council of Economic Advisers; (3) the Assistant to the President for Economic Policy; (4) the Assistant to the President for Domestic Policy; (5) the Assistant to the President for National Security Affairs; (6) the Assistant to the President for Science and Technology; (7) the Assistant to the President for

Intergovernmental Affairs; (8) the Assistant to the President and Staff Secretary; (9) the Assistant to the President and Chief of Staff to the Vice President; (10) the Assistant to the President and Counsel to the President; (11) the Deputy Assistant to the President and Director of the White House Office on Environmental Policy; and (12) the Administrator of OIRA, who also shall coordinate communications relating to this Executive order among the agencies, OMB, the other Advisors, and the Office of the Vice President.

(b) "Agency," unless otherwise indicated, means any authority of the United States that is an "agency" under 44 U.S.C. 3502(1), other than those considered to be independent regulatory agencies, as defined in 44 U.S.C. 3502(10).

(c) "Director" means the Director of OMB.

(d) "Regulation" or "rule" means an agency statement of general applicability and future effect, which the agency intends to have the force and effect of law, that is designed to implement, interpret, or prescribe law or policy or to describe the procedure or practice requirements of an agency. It does not, however, include:

(1) Regulations or rules issued in accordance with the formal rulemaking provisions of 5 U.S.C. 556, 557;

(2) Regulations or rules that pertain to a military or foreign affairs function of the United States, other than procurement regulations and regulations involving the import or export of non-defense articles and services;

(3) Regulations or rules that are limited to agency organization, management, or personnel matters; or

(4) Any other category of regulations exempted by the Administrator of OIRA.

(e) "Regulatory action" means any substantive action by an agency (normally published in the Federal Register) that promulgates or is expected to lead to the promulgation of a final rule or regulation, including notices of inquiry, advance notices of proposed rulemaking, and notices of proposed rulemaking.

(f) "Significant regulatory action" means any regulatory action that is likely to result in a rule that may:

(1) Have an annual effect on the economy of \$100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive order.

Sec. 4. Planning Mechanism. In order to have an effective regulatory program, to provide for coordination of regulations, to maximize consultation and the resolution of potential conflicts at an early stage, to involve the public and its State, local, and tribal officials in regulatory planning, and to ensure that new or revised regulations promote the President's priorities and the principles set forth in this Executive order, these procedures shall be followed, to the extent permitted by law: (a) **Agencies' Policy Meeting.** Early in each year's planning cycle, the Vice President shall convene a meeting of the Advisors and the heads of agencies to seek a common understanding of priorities and to coordinate regulatory efforts to be accomplished in the upcoming year.

(b) **Unified Regulatory Agenda.** For purposes of this subsection, the term "agency" or "agencies" shall also include those considered to be independent regulatory agencies, as defined in 44 U.S.C. 3502(10). Each agency shall prepare an agenda of all regulations under development or review, at a time and in a manner specified by the Administrator of OIRA. The description of each regulatory action shall contain, at a minimum, a regulation identifier number, a brief summary of the action, the legal authority for the action, any legal deadline for the action, and the name and telephone number of a knowledgeable agency official. Agencies may incorporate the information required under 5 U.S.C. 602 and 41 U.S.C. 402 into these agendas.

(c) **The Regulatory Plan.** For purposes of this subsection, the term "agency" or "agencies" shall also include those considered to be independent regulatory agencies, as defined in 44 U.S.C. 3502(10). (1) As part of the Unified Regulatory Agenda, beginning in 1994, each agency shall prepare a Regulatory Plan (Plan) of the most important significant regulatory actions that the agency reasonably expects to issue in proposed or final form in that fiscal year or thereafter. The Plan shall be approved personally by the agency head and shall contain at a minimum:

(A) A statement of the agency's regulatory objectives and priorities and how they relate to the President's priorities;

(B) A summary of each planned significant regulatory action including, to the extent possible, alternatives to be considered and preliminary estimates of the anticipated costs and benefits;

(C) A summary of the legal basis for each such action, including whether any aspect of the action is required by statute or court order;

(D) A statement of the need for each such action and, if applicable, how the action will reduce risks to public health, safety, or the environment, as well as how the magnitude of the risk addressed by the action relates to other risks within the jurisdiction of the agency;

(E) The agency's schedule for action, including a statement of any applicable statutory or judicial deadlines; and

(F) The name, address, and telephone number of a person the public may contact for additional information about the planned regulatory action.

(2) Each agency shall forward its Plan to OIRA by June 1st of each year.

(3) Within 10 calendar days after OIRA has received an agency's Plan, OIRA shall circulate it to other affected agencies, the Advisors, and the Vice President.

(4) An agency head who believes that a planned regulatory action of another agency may conflict with its own policy or action taken or planned shall promptly notify, in writing, the Administrator of OIRA, who shall forward that communication to the issuing agency, the Advisors, and the Vice President.

(5) If the Administrator of OIRA believes that a planned regulatory action of an agency may be inconsistent with the President's priorities or the principles set forth in this Executive order or may be in conflict with any policy or action taken or planned by another agency, the Administrator of OIRA shall promptly notify, in writing, the affected agencies, the Advisors, and the Vice President.

(6) The Vice President, with the Advisors' assistance, may consult with the heads of agencies with respect to their Plans and, in appropriate instances, request further consideration or inter-agency coordination.

(7) The Plans developed by the issuing agency shall be published annually in the October publication of the Unified Regulatory Agenda. This publication shall be made available to the Congress; State, local, and tribal governments; and the public. Any views on any aspect of any agency Plan, including whether any planned regulatory action might conflict with any other planned or existing regulation, impose any unintended consequences on the public, or confer any unclaimed benefits on the public, should be directed to the issuing agency, with a copy to OIRA.

(d) Regulatory Working Group. Within 30 days of the date of this Executive order, the Administrator of OIRA shall convene a Regulatory Working Group ("Working Group"), which shall consist of representatives of the heads of each agency that the Administrator determines to have significant domestic regulatory responsibility, the Advisors, and the Vice President. The Administrator of OIRA shall chair the Working Group and shall periodically advise the Vice President on the activities of the Working Group. The Working Group shall serve as a forum to assist agencies in identifying and analyzing important regulatory issues (including, among others (1) the development of innovative regulatory techniques, (2) the methods, efficacy, and utility of comparative risk assessment in regulatory decision-making, and (3) the development of short forms and other streamlined regulatory approaches for small businesses and other entities). The Working Group shall meet at least quarterly and may meet as a whole or in subgroups of agencies with an interest in particular issues or subject areas. To inform its discussions, the Working Group may commission analytical studies and reports by OIRA, the Administrative Conference of the United States, or any other agency.

(e) Conferences. The Administrator of OIRA shall meet quarterly with representatives of State, local, and tribal governments to identify both existing and proposed regulations that may uniquely or significantly affect those governmental entities. The Administrator of OIRA shall also convene, from time to time, conferences with representatives of businesses, nongovernmental organizations, and the public to discuss regulatory issues of common concern.

Sec. 5. Existing Regulations. In order to reduce the regulatory burden on the American people, their families, their communities, their State, local, and tribal governments, and their industries; to determine whether regulations promulgated by the executive branch of the Federal Government have become unjustified or unnecessary as a result of changed circumstances; to confirm that regulations are both compatible with each other and not duplicative or inappropriately burdensome in the aggregate; to ensure that all regulations are consistent with the President's priorities and the principles set forth in this Executive order, within applicable law; and to otherwise improve the effectiveness of existing regulations: (a) Within 90 days of the date of this Executive order, each agency shall submit to OIRA a program, consistent with its resources and regulatory priorities, under which the agency will periodically review its existing significant regulations to determine whether any such regulations should be modified or eliminated so as to make the agency's regulatory program more effective in achieving the regulatory objectives, less burdensome, or in greater alignment with the President's priorities and the principles set forth in this Executive order. Any significant regulations selected for review shall be included in the agency's annual Plan. The agency shall also identify any legislative mandates that require the agency to promulgate or continue to impose regulations that the agency believes are unnecessary or outdated by reason of changed circumstances.

(b) The Administrator of OIRA shall work with the Regulatory Working Group and other interested entities to pursue the objectives of this section. State, local, and tribal governments are specifically encouraged to assist in the identification of regulations that impose significant or unique burdens on those governmental entities and that appear to have outlived their justification or be otherwise inconsistent with the public interest.

(c) The Vice President, in consultation with the Advisors, may identify for review by the appropriate agency or agencies other existing regulations of an agency or groups of regulations of more than one agency that affect a particular group, industry, or sector of the economy, or may identify legislative mandates that may be appropriate for reconsideration by the Congress.

Sec. 6. Centralized Review of Regulations. The guidelines set forth below shall apply to all regulatory actions, for both new and existing regulations, by agencies other than those agencies specifically exempted by the Administrator of OIRA:

(a) **Agency Responsibilities.** (1) Each agency shall (consistent with its own rules, regulations, or procedures) provide the public with meaningful participation in the regulatory process. In particular, before issuing a notice of proposed rulemaking, each agency should, where appropriate, seek the involvement of those who are intended to benefit from and those expected to be burdened by any regulation (including, specifically, State, local, and tribal officials). In addition, each agency should afford the public a meaningful opportunity to comment on any proposed regulation, which in most cases should include a comment period of not less than 60 days. Each agency also is directed to explore and, where appropriate, use consensual mechanisms for developing regulations, including negotiated rulemaking.

(2) Within 60 days of the date of this Executive order, each agency head shall designate a Regulatory Policy Officer who shall report to the agency head. The Regulatory Policy Officer shall be involved at each stage of the regulatory process to foster the development of effective, innovative, and least burdensome regulations and to further the principles set forth in this Executive order.

(3) In addition to adhering to its own rules and procedures and to the requirements of the Administrative Procedure Act, the Regulatory Flexibility Act, the Paperwork Reduction Act, and other applicable law, each agency shall develop its regulatory actions in a timely fashion and adhere to the following procedures with respect to a regulatory action:

(A) Each agency shall provide OIRA, at such times and in the manner specified by the Administrator of OIRA, with a list of its planned regulatory actions, indicating those which the agency believes are significant regulatory actions within the meaning of this Executive order. Absent a material change in the development of the planned regulatory action, those not designated as significant will not be subject to review under this section unless, within 10 working days of receipt of the list, the Administrator of OIRA notifies the agency that OIRA has determined that a planned regulation is a significant regulatory action within the meaning of this Executive order. The Administrator of OIRA may waive review of any planned regulatory action designated by the agency as significant, in which case the agency need not further comply with subsection (a)(3)(B) or subsection (a)(3)(C) of this section.

(B) For each matter identified as, or determined by the Administrator of OIRA to be, a significant regulatory action, the issuing agency shall provide to OIRA:

(i) The text of the draft regulatory action, together with a reasonably detailed description of the need for the regulatory action and an explanation of how the regulatory action will meet that need; and

(ii) An assessment of the potential costs and benefits of the regulatory action, including an explanation of the manner in which the regulatory action is consistent with a statutory mandate and, to the extent permitted by law, promotes the President's priorities and avoids undue interference with State, local, and tribal governments in the exercise of their governmental functions.

(C) For those matters identified as, or determined by the Administrator of OIRA to be, a significant regulatory action within the scope of section 3(f)(1), the agency shall also provide to OIRA the following additional information developed as part of the agency's decision-making process (unless prohibited by law):

(i) An assessment, including the underlying analysis, of benefits anticipated from the regulatory action (such as, but not limited to, the promotion of the efficient functioning of the economy and private markets, the enhancement of health and safety, the protection of the natural environment, and the elimination or reduction of discrimination or bias) together with, to the extent feasible, a quantification of those benefits;

(ii) An assessment, including the underlying analysis, of costs anticipated from the regulatory action (such as, but not limited to, the direct cost both to the government in administering the regulation and to businesses and others in complying with the regulation, and any adverse effects on the efficient functioning of the economy, private markets (including productivity, employment, and competitiveness), health, safety, and the natural environment), together with, to the extent feasible, a quantification of those costs; and

(iii) An assessment, including the underlying analysis, of costs and benefits of potentially effective and reasonably feasible alternatives to the planned regulation, identified by the agencies or the public (including improving the current regulation and reasonably viable nonregulatory actions), and an explanation why the planned regulatory action is preferable to the identified potential alternatives.

(D) In emergency situations or when an agency is obligated by law to act more quickly than normal review procedures allow, the agency shall notify OIRA as soon as possible and, to the extent practicable, comply with subsections (a)(3)(B) and (C) of this section. For those regulatory actions that are governed by a statutory or court-imposed deadline, the agency shall, to the extent practicable, schedule rulemaking proceedings so as to permit sufficient time for OIRA to conduct its review, as set forth below in subsection (b)(2) through (4) of this section.

(E) After the regulatory action has been published in the Federal Register or otherwise issued to the public, the agency shall:

(i) Make available to the public the information set forth in subsections (a)(3)(B) and (C);

(ii) Identify for the public, in a complete, clear, and simple manner, the substantive changes between the draft submitted to OIRA for review and the action subsequently announced; and

(iii) Identify for the public those changes in the regulatory action that were made at the suggestion or recommendation of OIRA.

(F) All information provided to the public by the agency shall be in plain, understandable language.

(b) OIRA Responsibilities. The Administrator of OIRA shall provide meaningful guidance and oversight so that each agency's regulatory actions are consistent with applicable law, the President's priorities, and the principles set forth in this Executive order and do not conflict with the policies or actions of another agency. OIRA shall, to the extent permitted by law, adhere to the following guidelines:

(1) OIRA may review only actions identified by the agency or by OIRA as significant regulatory actions under subsection (a)(3)(A) of this section.

(2) OIRA shall waive review or notify the agency in writing of the results of its review within the following time periods:

(A) For any notices of inquiry, advance notices of proposed rulemaking, or other preliminary regulatory actions prior to a Notice of Proposed Rulemaking, within 10 working days after the date of submission of the draft action to OIRA;

(B) For all other regulatory actions, within 90 calendar days after the date of submission of the information set forth in subsections (a)(3)(B) and (C) of this section, unless OIRA has previously reviewed this information and, since that review, there has been no material change in the facts and circumstances upon which the regulatory action is based, in which case, OIRA shall complete its review within 45 days; and

(C) The review process may be extended (1) once by no more than 30 calendar days upon the written approval of the Director and (2) at the request of the agency head.

(3) For each regulatory action that the Administrator of OIRA returns to an agency for further consideration of some or all of its provisions, the Administrator of OIRA shall provide the issuing agency a written explanation for such return, setting forth the pertinent provision of this Executive order on which OIRA is relying. If the agency head disagrees with some or all of the bases for the return, the agency head shall so inform the Administrator of OIRA in writing.

(4) Except as otherwise provided by law or required by a Court, in order to ensure greater openness, accessibility, and accountability in the regulatory review process, OIRA shall be governed by the following disclosure requirements:

(A) Only the Administrator of OIRA (or a particular designee) shall receive oral communications initiated by persons not employed by the executive branch of the Federal Government regarding the substance of a regulatory action under OIRA review;

(B) All substantive communications between OIRA personnel and persons not employed by the executive branch of the Federal Government regarding a regulatory action under review shall be governed by the following guidelines: (i) A representative from the issuing agency shall be invited to any meeting between OIRA personnel and such person(s);

(ii) OIRA shall forward to the issuing agency, within 10 working days of receipt of the communication(s), all written communications, regardless of format, between OIRA personnel and any person who is not employed by the executive branch of the Federal Government, and the dates and names of individuals involved in all substantive oral communications (including meetings to which an agency representative was invited, but did not attend, and telephone conversations between OIRA personnel and any such persons); and

(iii) OIRA shall publicly disclose relevant information about such communication(s), as set forth below in subsection (b)(4)(C) of this section.

(C) OIRA shall maintain a publicly available log that shall contain, at a minimum, the following information pertinent to regulatory actions under review:

(i) The status of all regulatory actions, including if (and if so, when and by whom) Vice Presidential and Presidential consideration was requested;

(ii) A notation of all written communications forwarded to an issuing agency under subsection (b)(4)(B)(ii) of this section; and

(iii) The dates and names of individuals involved in all substantive oral communications, including meetings and telephone conversations, between OIRA personnel and any person not employed by the executive branch of the Federal Government, and the subject matter discussed during such communications.

(D) After the regulatory action has been published in the Federal Register or otherwise issued to the public, or after the agency has announced its decision not to publish or issue the regulatory action, OIRA shall make available to the public all documents exchanged between OIRA and the agency during the review by OIRA under this section.

(5) All information provided to the public by OIRA shall be in plain, understandable language.

Sec. 7. Resolution of Conflicts. To the extent permitted by law, disagreements or conflicts between or among agency heads or between OMB and any agency that cannot be resolved by the Administrator of OIRA shall be resolved by the President, or by the Vice President acting at the request of the President, with the relevant agency head (and, as appropriate, other interested government officials). Vice Presidential and Presidential consideration of such disagreements may be initiated only by the Director, by the head of the issuing agency, or by the head of an agency that has a significant interest in the regulatory action at issue. Such review will not be undertaken at the request of other persons, entities, or their agents.

Resolution of such conflicts shall be informed by recommendations developed by the Vice President, after consultation with the Advisors (and other executive branch officials or personnel whose responsibilities to the President include the subject matter at issue). The development of these recommendations shall be concluded within 60 days after review has been requested.

During the Vice Presidential and Presidential review period, communications with any person not employed by the Federal Government relating to the substance of the regulatory action under review and directed to the Advisors or their staffs or to the staff of the Vice President shall be in writing and shall be forwarded by the recipient to the affected agency(ies) for inclusion in the public docket(s). When the communication is not in writing, such Advisors or staff members shall inform the outside party that the matter is under review and that any comments should be submitted in writing.

At the end of this review process, the President, or the Vice President acting at the request of the President, shall notify the affected agency and the Administrator of OIRA of the President's decision with respect to the matter.

Sec. 8. Publication. Except to the extent required by law, an agency shall not publish in the Federal Register or otherwise issue to the public any regulatory action that is subject to review under section 6 of this Executive order until (1) the Administrator of OIRA notifies the agency that OIRA has waived its review of the action or has completed its review without any

requests for further consideration, or (2) the applicable time period in section 6(b)(2) expires without OIRA having notified the agency that it is returning the regulatory action for further consideration under section 6(b)(3), whichever occurs first. If the terms of the preceding sentence have not been satisfied and an agency wants to publish or otherwise issue a regulatory action, the head of that agency may request Presidential consideration through the Vice President, as provided under section 7 of this order. Upon receipt of this request, the Vice President shall notify OIRA and the Advisors. The guidelines and time period set forth in section 7 shall apply to the publication of regulatory actions for which Presidential consideration has been sought.

Sec. 9. Agency Authority. Nothing in this order shall be construed as displacing the agencies' authority or responsibilities, as authorized by law.

Sec. 10. Judicial Review. Nothing in this Executive order shall affect any otherwise available judicial review of agency action. This Executive order is intended only to improve the internal management of the Federal Government and does not create any right or benefit, substantive or procedural, enforceable at law or equity by a party against the United States, its agencies or instrumentalities, its officers or employees, or any other person.

Sec. 11. Revocations. Executive Orders Nos. 12291 and 12498; all amendments to those Executive orders; all guidelines issued under those orders; and any exemptions from those orders heretofore granted for any category of rule are revoked.

WILLIAM J. CLINTON

THE WHITE HOUSE,
September 30, 1993.

THE WHITE HOUSE
Office of the Press Secretary

For Immediate Release

October 26, 1993

EXECUTIVE ORDER

12875

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ENHANCING THE INTERGOVERNMENTAL PARTNERSHIP

The Federal Government is charged with protecting the health and safety, as well as promoting other national interests, of the American people. However, the cumulative effect of unfunded Federal mandates has increasingly strained the budgets of State, local, and tribal governments. In addition, the cost, complexity, and delay in applying for and receiving waivers from Federal requirements in appropriate cases have hindered State, local, and tribal governments from tailoring Federal programs to meet the specific or unique needs of their communities. These governments should have more flexibility to design solutions to the problems faced by citizens in this country without excessive micromanagement and unnecessary regulation from the Federal Government.

THEREFORE, by the authority vested in me as President by the Constitution and the laws of the United States of America, and in order to reduce the imposition of unfunded mandates upon State, local, and tribal governments; to streamline the application process for and increase the availability of waivers to State, local, and tribal governments; and to establish regular and meaningful consultation and collaboration with State, local, and tribal governments on Federal matters that significantly or uniquely affect their communities, it is hereby ordered as follows:

Section 1. Reduction of Unfunded Mandates. (a) To the extent feasible and permitted by law, no executive department or agency ("agency") shall promulgate any regulation that is not required by statute and that creates a mandate upon a State, local, or tribal government, unless:

(1) funds necessary to pay the direct costs incurred by the State, local, or tribal government in complying with the mandate are provided by the Federal Government; or

(2) the agency, prior to the formal promulgation of regulations containing the proposed mandate, provides to the Director of the Office of Management and Budget a description of the extent of the agency's prior consultation with representatives of affected State, local, and tribal governments, the nature of their concerns, any written communications submitted to the agency by such units of government, and the agency's position supporting the need to issue the regulation containing the mandate.

(b) Each agency shall develop an effective process to permit elected officials and other representatives of State, local, and tribal governments to provide meaningful and timely input in the development of regulatory proposals containing significant unfunded mandates.

Sec. 2. Increasing Flexibility for State and Local Waivers. (a) Each agency shall review its waiver application process and take appropriate steps to streamline that process.

(b) Each agency shall, to the extent practicable and permitted by law, consider any application by a State, local, or tribal government for a waiver of statutory or regulatory requirements in connection with any program administered by that agency with a general view toward increasing opportunities for utilizing flexible policy approaches at the State, local, and tribal level in cases in which the proposed waiver is consistent with the applicable Federal policy objectives and is otherwise appropriate.

(c) Each agency shall, to the fullest extent practicable and permitted by law, render a decision upon a complete application for a waiver within 120 days of receipt of such application by the agency. If the application for a waiver is not granted, the agency shall provide the applicant with timely written notice of the decision and the reasons therefor.

(d) This section applies only to statutory or regulatory requirements of the programs that are discretionary and subject to waiver by the agency.

Sec. 1. Responsibility for Agency Implementation. The Chief Operating Officer of each agency shall be responsible for ensuring the implementation of and compliance with this order.

Sec. 4. Executive Order No. 12866. This order shall supplement but not supersede the requirements contained in Executive Order No. 12866 ("Regulatory Planning and Review").

Sec. 3. Scope. (a) Executive agency means any authority of the United States that is an "agency" under 44 U.S.C. 3502(1), other than those considered to be independent regulatory agencies, as defined in 44 U.S.C. 3502(10).

(b) Independent agencies are requested to comply with the provisions of this order.

Sec. 5. Judicial Review. This order is intended only to improve the internal management of the executive branch and is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or equity by a party against the United States, its agencies or instrumentalities, its officers or employees, or any other person.

Sec. 7. Effective Date. This order shall be effective 90 days after the date of this order.

WILLIAM J. CLINTON

THE WHITE HOUSE,
October 26, 1993.

REGULATORY PROGRAM OF THE UNITED STATES GOVERNMENT



APRIL 1, 1991 - MARCH 31, 1992

APPENDIX V

Regulatory Impact Analysis Guidance

A Regulatory Impact Analysis (RIA) should demonstrate that a proposed regulatory action satisfies the requirements of Section 2 of Executive Order 12291. To do so, it should show that:

- There is adequate information concerning the need for and consequences of the proposed action;
- The potential benefits to society outweigh the potential costs; and
- Of all the alternative approaches to the given regulatory objective, the proposed action will maximize net benefits to society.

The fundamental test of a satisfactory RIA is whether it enables independent reviewers to make an informed judgment that the objectives of Executive Order 12291 are satisfied. An RIA that includes all the elements described below is likely to fulfill this requirement. Although variations consistent with the spirit and intent of the executive order may be warranted for some rules, most RIAs should include these elements.

The guidance in this document is not in the form of a mechanistic blueprint, for a good RIA cannot be written according to a formula. Competent professional judgment is indispensable for the preparation of a high-quality analysis. Different regulations may call for very different emphases in analysis. For one proposed regulation, the crucial issue may be the question of whether a market failure exists, and much of the analysis may need to be devoted to that key question. In another case, the existence of a market failure may be obvious from the outset, but extensive analysis might be necessary to estimate the magnitude of benefits to be expected from proposed regulatory alternatives. The amount of analysis (whether scientific, statistical, or economic) that a particular issue requires depends on how crucial that issue is to determine the best alternative and on the complexity of the issue.

Regulatory analysis inevitably involves uncertainties and requires informed professional judgments. Whenever an agency has questions about such issues as the appropriate analytical techniques to use or the alternatives that should be considered, it should consult with the Office of Management and Budget as early in the analysis stage as possible.

This document is written primarily in terms of proposed regulatory changes. However, it is equally applicable to the review of existing regulations. In the latter case, the regulation under review should be

compared to a baseline case of no regulation and to reasonable alternatives.

Elements of a Regulatory Impact Analysis

Preliminary and final Regulatory Impact Analyses of major rules should contain five elements. They are: (1) a statement of the potential need for the proposal, (2) an examination of alternative approaches, (3) an analysis of benefits and costs, (4) the rationale for choosing the proposed regulatory action, and (5) a statement of statutory authority. These elements are explained in Sections I-V below.

I. STATEMENT OF POTENTIAL NEED FOR THE PROPOSAL

In order to establish the potential need for the proposal, the analysis should demonstrate that (a) market failure exists that is (b) not adequately resolved by measures other than Federal regulation.

A. Market Failure

The analysis should determine whether there exists a market failure that is likely to be significant. Once such market failure has been identified, the analysis should show how adequately the regulatory alternatives to be considered address the specified market failure. The three major types of market failure are externality, natural monopoly, and inadequate information.

1. *Externality.* An externality occurs when one party's actions impose uncompensated benefits or costs on another outside the marketplace. Environmental problems are a classic case of externality. Another example is the case of common property resources that may become congested or overused, such as fisheries or the broadcast spectrum. A third example is a "public good," such as defense or scientific research, whose distinguishing characteristic is that it is inefficient, or impossible, to exclude individuals from its benefits.

2. *Natural monopoly.* Natural monopoly exists where a market can be served at lowest cost only if production is limited to a single producer. Local telephone, gas, and electricity services are examples.

3. *Inadequate information.* The optimum, or ideal, level of information is not necessarily the maximum possible amount, because information, like other goods, should not be produced when the costs of doing so exceed the benefits. The free market does not

necessarily supply an optimal level of information, because information, once generated, can be disseminated at little or no marginal cost, and because it is commonly infeasible to exclude nonpayers from reaping benefits from the provision of information by others. Where market failure due to inadequate information is the rationale for government intervention, a regulatory action to improve the availability of information will ordinarily be the preferred alternative.

The current state of knowledge about the economics of information is not highly developed. Therefore, regulatory intervention to address an information problem should only be undertaken where there is substantial reason to believe that private incentives to provide information are seriously inadequate and that the specific regulatory intervention proposed will provide net benefits for society.

In many circumstances, the availability of information, while perhaps not optimal, is reasonably adequate, so that attempts to regulate information are as likely to make things worse as to make them better. Information about a particular characteristic of a product, for example, would be reasonably adequate if buyers could determine the existence of the characteristic by inspection of the product before purchase or (in the case of a frequently purchased product) by use of the product. Even if the characteristic could not be determined by buyers, government intervention would not be warranted where sellers have incentives to reveal the existence of the characteristic to buyers. Sellers will have substantial incentives to supply information about any characteristic that is important to buyers and valued positively by them, particularly if the level of the characteristic varies between the products of one seller and another. In these circumstances, sellers whose products rank highly in the valued characteristic can increase their sales by informing buyers of the superiority of their products. If the level of the characteristic does not vary between the products of one seller and another, individual sellers have less incentive to inform buyers about the characteristic. Even so, the incentives of individual sellers or of a trade association to supply information may be substantial.

Sellers are least likely to supply adequate information about a particular characteristic of their product where the characteristic is negatively valued by consumers and the level of the characteristic does not vary between the products of one seller and those of another (e.g., cholesterol in eggs). Even in such circumstances, substantial information about the characteristic may be available to buyers. For example, sellers of rival products may supply the information

(e.g., while sellers of butter may have no incentive to tell buyers about cholesterol in butter and its possible consequences, sellers of margarine do have such an incentive). Where the negative characteristic involves a health or safety hazard, the threat of future product liability lawsuits may give sellers adequate incentives to reveal information about the potential hazard. News media, consumer groups, public health agencies, and similar services may supply information not supplied by sellers. In summary, while it is possible to identify situations in which market failure due to inadequate information is more likely to warrant regulatory intervention, each situation must be examined on a case-by-case basis.

There should be a presumption against the need for certain types of regulatory actions, except in special circumstances. A particularly demanding burden of proof is required to demonstrate the potential need for any of the following types of regulations:

- Price controls in competitive markets
- Controls on production or sales in competitive markets
- Mandatory uniform quality standards for goods or services, unless they have hidden safety or other defects and the problem cannot be adequately dealt with by voluntary standards or information disclosing the hazard to potential buyers or users
- Controls on entry into employment or production, except (a) where indispensable to protect health and safety (e.g., FAA tests for commercial pilots) or (b) to manage the use of common property resources (e.g., fisheries, airwaves, Federal lands, and offshore areas).

B. Alternatives to Federal Regulation

Even where a market failure exists, there may be no need for Federal regulatory intervention if other means of dealing with the market failure resolve the problem adequately or better than the proposed Federal regulation would. Among the alternative means that may be applicable are the judicial system (particularly liability cases to deal with health and safety), antitrust enforcement, and workers' compensation systems.

An important alternative that may often be relevant is regulation at the State or local level. In determining whether there exists a potential need for a proposed Federal regulation, the analysis should examine whether regulation at the Federal level is more appropriate than regulation at the State or local level. This analysis may support regulation at the Federal level where rights of national citizenship (such as legal equality among the races) or considerations of interstate commerce are involved. If interstate commerce is involved the analysis should

attempt to determine whether the burdens on interstate commerce arising from different State and local regulations are so great that they outweigh the advantages of diversity and local political choice. In some cases, the nature of the market failure may itself suggest the most appropriate governmental level of regulation. For example, pollution that spills across State lines (such as acid rain whose precursors are transported widely in the atmosphere) is probably best controlled by Federal regulation, while localized pollution (such as garbage truck noise) is probably more efficiently handled by local government regulation.

In general, because demands among localities for different governmental services differ and because competition among governmental units for taxpayers and citizens may encourage efficient regulation, the smallest unit of government capable of correcting the market failure should be chosen. This must, however, be balanced against the possibility of higher costs because national firms would be required to comply with more than one set of regulations and because administering similar regulations in more than one governmental unit involves some costs of duplication. Thus, some analysis may be necessary to determine which level of government can most efficiently regulate a specific market failure.

If the analysis does suggest a potential need for a Federal action, it should also consider alternatives of nonregulatory Federal measures. For example, as an alternative to requiring an action or the use of a particular product, it may be more efficient to subsidize it. Similarly, a fee or charge may be a preferable alternative to banning or restricting a product or action. An example would be an effluent discharge fee, which has been recommended as an efficient way to limit pollution, because it causes pollution sources with different marginal costs of abatement to control effluents in an efficient manner. In addition, legislative measures that make use of economic incentives, such as changes in insurance provisions or changes in property rights, should be considered.

II. AN EXAMINATION OF ALTERNATIVE APPROACHES

The RIA should show that the agency has considered the most important alternative approaches to the problem and must provide the agency's reasoning for selecting the proposed regulatory change over such alternatives. Ordinarily, it will be possible to eliminate some alternatives by a preliminary analysis, leaving a manageable number of alternatives to be evaluated by quantitative benefit-cost analysis according to the principles to be described in Section

III. The number and choice of alternatives to be selected for detailed benefit-cost analysis is unavoidably a matter of judgment. There must be some balance between thoroughness of analysis and practical limits to the agency's capacity to carry out analysis.

Alternative regulatory actions that should be explored include the following:

1. *More performance-oriented standards for health, safety, and environmental regulations.* Performance standards are generally to be preferred to engineering or design standards because they allow the regulated parties to achieve the regulatory objective in the most cost-effective way. In general, a performance standard should be preferred wherever that performance can be measured or reasonably imputed. Performance standards should also be applied as broadly as possible without creating too much variation in regulatory benefits; for example, by setting emission standards on a plant-wide or firm-wide basis rather than source by source. It is misleading and inappropriate, however, to characterize a standard as a performance standard if it is set so that there is only one feasible way to meet it; as a practical matter, such a standard is a design standard.

2. *Different requirements for different segments of the regulated population.* For example, there might be different requirements for large and small firms. If such a differentiation is made, it should be based on perceptible differences in the costs of compliance or in the benefits to be expected from compliance. For example, some worker safety measures may exhibit economies of scale, that is, lower costs per worker protected in large firms than in small firms. A heavier burden should not be placed on one segment of the regulated population on the grounds that it is better able to afford the higher cost; this is a sure formula for loading disproportionate costs on the most productive sectors of the economy.

3. *Alternative levels of stringency.* In general, both the benefits and costs associated with a regulation will increase with the level of stringency (although costs will eventually increase more rapidly than benefits). It is important to consider alternative levels of stringency to better understand the relationship between stringency and benefits and costs. This approach will increase the information available to the decisionmaker on the option that maximizes net benefits.

4. *Alternative effective dates of compliance.* The timing of a regulation may also have an important effect on its net benefits. For example, costs of a regulation may vary substantially over different compliance dates for an industry that requires a year or

more to plan its production runs efficiently. In this instance, a regulation whose requirements provide sufficient lead time is likely to achieve its goals at a much lower overall cost than a regulation that is effective immediately.

5. *Alternative methods of ensuring compliance.* Compliance alternatives include the appropriate entity (Federal, State, or local) enforcing compliance, whether compliance is enforced by on-site inspection or periodic reporting, and structuring compliance penalties so that they provide the most appropriate incentives.

6. *Informational measures.* Measures to improve the availability of information include government establishment of a standardized testing and rating system (the use of which could be made mandatory or left voluntary), mandatory disclosure requirements (e.g., by advertising, labeling, or enclosures), and government provision of information (e.g., by government publications, telephone hotlines, or public interest broadcast announcements). If intervention is necessary to address a market failure arising from inadequate information, informational remedies will generally be the preferred approaches. As an alternative to a mandatory standard, a regulatory measure to improve the availability of information has the advantage of being a more market-oriented approach. Thus, providing consumers information about concealed characteristics of consumer products gives consumers a greater choice than banning these products (for example, consumers are likely to benefit more from information on energy efficiency than from a prohibition on sale of appliances or automobiles falling below a specified standard of energy efficiency).

Except for prohibiting indisputably false statements (whose banning can be presumed beneficial), specific informational measures must be evaluated in terms of their benefits and costs. Paradoxically, the current state of knowledge does not generally permit the benefits and costs of informational remedies to be measured very accurately. Nonetheless, it is essential to consider carefully the costs and benefits of alternative informational measures, even if they cannot be quantified very precisely. Some effects of informational measures can easily be overlooked. For example, the costs of a mandatory disclosure requirement for a consumer product include not only the obvious cost of gathering and communicating the required information, but also the loss of any net benefits of information displaced by the mandated information, the cost of any inaccurate consumer interpretation of the mandated information, and any inefficiencies arising from the incentive that mandatory disclosure of a particular characteristic gives to producers to over-

invest in improving that specific characteristic of their products.

Where information on the benefits and costs of alternative informational measures is insufficient to provide a clear choice between them, as will often be the case, the least intrusive alternative, sufficient to accomplish the regulatory objective, should be chosen. For example, it will often be sufficient for government to establish a standardized testing and rating system without mandating its use, because firms that score well according to the system will have ample incentive to publicize the fact.

7. *More market-oriented approaches.* In general, alternatives that provide for more market-oriented approaches, with the use of economic incentives replacing command-and-control requirements, should be explored. Market-oriented alternatives that may be considered include fees, subsidies, penalties, marketable rights or offsets, changes in liabilities or property rights, and required bonds, insurance or warranties. (In many instances, implementing these alternatives will require legislation.)

III. ANALYSIS OF BENEFITS AND COSTS

A. General Principles

The preliminary analysis called for by Sections I and II should have narrowed the number of alternatives to be considered by quantitative benefit-cost analysis to a workable number. Ordinarily, one of the alternatives will be to promulgate no regulation at all, and this alternative will commonly serve as the base from which increments in benefits and costs are calculated for the other alternatives. Even if alternatives such as no regulation are not permissible statutorily, it is often desirable to evaluate the benefits and costs of such alternatives to determine if statutory change would be desirable. Departments and agencies bear a similar burden when they perform environmental impact statements in which alternatives that lie outside their statutory authority must be considered.

In some cases, the desirability of specific alternatives outside the scope of the agency's regulatory authority may be determined by use of basic economic concepts in light of the principles enumerated in Section I. In other instances, however, only a quantitative benefit-cost analysis can resolve the question, and such alternatives will need to be included in the analysis of this section. In addition, alternative forms of agency regulation will need to be evaluated by quantitative benefit-cost analysis.

1. *Evaluation of Alternatives.* Except where prohibited by law, the primary criterion for choice among alternatives is expected net benefit (benefits minus

costs). Other criteria may sometimes produce equivalent results, but they must be used with care to avoid the potentially serious pitfalls to be explained in Part B of this section and in Section IV. Both benefits and costs should be expressed in discounted constant dollars. Appropriate discounting procedures are discussed in the following section.

The distinction between benefits and costs in benefit-cost analysis is somewhat arbitrary, since a positive benefit may be considered a negative cost, and vice versa, without affecting the net benefit (benefits minus costs) decision criterion. This implies that the considerations applicable to benefit estimates also apply to costs and vice versa. The different issues are considered separately under benefits or costs in Sections B and C below according to where they most often arise.

If the proposed regulation is composed of a number of distinct provisions, it is important to evaluate the benefits and costs of the different provisions separately. The interaction effects between separate provisions (such that the existence of one provision affects the benefits or costs arising from another provision) may complicate the analysis but does not eliminate the need to examine provisions separately. In such a case, the desirability of a specific provision may be appraised by determining the net benefits of the proposed regulation with and without the provision in question. Where the number of provisions is large and interaction effects are pervasive, it is obviously impractical to analyze all possible combinations of provisions in this way. Some judgment must be used to select the most significant or suspect provisions for such analysis.

2. *Discounting.* The monetary values of benefits and costs occurring in different years should be discounted to their present values so that they are comparable. This is not the same as correcting for inflation. An inflation adjustment is made with a price index, whereas discounting to present value is done with a discount rate. Benefits and costs expressed in constant (i.e., unaffected by inflation) dollars must further be discounted to present values before benefits and costs in different years can be added together to determine overall net benefits. As an equivalent alternative to discounting, non-monetized benefits, the RIA may use the discount rate to annualize (amortize) costs over a period that corresponds to the occurrence of the benefits. Regardless of the discounting procedure selected, the RIA must contain a schedule indicating when the benefits and costs occur.

Discounting takes account of the fact that resources (goods or services) in a given year are worth more than identical resources in a later year. The underlying

reason for this is that resources can be invested so as to return more resources later. Partly because of this productivity of investment, individuals value consumption in earlier years higher than consumption in later years.

Modern analysis of discounting for public programs stresses the distinction between two rates of return:

- The *before-tax* rate, also known as the opportunity cost of capital. This is the real rate of return to marginal private investments. Estimates of the opportunity cost of capital in the U.S. economy vary substantially. The 10-percent discount rate specified by OMB Circular A-94 for use in evaluating government programs is intended to represent the opportunity cost of capital.
- The *after-tax* rate, also known as the consumption rate of interest. This represents the rate at which consumers would be willing to exchange present for future consumption, that is, the rate at which consumers must be compensated for postponing their consumption. As with the opportunity cost of capital, alternative estimates of the consumption rate of interest vary significantly. A rate of 4 percent is reasonably representative of the range of alternative estimates and consistent with a 10-percent before-tax rate of return.

The basic concept underlying the academic literature on public-sector discounting is that economic welfare is ultimately determined by consumption and only indirectly by investment. Therefore, the value of investment must be measured by the value of the subsequent increase in consumption it permits. Any effect that a government program has on investment must be converted to an equivalent timestream of consumption before being discounted. In practice, this results in a complex procedure that uses the before-tax and after-tax discount rates, a "shadow price of capital," and the impacts of benefits and costs on investment. It is recommended that agencies continue to use the well-understood procedure of discounting by a single rate (as specified by OMB Circular A-94) and, when appropriate, perform additional analysis using the more complex shadow-price-of-capital methodology.

There are two circumstances when it is important to perform sensitivity analysis using the shadow price of capital approach:

(a) Where the costs of the regulation are almost entirely current costs borne by consumers. In such circumstances, a low rate close to 4 percent is called for. (This assumes, as is normally the case, that the benefits are all in the form of disposable income or other benefits directly to individuals.)

(b) Where some of the costs are capital costs financed out of saving *and* there is a long period

between the time when most costs are incurred and the time when most benefits accrue. In general, the *smaller* the fraction of costs that are capital costs financed out of saving and the *longer* the time period between costs and benefits, the greater the likelihood that the shadow price of capital approach will be correct.

It is conceptually incorrect to adjust the discount rate as a device to account for the uncertainty of expected future benefits and costs. This procedure will virtually never lead to a correct adjustment of benefits and costs. Therefore, risk and uncertainty should be dealt with according to the principles in Section 3 below and not by changing the discount rate.

3. *Treatment of Risk and Uncertainty.* Where uncertainties exist about important parameters affecting the expected benefits or costs of an alternative under consideration, it is essential to carry out a *sensitivity analysis* to determine the effect on net benefits of plausible variations in the value of the parameters. One form of sensitivity analysis involves calculation of the "switch-point" value of the parameter under examination, that is, the value of the parameter at the break-even point at which the net-benefit decision criterion switches over from favoring one alternative to favoring another. When this break-even point of the parameter value is determined, the analysis may then consider the probability that the true parameter value is above or below the break-even value. For example, if the major uncertainty about a proposed regulation were its cost, the analysis could calculate how high the cost would need to be in order to reduce the net benefit of the proposal to zero. If it is judged to be highly unlikely that the actual cost would be that high or higher, it may be concluded that the choice of the proposed alternative is not sensitive to uncertainties about its cost.

A primary objective of sensitivity analysis is to identify where additional analysis may be most needed. If the choice of a specific regulatory action is sensitive to alternative parameter values that are about equally likely to be true, more research to better determine the true parameter value could be very valuable.

Wherever parameter estimates are uncertain, for either benefits or costs, expected-value estimates should be presented. Hypothetical best-case or worst-case estimates may be presented as alternatives for sensitivity analysis. Where possible, information about the probability distribution of the parameter estimate should be presented.

A common situation that arises in estimating both benefits and costs is that a number of different

studies may exist which together provide a range of different estimates for a particular parameter. In general, it is not appropriate to use the midpoint of the range of extreme values provided by the studies. Such a technique ignores the information provided by all studies except those providing the extreme values, which may be the least reliable. The preferred approach to deriving an expected-value estimate of a particular parameter in this situation would be to derive it as a weighted average of the estimates of the individual studies, with the weight of each estimate being based on the reliability (in the best judgment of the agency) of the study that produced it.

Where expected future benefits or costs are uncertain, their value to those who receive them may be different from their value if they were certain. (Often, but not always, a certain future benefit is worth more to people than an uncertain future benefit with the same expected value.) As noted in the previous section, it is incorrect to adjust the discount rate as a device to account for the riskiness of future benefits or costs. Any allowance for risk should be made by adjusting the monetary values (for the year in which they occur) of the uncertain benefits and costs so that they are expressed in terms of their "certainty-equivalents."

For an uncertain benefit in future year X , the certainty-equivalent is the number of certain dollars in year X that the uncertain benefit is worth to its recipient. For example, suppose that a particular regulation reduces the probability of fire in a particular type of facility. As part of a benefit-cost analysis for this regulation, the dollar value of the expected reduction in fire loss would be calculated. The owners of the protected facilities place a higher dollar value on the risk of a fire than the expected dollar value of the loss. This is demonstrated by their willingness-to-pay for fire insurance. Therefore, their relative net cost (the percentage difference between insurance premiums and insurance company claim payments) for fire insurance can be used to increase the expected dollar value of the reduction in fire loss to its certainty-equivalent value.

In the example of the preceding paragraph, the adjustment for risk would involve an increase in the value of the benefit, whereas uncertainty of a benefit is normally thought to reduce its certainty-equivalent value. The reason is that even though this benefit by itself is uncertain, it acts to reduce the overall level of risk that would prevail in the absence of the regulation. This illustrates the important principle that what matters is not the variability or riskiness of a regulation's net benefits by themselves but the regulation's effect on risk and uncertainty overall.

While an adjustment to account for risk may be called for in the fire-risk example given, a similar adjustment for the value of reductions in fatalities and injuries would not be appropriate. Assuming that the values of fatalities and injuries have been derived by the willingness-to-pay methodology recommended in Section B.2 below, they would already represent the certainty-equivalent value of the uncertain risk. This is because the estimated dollar values represent the certain dollar amounts that individuals would sacrifice to reduce these risks.

Probably, in most cases, it will not be advisable to adjust for risk and uncertainty. As a theoretical matter, no adjustment for risk is necessary wherever the net benefits are widely dispersed among many individuals and are not correlated with disposable income. And in cases where this does not apply, risk may be relatively unimportant or may already be taken into account by use of the willingness-to-pay methodology. In other cases, there may be no practical way to quantify the value of changes in risk.

4. *Assumptions.* Where benefit or cost estimates are heavily dependent on certain assumptions, it is essential to make these assumptions explicit and, where alternative assumptions are plausible, to carry out sensitivity analyses based on plausible alternative assumptions. If the decision criterion proves to be sensitive to alternative plausible assumptions, this may necessitate further research to develop more evidence on which of the alternative assumptions is the most appropriate. Because the adoption of a particular estimation methodology sometimes implies major hidden assumptions, it is important to analyze estimation methodologies carefully to make hidden assumptions explicit.

5. *International Trade Effects.* In calculating the benefits and costs of a proposed regulatory action, generally no explicit distinction needs to be made between domestic and foreign resources. If, for example, compliance with a proposed regulation requires the purchase of specific equipment, the opportunity cost of that equipment is ordinarily best represented by its domestic cost in dollars, regardless of whether the equipment is produced domestically or imported. The relative value of domestic and foreign resources is correctly represented by their respective dollar values, as long as the foreign exchange value of the dollar is determined by a free exchange market. Nonetheless, an awareness of the role of international trade may be quite useful for assessing the benefits and costs of a proposed regulatory action. For example, the existence of foreign competition usually makes the demand curve facing a domestic industry more elastic than it would be otherwise. Elasticities of demand and supply frequently can significantly

affect the magnitude of the benefits or costs of a regulation.

A regulation that discriminates unjustifiably against foreign exporters is a form of economic protectionism. The economic loss to the United States due to the fact that protectionism is economically inefficient will be reflected in the net benefit estimate of any properly conducted benefit-cost analysis. However, a benefit-cost analysis will generally not be able to measure the potential U.S. loss from the threat of future retaliation by foreign governments. Therefore, special attention should be given to any possibility that a regulation would unjustifiably discriminate between domestic and foreign producers and consumers—both discrimination against foreigners and discrimination in favor of foreigners.

The fact that a regulation has a differential effect on foreigners as compared to Americans does not necessarily constitute discrimination. If, for example, an automobile safety standard could be complied with less expensively by large cars than by small cars, such a standard would be more favorable to American car producers, who produce relatively more large cars compared to the fleet mix of foreign producers. Nonetheless, such a differential effect would not be discriminatory if the difference in compliance cost between large and small cars was necessary to achieve legitimate regulatory objectives in the most efficient way.

If a regulation has an adverse differential effect on foreign producers or consumers relative to domestic producers and consumers that is not necessary to realize regulatory goals efficiently, then a discriminatory effect on foreign trade exists. The RIA should identify any substantial differential effect on international trade and explain why it is necessary to achieve legitimate regulatory goals in the most efficient way. One means for reducing the likelihood of international discrimination would be for a U.S. product standard for an internationally traded good to be based on an international standard, wherever an international standard exists and is compatible with the health, safety, or environmental needs of the U.S. International harmonization can be beneficial for regulations directly setting standards for internationally traded goods or services. For example, it would be appropriate to consider international harmonization in setting safety standards for automobiles. There is no similar advantage to international harmonization where a regulation does not directly affect the quality of an internationally traded good or service, even if it indirectly affects its costs (e.g., environmental controls for automobile plants).

6. *Distributional Effects.* Those who bear the costs of a regulation and those who enjoy its benefits often

are not the same people. Benefits and costs of regulation may also be distributed unevenly over time, perhaps spanning several generations. There is no generally accepted way to monetize potential distributional effects. Attempts to incorporate distributional concerns in benefit-cost analysis require the establishment of unequal weights for different groups in society. Because positive economics treats equally the willingness-to-pay of all individuals, any alternative weighting would undermine the objective character of the analysis. Policymakers may wish, however, to take account of the distributional effects of various regulatory alternatives. Therefore, where there are potentially important differences between those who stand to gain and those who stand to lose under alternative regulatory options, the RIA should identify these groups and indicate the nature of the differential effects. The RIA should also present information on the streams of benefits and costs over time as well as present value estimates, particularly where intergenerational effects are concerned.

B. Benefit Estimates

The RIA should state the beneficial effects of the proposed regulatory change and its principal alternatives. In each case, there should be an explanation of the mechanism by which the proposed action is expected to yield the anticipated benefits. An attempt should be made to quantify all potential real incremental benefits to society in monetary terms to the maximum extent possible. A schedule of monetized benefits should be included that would show the type of benefit and when it would accrue; the numbers in this table should be expressed in constant, undiscounted dollars. Any expected incremental benefits that cannot be monetized should be explained.

The RIA should identify and explain in detail the data or studies on which benefit estimates are based. Where benefit estimates are derived from a statistical study, the RIA must provide sufficient information so that an independent observer can determine the representativeness of the sample, whether it was extrapolated from properly in developing aggregate estimates, and whether the results are statistically significant.

For regulations addressing health and safety risks, the calculation of potential benefits should derive from the agency's estimate of the mean expected value of the reduction in risk attributable to the standard. Estimates of the prevailing level of risk and of the reduction in risk to be anticipated from a proposed standard should be unbiased expected-value estimates rather than hypothetical worst-case estimates. Extreme safety or health results should be

weighted (along with intermediate results) by the probability of their occurrence to estimate the expected result implied by the available evidence. In addition, to the extent possible, the distribution of probabilities for various possible results should be presented separately, so as to allow for an explicit margin of safety, where required, in final decisions. If a margin of safety is to be provided, the proper place for it is the final stage of the decisionmaking process, not by adjusting the risk or benefit estimates in a conservative direction at the information-gathering or analytical stages of the process. Conservative estimates should be presented as alternatives to best estimates for sensitivity analysis but should not substitute for them.

It is important to guard against double-counting of benefits. For example, if a regulation improved the quality of the environment in a community, the value of real estate in the community might rise, reflecting the greater attractiveness of living in the improved environment. It would ordinarily be incorrect to include the rise in property values among the benefits of the regulation. Ordinarily, the value of environmental benefits (e.g., reduced health risks, scenic improvements) will already be included among the benefits. The rise in property values reflects the capitalized value of these improvements. Therefore, to count as benefits both the value of the environmental improvements and the corresponding increase in property values is to count the same benefits twice. Only where a direct estimate of the benefits has not been included would it be appropriate to include the increase in property values among the benefits.

1. *General Considerations.* The concept of "opportunity cost" is the appropriate construct for valuing both benefits and costs. The principle of "willingness-to-pay" captures the notion of opportunity cost by providing an aggregate measure of what individuals are willing to forgo so as to enjoy a particular benefit. Market transactions provide the richest data base for estimating benefits based on willingness-to-pay, so long as the goods and services affected by a potential regulation are traded in markets. Estimation problems arise in a variety of instances, of course, where prices or market transactions are difficult to monitor. Markets may not even exist in some instances, forcing regulatory analysts to develop appropriate proxies that simulate market exchange. Indeed, the analytical process of deriving benefit estimates by simulating markets may suggest alternative regulatory strategies that create such markets.

Willingness-to-pay always provides the preferred measure of benefits. Estimates of willingness-to-pay based on observable and replicable behavior deserve

the greatest level of confidence. Considerably less confidence should be conferred on benefit estimates that are neither derived from market transactions nor based on behavior that is observable or replicable. Of course, innovative benefit estimation methodologies may be necessary in some cases and should be encouraged. However, reliance upon such methods intensifies the need for quality control to ensure that estimates derived conform as closely as possible to what would be observed if markets existed.

2. Principles for Valuing Directly Observable Benefits. Ordinarily, goods and services are to be valued at their market prices. However, in some instances, the market value of a good or service may not reflect its true value to society. If a regulatory alternative involves changes in such a good or service, its monetary value for purposes of benefit-cost analysis should be derived using an estimate of its true value to society (often called its "shadow price"). For example, suppose a particular air pollutant damages crops. One of the benefits of controlling that pollutant will be the value of the crop saved as a result of the controls. If the price of that crop is held above the free-market equilibrium price by a government price-support program it will overstate the value of the benefit of controlling the pollutant if the crop saved were valued at the market price established by the support program. The social value of the benefit should be calculated using a shadow price for crops subject to price supports. The estimated shadow price should reflect the value to society of marginal uses of the crop (e.g., the world price if the marginal use is for exports). If the marginal use is to add to very large surplus stockpiles, the shadow price would be the value of the last units released from storage minus storage cost. Therefore, where stockpiles are large and growing, the shadow price is likely to be low and could well be negative.

3. Principles for Valuing Benefits That Are Indirectly Traded in Markets. In some important instances, a benefit corresponds to a good or service that is indirectly traded in the marketplace. Important examples include reductions in the health-and-safety risks, the use-value of environmental amenities and scenic vistas, and savings in time. To estimate the monetary value of such an indirectly traded good, the willingness-to-pay valuation methodology is still conceptually superior, because the amount that people are willing to pay for a good or service is the best measure of its value to them. As noted in Sections 4 and 5 immediately following, alternative methods may be used where there are practical obstacles to the accurate application of direct willingness-to-pay methodologies.

A variety of methods have been developed for estimating indirect benefits. Generally, these methods apply statistical techniques to distill from observable market transactions the portion of willingness-to-pay that can be attributed to the benefit in question. Examples include estimates of the value of environmental amenities derived from travel-cost studies, hedonic price models that measure differences or changes in the value of land, and statistical studies of occupational-risk premiums in wage rates.

Contingent-valuation methods have become increasingly popular for estimating indirect benefits, but they suffer from the fact that survey instruments have a limited capacity to simulate real-world market behavior. Benefit estimates derived from contingent-valuation studies thus have a greater burden of analytical care to ensure that they represent in an unbiased manner what actually occurs in the marketplace.

4. Principles and Methods for Valuing Benefits That Are Not Traded Directly or Indirectly in Markets. Some types of goods, such as the social benefit of preserving environmental amenities apart from their use and direct enjoyment by people, are not traded directly or indirectly in markets. The practical obstacles to accurate measurement are similar to (but generally more severe than) those arising with respect to indirect benefits, principally because there are not market transactions to provide data for willingness-to-pay estimates.

Contingent-valuation methods provide the only analytical approaches currently available for estimating the benefits of such untraded goods. The absence of observable and replicable behavior with respect to the benefit in question, combined with the difficulties of avoiding bias in contingent-valuation studies, argues for great care and circumspection in the use of such methods. This means, for example, that estimates of willingness-to-pay must incorporate the variety of alternative means individuals have of expressing value for untraded goods. Moreover, analyses must faithfully capture individuals' budget constraints, which restrict their willingness-to-pay for untraded as well as traded goods and services. Benefit analyses derived from contingent valuation and similar methods thus require considerable analytic rigor in design and careful execution. Absent such efforts, analyses based heavily on the benefits of untraded goods and services ordinarily would fail the test of a satisfactory RIA.

5. Methods for Valuing Health and Safety Benefits. For health and safety benefits, a distinction should be made between risks of nonfatal illness or injury and fatality risks.

(a) *Nonfatal illness and injury.* Although the willingness-to-pay approach is conceptually superior, the current state of empirical research in the area is not sufficiently advanced to assure that estimates derived by this method are necessarily superior to direct-cost valuations of reductions in risks of nonfatal illness or injury. Any injury-value estimate from a willingness-to-pay study is necessarily an average over a specific combination of injuries of varying severity. If the average injury severity in such a study is greatly different from that for the regulatory action under study, then the study's estimated injury value may not be appropriate for evaluating that action. Accordingly, the agency should use whichever approach it considers most appropriate for the decision at hand. The primary components of the direct-cost approach are medical costs and the value of lost production. Possibly important costs that may be omitted by the use of the direct-cost approach are the value of pain and suffering and the value of time lost from leisure and other activities that are not economically directly productive.

(b) *Fatality.* Reductions in fatality risks are best monetized according to the willingness-to-pay approach. The value of changes in fatality risk is sometimes expressed in terms of the "value of life." This is something of a misnomer since the value of a life really refers to the sum of many small reductions in fatality risk. For example, if the annual risk of death is reduced by one in a million for each of two million people, that represents two "statistical lives" saved per year (two million \times one millionth = two). If the annual risk of death is reduced by one in 10 million for each of 20 million people, that also represents two statistical lives saved. The conclusion that the fatality risk reductions in these two cases are equivalent implies an assumption. The implicit assumption—that equal increments in risk are valued equally—allows different risk increments to be added together and compared directly. As a different example, suppose there are two alternative reductions in the annual risk faced by an individual:

- A: from $.10 \times 10^{-5}$ to $.09 \times 10^{-5} = .01 \times 10^{-5}$
 B: from 1.00×10^{-5} to $.99 \times 10^{-5} = .01 \times 10^{-5}$

Since in both cases the reduction in annual risk is the same ($.01 \times 10^{-5}$), the value of A and B should be considered the same.

The assumption that equal increments in fatality risk are of equal value is a legitimate one, so long as the level of fatality risk is below 10^{-4} annually. There is evidence that the willingness-to-pay value for increments in fatality risk does not change

significantly over a wide range of risk exposure below 10^{-4} annually.

For levels of annual risk exposure of 10^{-4} and above it cannot be assumed that equal increments of risk are valued equally. At these higher risk levels, it is particularly important to distinguish between situations of voluntary risk assumption and those of involuntary risk. Where the high risk is involuntary, it is appropriate to value reductions in risk from that high level more highly than equal risk reductions at lower risk levels. In general, the greater the risk that an individual bears, the higher will be the value the individual places on marginal changes in risk. On the other hand, where a high risk is chosen voluntarily those assuming the risk tend to be persons who place a relatively low value on averting safety risks. Empirical studies of risk premiums in high-risk occupations suggest that reductions in voluntarily assumed high risks should be valued less than equal risk reductions at ordinary risk levels.

Estimates of the value of fatality risks refer only to changes in an uncertain risk of death. They have no application to the certain prevention of the death of an identifiable individual.

6. *Alternative Methodological Frameworks for Estimating Health and Safety Benefits.* Several alternative ways of incorporating fatality risks into the framework of benefit-cost analysis may be appropriate. These may involve either explicit or implicit valuation of fatality risks.

One acceptable explicit valuation approach would be for the agency to select a single value for reductions in fatality risk at ordinary risk levels (below 10^{-4} annually) and use this value consistently for evaluating all its programs that affect ordinary fatality risks. Another acceptable explicit valuation approach would be to use a range of values for reductions in fatality risk and apply sensitivity analysis as with other parameters that have alternative plausible values. The range of alternative values should be a reasonable one, not one that includes the most extreme upper and lower values of fatality risk reduction that have been estimated. Extreme values are more appropriate for instances of extraordinarily high risks (above 10^{-4} annually), with the extreme low values being appropriate where voluntary assumption of high risk leads to self-selection and the extreme high values being appropriate where the high risk is involuntarily assumed.

Where the analysis uses a range of alternative values for reductions in fatality risk, it may be useful to calculate break-even values, as in other sensitivity analyses. This requires calculating the borderline value of reductions in fatality risk at which the net benefit decision criterion would switch over from

favoring one alternative to favoring another (i.e., the value of fatality risk at which the net benefits of the two alternatives are equal). This method will frequently be infeasible because of its computational demands or because alternatives are continuous rather than discrete (e.g., alternative stringencies for exposure levels), but where appropriate, it is a useful supplement to the sensitivity analysis.

An implicit valuation approach could entail calculations of the cost per unit of reduction in fatality risk (cost per "statistical life saved"), with costs defined as costs minus monetized benefits. This must be used with care since there is a serious potential pitfall: It is *not* correct to choose between two mutually exclusive alternatives by selecting the alternative with lowest cost per statistical life saved. The alternative with higher cost per life saved may nonetheless be the alternative with the higher net benefit to society.

The way to avoid this pitfall while retaining the implicit valuation approach is to make all calculations of cost per life saved in terms of increments between alternatives. Alternatives should be arrayed in order of their total reduction in expected fatalities and the incremental cost per life saved calculated between each adjacent pair of alternatives. In contrast to explicit valuation approaches, this avoids the necessity of specifying in advance a value for reductions in fatality risks. However, a range of values will be implied by the final selection of an alternative. This range should be consistent with estimated values of reductions in fatality risks calculated according to the willingness-to-pay methodology.

Another way of expressing reductions in fatality risks is in terms of life-years saved. For example, if a regulation protected individuals whose average remaining life expectancy was 40 years, then a risk reduction of one fatality would be expressed as 40 life-years saved. Such a refinement may be desirable for regulations that disproportionately protect young people (e.g., motor vehicle safety regulations) or elderly people (e.g., regulations controlling carcinogens). To derive the value of a life-year saved from an estimate of the value of life, first determine the average remaining life expectancy of the sample population in the study from which the estimate was drawn. Assuming that the average age of the sample population is known, the average remaining life expectancy may be derived from actuarial tables giving life expectancy in relation to age. Using standard compound interest tables, the value of a life-year saved can then be determined as the estimated value of life annualized over a period equal to the number of years of remaining average life expectancy.

C. Cost Estimates

1. *General Considerations.* The opportunity cost of an alternative is the value of the benefits foregone as a consequence of that alternative. For example, the opportunity cost of banning a product (e.g., a drug, food additive, or hazardous chemical) is the foregone net benefit of that product. It is measured by changes in producers' and consumers' surpluses. (Producers' surplus is the difference between the amount a producer is paid for a unit of a good and the minimum amount the producer would accept to supply that unit. It is measured by the distance between the price and the supply curve for that unit. Consumers' surplus is the difference between what a consumer pays for a unit of a good and the maximum amount the consumer would be willing to pay for that unit. It is measured by the distance between the price and the demand curve for that unit.) As another example, even if a resource required by regulation does not have to be paid for because it is already owned by the regulated firm, nonetheless, the use of that resource to meet the regulatory requirement has an opportunity cost equal to the net benefit it would have provided in the absence of the requirement. Any such foregone benefits for an alternative should be monetized wherever possible and either added to the costs or subtracted from the benefits of that alternative. Any costs that are averted as a result of an alternative should be monetized wherever possible and either added to the benefits or subtracted from the costs of that alternative.

All costs calculated should be incremental, that is, they should represent changes in costs that would occur if the regulatory alternative is chosen compared to costs in the base case (ordinarily no regulation or the existing regulation). Future costs that would be incurred even if the regulation is not promulgated, as well as costs that have already been incurred (sunk costs), are not part of incremental costs. If marginal cost is not constant for any component of costs, incremental costs should be calculated as the area under the marginal cost curve over the relevant range.

Costs include private-sector compliance costs, government administrative costs, and costs of reallocating workers displaced as a result of the regulation. Costs that are not monetary outlays must be included and should be attributed a monetary value wherever possible. Such costs may include the value (opportunity cost) of benefits foregone, losses in consumers' or producers' surpluses, discomfort or inconvenience, and loss of time. A schedule of monetized costs should be included that would show the type of cost and when it would occur; the numbers in this table should be expressed in constant, undiscounted

dollars. Any expected incremental costs that cannot be monetized should be explained. An important type of cost that often cannot be quantified is a slowing in the rate of innovation or of adoption of new technology. For example, regulations requiring a costly and time-consuming approval process for new products or new facilities may have such costs, as may regulations setting much more stringent standards for new facilities than existing ones.

Two accounting cost concepts that should not be counted as costs in benefit-cost analysis are interest and depreciation. The time value of money is already accounted for by the discounting of benefits and costs. Depreciation is already taken into account by the time distribution of benefits and costs; the only legitimate use for depreciation calculations in benefit-cost analysis is to estimate the salvage value of a capital investment.

2. *Real Costs Versus Transfer Payments.* An important, but sometimes difficult, problem in cost estimation is to distinguish between real costs and transfer payments. Transfer payments are not genuine costs but payments for which no real good or service is received in return. Several examples of problems that may arise from the confusion between transfer payments and real costs (or benefits) may help to identify situations in which further analysis of the problem may be warranted. Monopoly profits, insurance payments, government subsidies and taxes, and distribution expenses are four potential problem areas.

(a) *Monopoly profits.* If, for example, sales of a competitively produced product were restricted by a government regulation so as to raise prices to consumers, the resulting monopoly profits are not a benefit of the rule, nor is their payment by consumers a cost. The real benefit-cost effects of the regulation would be represented by changes in producers' and consumers' surpluses.

(b) *Insurance payments.* Potential pitfalls in benefit-cost analysis may also arise in the case of insurance payments, which are transfers. Suppose, for example, a worker safety regulation, by decreasing employee injuries, led to reductions in firms' insurance premium payments. It would be incorrect to count the amount of the reduction in insurance premiums as a benefit of the rule. The proper measure of benefits is the value of the reduction in worker injuries, monetized as described previously, plus any reduction in real costs of administering insurance (such as the time insurance company employees needed to process claims) due to the reduction in worker insurance claims. Reductions in insurance premiums that are matched by reductions in insur-

ance claim payments are changes in transfer payments, not benefits.

(c) *Indirect taxes and subsidies.* A third instance where special treatment may be needed to deal with transfer payments is the case of indirect taxes (tariffs or excise taxes) or subsidies on specific goods or services. Suppose a regulation requires firms to purchase a \$10,000 piece of imported equipment, on which there is a \$1,000 customs duty. For purposes of benefit-cost analysis the cost of the regulation for each firm ordinarily would be \$10,000, not \$11,000, since the \$1,000 customs duty is a transfer payment from the firm to the Treasury, not a real resource cost. This approach, which implicitly assumes that the equipment is supplied at constant costs, should be used except in special circumstances. Where the taxed equipment is not supplied at constant cost, the technically correct treatment is to calculate how many of the units purchased as a result of the regulation are supplied from increased production and how many from decreased purchases by other buyers. The former units would be valued at the price without the tax and the latter units would be valued at the price including tax. This calculation is usually difficult and imprecise because it requires estimates of supply and demand elasticities, which are often difficult to obtain and inexact. Therefore, this treatment should only be used where the benefit-cost conclusions are likely to be sensitive to the treatment of the indirect tax. While costs ordinarily should be adjusted to remove indirect taxes on specific goods or services as described here, similar treatment is not warranted for other taxes, such as general sales taxes applying equally to most goods and services or income taxes.

(d) *Distribution expenses.* The treatment of distribution expenses is also a source of potential error. For example, suppose a particular regulation raises the cost of a product by \$100 and that wholesale and retail distribution expenses are on average 50 percent of the factory-level cost. It would ordinarily be incorrect to add a \$50 distribution markup to the \$100 cost increase to derive a \$150 incremental cost per product for benefit-cost analysis. Most real resource costs of distribution do not increase with the price of the product being distributed. In that case, either distribution expenses would be unchanged or, if they increased, the increase would represent distributor monopoly profits. Since the latter are transfer payments, not real resource costs, in neither case should additional distribution expenses be included in the benefit-cost analysis. However, increased distribution expenses should be counted as costs to the extent that they correspond to increased real resource costs

of the distribution sector as a result of the change in the price or characteristics of the product.

D. Expenditure Rules

Regulations establishing terms or conditions of Federal grants, contracts, or financial assistance call for a different form of regulatory analysis than do other types of regulation. In some instances, a full-blown benefit-cost analysis may be appropriate to inform Congress and the President more fully about the desirability of the program, but this would not ordinarily be required in an RIA. The primary function of the RIA for this type of regulation should be to verify that the terms or conditions are the minimum necessary to achieve the purposes for which the funds were appropriated. They should not contain conditions in pursuit of goals that are not germane to the purpose for which the funds were authorized and appropriated. Beyond controls to prevent abuse and to ensure that funds appropriated to achieve a specific purpose are channeled efficiently toward that end, maximum discretion should be allowed in the use of Federal funds, particularly when the recipient is a State or local government.

IV. RATIONALE FOR CHOOSING THE PROPOSED REGULATORY ACTION

The RIA should include an explanation of the reasons for choosing the selected regulation. Ordinarily, the regulatory alternative selected should be the one that achieves the greatest net benefits. If legal constraints prevent this choice, they should be identified and explained, and their net cost should be estimated.

Where uncertainties are substantial or a large proportion of benefits cannot be monetized, other methods of summarizing the benefit-cost analysis may sometimes be appropriate. When alternative forms of presentation are used, the objective must continue to be the maximization of net benefits (except where prohibited by law). Alternative criteria must be used with care because of the potential for errors or misinterpretation.

Agencies need not calculate the internal rate of return for a regulation. The internal rate of return is often difficult to compute and is problematical when multiple rates exist. It must not be used as a criterion for choosing between mutually exclusive alternatives. As a criterion for choosing between alternatives that are not mutually exclusive, it has no advantages over the criterion of maximizing the present value of net benefits.

Benefit-cost ratios, if used at all, must be used with care to avoid a common pitfall. It is a mistake to choose among mutually exclusive alternatives by

selecting the alternative with the highest ratio of benefits to costs. An alternative with a lower benefit-cost ratio than another may have the higher net benefits. Whether a regulation's benefits are greater (or less) than its costs can be determined by whether its benefit-cost ratio is greater (or less) than one. The benefit-cost ratio may be used as a very simplified indicator of the likely sensitivity of the result: If the benefit-cost ratio is much greater than one, the conclusion that the regulation's benefits exceed its costs probably is not sensitive to likely alternative parameter values. If the ratio is only slightly greater than one, the conclusion probably is sensitive. The benefit-cost ratio may sometimes be acceptable as a rough substitute for genuine sensitivity analysis where it is not feasible to carry out a full sensitivity analysis (e.g., if the number of regulatory parameters to be tested by sensitivity analysis is large). When so used, the benefit-cost ratio should be recognized as only a crude approximation to a genuine sensitivity analysis and the analyst should be aware of its limitations (e.g., the benefit-cost ratio is sensitive to the arbitrary classification of an item as a benefit or an averted cost).

Where the benefits of proposed regulatory alternatives include reductions in fatality risks, an acceptable alternative to direct calculation of net benefits is the indirect approach of calculating incremental costs per life saved between adjacent alternatives. This is done by ranking all the alternatives according to the number of lives they save and then calculating the change in costs and the change in lives saved between each alternative and the one with the next highest number of lives saved. If the alternative selected is the one whose incremental cost per life saved is closest to the willingness-to-pay value of life, this decision criterion is analytically equivalent to that of maximizing net benefit.

In cases where important benefits cannot be assigned monetary values, cost-effectiveness analysis should be used where possible to evaluate alternatives that generate equivalent nonmonetizable benefits. Costs should be a calculated net of monetized benefits. Between two alternatives with equivalent nonmonetizable benefits, the alternative with the lower net costs should be selected. Cost-effectiveness analysis should also be used to compare regulatory alternatives in cases where the level of benefits is specified by statute.

V. STATUTORY AUTHORITY

The RIA should include a statement of determination and explanation that the proposed regulatory action is within the agency's statutory authority.

Further Reading

Edith Stokey and Richard Zeckhauser, *A Primer for Policy Analysis*. Chapters 9 and 10 provide a good introduction to basic concepts.

E. J. Mishan, *Economics for Social Decisions: Elements of Cost-Benefit Analysis*. Assumes some knowledge of economics. Chapters 5-8 should be helpful on the important subjects of producers' and consumers' surpluses (not discussed extensively in this guidance document).

W. Kip Viscusi, *Risk By Choice*. Chapter 6 is a good starting point for the topic of valuing health and

safety benefits. Other more technical sources are given in the bibliography.

Robert Cameron Mitchell and Richard C. Carson, *Using Surveys to Value Public Goods: The Contingent Valuation Method*. Provides a valuable discussion on the potential pitfalls associated with the use of contingent-valuation methods.

V. Kerry Smith, Ed., *Advances in Applied Microeconomics: Risk, Uncertainty, and the Valuation of Benefits and Costs*.

Judith D. Bentkover, Vincent T. Covello, and Jeryl Mumpower, Eds., *Benefits Assessment: The State of the Art*.

Paperwork Reduction Act

Citations:

44 U.S.C. §§3501-3520 (1990); enacted December 11, 1980 by Pub. L. No. 96-511, 94 Stat. 2812, amended October 1986 by Pub. L. No. 99-591, title I, §101(m), 100 Stat. 3341-335.

Lead Agency:

Office of Management and Budget, Office of Information and Regulatory Affairs, Old Executive Office Building, 17th Street and Pennsylvania Avenue NW, Washington, DC 20503 (202) 395-4852..

Overview:

The Paperwork Reduction Act of 1980 has as its main purposes to "minimize federal paperwork burden for individuals, small business and State and local government, . . . to minimize the cost of information collection to the Federal Government, . . . and to maximize the usefulness" to the federal government of the information collected. 44 U.S.C. §3501. The Act statutorily established the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget (OMB), and assigned it responsibility for coordinating government information policies, including approving agency collections of information. The Act applies to all agencies in the executive branch, as well as to the independent regulatory agencies. Only very narrow functions are exempted from its coverage: (1) federal criminal matters or actions; (2) civil and administrative actions, and investigations of specified individuals or entities; (3) compulsory

process issued in connection with antitrust proceedings; and (4) federal intelligence activities carried out under presidential executive order.

Basic Clearance Requirement. The Act assigns to OIRA the function of approving information collections. The Act provides that agencies "shall not conduct or sponsor the collection of information" without first obtaining the approval of the OMB director or his designee. §3507(a). The Act (§3502(4)) defines "collection of information" as:

"the obtaining or soliciting of facts or opinions by an agency through the use of written report forms, application forms, schedules, questionnaires, reporting or recordkeeping requirements, or other similar methods calling for either-

"(A) answers to identical questions posed to, or identical reporting or recordkeeping requirements imposed on, ten or more persons, other than agencies, instrumentalities, or employees of the United States; or

"(B) answers to questions posed to agencies, instrumentalities, or employees of the United States which are used for general statistical purposes."

OMB has promulgated regulations that further define "collection of information" by broadly interpreting the term "similar methods." The Act does not cover agency rules mandating disclosure by regulated entities to third parties, however, where the information is not provided either directly or indirectly to an agency. *Dole v. United Steelworkers of America*, 110 S. Ct. 929, 938 (1990).

The Act forbids OMB to approve any information collection for a period of more than 3 years at a time. §3507(d). Failure to obtain OMB approval of a collection of information triggers operation of the Act's public protection provision, §3512, which provides that "no person shall be subject to any penalty for failing to maintain or provide information to any agency if the information collection request . . . does not display a current control number assigned by the Director [of OMB], or fails to state that such a request is not subject to [the requirements of the Paperwork Reduction Act]."

Clearance Procedure. The Act provides a general set of clearance procedures for approving agency information collections, with more specific procedures prescribed for information collections imposed through notice-and-comment rulemakings.

Section 3504(h) of the Act prescribes the following procedure for information collections contained in rules promulgated following notice and comment:

- No later than publication of the notice of proposed rulemaking (NPRM), the agency must submit the rule to OMB along with any background information OMB needs to conduct its review.
- OMB has 60 days after publication of the NPRM to file comments on the collection of information; if it does not file comments, OMB forfeits its right to disapprove of the information collection.
- When publishing its final rule, the agency must explain how its rule responds to OMB's comments, or why it rejected the comments.
- OMB has 60 days from publication of the final rule to disapprove the collection of information. Disapproval may be because (1) the agency failed to comply with the submission requirements; (2) the agency substantially modified the collection of information in the final rule without giving OMB 60 days to review the modified requirement; or (3) the agency's response to OMB's comments is found to be "unreasonable."
- OMB's decision to disapprove the collection of information in the rule, and its reasons for that decision, must be made publicly available.

OMB's regulations implementing the Act have added certain requirements to the clearance process for collections of information contained in agency rules. OMB requires, among other things, that:

- The public always be given a chance to comment on proposed collections of information. In rulemakings, this is accomplished by including in the NPRM a reference to the fact that the rule has been submitted to OMB for review and that comments may be sent to the OMB desk officer for the agency. 5 CFR §1320.13(a). The rules also require that the agency include in the preamble to the NPRM a brief statement of the need for the collection of information, a description of the likely respondents, and an estimate of the total annual reporting and recordkeeping burden that will result from each collection of information. §1320.15(a).
- OMB comments on the collection of information be placed in the agency's rulemaking record. §1320.13(c).
- All collections of information provisions in rules display an OMB control number, which OMB may assign when it approves the provision even if this occurs prior to publication of the final rule. §1320.13(f).

For information collections that are not contained in new rules promulgated after notice and comment, there is a different process:

- On or before the day an information collection proposal is submitted to OMB for clearance, the agency must send a notice to the Federal Register, in which the agency advises the public that OMB approval has been requested and that the public may submit comments on the proposal to the OMB desk officer for the agency. The notice must include a brief description of the information to be collected, the likely respondents, and an estimate of the total annual recordkeeping burden. 5 CFR §§1320.12(a), 1320.14(b), 1320.15(a).

- Within 60 days after receipt of the agency's submission, OMB will notify the agency of its decision to approve or disapprove, in whole or in part, the information collection. OMB may extend the review period for another 30 days. §1320.12(b).
- If OMB does not act within the 60- or 90-day period, the agency can ask OMB to assign the required control number, and OMB must do so without delay. §1320.12(c).

OMB has also developed procedures that govern clearance for information collections in existing rules. §1320.14. The procedures are intended to prevent expiration of OMB approval for an information collection before the agency has undertaken the necessary administrative procedure to extend OMB's 3-year approval or effect a repeal or amendment of the rule containing the collection provision. The agency is required to initiate the OMB review process not later than 90 days before the existing OMB approval expires, and if OMB indicates disapproval of the existing information collection provision, the agency must initiate rulemaking to amend or rescind the provision, consistent with the APA or other applicable requirements.

Alternative Procedures. The Act contains several variations from the general review procedures for review of agency information collections. It establishes a "fast track" review procedure for emergency situations, which is available on request by agency heads if the stringent tests of section 3507(g) are met. However, OMB by regulation has provided that agencies may request "expedited" processing of collections of information even though the request does not qualify for emergency processing under the statute. 5 CFR §1320.18.

The Act also authorizes the OMB director, following notice and comment, to delegate his approval authority to an agency senior official who "is sufficiently independent of program responsibility to evaluate fairly whether proposed information collection requests should be approved and has sufficient resources to carry out this responsibility effectively." Such an official must comply with OMB's regulations in reviewing his or her agency's information collection provisions. 5 CFR §1320.9.

OMB's general clearance procedures are subject to the Act's provision that independent regulatory agencies may, by majority

vote, override an OMB decision disapproving a proposed information collection.

Substantive Standard of Review. The substantive standard governing OMB review of agency information collections is "whether the collection of information by an agency is necessary for the proper performance of the functions of the agency, including whether the information will have practical utility for the agency." 44 U.S.C. §3504(c). OMB's regulations further describe the standard: an agency must show that all reasonable steps have been taken to ensure that the collection of information is the least burdensome necessary, that it is not duplicative of information otherwise accessible to the agency, and that the collection of information has practical utility. 5 CFR §1320.4(b).

The regulations further provide that any collection of information specifically mandated by statute or court order will be considered "necessary" by OMB, as will any collection of information "specifically required by an agency rule approved or not acted upon by OMB" under the Act. In addition, OMB has established general guidelines that will be applied unless the agency can demonstrate the need for an exception to them. Among other things, OMB will generally not approve a collection of information that requires reporting more often than quarterly; that requires a response in less than 30 days; that requires respondents to submit more than one original and two copies of a document; that requires persons to retain records (other than health, medical or tax records) for more than 3 years; that does not attempt to ease the burden for small entities; that requires respondents to submit proprietary, trade secret, or other confidential information, unless the agency has instituted permissible procedures to protect the information; or that requires persons to maintain or provide information in a format other than that in which it is customarily maintained. 5 CFR §1320.6.

Also pertinent to OMB's authority is section 3518(e) of the Act, which states:

"Nothing in [the Act] shall be interpreted as increasing or decreasing the authority of the President, the Office of Management and Budget or the Director thereof, under the laws of the United States, with respect to the substantive policies and programs of departments, agencies, and offices, including the substantive authority of any Federal agency to enforce the civil rights laws."

Information Management. The Paperwork Reduction Act also authorizes OMB to develop and implement uniform policies on information resources management by federal agencies. OMB has done this through Circular A-130, which sets out various policies agencies are to use in managing government information. 50 Fed. Reg. 52730 (Dec.24, 1985). Circular A-130, originally issued in 1985, is in the process of being amended. See 57 Fed. Reg. 18296 (April 29, 1992).

Legislative History:

The Paperwork Reduction Act of 1980 replaced the Federal Reports Act of 1942 as the basic statute controlling paperwork requirements imposed on the public by the federal government. The Act was amended in 1986.

The Paperwork Reduction Act was originally enacted as part of the regulatory reform movement of the 1970s. Reacting to growing public concern over the burden imposed by federal information collections, Congress established the Commission on Federal Paperwork in late 1974. The Commission, in its report in 1977, made 770 recommendations for reducing the federal paperwork burden. Legislation implementing some of the recommendations was introduced in both the 95th and 96th Congresses, and the Paperwork Reduction Act was passed in November 1980, and signed by President Carter on December 11, 1980.

Conflicts over the interpretations of certain provisions of the Act resulted in amendments enacted in 1986. Among the amendments was language clarifying the relationship between the procedures required for clearance of information collections in proposed rules and other proposed information collections.

THE REGULATORY FLEXIBILITY ACT

Purpose: The purpose of the Regulatory Flexibility Act of 1980 is to require federal agencies to consider the economic impact of their regulations on "small entities" (i.e., small businesses, small governments, small non-profit organizations). The Act applies to all rules subject to the notice and comment procedures of the Administrative Procedures Act; certain other rules are covered by all or some of the Act's provisions.

Under the Act's provisions, agencies are required to conduct a regulatory flexibility (regflex) analysis if a rule will have a "significant economic impact on a substantial number" of small entities. The purpose is to consider any regulatory alternatives that accomplish the objectives of applicable statutes while minimizing economic impacts on small entities. Regflex analysis is not required if an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. The Act also mandates special efforts to involve small entities in rulemaking.

Agency Policy: Under the Agency's new (4/9/92) Guidelines for implementation of the Act, any economic impact is a significant impact, and any number of small entities impacted is a substantial number. In other words, EPA will perform a regflex analysis if a rule will have any economic impact, however small, on any small entities, even though the agency may not be legally required to do so. Under this policy, regflex certifications are permissible only when a rule will have no impact on any small entity. The new regflex Guidelines are mandatory for any rulemaking for which has a Start Action Notice (SAN) had not been submitted to the Agency's Steering Committee on or after April 9, 1992.

Rules which were underway prior to April 9, 1992, are subject to the Agency's regflex Guidelines issued February 9, 1982. Under these Guidelines, a regflex analysis is required only if the rule will have a "significant economic impact on a substantial number of small entities."

Preparing Regflex Analyses: At the rule proposal stage, the lead office prepares an "initial regulatory flexibility analysis" (IRFA), which must contain the following information: (1) why agency action is being considered; (2) objectives/legal basis for the proposed rule; (3) small entities affected; (4) reporting, recordkeeping, compliance requirements; (5) duplicative, overlapping or conflicting federal rules; (6) alternatives which may minimize economic impacts. A "final regulatory flexibility analysis" (FRFA) must be prepared for the final rule, and must contain: (1) a statement of need for/objectives of the rule; (2) a summary of public comments on the IRFA, the agency's response, and any changes resulting from public comments; (3) a description of significant alternatives considered and the Agency's justification for rejection of any.

Participants: The lead office is responsible for preparing the IRFA/FRFA or preparing and justifying regflex certifications. The Regulatory Development Branch (RDB) in the Office of Regulatory Management and Evaluation (ORME) oversees EPA's compliance with the Act. EPA's Small Business Ombudsman (in the Office of Small and Disadvantaged Business Utilization) can advise on small business issues, and the Agency's Small Community Coordinator (Office of Regional Operations, State and Local Relations) can advise on small community issues. The Small Business Administration's Office of Advocacy has responsibility for monitoring compliance with the Act.

Operation: As previously mentioned, the Act directs agencies to assure that small entities have an opportunity to participate in rulemaking. In the early stages of rulemaking, such participation of small entities can be especially beneficial to the Agency in helping to identify the nature and extent of impacts and ways to reduce those impacts. See also: "Guidelines for Implementing the Regulatory Flexibility Act (Revised April 1992)", and "Guidelines for Implementing the Regulatory Flexibility Act" (2/9/82). Copies are available from the Regulatory Development Branch (202-260-5475).

Steps to Implement the Regulatory Flexibility Act

Will the Rule Have Any Economic Impact on Any Small Entities?

If Yes:

If No:

Does the operating statute allow the Agency to consider alternative regulatory requirements to reduce impacts on small entities?

Certify and explain in preamble. **STOP:** No further analysis required.

If Yes:

If No:

Is the approximate severity of the rule's impacts on small entities known, in either quantitative or qualitative terms?

Prepare and insert in preamble an abbreviated RFA (or a summary) that characterizes small entity impacts and explains why the Agency is precluded from considering regulatory options. **STOP:**

If Yes:

If No:

Conduct screening analysis to ascertain potential impacts. Based on results:

Devote an appropriate level of resources to perform an RFA that:

- explains why the agency is considering taking action;
- identifies the objectives of, and legal basis for, the proposed rule;
- describes and, where feasible, estimates the number of small entities to which the proposed rule will apply;
- describes the projected reporting, recordkeeping, and other requirements of the proposed rule, including an estimate of the classes of small entities that will be subject to the requirements and the type of professional skills necessary for implementing the requirements of the proposed rule and preparing reports or records;
- identifies, to the extent practicable, all relevant Federal rules that may duplicate, overlap, or conflict with the proposed rule; and
- describes any significant alternatives to the proposed rule that accomplish statutory objectives while minimizing economic impacts on small entities.

In the final rule, also:

- summarize the issues raised by public comments in response to the initial RFA and the Agency's assessment of those issues, and describe any changes in the rule resulting from public comments; and
- explain why the Agency rejected the alternatives it did not adopt.

Regulatory Flexibility Act

Citations:

5 U.S.C. §§601-612 (1988); enacted September 19, 1980 by Pub. L. No. 96-354, 94 Stat. 1164-1170.

Lead Agency:

U.S. Small Business Administration, Chief Counsel for Advocacy, 3rd Street SW, 7th floor, Washington, DC 20416 (202) 205-6532.

Overview:

Requirements. The Regulatory Flexibility Act requires agencies to consider the special needs and concerns of small entities whenever they engage in rulemaking subject to the notice-and-comment requirements of the APA or other laws. Each time it publishes a proposed rule in the Federal Register, an agency must prepare and publish a regulatory flexibility analysis (RFA) describing the impact of the proposed rule on small entities (including small businesses, organizations, and governmental jurisdictions), unless the agency head certifies that the proposed rule will not "have a significant economic impact on a substantial number of small entities." The initial RFA, like the proposed rule itself, is subject to public comment, and the agency is encouraged to facilitate participation by small entities by providing actual notice of the proceeding to affected small entities, holding conferences and public hearings on the proposed rule as it affects small entities, and transmitting copies of its initial RFAs to the Chief Counsel for Advocacy of the Small Business Administration.

The final rule adopted by the agency must be accompanied by a final RFA that summarizes and responds to the comments received.

The Act does not mandate any particular outcome in rulemaking; it encourages, but does not require, the "tiering" of government regulations through a number of techniques designed to make them less burdensome to small entities. An agency's initial RFA must identify any "significant alternatives" to the proposed regulation that might achieve its goals while minimizing the impact on small entities. Approaches suggested in the statute include modifying compliance or reporting timetables, simplifying compliance or reporting requirements, using performance rather than design standards, and exempting small entities from certain requirements. The final RFA must explain why any such significant alternatives to the rule were not adopted.

Agencies must publish semiannual regulatory agendas identifying upcoming and current rulemaking proposals that may affect small entities. In addition, the Act directs agencies to apply regulatory flexibility analysis to their *existing* rules, initially evaluating them over a 10-year period and reviewing them periodically.

Coverage. The Act's limitations are important. It does not apply to the vast amount of administrative activity that is not rulemaking, whether it be adjudication or the large realm of informal action. Nor does it reach rulemaking that is not subject to notice-and-comment, such as interpretative rules and other rules exempted by the provisions of section 553 of the APA.

Issues Under the Act. Several issues have arisen under the Act, though few opinions have construed its terms owing to the Act's extremely limited provision for judicial review (§611). Echoing the statutory language, courts considering the judicial review provision have ruled that agency action under the Act is not subject to judicial review as such, although the contents of a regulatory flexibility analysis (including any defects it may contain) will form part of the record through which the courts determine a rule's reasonableness under the APA. *State of Michigan v. Thomas*, 805 F.2d 176 (6th Cir. 1986); *Thompson v. Clark*, 741 F.2d 401 (D.C. Cir. 1984). The D.C. Circuit noted in *Thompson* that the impact of a rule on small entities may be placed at issue in the public comments even when the agency has decided that it need not prepare an RFA.

In a later case, the D.C. Circuit explicitly reviewed (within the context of judicial review of the final rule) an agency's certification that a rule would not have a significant impact on small entities,

Mid-Tex Electric Cooperative, Inc. v. FERC, 773 F.2d 327 (D.C. Cir. 1985), determining that the agency's certification was correct because it need only consider the rule's impact on regulated entities and not the indirect impact on small entities not regulated by the agency. A federal district court in the Third Circuit criticized *Mid-Tex*, ruling that because certifications under the Act are not RFAs, they are unreviewable even as part of the record on review of the final rule. *Lehigh Valley Farmers v. Block*, 640 F. Supp. 1497 (E.D. Pa. 1986), *aff'd*, 820 F.2d 409 (3d Cir. 1987).

Although these judicial interpretations have been helpful, uncertainties persist concerning the Act's coverage and its mandated process. Many of these are described in Paul Verkuil's study for the Conference, *A Critical Guide to the Regulatory Flexibility Act*. Moreover, according to the Small Business Administration's Chief Counsel for Advocacy, who monitors agency activity under the Regulatory Flexibility Act and issues annual reports, agency compliance with the Act has been very uneven, at least in part because of the lack of judicial review. An additional concern of some has been whether the Act has been as effective in reducing regulatory burdens for small governmental units as for small businesses. Senate oversight hearings in 1988 aired some of these issues, and legislation introduced, but not acted on, in the 101st Congress (S. 1758) proposed measures intended to improve implementation of the Act as it applies to small governments.

Legislative History:¹

95th Congress. The Act was introduced originally as S. 1974 by Senators Culver and Nelson. Hearings on S. 1974 as amended were held on October 7, 1977 and August 23, 1978 before the Senate Subcommittee on Administrative Practice and Procedure, which unanimously reported S. 1974 to the Judiciary Committee on September 9, 1978. The Senate passed the bill on October 14, 1978. In the House of Representatives, H.R. 11376, the companion bill to S. 1974, was introduced on March 8, 1978 by Representatives Kastenmeier and Baldus, but no further action was taken.

¹Derived from Verkuil, 1982 *Duke L.J.* 227-229.

96th Congress. On January 31, 1979, Senator Culver reintroduced his original bill as S. 299. Three similar bills were introduced in the House of Representatives: H.R. 1971 (companion bill to S. 299, on February 8, 1979), H.R. 1745 (a similar bill, but cast as an amendment to the Small Business Act, on January 31, 1979) and H.R. 4660 (an expansion of H.R. 1745, on June 28). The latter bill became the principal bill in the House.

After extensive hearings, the Senate bill, S. 299, passed the Senate on August 6, 1980 in the form of a substitute, unprinted amendment intended to recodify the bill from 5 U.S.C. §§551, 552 to a new chapter within title 5 (sections 601-612). (See the Senate "Description of Major Issues" accompanying the amendment at 126 Cong. Rec. S10, 934-43 (daily ed. August 6, 1980).)

On September 8, 1980 the House of Representatives passed the Senate-passed version of S. 299 without amendment. The House held no separate hearings on the Senate bill; rather it simply adopted the Senate's "Description of Major Issues" and section-by-section analysis. The House did offer its own three-page "Discussion of the Issues" (126 Cong. Rec. H 8468-70 (daily ed. September 8, 1980)).

President Carter signed the bill into law on September 19, 1980.

Source Note:

The most extensive discussion of the Act's provisions is Verkuil's 1982 *Critical Guide*. The annual reports issued by the Small Business Administration's Office of Advocacy contain a wealth of information on agency implementation of the Act, as well as on the Act's strengths and weaknesses as identified by that Office. An in-depth prescription for legislative changes to the Regulatory Flexibility Act appears in the Dickinson Law Review article authored by a former Chief Counsel for Advocacy of the Small Business Administration and two staff members of the Office of Advocacy.

Regulatory Flexibility Act**Title 5, U.S. Code****Chapter 6—The Analysis of Regulatory Functions**

- §601. Definitions.**
- §602. Regulatory agenda.**
- §603. Initial regulatory flexibility analysis.**
- §604. Final regulatory flexibility analysis.**
- §605. Avoidance of duplicative or unnecessary analyses.**
- §606. Effect on other law.**
- §607. Preparation of analyses.**
- §608. Procedure for waiver or delay of completion.**
- §609. Procedures for gathering comments.**
- §610. Periodic review of rules.**
- §611. Judicial review.**
- §612. Reports and intervention rights.**

§601. Definitions

For purposes of this chapter-

(1) the term "agency" means an agency as defined in section 551(1) of this title;

(2) the term "rule" means any rule for which the agency publishes a general notice of proposed rulemaking pursuant to section 553(b) of this title, or any other law, including any rule of general applicability governing Federal grants to State and local governments for which the agency provides an opportunity for notice and public comment, except that the term "rule" does not include a rule of particular applicability relating to rates, wages, corporate or financial structures or reorganizations thereof, prices, facilities, appliances, services, or allowances therefor or to valuations, costs or accounting, or practices relating to such rates, wages, structures, prices, appliances, services, or allowances;

(3) the term "small business" has the same meaning as the term "small business concern" under section 3 of the Small Business Act, unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register;

(4) the term "small organization" means any not-for-profit enterprise which is independently owned and operated and is not dominant in its field, unless an agency establishes, after opportunity for public comment, one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register;

(5) the term "small governmental jurisdiction" means governments of cities, counties, towns, townships, villages, school districts, or special districts, with a population of less than fifty thousand, unless an agency establishes, after

opportunity for public comment, one or more definitions of such term which are appropriate to the activities of the agency and which are based on such factors as location in rural or sparsely populated areas or limited revenues due to the population of such jurisdiction, and publishes such definition(s) in the Federal Register; and

(6) the term "small entity" shall have the same meaning as the terms "small business", "small organization" and "small governmental jurisdiction" defined in paragraphs (3), (4) and (5) of this section.

(Added Pub. L. No. 96-354, §3(a), Sept. 19, 1980, 94 Stat. 1165.)

CONGRESSIONAL FINDINGS AND DECLARATION OF PURPOSE

Section 2 of Pub. L. No. 96-354 provided that:

"(a) The Congress finds and declares that-

"(1) when adopting regulations to protect the health, safety and economic welfare of the Nation, Federal agencies should seek to achieve statutory goals as effectively and efficiently as possible without imposing unnecessary burdens on the public;

"(2) laws and regulations designed for application to large scale entities have been applied uniformly to small businesses, small organizations, and small governmental jurisdictions even though the problems that gave rise to government action may not have been caused by those smaller entities;

"(3) uniform Federal regulatory and reporting requirements have in numerous instances imposed unnecessary and disproportionately burdensome demands including legal, accounting and consulting costs upon small businesses, small organizations, and small governmental jurisdictions with limited resources;

"(4) the failure to recognize differences in the scale and resources of regulated entities has in numerous instances adversely affected competition in the marketplace, discouraged innovation and restricted improvements in productivity;

"(5) unnecessary regulations create entry barriers in many industries and discourage potential entrepreneurs from introducing beneficial products and processes;

"(6) the practice of treating all regulated businesses, organizations, and governmental jurisdictions as equivalent may lead to inefficient use of regulatory agency resources, enforcement problems, and, in some cases, to actions inconsistent with the legislative intent of health, safety, environmental and economic welfare legislation;

"(7) alternative regulatory approaches which do not conflict with the stated objectives of applicable statutes may be available which minimize the significant economic impact of rules on small businesses, small organizations, and small governmental jurisdictions;

"(8) the process by which Federal regulations are developed and adopted should be reformed to require agencies to solicit the ideas and comments of small businesses, small organizations, and small governmental jurisdictions to examine the impact of proposed and existing rules on such entities, and to review the continued need for existing rules.

"(b) It is the purpose of this Act [enacting this chapter] to establish as a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational

requirements to the scale of the businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure that such proposals are given serious consideration."

§602. Regulatory agenda

(a) During the months of October and April of each year, each agency shall publish in the Federal Register a regulatory flexibility agenda which shall contain-

(1) a brief description of the subject area of any rule which the agency expects to propose or promulgate which is likely to have a significant economic impact on a substantial number of small entities;

(2) a summary of the nature of any such rule under consideration for each subject area listed in the agenda pursuant to paragraph (1), the objectives and legal basis for the issuance of the rule, and an approximate schedule for completing action on any rule for which the agency has issued a general notice of proposed rulemaking,¹ and

(3) the name and telephone number of an agency official knowledgeable concerning the items listed in paragraph (1).

(b) Each regulatory flexibility agenda shall be transmitted to the Chief Counsel for Advocacy of the Small Business Administration for comment, if any.

(c) Each agency shall endeavor to provide notice of each regulatory flexibility agenda to small entities or their representatives through direct notification or publication of the agenda in publications likely to be obtained by such small entities and shall invite comments upon each subject area on the agenda.

(d) Nothing in this section precludes an agency from considering or acting on any matter not included in a regulatory flexibility agenda, or requires an agency to consider or act on any matter listed in such agenda.

(Added Pub. L. No. 96-354, §3(a), Sept. 19, 1980, 94 Stat. 1166.)

§603. Initial regulatory flexibility analysis

(a) Whenever an agency is required by section 553 of this title, or any other law, to publish general notice of proposed rulemaking for any proposed rule, the agency shall prepare and make available for public comment an initial regulatory flexibility analysis. Such analysis shall describe the impact of the proposed rule on small entities. The initial regulatory flexibility analysis or a summary shall be published in the Federal Register at the time of the publication of general notice of proposed rulemaking for the rule. The agency shall transmit a copy of the initial regulatory flexibility analysis to the Chief Counsel for Advocacy of the Small Business Administration.

(b) Each initial regulatory flexibility analysis required under this section shall contain-

(1) a description of the reasons why action by the agency is being considered;

(2) a succinct statement of the objectives of, and legal basis for, the proposed rule;

¹So in original. The comma probably should be a semicolon.

(3) a description of and, where feasible, an estimate of the number of small entities to which the proposed rule will apply;

(4) a description of the projected reporting, recordkeeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record;

(5) an identification, to the extent practicable, of all relevant Federal rules which may duplicate, overlap or conflict with the proposed rule.

(c) Each initial regulatory flexibility analysis shall also contain a description of any significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities. Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives such as-

(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;

(2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;

(3) the use of performance rather than design standards; and

(4) an exemption from coverage of the rule, or any part thereof, for such small entities.

(Added Pub. L. No. 96-354, §3(a), Sept. 19, 1980, 94 Stat. 1166.)

§604. Final regulatory flexibility analysis

(a) When an agency promulgates a final rule under section 553 of this title, after being required by that section or any other law to publish a general notice of proposed rulemaking, the agency shall prepare a final regulatory flexibility analysis. Each final regulatory flexibility analysis shall contain-

(1) a succinct statement of the need for, and the objectives of, the rule;

(2) a summary of the issues raised by the public comments in response to the initial regulatory flexibility analysis, a summary of the assessment of the agency of such issues, and a statement of any changes made in the proposed rule as a result of such comments; and

(3) a description of each of the significant alternatives to the rule consistent with the stated objectives of applicable statutes and designed to minimize any significant economic impact of the rule on small entities which was considered by the agency, and a statement of the reasons why each one of such alternatives was rejected.

(b) The agency shall make copies of the final regulatory flexibility analysis available to members of the public and shall publish in the Federal Register at the time of publication of the final rule under section 553 of this title a statement describing how the public may obtain such copies.

(Added Pub. L. No. 96-354, §3(a), Sept. 19, 1980, 94 Stat. 1167.)

§605. Avoidance of duplicative or unnecessary analyses

(a) Any Federal agency may perform the analyses required by sections 602, 603, and 604 of this title in conjunction with or as a part of any other agenda or

analysis required by any other law if such other analysis satisfies the provisions of such sections.

(b) Sections 603 and 604 of this title shall not apply to any proposed or final rule if the head of the agency certifies that the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities. If the head of the agency makes a certification under the preceding sentence, the agency shall publish such certification in the Federal Register, at the time of publication of general notice of proposed rulemaking for the rule or at the time of publication of the final rule, along with a succinct statement explaining the reasons for such certification, and provide such certification and statement to the Chief Counsel for Advocacy of the Small Business Administration.

(c) In order to avoid duplicative action, an agency may consider a series of closely related rules as one rule for the purposes of sections 602, 603, 604 and 610 of this title.

(Added Pub. L. No. 96-354, §3(a), Sept. 19, 1980, 94 Stat. 1167.)

§606. Effect on other law

The requirements of sections 603 and 604 of this title do not alter in any manner standards otherwise applicable by law to agency action.

(Added Pub. L. No. 96-354, §3(a), Sept. 19, 1980, 94 Stat. 1168.)

§607. Preparation of analyses

In complying with the provisions of sections 603 and 604 of this title, an agency may provide either a quantifiable or numerical description of the effects of a proposed rule or alternatives to the proposed rule, or more general descriptive statements if quantification is not practicable or reliable.

(Added Pub. L. No. 96-354, §3(a), Sept. 19, 1980, 94 Stat. 1168.)

§608. Procedure for waiver or delay of completion

(a) An agency head may waive or delay the completion of some or all of the requirements of section 603 of this title by publishing in the Federal Register, not later than the date of publication of the final rule, a written finding, with reasons therefor, that the final rule is being promulgated in response to an emergency that makes compliance or timely compliance with the provisions of section 603 of this title impracticable.

(b) Except as provided in section 605(b), an agency head may not waive the requirements of section 604 of this title. An agency head may delay the completion of the requirements of section 604 of this title for a period of not more than one hundred and eighty days after the date of publication in the Federal Register of a final rule by publishing in the Federal Register, not later than such date of publication, a written finding, with reasons therefor, that the final rule is being promulgated in response to an emergency that makes timely compliance with the provisions of section 604 of this title impracticable. If the agency has not prepared a final regulatory analysis pursuant to section 604 of this title within one hundred and eighty days from the date of publication of the final rule, such rule

shall lapse and have no effect. Such rule shall not be repromulgated until a final regulatory flexibility analysis has been completed by the agency.
(Added Pub. L. No. 96-354, §3(a), Sept. 19, 1980, 94 Stat. 1168.)

§609. Procedures for gathering comments

When any rule is promulgated which will have a significant economic impact on a substantial number of small entities, the head of the agency promulgating the rule or the official of the agency with statutory responsibility for the promulgation of the rule shall assure that small entities have been given an opportunity to participate in the rulemaking for the rule through techniques such as-

- (1) the inclusion in an advanced notice of proposed rulemaking, if issued, of a statement that the proposed rule may have a significant economic effect on a substantial number of small entities;
 - (2) the publication of general notice of proposed rulemaking in publications likely to be obtained by small entities;
 - (3) the direct notification of interested small entities;
 - (4) the conduct of open conferences or public hearings concerning the rule for small entities; and
 - (5) the adoption or modification of agency procedural rules to reduce the cost or complexity of participation in the rulemaking by small entities.
- (Added Pub. L. No. 96-354, §3(a), Sept. 19, 1980, 94 Stat. 1168.)

§610. Periodic review of rules

(a) Within one hundred and eighty days after the effective date of this chapter, each agency shall publish in the Federal Register a plan for the periodic review of the rules issued by the agency which have or will have a significant economic impact upon a substantial number of small entities. Such plan may be amended by the agency at any time by publishing the revision in the Federal Register. The purpose of the review shall be to determine whether such rules should be continued without change, or should be amended or rescinded, consistent with the stated objectives of applicable statutes, to minimize any significant economic impact of the rules upon a substantial number of such small entities. The plan shall provide for the review of all such agency rules existing on the effective date of this chapter within ten years of that date and for the review of such rules adopted after the effective date of this chapter within ten years of the publication of such rules as the final rule. If the head of the agency determines that completion of the review of existing rules is not feasible by the established date, he shall so certify in a statement published in the Federal Register and may extend the completion date by one year at a time for a total of not more than five years.

(b) In reviewing rules to minimize any significant economic impact of the rule on a substantial number of small entities in a manner consistent with the stated objectives of applicable statutes, the agency shall consider the following factors-

- (1) the continued need for the rule;
- (2) the nature of complaints or comments received concerning the rule from the public;
- (3) the complexity of the rule;

(4) the extent to which the rule overlaps, duplicates or conflicts with other Federal rules, and, to the extent feasible, with State and local governmental rules; and

(5) the length of time since the rule has been evaluated or the degree to which technology, economic conditions, or other factors have changed in the area affected by the rule.

(c) Each year, each agency shall publish in the Federal Register a list of the rules which have a significant economic impact on a substantial number of small entities, which are to be reviewed pursuant to this section during the succeeding twelve months. The list shall include a brief description of each rule and the need for and legal basis of such rule and shall invite public comment upon the rule. (Added Pub. L. No. 96-354, §3(a), Sept. 19, 1980, 94 Stat. 1169.)

§611. Judicial review

(a) Except as otherwise provided in subsection (b), any determination by an agency concerning the applicability of any of the provisions of this chapter to any action of the agency shall not be subject to judicial review.

(b) Any regulatory flexibility analysis prepared under sections 603 and 604 of this title and the compliance or noncompliance of the agency with the provisions of this chapter shall not be subject to judicial review. When an action for judicial review of a rule is instituted, any regulatory flexibility analysis for such rule shall constitute part of the whole record of agency action in connection with the review.

(c) Nothing in this section bars judicial review of any other impact statement or similar analysis required by any other law if judicial review of such statement or analysis is otherwise provided by law. (Added Pub. L. No. 96-354, §3(a), Sept. 19, 1980, 94 Stat. 1169.)

§612. Reports and intervention rights

(a) The Chief Counsel for Advocacy of the Small Business Administration shall monitor agency compliance with this chapter and shall report at least annually thereon to the President and to the Committees on the Judiciary of the Senate and House of Representatives, the Select Committee on Small Business of the Senate, and the Committee on Small Business of the House of Representatives.

(b) The Chief Counsel for Advocacy of the Small Business Administration is authorized to appear as *amicus curiae* in any action brought in a court of the United States to review a rule. In any such action, the Chief Counsel is authorized to present his views with respect to the effect of the rule on small entities.

(c) A court of the United States shall grant the application of the Chief Counsel for Advocacy of the Small Business Administration to appear in any such action for the purposes described in subsection (b). (Added Pub. L. No. 96-354, §3(a), Sept. 19, 1980, 94 Stat. 1170.)

Negotiated Rulemaking Act

Citations:

5 U.S.C. §§581-590;¹ enacted November 29, 1990, by Pub. L. No. 101-648, 104 Stat. 4969.

Lead Agency:

Administrative Conference of the United States, Suite 500, 2120 L Street NW, Washington, DC 20037 (202) 254-7020.

Overview:

The Negotiated Rulemaking Act of 1990 establishes a statutory framework for agency use of negotiated rulemaking to formulate proposed regulations. The Act supplements the rulemaking provisions of the Administrative Procedure Act (see Chapter 1), clarifying the authority of federal agencies to conduct negotiated rulemaking. It largely codifies the practice of those agencies that had previously used the procedure. While not requiring use of the technique, the Act allows each agency discretion about using negotiated rulemaking.

Negotiated rulemaking (sometimes known as "regulatory negotiation" or "reg-neg") has emerged in the 1980s as an alternative to traditional procedures for drafting proposed regulations. The essence of the idea is that in certain situations it is possible to bring together representatives of the agency and the

¹The Administrative Dispute Resolution Act (see Chapter 3), Pub. L. No. 101-552, also contains sections in title 5 of the U.S. Code numbered 581-590. H.R. 2549, 102d Congress, 1st session, would remedy this anomaly (see Chapter 3, footnote 1).

various affected interest groups to negotiate the text of a proposed rule. The negotiators try to reach a consensus through a process of evaluating their own priorities and making tradeoffs to achieve an acceptable outcome on the issues of greatest importance to them. If they do achieve a consensus, then the resulting rule is likely to be easier to implement and the likelihood of subsequent litigation is diminished. Even in the absence of consensus on a draft rule, the process may be valuable as a means of better informing the regulatory agency of the issues, and the concerns of the affected interests.

Negotiated rulemaking should be viewed as a supplement to the rulemaking provisions of the Administrative Procedure Act. This means that the negotiation sessions generally take place prior to issuance of the notice and the opportunity for the public to comment on a proposed rule that are required by the Act (5 U.S.C. §553). In some instances, negotiations may be appropriate at a later stage of the proceeding and have sometimes been used effectively in drafting the text of a final rule based on comments received.

In 1982 the Administrative Conference of the United States set forth criteria for identifying rulemaking situations for which reg-neg is likely to be successful (Recommendation 82-4, 1 CFR §305.82-4). These criteria were intended to guide agencies in making the key determination whether negotiated rulemaking is appropriate for particular regulatory problems. The Conference also suggested specific procedures to be followed by agencies in applying this approach. Additional refinements, based on a study of initial agency experiences with reg-neg, were recommended in 1985 (Recommendation 85-5, 1 CFR §305.85-5).

Much of the Negotiated Rulemaking Act is permissive, incorporating many of the criteria and procedures suggested in the Conference recommendations. The drafters intended that the Act not impair any rights otherwise retained by agencies or parties, and section 581 expressly provides that the Act is not intended to limit innovation or experimentation with the negotiated rulemaking process. Although the Act plainly permits an agency to publish as its own the consensus proposal adopted by the negotiating committee, nothing in the Act *requires* the agency to publish either a proposed or final rule merely because a negotiating committee proposed it.

Following the recommendations of the Conference, section 583 of the Act lists several criteria to be considered by agencies in determining whether to use negotiated rulemaking in any particular

instance. It permits, but does not require, the use of outside impartial persons (referred to as "conveners") to assist the agency in identifying potential participants in the negotiation process. Section 584 requires public notice of planned negotiated rulemaking proceedings in the Federal Register and appropriate trade and specialized publications. Persons or interests believing that they are not adequately represented on the negotiating committee must be given an opportunity to apply for membership, though the agency retains discretion as to whether to grant such requests.

Section 585 makes clear that agencies establishing negotiating committees under the Act are also to comply with the Federal Advisory Committee Act (see Chapter 10). At least one member of the committee must be a representative of the agency. If, after considering the public responses to the published notice of intent to establish a negotiating committee under the Act, the agency determines not to do so, then the agency must publish a notice of that fact and the reasons for the decision.

Section 586 addresses procedures of the negotiating committee and provides for selection of a neutral "facilitator" or mediator to assist the committee in its deliberations.

Section 587 permits an agency to keep a negotiating committee in existence until promulgation of the final rule, but also allows earlier termination if the agency or the committee so chooses.

Options for agencies with respect to acquiring the services of conveners and facilitators are addressed in section 588.² Agencies are authorized to pay expenses of certain committee members in accordance with the Federal Advisory Committee Act. Section 589 authorizes the Conference to pay certain expenses at the request of an agency conducting a negotiated rulemaking. (Funding for this purpose is authorized by section 4 of the Act.)

To avoid creating new sources of potential litigation, section 590 provides that agency actions pertaining to *procedural* decisions in negotiated rulemaking are not subject to judicial review. However, otherwise available judicial review of the *rules* promulgated through the negotiation process is not affected by the Act.

²See also Conference Recommendation 86-8, *Acquiring the Services of "Neutrals" for Alternative Means of Dispute Resolution*, 1 CFR §305.86-8; Ruttinger, *Acquiring the Services of Neutrals for Alternative Means of Dispute Resolution and Negotiated Rulemaking*, 1986 ACUS 863.

Section 5 of the Negotiated Rulemaking Act terminates the provisions of the Act after 6 years (November 29, 1996). Numerous federal agencies conducted negotiated rulemaking proceedings under other authority prior to adoption of the Negotiated Rulemaking Act. Expiration of this Act clearly does not imply that an agency could no longer undertake a negotiated rulemaking.

Legislative History:

Joint hearings on "regulatory negotiation" were held in July 1980 by the Senate's Select Committee on Small Business and Committee on Governmental Affairs. Legislation was introduced in September 1980 "to create a pilot program to encourage . . . the formation of regulatory negotiation commissions, comprised of representatives of business, public interest organizations, labor, State and local officials, and other interested persons, for the purpose of making recommendations to Federal agencies on regulatory policy." (H.R. 8240, 96th Congress) Other bills to establish a statutory framework for negotiated rulemaking were introduced in each subsequent Congress throughout the 1980s.

The first negotiated rulemaking bill to be acted upon was S. 1504, introduced by Senator Carl Levin in the 100th Congress. The Senate Committee on Governmental Affairs held hearings on May 13, 1988, and the Senate passed the bill on September 30, 1988 (134 Cong. Rec. S 13760, September 30, 1988; see also the report of the Senate Committee on Governmental Affairs, 100th Congress, 2d Session, S. Rep. No. 100-547). In the House, the Judiciary Subcommittee on Administrative Law and Governmental Relations held a hearing on August 10, 1988, on a companion bill, H.R. 3052, introduced by Representative Donald Pease. No further action was taken.

In the 101st Congress, identical bills, S. 303 and H.R. 743, were introduced on January 31, 1989 (135 Cong. Rec. S 862 and H 144, January 31, 1989). The Senate Committee on Governmental Affairs reported out S. 303 on July 13, 1989, and the Senate passed it on August 3, 1989 (see 135 Cong. Rec. S 10060, August 3, 1989; see also the report of the Senate Committee on Governmental Affairs, 101st Congress, 1st Session, S. Rep. No. 101-97).

The House Subcommittee held a hearing on H.R. 743 on May 3, 1989, and on February 7, 1990, reported out the bill with amendments. The Committee on the Judiciary passed the bill on March 28, and the House passed it on May 1 (136 Cong. Rec. H 1852, May 1, 1990; see also the report of the House Committee on the Judiciary, 101st Congress, 2d Session, H. Rep. No. 101-461). The Senate amended the bill further and passed S. 303 again on October 4 (136 Cong. Rec. S 14580, October 4, 1990). The House accepted the Senate amendments, voting final passage on October 22 (136 Cong. Rec. H 10966, October 22, 1990). The bill was signed by President Bush on November 29, 1990.

During the period of congressional consideration of the Negotiated Rulemaking Act, Congress passed three other pieces of legislation that mandated use of negotiated rulemaking: the Carl D. Perkins Vocational and Applied Technology Education Act Amendments (Pub. L. No. 101-392), the Hawkins-Stafford Elementary and Secondary School Improvements Amendments (Pub. L. No. 100-297), and the Price-Anderson Amendments Act of 1988 (Pub. L. No. 100-408). Each of these laws provided specific and widely differing procedures for negotiating rules. In the future, the Negotiated Rulemaking Act may serve as a common reference whenever Congress wants to use reg-neg in other legislation, replacing this ad hoc approach.

Significant Case Law:

EPA's final rule on asbestos-containing materials in schools was the first reg-neg rule to be challenged in court. The suit was brought by the Safe Buildings Alliance, a group representing former manufacturers of asbestos building products that are now illegal. Plaintiffs in the lawsuit claimed that the rule would encourage unnecessary removal of materials from buildings and would result in a chaotic situation. They sought a more objective standard—based on air monitoring, for example—rather than the professional judgment called for under EPA's rule. The Safe Buildings Alliance had been represented on the negotiating committee. Several other parties who were represented on the negotiating committee intervened *in support of the final rule as published*. These included the National Education Association, the American Association of School Administrators, and a group of state attorneys general.

In May 1988, the rule was upheld by the U.S. Court of Appeals for the D.C. Circuit, *Safe Buildings Alliance v. EPA*, 846 F.2d 79 (D.C. Cir. 1988). The court determined that EPA's regulation embodied a reasonable interpretation of the requirements of the Asbestos Hazard Emergency Response Act of 1986, Pub. L. No. 99-519, 15 U.S.C. §§2641-54. Neither the appeal nor the court's decision referred to the negotiation procedure that was followed. EPA's underground injection rule, based in part on negotiated rulemaking, was also challenged and essentially upheld by the D.C. Circuit, *Natural Resources Defense Council v. EPA*, 907 F.2d 1146 (D.C. Cir. 1990).

Source Note:

In 1990 the Administrative Conference of the United States published the *Negotiated Rulemaking Sourcebook*, a step-by-step guide to the conduct of negotiated rulemaking proceedings. The volume contains a discussion of when and how to use the procedure, along with sample notices and other documents that may be needed by an agency using the process. Numerous articles, both analytical and practical, are reprinted in the *Sourcebook*, including the Harter and Perritt reports to the Conference that furnished the research background for Conference Recommendations 82-4 and 85-5. An extensive bibliography is also included.

Negotiated Rulemaking Act

Title 5, U.S. Code

Subchapter IV—Negotiated Rulemaking Procedure

§581. Purpose.

§582. Definitions.

§583. Determination of need for negotiated rulemaking committee.

§584. Publication of notice; applications for membership on committees.

§585. Establishment of committee.

§586. Conduct of committee activity.

§587. Termination of committee.

§588. Services, facilities, and payment of committee member expenses.

§589. Role of the Administrative Conference of the United States and other entities:

§590. Judicial review.

Subchapter IV—Negotiated Rulemaking Procedure¹

REPEAL OF SUBCHAPTER

Subchapter repealed effective six years after Nov. 29, 1990, see section 5 of Pub. L. No. 101-648, set out as an Effective Date of Repeal, Savings Provision note under section 581 of this subchapter.

§581. Purpose

The purpose of this subchapter is to establish a framework for the conduct of negotiated rulemaking, consistent with section 553 of this title, to encourage agencies to use the process when it enhances the informal rulemaking process. Nothing in this subchapter should be construed as an attempt to limit innovation and experimentation with the negotiated rulemaking process or with other innovative rulemaking procedures otherwise authorized by law.

(Added Pub. L. No. 101-648, §3(a), Nov. 29, 1990, 104 Stat. 4970.)

¹Another subchapter IV (§§581-593) is set out preceding this subchapter.

EFFECTIVE DATE OF REPEAL; SAVINGS PROVISION

Section 5 of Pub. L. No. 101-648 provided that: "Subchapter IV of title 5, United States Code, as added by section 3 of this Act, and that portion of the table of sections at the beginning of chapter 5 of title 5, United States Code, relating to subchapter IV, are repealed, effective 6 years after the date of the enactment of this Act [Nov. 29, 1990], except that the provisions of such subchapter shall continue to apply after the date of the repeal with respect to then pending negotiated rulemaking proceedings initiated before the date of repeal which, in the judgment of the agencies which are convening or have convened such proceedings, require such continuation, until such negotiated rulemaking proceedings terminate pursuant to such subchapter."

CONGRESSIONAL FINDINGS

Section 2 of Pub. L. No. 101-648 provided that: "The Congress makes the following findings:

"(1) Government regulation has increased substantially since the enactment of the Administrative Procedure Act [see Short Title note set out preceding section 551 of this title].

"(2) Agencies currently use rulemaking procedures that may discourage the affected parties from meeting and communicating with each other, and may cause parties with different interests to assume conflicting and antagonistic positions and to engage in expensive and time-consuming litigation over agency rules.

"(3) Adversarial rulemaking deprives the affected parties and the public of the benefits of face-to-face negotiations and cooperation in developing and reaching agreement on a rule. It also deprives them of the benefits of shared information, knowledge, expertise, and technical abilities possessed by the affected parties.

"(4) Negotiated rulemaking, in which the parties who will be significantly affected by a rule participate in the development of the rule, can provide significant advantages over adversarial rulemaking.

"(5) Negotiated rulemaking can increase the acceptability and improve the substance of rules, making it less likely that the affected parties will resist enforcement or challenge such rules in court. It may also shorten the amount of time needed to issue final rules.

"(6) Agencies have the authority to establish negotiated rulemaking committees under the laws establishing such agencies and their activities and under the Federal Advisory Committee Act (5 U.S.C. App.). Several agencies have successfully used negotiated rulemaking. The process has not been widely used by other agencies, however, in part because such agencies are unfamiliar with the process or uncertain as to the authority for such rulemaking."

Authorization of Appropriations

Section 4 of Pub. L. No. 101-648 provided that: "In order to carry out this Act [see Short Title note above] and the amendments made by this Act, there are authorized to be appropriated to the Administrative Conference of the United States, in addition to amounts authorized by section 576 of title 5, United States Code, not in excess of \$500,000 for each of the fiscal years 1991, 1992, and 1993."

§582. Definitions

For the purposes of this subchapter, the term--

- (1) "agency" has the same meaning as in section 551(1) of this title;
- (2) "consensus" means unanimous concurrence among the interests represented on a negotiated rulemaking committee established under this subchapter, unless such committee
 - (A) agrees to define such term to mean a general but not unanimous concurrence; or
 - (B) agrees upon another specified definition;
- (3) "convener" means a person who impartially assists an agency in determining whether establishment of a negotiated rulemaking committee is feasible and appropriate in a particular rulemaking;
- (4) "facilitator" means a person who impartially aids in the discussions and negotiations among the members of a negotiated rulemaking committee to develop a proposed rule;
- (5) "interest" means, with respect to an issue or matter, multiple parties which have a similar point of view or which are likely to be affected in a similar manner;
- (6) "negotiated rulemaking" means rulemaking through the use of a negotiated rulemaking committee;
- (7) "negotiated rulemaking committee" or "committee" means an advisory committee established by an agency in accordance with this subchapter and the Federal Advisory Committee Act to consider and discuss issues for the purpose of reaching a consensus in the development of a proposed rule;
- (8) "party" has the same meaning as in section 551(3) of this title;
- (9) "person" has the same meaning as in section 551(2) of this title;
- (10) "rule" has the same meaning as in section 551(4) of this title; and
- (11) "rulemaking" means "rule making" as that term is defined in section 551(5) of this title.

(Added Pub. L. No. 101-648, §3(a), Nov. 29, 1990, 104 Stat. 4970.)

§583. Determination of need for negotiated rulemaking committee

(a) *Determination of Need by the Agency.* An agency may establish a negotiated rulemaking committee to negotiate and develop a proposed rule, if the head of the agency determines that the use of the negotiated rulemaking procedure is in the public interest. In making such a determination, the head of the agency shall consider whether--

- (1) there is a need for a rule;
- (2) there are a limited number of identifiable interests that will be significantly affected by the rule;
- (3) there is a reasonable likelihood that a committee can be convened with a balanced representation of persons who
 - (A) can adequately represent the interests identified under paragraph (2); and
 - (B) are willing to negotiate in good faith to reach a consensus on the proposed rule;
- (4) there is a reasonable likelihood that a committee will reach a consensus on the proposed rule within a fixed period of time;

(5) the negotiated rulemaking procedure will not unreasonably delay the notice of proposed rulemaking and the issuance of the final rule;

(6) the agency has adequate resources and is willing to commit such resources, including technical assistance, to the committee; and

(7) the agency, to the maximum extent possible consistent with the legal obligations of the agency, will use the consensus of the committee with respect to the proposed rule as the basis for the rule proposed by the agency for notice and comment.

(b) Use of Conveners.

(1) Purposes of conveners. An agency may use the services of a convener to assist the agency in

(A) identifying persons who will be significantly affected by a proposed rule, including residents of rural areas; and

(B) conducting discussions with such persons to identify the issues of concern to such persons, and to ascertain whether the establishment of a negotiated rulemaking committee is feasible and appropriate in the particular rulemaking.

(2) Duties of conveners. The convener shall report findings and may make recommendations to the agency. Upon request of the agency, the convener shall ascertain the names of persons who are willing and qualified to represent interests that will be significantly affected by the proposed rule, including residents of rural areas. The report and any recommendations of the convener shall be made available to the public upon request.

(Added Pub. L. No. 101-648, §3(a), Nov. 29, 1990, 104 Stat. 4970.)

§584. Publication of notice; applications for membership on committees

(a) Publication of Notice. If, after considering the report of a convener or conducting its own assessment, an agency decides to establish a negotiated rulemaking committee, the agency shall publish in the Federal Register and, as appropriate, in trade or other specialized publications, a notice which shall include--

(1) an announcement that the agency intends to establish a negotiated rulemaking committee to negotiate and develop a proposed rule;

(2) a description of the subject and scope of the rule to be developed, and the issues to be considered;

(3) a list of the interests which are likely to be significantly affected by the rule;

(4) a list of the persons proposed to represent such interests and the person or persons proposed to represent the agency;

(5) a proposed agenda and schedule for completing the work of the committee, including a target date for publication by the agency of a proposed rule for notice and comment;

(6) a description of administrative support for the committee to be provided by the agency, including technical assistance;

(7) a solicitation for comments on the proposal to establish the committee, and the proposed membership of the negotiated rulemaking committee; and

(8) an explanation of how a person may apply or nominate another person for membership on the committee, as provided under subsection (b).

(b) **Applications for Membership or² Committee.** Persons who will be significantly affected by a proposed rule and who believe that their interests will not be adequately represented by any person specified in a notice under subsection (a)(4) may apply for, or nominate another person for, membership on the negotiated rulemaking committee to represent such interests with respect to the proposed rule. Each application or nomination shall include—

(1) the name of the applicant or nominee and a description of the interests such person shall represent;

(2) evidence that the applicant or nominee is authorized to represent parties related to the interests the person proposes to represent;

(3) a written commitment that the applicant or nominee shall actively participate in good faith in the development of the rule under consideration; and

(4) the reasons that the persons specified in the notice under subsection (a)(4) do not adequately represent the interests of the person submitting the application or nomination.

(c) **Period for Submission of Comments and Applications.** The agency shall provide for a period of at least 30 calendar days for the submission of comments and applications under this section.

(Added Pub. L. No. 101-648, §3(a), Nov. 29, 1990, 104 Stat. 4971.)

§585. Establishment of committee

(a) **Establishment.**

(1) **Determination to establish committee.** If after considering comments and applications submitted under section 584, the agency determines that a negotiated rulemaking committee can adequately represent the interests that will be significantly affected by a proposed rule and that it is feasible and appropriate in the particular rulemaking, the agency may establish a negotiated rulemaking committee. In establishing and administering such a committee, the agency shall comply with the Federal Advisory Committee Act with respect to such committee, except as otherwise provided in this subchapter.

(2) **Determination not to establish committee.** If after considering such comments and applications, the agency decides not to establish a negotiated rulemaking committee, the agency shall promptly publish notice of such decision and the reasons therefor in the Federal Register and, as appropriate, in trade or other specialized publications, a copy of which shall be sent to any person who applied for, or nominated another person for membership on the negotiating³ rulemaking committee to represent such interests with respect to the proposed rule.

(b) **Membership.** The agency shall limit membership on a negotiated rulemaking committee to 25 members, unless the agency head determines that a greater number of members is necessary for the functioning of the committee or to achieve balanced membership. Each committee shall include at least one person representing the agency.

²So in original. Probably should be "on".

³So in original. Probably should be "negotiated".

(c) **Administrative Support.** The agency shall provide appropriate administrative support to the negotiated rulemaking committee, including technical assistance.

(Added Pub. L. No. 101-648, §3(a), Nov. 29, 1990, 104 Stat. 4972.)

§586. Conduct of committee activity

(a) **Duties of Committee.** Each negotiated rulemaking committee established under this subchapter shall consider the matter proposed by the agency for consideration and shall attempt to reach a consensus concerning a proposed rule with respect to such matter and any other matter the committee determines is relevant to the proposed rule.

(b) **Representatives of Agency on Committee.** The person or persons representing the agency on a negotiated rulemaking committee shall participate in the deliberations and activities of the committee with the same rights and responsibilities as other members of the committee, and shall be authorized to fully represent the agency in the discussions and negotiations of the committee.

(c) **Selecting Facilitator.** Notwithstanding section 10(e) of the Federal Advisory Committee Act, an agency may nominate either a person from the Federal Government or a person from outside the Federal Government to serve as a facilitator for the negotiations of the committee, subject to the approval of the committee by consensus. If the committee does not approve the nominee of the agency for facilitator, the agency shall submit a substitute nomination. If a committee does not approve any nominee of the agency for facilitator, the committee shall select by consensus a person to serve as facilitator. A person designated to represent the agency in substantive issues may not serve as facilitator or otherwise chair the committee.

(d) **Duties of Facilitator.** A facilitator approved or selected by a negotiated rulemaking committee shall—

- (1) chair the meetings of the committee in an impartial manner;
- (2) impartially assist the members of the committee in conducting discussions and negotiations; and
- (3) manage the keeping of minutes and records as required under section 10(b) and (c) of the Federal Advisory Committee Act, except that any personal notes and materials of the facilitator or of the members of a committee shall not be subject to section 552 of this title.

(e) **Committee Procedures.** A negotiated rulemaking committee established under this subchapter may adopt procedures for the operation of the committee. No provision of section 553 of this title shall apply to the procedures of a negotiated rulemaking committee.

(f) **Report of Committee.** If a committee reaches a consensus on a proposed rule, at the conclusion of negotiations the committee shall transmit to the agency that established the committee a report containing the proposed rule. If the committee does not reach a consensus on a proposed rule, the committee may transmit to the agency a report specifying any areas in which the committee reached a consensus. The committee may include in a report any other information, recommendations, or materials that the committee considers appropriate. Any committee member may include as an addendum to the report additional information, recommendations, or materials.

(g) **Records of Committee.** In addition to the report required by subsection (f), a committee shall submit to the agency the records required under section 10(b) and (c) of the Federal Advisory Committee Act.
(Added Pub. L. No. 101-648, §3(a), Nov. 29, 1990, 104 Stat. 4973.)

§587. Termination of committee

A negotiated rulemaking committee shall terminate upon promulgation of the final rule under consideration, unless the committee's charter contains an earlier termination date or the agency, after consulting the committee, or the committee itself specifies an earlier termination date.
(Added Pub. L. No. 101-648, §3(a), Nov. 29, 1990, 104 Stat. 4974.)

§588. Services, facilities, and payment of committee member expenses

(a) Services of Conveners and Facilitators.

(1) **In general.** An agency may employ or enter into contracts for the services of an individual or organization to serve as a convener or facilitator for a negotiated rulemaking committee under this subchapter, or may use the services of a Government employee to act as a convener or a facilitator for such a committee.

(2) **Determination of conflicting interests.** An agency shall determine whether a person under consideration to serve as convener or facilitator of a committee under paragraph (1) has any financial or other interest that would preclude such person from serving in an impartial and independent manner.

(b) **Services and Facilities of Other Entities.** For purposes of this subchapter, an agency may use the services and facilities of other Federal agencies and public and private agencies and instrumentalities with the consent of such agencies and instrumentalities, and with or without reimbursement to such agencies and instrumentalities, and may accept voluntary and uncompensated services without regard to the provisions of section 1342 of title 31. The Federal Mediation and Conciliation Service may provide services and facilities, with or without reimbursement, to assist agencies under this subchapter, including furnishing conveners, facilitators, and training in negotiated rulemaking.

(c) **Expenses of Committee Members.** Members of a negotiated rulemaking committee shall be responsible for their own expenses of participation in such committee, except that an agency may, in accordance with section 7(d) of the Federal Advisory Committee Act, pay for a member's reasonable travel and per diem expenses, expenses to obtain technical assistance, and a reasonable rate of compensation, if—

(1) such member certifies a lack of adequate financial resources to participate in the committee; and

(2) the agency determines that such member's participation in the committee is necessary to assure an adequate representation of the member's interest.

(d) **Status of Member as Federal Employee.** A member's receipt of funds under this section or section 589 shall not conclusively determine for purposes of sections 202 through 209 of title 18 whether that member is an employee of the United States Government.

(Added Pub. L. No. 101-648, §3(a), Nov. 29, 1990, 104 Stat. 4974.)

§589. Role of the Administrative Conference of the United States and other entities

(a) **Consultation by Agencies.** An agency may consult with the Administrative Conference of the United States or other public or private individuals or organizations for information and assistance in forming a negotiated rulemaking committee and conducting negotiations on a proposed rule.

(b) **Roster of Potential Conveners and Facilitators.** The Administrative Conference of the United States, in consultation with the Federal Mediation and Conciliation Service, shall maintain a roster of individuals who have acted as or are interested in serving as conveners or facilitators in negotiated rulemaking proceedings. The roster shall include individuals from government agencies and private groups, and shall be made available upon request. Agencies may also use rosters maintained by other public or private individuals or organizations.

(c) **Procedures To Obtain Conveners and Facilitators.**

(1) **Procedures.** The Administrative Conference of the United States shall develop procedures which permit agencies to obtain the services of conveners and facilitators on an expedited basis.

(2) **Payment for services.** Payment for the services of conveners or facilitators shall be made by the agency using the services, unless the Chairman of the Administrative Conference agrees to pay for such services under subsection (f).

(d) **Compilation of Data on Negotiated Rulemaking; Report to Congress.**

(1) **Compilation of data.** The Administrative Conference of the United States shall compile and maintain data related to negotiated rulemaking and shall act as a clearinghouse to assist agencies and parties participating in negotiated rulemaking proceedings.

(2) **Submission of information by agencies.** Each agency engaged in negotiated rulemaking shall provide to the Administrative Conference of the United States a copy of any reports submitted to the agency by negotiated rulemaking committees under section 586 and such additional information as necessary to enable the Administrative Conference of the United States to comply with this subsection.

(3) **Reports to congress.** The Administrative Conference of the United States shall review and analyze the reports and information received under this subsection and shall transmit a biennial report to the Committee on Governmental Affairs of the Senate and the appropriate committees of the House of Representatives that—

(A) provides recommendations for effective use by agencies of negotiated rulemaking; and

(B) describes the nature and amounts of expenditures made by the Administrative Conference of the United States to accomplish the purposes of this subchapter.

(e) **Training in Negotiated Rulemaking.** The Administrative Conference of the United States is authorized to provide training in negotiated rulemaking techniques and procedures for personnel of the Federal Government either on a reimbursable or nonreimbursable basis. Such training may be extended to private individuals on a reimbursable basis.

(f) **Payment of Expenses of Agencies.** The Chairman of the Administrative Conference of the United States is authorized to pay, upon request of an agency, all or part of the expenses of establishing a negotiated rulemaking committee and conducting a negotiated rulemaking. Such expenses may include, but are not limited to—

- (1) the costs of conveners and facilitators;
- (2) the expenses of committee members determined by the agency to be eligible for assistance under section 588(c); and
- (3) training costs.

Determinations with respect to payments under this section shall be at the discretion of such Chairman in furthering the use by Federal agencies of negotiated rulemaking.

(g) **Use of Funds of the Conference.** The Administrative Conference of the United States may apply funds received under section 575(c)(12) of this title to carry out the purposes of this subchapter.

(Added Pub. L. No. 101-648, §3(a), Nov. 29, 1990, 104 Stat. 4975.)

§590. Judicial review

Any agency action relating to establishing, assisting, or terminating a negotiated rulemaking committee under this subchapter shall not be subject to judicial review. Nothing in this section shall bar judicial review of a rule if such judicial review is otherwise provided by law. A rule which is the product of negotiated rulemaking and is subject to judicial review shall not be accorded any greater deference by a court than a rule which is the product of other rulemaking procedures.

(Added Pub. L. No. 101-648, §3(a), Nov. 29, 1990, 104 Stat. 4976.)

**THE UNITED STATES EXPERIENCE
WITH ECONOMIC INCENTIVES
TO CONTROL ENVIRONMENTAL POLLUTION**

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TABLE OF CONTENTS

ADMINISTRATOR'S PREFACE iii

EXECUTIVE SUMMARY v

LIST OF TABLES x

FOREWORD xi

1. INTRODUCTION 1-1

 1.1. PURPOSE OF REPORT 1-1

 1.2. DEFINITIONS 1-1

 1.3. ORGANIZATION OF REPORT 1-3

 1.4. TYPES OF ECONOMIC INCENTIVES DISCUSSED IN THE REPORT ... 1-4

 1.5. SCOPE OF REPORT 1-6

2. THE ECONOMIC EFFICIENCY AND ENVIRONMENTAL EFFECTS OF IN-
CENTIVE SYSTEMS 2-1

 2.1. DIVERSE SOURCES AND LITTLE-KNOWN CONTROL TECHNOLOGY 2-1

 2.2. GREATER EFFICIENCY 2-2

 2.3. STIMULUS TO INNOVATION AND TECHNICAL CHANGE 2-7

 2.4. ENVIRONMENTAL EFFECTS OF INCENTIVE APPROACHES 2-8

3. FEES, CHARGES, AND TAXES 3-1

 3.1. NPDES PERMIT FEES 3-2

 3.2. PUBLICLY OWNED SEWAGE TREATMENT PLANT USER FEES 3-2

 3.3. MUNICIPAL SOLID WASTE DISPOSAL CHARGES 3-3

 3.4. AIR EMISSION FEES 3-3

 3.4.1. *State Permit Fees* 3-3

 3.4.2. *Federal Nonattainment Area Fees* 3-4

 3.5. INDUSTRIAL SOLID AND HAZARDOUS WASTE CHARGES 3-4

 3.6. PRODUCT CHARGES 3-5

 3.6.1. *Fertilizer Taxes* 3-5

 3.6.2. *Automobile Tire Taxes* 3-5

 3.6.3. *Motor Oil Taxes* 3-5

 3.6.4. *Superfund Feedstock Taxes* 3-5

 3.6.5. *Chlorofluorocarbon Taxes* 3-6

 3.7. WETLAND COMPENSATION FEES 3-6

4. DEPOSIT-REFUND SYSTEMS 4-1

 4.1. BEVERAGE CONTAINER DEPOSITS 4-1

 4.2. BATTERY DEPOSITS 4-1

 4.3. PESTICIDE CONTAINER DEPOSITS 4-2

5. TRADING SYSTEMS	5-1
5.1. SOME ATTRIBUTES OF TRADING SYSTEMS	5-1
5.1.1. <i>Industrial Scope</i>	5-1
5.1.2. <i>Credits Versus Allowances</i>	5-1
5.1.3. <i>Degree of Government Intervention</i>	5-4
5.1.4. <i>Emission Limits</i>	5-4
5.1.5. <i>Geographic Area</i>	5-4
5.1.6. <i>Section Organization</i>	5-5
5.2. INTER-FIRM NON-APPROVAL TRADING	5-5
5.2.1. <i>Acid Rain Allowance Trading</i>	5-5
5.2.2. <i>Oxygenated Gasoline Credit Program</i>	5-6
5.2.3. <i>Low Emission Vehicle Credit Program</i>	5-7
5.2.4. <i>Chlorofluorocarbon Production Allowance Trading</i>	5-7
5.2.5. <i>Lead Trading</i>	5-7
5.2.5.1. <i>The Lead Trading Program</i>	5-8
5.2.5.2. <i>Administration and Enforcement</i>	5-8
5.2.5.3. <i>Effects of Lead Trading on Gasoline Markets</i>	5-9
5.2.5.4. <i>Environmental Effects of Lead Trading</i>	5-9
5.2.6. <i>Transferable Development Rights</i>	5-9
5.2.6.1. <i>Montgomery County, Maryland</i>	5-9
5.2.6.2. <i>Talbot County, Maryland</i>	5-10
5.2.6.3. <i>The Pinelands, New Jersey</i>	5-11
5.2.7. <i>Fireplace and Wood Stove Permit Trading</i>	5-11
5.3. INTER-FIRM APPROVAL TRADING	5-12
5.3.1. <i>Trading of Air Emissions Rights</i>	5-12
5.3.1.1. <i>Bubbles</i>	5-12
5.3.1.2. <i>Offsets</i>	5-13
5.3.1.3. <i>Banking</i>	5-13
5.3.1.4. <i>Netting</i>	5-14
5.3.1.5. <i>Evaluation of Air Emissions Trading Program</i>	5-14
5.3.2. <i>Water Effluent Reduction Trading</i>	5-15
5.3.2.1. <i>Wisconsin</i>	5-15
5.3.2.2. <i>Dillon Reservoir, Colorado</i>	5-15
5.3.2.3. <i>Cherry Creek Reservoir, Colorado</i>	5-16
5.3.2.4. <i>Tar-Pamlico Basin, North Carolina</i>	5-16
5.3.2.5. <i>Steel Industry Effluent Bubble</i>	5-16
5.3.3. <i>Wetland Mitigation Banking</i>	5-17
5.4. EMISSIONS AVERAGING	5-17
5.4.1. <i>Reasonably Available Control Technology Requirements</i>	5-18
5.4.2. <i>Heavy Duty Truck Engine Emissions</i>	5-18
5.4.3. <i>California Motor Fuel Characteristics</i>	5-18
5.4.4. <i>Hazardous Air Pollutant Early Reduction Program</i>	5-19

6. OTHER INCENTIVES	6-1
6.1. SUBSIDIES AND TAX CONCESSIONS	6-1
6.1.1. <i>Municipal Sewage Treatment Plant Construction Grants</i>	6-1
6.1.2. <i>Louisiana Tax Concessions</i>	6-2
6.2. LIABILITY APPROACHES	6-2
6.2.1. <i>Superfund</i>	6-2
6.2.1.1. <i>Hazardous Waste Cleanup Liability</i>	6-2
6.2.1.2. <i>Natural Resource Damage Liabilities</i>	6-3
6.2.2. <i>Other Statutes Providing for Environmental Liability</i>	6-3
6.2.3. <i>Tort Law</i>	6-4
6.2.4. <i>Effectiveness of Liability Approaches</i>	6-4
6.3. INFORMATION PROGRAMS	6-4
6.3.1. <i>Proposition 65</i>	6-5
6.3.2. <i>SARA Title III</i>	6-5
7. NEW INCENTIVE SYSTEMS PROPOSED BUT NOT YET ADOPTED	7-1
7.1. SOUTH COAST AIR BASIN MARKETABLE PERMITS PROPOSAL	7-1
7.2. SCRAPPING OLDER VEHICLES	7-2
8. SOME OTHER INCENTIVES THAT HAVE BEEN SUGGESTED	8-1
8.1. EPA ECONOMIC INCENTIVES REPORT	8-1
8.2. THE PROJECT-88 REPORT	8-1
9. FOREIGN EXPERIENCE WITH INCENTIVE SYSTEMS	9-1
9.1. FEES, CHARGES, AND TAXES	9-1
9.1.1. <i>Waste</i>	9-1
9.1.2. <i>Air</i>	9-2
9.1.3. <i>Water</i>	9-2
9.1.4. <i>Noise</i>	9-2
9.1.5. <i>Product Charges</i>	9-3
9.2. DEPOSIT-REFUND SYSTEMS	9-4
9.3. TRADING SYSTEMS	9-5
9.4. OTHER INCENTIVES	9-5
9.4.1. <i>Subsidies</i>	9-5
9.4.2. <i>Product Labelling</i>	9-6
9.5. CONCLUSIONS	9-7
10. CONCLUSIONS	10-1

APPENDICES

A. BIBLIOGRAPHY	A-1
B. ECONOMIC INCENTIVE ASPECTS OF THE CLEAN AIR ACT AMENDMENTS OF 1990	B-1

LIST OF TABLES

Table 1-1: INCENTIVES FACED BY SOURCES UNDER THE COMMAND-AND-CONTROL APPROACH 1-3
Table 1-2: TYPES OF ECONOMIC INCENTIVES 1-4
Table 2-1: QUANTITATIVE STUDIES OF ECONOMIC INCENTIVE SAVINGS . . 2-3
Table 5-1: ATTRIBUTES OF TRADING SYSTEMS DISCUSSED 5-2

FOREWORD

Many people both inside and outside of EPA have made major contributions to this report. Inside EPA, Betsy David, Barry Elman, Richard Kashmanian, Barry Korb, Albert McGartland, and Dan Mussatti of the EPA Office of Policy, Planning and Evaluation made a number of useful comments on earlier drafts of this report. Three EPA employees outside OPPE provided valuable and detailed comments: Mark Luttner of the Office of Water, and Dr. Leland Deck and Karen Martin of the Office of Air Quality Planning and Standards. Outside EPA, Dr. Randy Lyon of the Office of Management and Budget made useful comments. Dr. Robert C. Anderson contributed both his time and expertise generously.

Particular thanks are due to Bob Anderson, Leland Deck, and Barry Elman for continuing and unusually useful inputs.

1. INTRODUCTION

In the past few years, economic incentives have moved from relative obscurity to the fore as tools for managing the environment. Nowhere is this attention to incentives more explicit than in the 1990 Clean Air Act Amendments. That legislation authorizes incentive-based mechanisms for the control of acid rain, for the development of cleaner burning gasoline and less polluting vehicles, for states to use in controlling urban ozone and carbon monoxide, and to facilitate the reduction of toxic air emissions.

Other key environmental statutes, the Clean Water Act and the Resource Conservation and Recovery Act, are currently up for reauthorization. Incentive mechanisms promise to be actively debated as these and other environmental legislative proposals make their way through Congress. At the state level, incentive proposals also are being actively debated and in some cases have already been adopted.

1.1. PURPOSE OF REPORT

With current high levels of interest in incentive mechanisms for environmental management, it is useful to examine the record to date. Over the past 20 years, governments at the federal, state and local levels have implemented a variety of incentive systems for managing the environment. Many European nations also have implemented incentive mechanisms to supplement traditional approaches for managing the environment. How well have these mechanisms performed? What can be learned from the record that will assist in the formulation of new mechanisms? How economically efficient have these mechanisms been in achieving their objectives? What have been their environmental effects?

Focusing primarily on results in the United States, this report examines the record to the extent permitted by available information. Particular attention is paid, where information is available, to the effectiveness of each incentive in achieving the desired environmental objective and the economic efficiency with which it is accomplished. Unfortunately, much less information is available, particularly on the environmental effects, than would be desirable.

1.2. DEFINITIONS

In order to bound the subject, economic incentives for the purposes of this report only will be defined broadly as instruments that provide continuous inducements, financial or otherwise, for sources to make reductions in the environmental pollution they release. That is, sources view each unit of pollution as having a cost. For maximum efficiency, the cost per unit of pollution faced by different sources should be comparable, except as adjusted to reflect differences in harm caused at different geographical locations or at different times.

This definition excludes certain mechanisms that sometimes are referred to as incentives. Although such mechanisms may have many admirable characteristics and some of the attributes of economic incentives as the term is often used, they will not be discussed in this report. This class of mechanisms prices (explicitly or implicitly) activities that have pollution as a byproduct. Ride sharing, bike paths, high occupancy vehicle lanes, and parking surcharges provide examples of this type of mechanism. While these mechanisms may lead to a reduction in pollution, the mechanisms place neither an explicit nor an implicit price on incremental units of pollution. Exclusion of these mechanisms carries no implications for whether future EPA actions will or will not consider them to be economic incentives. Rather, their exclusion is primarily for the purpose of limiting the subject of this report to something manageable.

Payments per unit of pollution are the clearest example of an incentive, as the term is used in this report. Market-based systems in pollution reduction credits also qualify, for sources earn a credit that can be sold if they reduce pollutants below permitted amounts. Finally, indirect financial incentives for continuous effort at pollution abatement are created when sources must report publicly the quantities of specified substances they release and thus risk the loss of market share or a lower demand for their products. All of these incentive mechanisms operate through the ingenuity and actions of individual sources, who have an incentive to be on the alert for opportunities to make reductions in their pollution.

The contrast between incentive mechanisms and traditional "command-and-control" approaches is that the latter do not provide incentives to reduce the quantity of releases below permitted levels or to improve the quality of the releases of pollutants beyond permitted levels, as illustrated in Table 1-1. Under pure command-and-control approaches, sources view all releases below permitted quantities or above permitted quality as costless. To have gains in environmental quality, the burden is solely on regulators to tighten requirements imposed on individual sources. Sources operating within the limits of existing regulations (the shaded area in Table 1-1) have no economic reason to act until new regulations are issued.

Unfortunately, there are a wide variety of definitions of economic incentives in common use as well as a variety of related concepts. One of these related concepts is "market mechanisms." Generally, this term is used for a somewhat narrower concept than economic incentives involving only those economic incentives which are implemented through mechanisms having direct effects on economic markets. Thus providing risk information could be an economic incentive but not a market mechanism while pollution fees would be both. Risk information can have an indirect effect on economic markets by shifting either the demand function or the supply function (either through appealing to profit-motivated market share considerations or liability-aversion), but does not directly change prices.

It must be emphasized that although this report makes a careful distinction between

Table 1-1: INCENTIVES FACED BY SOURCES UNDER THE COMMAND-AND-CONTROL APPROACH

		Quantity of Pollution Released→	
		Within Regulatory Limits	Excess above Those Allowed by Regulations
↑ Toxicity of Pollution Released	Excess above Those Allowed by Regulations	Fines and Penalties for Exceeding Regulations	
	Within Regulatory Limits	No Incentives for Reducing Pollution	if Caught and Successfully Prosecuted

command-and-control and economic incentive approaches, these distinctions are often difficult to apply in practice. In other words, there is a continuous distribution of pollution control measures ranging from the "pure" command-and-control to the "pure" market mechanism. Expressed still another way, the dividing line between command-and-control and economic incentives can be drawn at any number of places; although the definition used above is based on what is probably the most important economic distinction between the two approaches, a case can be made for a number of other definitions.

Another important definition is what is meant by the economic efficiency of economic incentives. Theoretically, the most economically efficient incentive is one which requires the polluter to pay exactly the price for pollution that he imposes in terms of damages on others. The polluter will then in theory reduce his pollution to the point that the cost of further reductions exactly equals the damages caused to others by the pollution. An economically efficient incentive will therefore be defined as one that either imposes an incentive that meets this criterion or that encourages polluters to act as if it had been imposed.

1.3. ORGANIZATION OF REPORT

After reviewing the economic efficiency and environmental effects of using economic incentive systems in general to control pollution (Section 2), Sections 3 through 8 discuss a broad spectrum of economic incentives, in descending order of how closely they fit the classification of market mechanisms and how far along they are toward actual use. Thus Section 3 discusses pollution fees that are already in use, which represent the purest form of economic incentive. Section 8, at the other end of the spectrum,

Table 1-2: TYPES OF ECONOMIC INCENTIVES

Incentive Type	Time Incentive Becomes Effective		
	Prior to Time of Pollution	At Time of or as a Direct Result of Pollution	Long after Pollution Occurred or Might Have Occurred
Payments to Government for Pollution (Section 3)		Pollution fees	
Deposit-refund Systems (Sec. 4)	Deposits		Refunds
Trading of Pollution Permits (Sec. 5)	Allowance Trading Systems		Credit Trading Systems
Payments from Government for Pollution Control (Sec. 6.1)	Subsidies for Installing Pollution Control Equipment		Tax Advantages in Return for Reduced Pollution
Payments to Damaged Parties under Liability Law (Sec. 6.2)			Tort Law for Private Damages Natural Resource Damages to Public Resources
Information on Pollution (Sec. 6.3)	Manufacturer-Provided Warnings		Disclosure of Past Emissions

summarizes some additional incentives that have been suggested but not yet implemented. Section 9 briefly summarizes foreign experience for the purpose of providing some perspective on the US experience. Section 10 summarizes the conclusions reached in the report. Finally, Appendix A provides a bibliography of the references used in each section and Appendix B highlights key incentive mechanisms created or authorized by the Clean Air Act Amendments of 1990.

1.4. TYPES OF ECONOMIC INCENTIVES DISCUSSED IN THE REPORT

The nation's environmental laws control pollution through a mix of strategies, most of which involve direct regulation of the quantity of pollution allowed by individual sources or the control technology sources must use. This direct regulatory approach to

pollution control often is termed "command-and-control."

In a limited number of applications, incentive systems create rewards for preventing or controlling and penalties for increasing one's emissions, effluents, or wastes. Incentive mechanisms can establish a system of rewards and penalties through a variety of specific mechanisms. Table 1-2 shows the mechanisms discussed in this report classified according to the time the incentive becomes effective in relation to the time the pollution occurs. A case can be made for including liability for damages to publicly-owned or managed natural resources within the first category since payments are made to a government agency. It appears easier, however, to group them with other liability approaches.

Some incentive mechanisms, generally shown in the last line of Table 1-2, establish prices indirectly through market transactions. Within this group are information reporting requirements such as Title III of the Superfund Amendments and Reauthorization Act and California's Proposition 65. Others, such as pollution fees and various trading systems, including EPA's air emission trading program, transferable development rights, and marketable effluent discharge credits, work by directly affecting market prices.

More specifically, the economic incentives discussed in this report have been separated into the following categories:

- Pollution fees, charges, and taxes (Section 3) are payments by polluters based on the quantity of pollutants emitted.
- Deposit-refund systems (Section 4) involve payments by potential polluters at the time a potentially polluting product is purchased, which are refunded if the product is disposed of or recycled in specified ways.
- Pollution trading (Section 5) is the transfer of pollution credits and allowances for in-kind or financial compensation.
- Subsidies and tax concessions (Section 6.1) provide financial payments to polluters and tax advantages based on changes in pollution or in return for future pollution control actions.
- Liability approaches (Section 6.2) provide for future payment by polluters based on the damages caused by their emissions.
- Information approaches (Section 6.3) provide for the release of information related to companies' products or activities, such as data on their emissions or compliance status.
- New systems that have reached an advanced proposal status but have not yet been adopted (Section 7).
- Other systems that have been suggested (Section 8).

1.5. SCOPE OF REPORT

This report makes no pretense of being exhaustive. The literature on economic incentives is immense. Many levels of government have adopted such programs or are considering their use. Rather, an attempt has been made to pick out those efforts that seem most likely to have the greatest long-run significance. In doing so, many important efforts have undoubtedly been omitted either through lack of information or the need to make this project manageable. For example, economic mechanisms for allocating water use are not discussed (even though they may have some implications for environmental pollution control) since pollution control is not their primary purpose.

2. THE ECONOMIC EFFICIENCY AND ENVIRONMENTAL EFFECTS OF INCENTIVE SYSTEMS

Before reviewing the actual experience with using particular economic incentives, it is worthwhile to briefly review the available literature on the economic efficiency and the environmental effects of incentive systems in general. With respect to economic efficiency, incentive mechanisms have several properties that could make them especially well suited to environmental problems the nation faces now and into the future. First, relative to traditional forms of direct regulation, incentive approaches offer the prospect of more effectively dealing with pollution from diverse sources, an increasingly important problem. Second, incentive mechanisms are inherently more economically efficient; that is, they achieve environmental goals at lower cost than direct regulation. Third, incentive mechanisms provide a greater stimulus for innovation and technical change in pollution control than does a direct regulatory approach. These properties are discussed in the first three subsections. The last subsection summarizes what is known concerning the environmental effects of incentive systems.

2.1. DIVERSE SOURCES AND LITTLE-KNOWN CONTROL TECHNOLOGY

Direct regulatory approaches generally are most effective when all the affected sources of pollution have similar emission characteristics, environmental impacts, and pollution control possibilities and when the regulators have as good a knowledge of the available abatement opportunities. These conditions do not apply to many of current environmental problems since the "easy" pollution sources have already been controlled. Many heterogeneous smaller sources discharge effluents into the nation's streams and rivers. Emissions from small dispersed area and mobile sources contribute over one-half of the precursors of ozone in most nonattainment areas. Millions of motorists change their oil and release used motor oil into the environment in a variety of places and ways. Shortages of capacity and the difficulty of siting new solid waste facilities in communities across the nation have stimulated interest in ways to reduce the generation of solid waste by households. For these and similar environmental problems, direct regulatory action may be much more expensive and less effective than economic incentives.

Particularly for such diverse sources, individual firms or households are more likely than regulators or legislators to have the knowledge to choose the most effective pollution control techniques for their particular situation. Acting on their own knowledge or with information provided by vendors of equipment or government agencies, individuals and firms are most likely to be aware of the full range of options available—from process changes to input changes to behavioral changes to specific control technologies, and their costs and effectiveness. Regulatory bodies are not likely to have access to this range of knowledge. Regulatory approaches further fail to provide an incentive to adopt pollution controls other than those specified by regulators, even if they would be more effective.

2.2. GREATER EFFICIENCY

Evaluations of incentive systems that have been implemented typically find savings in control costs, improvements in environmental quality, or both relative to a command and control approach. Several of these systems will be described subsequently. Theoretical modeling of pollution control costs consistently demonstrates that incentive systems outperform command-and-control approaches in terms of efficiency.

Economists have long suggested that the traditional approach to environmental pollution control, which is predominantly command-and-control in nature, results in control costs that are higher than necessary to achieve a given level of environmental protection. They have suggested that costs could be substantially reduced if economic incentives were used in place of command-and-control regulations. Costs could be reduced because sources having the lowest costs of additional control would have an economic incentive to control more and those sources having the highest incremental control costs could control less rather than all polluters of a given type controlling to the same extent, as is now usually the case. Many of the quantitative studies done by these economists are summarized in Table 2-1. The ratio shown for most of the studies in the last column is the ratio of command-and-control costs to the lowest cost of meeting the same objective using economic incentives. A ratio of 1.0 suggests that the command-and-control approach is equal in cost to the economic incentive approach, so that the savings are zero. A ratio greater than 1.0 means that there are positive potential savings from using economic incentives. Since all the ratios shown are greater than 1.0, they support the assertion above that economic incentive approaches are more cost-effective than other approaches. Some additional studies are listed for which ratios have not been worked out. A review of these studies suggests that they also support the above assertion, however. The studies listed alphabetically under Section 2 of Appendix A of this report constitute the bulk of the quantitative studies done for the United States. No studies are known to exist for the United States that reach the opposite conclusion.

In particular, three studies of particulate control in the St. Louis area showed that the current approach costs from three to five times as much as a marketable permit system.¹ However more modest potential efficiency gains were reported for the control of six air pollutants in the St. Louis area.² A potential fourteen-fold decrease in control expenditures was estimated for nitrogen dioxide (NO₂) in the Chicago area through a permit system.³ Command-and-control regulations were estimated to be 50 percent more costly than a permit system for the control of sulfur dioxide (SO₂) in Cleveland.⁴ Potential savings also were noted for a marketable permit system for the control of phosphorous effluent in Lake Michigan,⁵ and for a marketable permit system for SO₂ in Los Angeles.⁶ Both emission taxes and marketable permits could reduce the cost of controlling noise at Boston's Logan airport.⁷ Cost savings could be obtained from a marketable permit system to restrict chlorofluorocarbons.⁸ The efficiency of emission charges for the control of benzene emissions was demonstrated in another study.⁹

Table 2-1: QUANTITATIVE STUDIES OF ECONOMIC INCENTIVE SAVINGS

Pollutants Controlled	Study, Year, and Source	Geographic Area	Command-and-control Approach	Ratio of CAC Cost to Least Cost
AIR				
Criteria Air Pollutants				
Hydrocarbons	Maloney & Yandle (1984) T	Domestic Dupont Plants	Uniform Percentage Reduction	4.15 ^a
Lead in Gasoline	U.S. EPA (1985) A	United States	Uniform standard for lead in gasoline	See footnote for \$ savings ^b
Nitrogen Dioxide (NO ₂)	Seskin <i>et al.</i> (1983) T	Chicago	Proposed RACT Regulations	14.4
NO ₂	Krupnick (1986) O	Baltimore	Proposed RACT Regulations	5.9
Particulates (TSP)	Atkinson & Lewis (1974) T	St. Louis	SIP Regulation	6.00 ^c
TSP	McGartland (1984) T	Baltimore	SIP Regulations	4.18
TSP	Spofford (1984) T	Lower Delaware Valley	Uniform Percentage Reduction	22.0
TSP	Oates <i>et al.</i> (1989) O	Baltimore	Equal Proportional Treatment	4.0 at 90 µg/m ³
Reactive Organic Gases/NO ₂	SCAQMD (Spring 1992) O	Southern California	Best Available Control Technology	1.5 in 1994
Sulfur Dioxide	Roach <i>et al.</i> (1981) T	Four Corners Area	SIP Regulation	4.25
Sulfur Dioxide	Atkinson (1983) A	Cleveland		About 1.5

The U.S. Experience with Economic Incentives to Control Environmental Pollution

Pollutants Controlled	Study, Year, and Source	Geographic Area	Command-and-control Approach	Ratio of CAC Cost to Least Cost
Sulfur Dioxide	Spofford (1984) T	Lower Delaware Valley	Uniform Percentage Reduction	1.78
Sulfur Dioxide	ICF Resources (1989) O	United States	Uniform Emission Limit	5.0
Sulfates	Hahn & Noll (1982) T	Los Angeles	California Emission Standards	1.07 ^d
Six Air Pollutants	Kohn (1978) A	St. Louis		
Other				
Benzene	Nichols <i>et al.</i> (1983) A	United States		
Chloro-fluorocarbons	Palmer <i>et al.</i> (1980); Shapiro & Warhit (1983) T	United States	Proposed Emission Standards	1.96
Airport Noise	Harrison (1983) T	United States	Mandatory Retrofit	1.72 ^e
WATER				
Biochemical Oxygen Demand (BOD)	Johnson (1967) T	Delaware Estuary	Equal Proportional Treatment	3.13 at 2mg/l DO; 1.62 @ 3mg/l; 1.43 @ 4mg/l
BOD	O'Neil (1980) T	Lower Fox River, Wisconsin	Equal Proportional Treatment	2.29 at 2mg/l DO; 1.71 @ 4mg/l; 1.45 @ 6.2 mg/l
BOD	Eheart <i>et al.</i> (1983) T	Willamette River, OR	Equal Proportional Treatment	1.12 at 4.8 mg/l; 1.19 @ 7.5 mg/l
BOD	Eheart <i>et al.</i> (1983) T	Delaware Estuary in PA, DL, & NJ	Equal Proportional Treatment	3.00 at 3 mg/l DO; 2.92 @ 3.6 mg/l

Pollutants Controlled	Study, Year, and Source	Geographic Area	Command-and-control Approach	Ratio of CAC Cost to Least Cost
BOD	Eheart <i>et al.</i> (1983) T	Upper Hudson River in NY	Equal Proportional Treatment	1.54 at 5.1 mg/l; 1.62 @ 5.9 mg/l
BOD	Eheart <i>et al.</i> (1983) T	Mohawk River in NY	Equal Proportional Treatment	1.22 at 6.8 mg/l
Heavy Metals	Opaluch & Kashmanian (1985) O	Rhode Island Jewelry Industry	Technology-based Standards	1.8
Phosphorus	David <i>et al.</i> (1977) A	Lake Michigan		

Footnotes for Table 2-1

- a. Based on 85 percent reduction of emissions from all sources.
- b. The trading of lead credits reduced the cost to refiners of the lead phasedown by about \$225 million.
- c. Ratio based on 40 g/m³ at worst receptor, as given in Tietenberg (1985), Table 4.
- d. Ratio based on a short-term, one-hour average of 250 g/m³.
- e. Because it is a benefit-cost study instead of a cost-effectiveness study, the Harrison comparison of the CA approach with the least-cost allocation involves different benefit levels. Specifically, the benefit levels associated with the least-cost allocation are only 82 percent of those associated with the CA allocation. To produce cost estimates based on more comparable benefits, as a first approximation the least-cost allocation was divided by 0.82 and the resulting number compared with the CA cost.

Acronyms Used: CAC—Command-and-control, the traditional regulatory approach. DO—Dissolved oxygen; higher DO targets indicate higher water quality. RACT—Reasonably available control technologies. SIP—State implementation plan.

Sources: A stands for Anderson *et al.* (1989); they did not compute the ratio or provide the other information left blank in this table. O stands for original reference. T stands for Tietenberg (1985), Table 5. See Appendix A for all references.

It is important to note, however, that one recent review of retrospective analyses of emission and effluent trading systems concluded that realized cost savings fall well short of these projections.¹⁰ Trades have been fewer and cost savings smaller, according to this analysis, than indicated by economic modeling. A number of explanations have been offered about why the full savings have not always been realized.¹¹ Regulatory and legal requirements of the actual programs may limit the trading opportunities to a greater extent than portrayed in the models, especially where the incentive programs is in addition to existing command-and-control programs. Various models have not fully reflected aspects of real regulatory programs, including the transaction costs, number of buyers and sellers, trading rules, monitoring and reporting requirements, and the administrative burden placed on both emission sources and regulatory agencies.

Even if the cost savings are less than predicted, the actual savings are still impressive. In the appropriate circumstances, the wider use of incentive programs that are feasible in an actual policy setting will result in substantial costs savings while achieving equivalent environmental goals. In other circumstances, the cost differences between an incentive program and a well designed command-and-control program will be less,¹² although the incentive program will provide a stronger stimulus for innovation and technical change.

2.3. STIMULUS TO INNOVATION AND TECHNICAL CHANGE

Because most economic incentive programs base the incentive on the quantity of emissions, they are more likely to provide incentives for innovation and technical change than command-and-control approaches. When emissions are used as the basis for determining either incentives or compliance with a command-and-control approach, polluters have incentives to innovate and introduce technical changes to reduce emissions to the point where the marginal cost of further reductions equals the magnitude of the incentive, or to the required levels in the case of command-and-control. When some other basis is used, particularly a technology standard, polluters usually have less of an incentive to innovate. In the case of a technology standard, pollution sources could have a negative incentive since if they use improved technology, the regulators may use that as the basis for requiring even tighter control in the future since it has then been "proven." So although emission-based command-and-control approaches can be used that provide incentives for innovation, they may be less effective than an economic incentives approach since they only provide incentives to bring emissions down to the standard rather than to zero. This may be considerably less technically challenging.

With this in mind, it is not surprising that studies that have examined the incentives for technological change and innovation under alternative pollution control regimes have concluded that emission taxes provide greater stimulus to innovation than direct controls, with marketable permits providing an intermediate level of stimulus.¹³

Long run changes in behavior, technology, and investment are among the most difficult economic effects to document. For that reason, relatively little is known of such effects that take place as a result of different pollution control systems. Yet these effects are thought to be very important; the rate of technological change in pollution control is "the single most important criterion on which to judge environmental policies," according to some analysts.¹⁴ Others term innovation in pollution control "the key to an effective solution" of environmental problems.¹⁵

What evidence is available suggests that existing environmental policies give only a mild stimulus for technical change and innovation.¹⁶ Outlays for research and development in pollution control are between two and three percent of total pollution control expenditures. This percentage is about average for all sectors of manufacturing, but far below that of drug, electronics, and information processing.¹⁷ Pollution control is a newer and growing industry; a low rate of investment in research and development is unexpected other than in the context of regulation through direct controls.

2.4. ENVIRONMENTAL EFFECTS OF INCENTIVE APPROACHES

To get a full understanding of the effectiveness and economic efficiency of incentive programs in achieving environmental objectives, it is necessary to have information on not only the relative costs of incentive-based versus command-and-control programs, but also the actual environmental benefits realized by both types of programs. The literature focuses almost exclusively on the relative cost side of the comparison, while providing very little information or analysis of the environmental benefit side of the comparison. Thus, while this report attempts to summarize the available information, it is important to recognize that a complete analysis of incentive-based approaches would require additional research on the relative environmental benefits that have been realized by such programs.

Generally, incentive mechanisms based on trading are designed to produce environmental effects that to a first order of approximation are equivalent to a command-and-control alternative. Trading-based approaches often require trading ratios in excess of one. That is, more than one unit of pollution is eliminated for every extra unit allowed. If faithfully executed, this should result in at least modest decreases in total pollution where such ratios are used. Fee-based incentive mechanisms implemented to date in the United States and elsewhere typically are used to raise revenue to support pollution control objectives and management authorities. Because their environmental objectives are more modest than command-and-control alternatives, the environmental effects are not strictly comparable. Deposit systems appear to produce environmental effects significantly greater than could be achieved through command-and-control methods, although there appears to be a threshold of deposit size needed in order to induce people to achieve the environmental objective¹⁸

Comparisons of environmental effects of alternative pollution control mechanisms

need to be made carefully. It is not safe to assume that the effects of command-and-control and incentive systems are always comparable. Oates *et al.* (1989) show, for example, that a command-and-control approach often results in "overcontrol" beyond a pollution control standard, whereas many of the incentive approaches analyzed in the literature would just achieve the standard. At least for the example they studied, particulate matter control in the Baltimore area, the relative attractiveness of the command-and-control compared to an incentive approach is much closer when measured in terms of net benefits. For that reason, when comparing the two approaches, it is important to examine not only differences in costs, but also in environmental effects.

Endnotes for Section 2

1. Atkinson and Lewis (1974 and 1976) and Atkinson and Tietenberg (1982).
2. Kohn (1978).
3. Seskin *et al.* (1983).
4. Atkinson (1983).
5. David *et al.* (1977).
6. Hahn and Noll (1982).
7. Harrison (1983).
8. Palmer *et al.* (1981).
9. Nichols (1983).
10. Atkinson and Tietenberg (1991).
11. See Atkinson & Tietenberg (1991), Dudek & Palmisano (1988), Hahn (1989), Hahn & Hester (1989), Liroff (1986), and Tietenberg (1985 and 1990).
12. Oates *et al.* (1989).
13. Zerbe (1970), Wenders (1975), Downing and White (1986), and Milliman and Prince (1989).
14. Kneese and Schulze (1978).
15. Orr (1976).
16. Cramer *et al.* (1990).
17. U.S. Department of Commerce. Articles entitled "Pollution Abatement and Control Expenditures," published periodically in the *Survey of Current Business*.
18. See, for example, the Swedish and Norwegian experience with automobile deposits in Section 9.2.

GAO

Report to the Chairman, Committee on
Public Works and Transportation, House
of Representatives

June 1992

WATER POLLUTION

Pollutant Trading Could Reduce Compliance Costs If Uncertainties Are Resolved



**Resources, Community, and
Economic Development Division**

B-247972.2

June 15, 1992

**The Honorable Robert A. Roe
Chairman, Committee on Public
Works and Transportation
House of Representatives**

Dear Mr. Chairman:

Pollutant trading has been touted within and outside the Environmental Protection Agency (EPA) as an economical supplement to traditional regulatory programs designed to address water pollution problems. Pollutant trading uses cost savings as an incentive for dischargers to reduce pollution. Under this approach, dischargers of pollution help determine (with EPA or state assistance and approval) how their collective discharges can be reduced to preapproved levels in a cost-effective manner. Within these bounds, pollutant trades can take place among dischargers of point source pollution (such as effluent from industrial facilities or municipal sewage treatment plants) or between dischargers of point and nonpoint source pollution (such as runoff from farms or construction sites).

This letter responds to your request for information on the use of pollutant trading as a cost-effective method of dealing with some of the nation's remaining water quality problems. As agreed with your office, this report discusses (1) projects that are using pollutant trading to help solve water quality problems at a particular watershed area or body of water, (2) potential barriers that may impede the wider use of pollutant trading, and (3) EPA's efforts to implement a nationwide trading program. Also, as agreed with your office, this report discusses whether statutory or administrative changes to make trading more viable are warranted.

Results in Brief

Pollutant trading to control water pollution has thus far been confined to four projects nationwide. Only one trade has actually been made so far, and all but one of the projects involve trading between point and nonpoint pollution sources. Although each of the projects varies considerably, they were all initiated by local communities searching for a way to address water pollution problems while reducing pollution control costs.

The limited activity in pollutant trading nationwide can be largely attributed to uncertainties surrounding its use. Some in the regulatory and

regulated communities are hesitant to establish trades because although the authority to conduct trades is implied in the Clean Water Act, they fear that the act's lack of explicit authority for trading could result in legal challenges to projects. Questions have also surfaced about how to administer, monitor, and enforce trades. Nevertheless, many of these issues are not unique to trading programs. In particular, adequate monitoring data and effective enforcement mechanisms would also be needed under more traditional regulatory programs aimed at controlling nonpoint source pollution.

EPA recognizes pollutant trading's potential to help address water pollution problems and has started to address some of the barriers that impede the wider use of trading. For example, EPA recently sponsored a 2-day conference on trading, has identified over 900 water bodies with trading potential, and is preparing a series of papers that examine the merits and limitations of trading and other market-based incentives. EPA is also considering guidance for communities that wish to initiate their own trading projects. However, agency officials acknowledge that the guidance could be more detailed and specific if more were known about how trading can be used and implemented.

Pollutant trading is not a panacea for all of the nation's water quality problems, nor is it applicable in all situations. However, in certain circumstances it could serve as a cost-effective supplement to more traditional water pollution regulatory programs. EPA could play a valuable role in demonstrating this potential by helping to establish projects for some of the water bodies it has identified as possible candidates for trading. These projects could help the agency resolve many of the questions surrounding trading's use. If the Congress wishes to see trading employed on a wider basis, it may want to address the concerns that some have raised about trading's legal status. This could be accomplished by amending the Clean Water Act to explicitly authorize trading.

Background

Since the Clean Water Act was passed in 1972, surface water pollution programs have largely focused on point sources of water pollution, such as sewage treatment plants or manufacturing facilities. Under the act, EPA or delegated states issue permits that limit the pollutant levels that these facilities can discharge into the nation's surface waters. Although this permit process has yielded significant gains in water quality, the process does not address pollution from diffuse, or nonpoint, sources of water pollution, such as urban or agricultural runoff. As we noted in our October

1990 report on nonpoint pollution,¹ the nation's remaining water quality problems are largely attributable to pollution from nonpoint sources. Although 1987 amendments to the act placed additional emphasis on nonpoint sources of water pollution, the diversity and pervasiveness of nonpoint source pollution, coupled with the political sensitivity of regulating land use activities, continues to present an enormous technical and regulatory challenge for state and local governments.

Over the past decade, pollutant trading has been suggested as an economical means to address some of the nation's remaining pollution problems. Recent amendments to the Clean Air Act, for example, specifically authorize air emissions trading. Trading's potential to reduce the cost of meeting point and nonpoint source water pollution standards has also received increasing attention in recent years. Under such a trading scheme, dischargers faced with differing costs for meeting pollution limits could arrange among themselves (with EPA or state assistance) how best to allocate the reduction of their total discharges, while decreasing their costs of meeting the limits.

For example, instead of the need for two sewage treatment plants to install additional equipment to reduce their discharges, one treatment plant could help finance the other's installation of additional, sophisticated treatment equipment if such an arrangement would yield equivalent (or better) reductions at lower costs. Trades could also be made between point and nonpoint sources. For example, instead of installing additional treatment equipment to reduce its discharge of nutrients, a sewage treatment plant could pay farmers to use management practices that would better control the runoff of nutrients from fertilizers or livestock wastes. In either case, the terms of the trade would then be approved by EPA or the state and reflected in the discharge permits.

Few Trading Projects Have Thus Far Been Initiated

On the basis of our literature review and discussions with EPA officials, we identified the following four projects in which trading is a component of a plan to address water pollution.² These projects were initiated by local groups who were searching for a means to avoid additional—and increasingly expensive—restrictions on point source dischargers. At three locations, the projects provide for trading between point and nonpoint sources as part of a strategy to control phosphorus and other nutrients

¹Water Pollution: Greater EPA Leadership Needed to Reduce Nonpoint Source Pollution (GAO/RCED-91-10, Oct. 15, 1990).

²Appendix I contains more detailed information on these four projects.

that impair water quality. The fourth project permits the trading of discharge allocations between point sources.

- Dillon Reservoir, Colorado. In 1984 the state of Colorado and EPA approved a trading program for the Dillon Reservoir to control nonpoint sources of phosphorus. In the only trade nationwide to date, a sewage treatment authority received an 11-pound credit on its discharge permit for 22 pounds of phosphorus removed from nonpoint sources when the authority installed sewers in a small development that had been using septic tanks. Incentives for additional trades were temporarily eliminated because treatment plants have improved their operating efficiencies, which substantially reduced phosphorus discharges into the reservoir.
- Cherry Creek Reservoir, Colorado. Representatives from the county, local communities, and water and sanitation districts surrounding the reservoir formed a trading authority to help address phosphorus pollution from nonpoint sources. After authority members achieve a 50-percent reduction of annual phosphorus loadings from nonpoint sources, they may make excess reductions available to sewage treatment plants in the form of a pollution credit. Trading will likely be delayed because anticipated land development has not materialized and treatment plants are operating well within their phosphorus load allocations.
- Tar-Pamlico River Basin, North Carolina. The state established a total, allowable discharge level for the basin. The state approved a strategy whereby an association of sewage treatment plants can meet this level either by making modifications to their facilities and/or by making a monetary contribution to a voluntary state program that helps farmers reduce nonpoint source pollution. Contributions to this program will begin in September 1992.
- Fox River, Wisconsin. In 1981 the state of Wisconsin initiated a trading program for the point source dischargers along the river. Under the program, the state established a total pollutant discharge goal, imposed more stringent limits among individual dischargers, and allowed dischargers—under limited circumstances—to trade the equivalent of discharge limits among themselves. No trades have taken place to date. According to EPA and state officials, excessive program restrictions (e.g., trades cannot be justified on cost savings alone) have largely eliminated the economic incentives for trading.

Impediments to the Wider Use of Pollutant Trading

The limited use of pollutant trading to achieve water quality goals can largely be attributed to concerns surrounding (1) trading's legal status under the Clean Water Act and (2) the complexities involved in designing and implementing a workable trading system.

The Clean Water Act Does Not Explicitly Authorize Trading

Unlike the Clean Air Act, the Clean Water Act does not explicitly authorize the use of pollutant trading. However, the act contains provisions that suggest that trading is allowed, at least to some extent. Specifically, the act establishes a process for determining the maximum amount of a pollutant that can enter a water body without violating water quality standards—referred to as the total maximum daily load (TMDL) process. Under this process, states allocate pollutant waste loads among point and nonpoint sources. EPA's regulations on TMDLs provide that if the nonpoint source pollution controls make more stringent nonpoint allocations practicable, then allocations for point sources can be made less stringent. In this regard, the regulations state that “. . . the TMDL process provides for nonpoint source control tradeoffs.”³ In addition, the Clean Water Act encourages EPA to help states develop techniques for controlling nonpoint source pollution—including innovative methods, practices, and regulatory programs. According to an EPA analysis of pollutant trading under the Clean Water Act, an argument can be made that such programs include pollutant trading.

Nevertheless, EPA attributes the low level of pollutant trading, in part, to the absence of a clear and unambiguous authorization of trading in the Clean Water Act. In particular, EPA's analysis of trading states that the absence of explicit authorization inhibits trading because of perceived legal risks that programs will be overturned or disallowed by regulators or the courts. Although the analysis does not contain recommendations, it concludes that there are benefits in amending the act to more clearly signal that trading is permissible.

Questions Remain About How to Design and Implement Trades

Other key questions center around how to (1) create institutional structures to facilitate trading, (2) obtain adequate data to establish and monitor compliance with terms of the trades, and (3) establish effective enforcement mechanisms to ensure that the terms of the trades are followed.

Creating Institutional Structures

Although trades are intended to take place between dischargers with minimal regulatory interference, some organization must be in place to

³40 C.F.R. 130.2(i).

help design, approve, and administer the trades. As was the case in the Dillon Reservoir and Cherry Creek projects, the organization might include representatives from the state, counties, and local communities and from water and sanitation districts neighboring the water body. It might also be useful to have others represented that could facilitate trades such as individuals from agricultural extension programs, the Soil and Conservation Service, and environmental organizations. In addition, proposed trades would have to be approved by a regulatory entity that may or may not be part of the trading project's organization. While the formation of such an organization is not a formidable task, it does entail a commitment of time and resources that needs to be taken into account when involved parties design trades.

Obtaining Adequate Data

Adequate data constitute a critical component of an effective trading program. Data on pollution types, levels, and sources are needed to determine (1) whether a trading program is needed and viable, (2) who and what pollutants should be involved in the trade, (3) what the trade's effect will be on the water body, and (4) whether the terms of the trade are being complied with. Although the need for monitoring data is not unique to trading programs, the data are a necessary component whose absence can impede the wider use of trading.

As we noted in our October 1990 report on nonpoint source pollution, obtaining data on this type of pollution is especially problematic and costly because the sources are diffuse and the pollution from these sources can be episodic. Project officials have been able to offset this problem, to some degree, by ensuring that any trades clearly result in water quality improvements. Under the Dillon Reservoir project, for example, point source dischargers earn 1 pound of credit on their permits for every 2 pounds of phosphorus removed through a nonpoint source control. Although the main purpose of the 2-for-1 credit is to help address new nonpoint source runoff from recent development and growth, this approach also provides a margin of safety to offset the uncertainty surrounding the monitoring data's ability to measure the effectiveness of nonpoint source controls.

Developing Enforcement Mechanisms

Finally, questions have been raised about how to establish an effective enforcement mechanism to ensure that the terms of the trade are complied with. As we have reported in the past, enforcement is a critical component of an effective regulatory program.⁴ Although pollutant trading

⁴For example, see our testimony entitled Water Pollution: Observations on Compliance and Enforcement Activities Under the Clean Water Act (GAO/RCED-91-80, July 18, 1991).

differs from traditional regulatory programs in many respects, most observers agree that effective enforcement mechanisms are also needed under a trading program.

Many of the concerns raised about enforcement under a trading program would also need to be addressed under more traditional regulatory programs aimed at controlling nonpoint source pollution. A primary example is the concern discussed above regarding the adequacy of monitoring data. Poor monitoring data make it difficult to determine if the generator of nonpoint source pollution is complying with the terms of the trade or other program requirements. The absence of this information could eliminate the viability of an enforcement program.

EPA Is Beginning to Address the Barriers to Trading

Although EPA has examined some of the benefits and limitations of pollutant trading since the early 1980s, the agency has only recently started to address the barriers to pollutant trading and to more actively promote its wider use. As discussed above, the few trading projects in existence were initiated by local communities searching for a more cost-effective approach to achieve water quality goals. EPA's involvement in these projects has largely been limited to providing technical and/or financial assistance. For example, EPA discussed trading options with project officials in some cases and in other cases provided some financial assistance to help identify existing problems and to test various nonpoint source pollution controls.

EPA has recently expanded its efforts to explore pollutant trading's potential and plans to increase its assistance to others interested in using trading as a tool to improve water quality. For example, the agency hosted a 2-day conference in April 1992 to promote point/nonpoint trading within federal, state, and local water quality programs. In addition, EPA is currently preparing a series of papers that examine the merits and limitations of pollutant trading and other market-based approaches, including effluent discharge fees, incentives for early reductions of toxic pollutants, and wetlands mitigation banking.

To date, EPA has completed a paper on pollutant trading between point and nonpoint sources. While the paper outlines many of the limitations of pollutant trading, it also identifies nearly 950 water bodies with the potential for trading projects for nutrients alone. However, the paper points out that, at least in the near-term, trading projects are likely to be implemented in only a portion of this group.

The paper also outlines a number of possible actions that EPA could take to ease the implementation of trading programs. These actions include providing guidance, technical and financial assistance, and explicit approval of trading as agency policy. Although EPA is considering drafting guidance for communities that wish to initiate their own pollutant trading projects, EPA officials told us that the number and variety of uncertainties surrounding trading have hindered this effort. According to these officials, the uncertainties make it difficult for the agency to issue detailed, specific guidance to help those considering implementing a trading project.

Conclusions

Although significant progress has been made in the past two decades, innovative and cost-effective approaches are needed to help address the nation's remaining water quality problems. Pollutant trading is one such approach with potential as a supplement to traditional regulatory programs. While EPA is beginning to address some of the barriers to pollutant trading, a number of questions and concerns need to be resolved before trading's potential as a supplement to existing regulatory programs can be demonstrated.

EPA can play a valuable role in this effort by helping others institute projects for a portion of the nearly 950 water bodies it identified as having trading potential. These projects could be specifically designed to test alternative approaches to deal with many of the questions and concerns that have been raised about trading. EPA then could share the "lessons learned" from these demonstration projects by providing detailed, specific guidance to others considering implementing a trading project. If the Congress wishes to see trading employed on a wider basis, it may want to address the concerns that some have raised about trading's legal status. This could be accomplished by amending the Clean Water Act to explicitly authorize trading under the act.

Recommendations

To help resolve some of the remaining questions and concerns surrounding pollutant trading, we recommend that the Administrator, EPA, assist others in initiating demonstration projects specifically designed to test alternative approaches to pollutant trading. EPA should then develop detailed and specific guidance—based in part on these demonstration projects—to help others considering implementing trading projects.

Trading Projects

The following provides additional details concerning the four pollutant trading projects visited during the course of our review.

Dillon Reservoir, Colorado

In 1984 the state of Colorado and EPA approved a trading program for the Dillon Reservoir to control nonpoint sources of phosphorus. This program constitutes the only trade nationwide to date. Under the program, sewage treatment authorities pay for the installation of nonpoint source controls and receive credit in their discharge permits of 1 pound for every 2 pounds of phosphorus removed from nonpoint sources. Sewage treatment authorities have the option of either implementing the nonpoint source controls (e.g., installing sewer lines to replace septic tanks) or paying other generators of the pollution, such as land developers, to do so.

In addition, developers may earn credits by installing nonpoint pollution controls themselves. The developers may then offer these credits to a sewage treatment authority. By doing so, the authority can avoid costly new facility improvements that would otherwise be needed to accommodate new development and whose cost would ultimately be passed on to the developer and its customers.¹ The treatment authorities are responsible for ensuring that the nonpoint source controls used in a trade are implemented. Their discharge permits must contain operation and maintenance requirements for the nonpoint source controls as well as monitoring and reporting requirements so that the effectiveness of the controls can be assessed.

A sewage treatment authority received an 11-pound credit on its discharge permit for 22 pounds of phosphorus removed from nonpoint sources when the authority installed sewers in a small development that had been using septic tanks. Incentives for additional trades were eliminated because population growth slowed and the treatment plants significantly improved the operating efficiency of their existing treatment equipment. These two factors substantially reduced phosphorous discharges into the reservoir and, for the present, have greatly reduced the need for point/nonpoint source trades.

Cherry Creek Reservoir, Colorado

Under this project, the trading authority consists of representatives from the county, local communities, and water and sanitation districts surrounding the reservoir. Because of the magnitude of pollution from

¹Trading credits are allowed only for the control of "old" nonpoint sources that existed before 1984—the year that Colorado approved the trading plan. New sources of nonpoint pollution are controlled through local regulations such as grading and excavation restrictions.

nonpoint sources—an estimated 85 percent of the total phosphorous pollutants—authority members adopted nonpoint source “best management practices,” such as storm water and erosion controls. Once these controls achieve a 50-percent reduction in the annual phosphorous load from nonpoint sources, the trading authority may make any excess reduction available to sewage treatment plants in the form of a pollution credit. Additional phosphorous credits will be available as a result of nonpoint source projects implemented by the authority and financed by the proceeds from member assessments, a reservoir user fee, and other fees and taxes.

As of January 1992 project officials believed that the initial 50-percent reduction goal had been achieved, but they were awaiting the collection of monitoring data to make a final determination. In any case, it appears that any trading will be delayed because the situation that prompted the development of the trading strategy—rapid growth and development pressures on treatment plant discharges—did not materialize and treatment plants are operating well within their phosphorous load allocations. However, the trading arrangement may be implemented if growth significantly increases in the future.

Tar-Pamlico River Basin, North Carolina

After the state identified a nutrient problem (nitrogen and phosphorous) in the basin, it recommended a strategy to limit nutrient discharges from a group of point source dischargers. Subsequently, some of the dischargers formed an association and proposed an alternative strategy that included pollutant trading. The strategy, approved by the state, contains a total, allowable discharge level for the association that, in turn, allocates individual discharge limits among its members. If the association's total discharge exceeds the maximum allowed, the excess must be offset with credits obtained through monetary contributions to the state's Agriculture Cost Share Program, a voluntary program that helps farmers pay for best management practices, such as animal waste treatment lagoons, to reduce nonpoint source pollution.

If association members choose to meet all of the nutrient reductions by funding nonpoint source controls rather than reducing their own discharges, they could pay as much as \$11.2 million into the Cost Share Program. The association has paid an additional \$150,000 to fund state administrative support for the Cost Share Program and agreed to pay \$400,000 for an estuarine water quality computer model. EPA awarded a \$500,000 grant to the association to assist in developing the model.

Under the agreement, the treatment plants' responsibility for implementing nonpoint source controls generally ends with the plants' payments into the state fund. However, the agreement includes several safeguards to ensure adequate protection of the basin. For example, the agreement does not preclude the state from requiring individual point sources to remove nutrients where a localized water quality problem exists. In addition, if association members fail to meet any of their requirements, they become subject to the stricter effluent limits that the state planned to impose prior to the development of the trading strategy. The recently revised strategy calls for association members to make an initial contribution to the Cost Share Program in September 1992. Accordingly, association-funded nonpoint source pollution control projects have not been implemented to date.

Fox River, Wisconsin

In 1981 the state of Wisconsin initiated a trading program for the point source dischargers—primarily paper mills and sewage treatment plants—along the Fox River. The state initiated the program in an effort to meet water quality standards for biological oxygen-demand pollutants. Under the program, the state (1) established a total waste load goal; (2) imposed more stringent limits on individual dischargers; and (3) under limited conditions, allowed the dischargers to trade the equivalent of discharge limits among themselves.

Proposed trades must be submitted to and approved by the state. To be approved, the increase in discharge levels must be from new production by a new discharger or increased production that could not be accommodated by existing state-of-the-art treatment technology. Trades cannot be justified on cost savings alone. No trades have taken place under the program to date.² According to EPA and state officials familiar with the project, these and other program restrictions have largely eliminated economic incentives for trading.

²Two "reallocations" have taken place under the program, however. In one case, a facility had part of its discharge limit allocated to other dischargers after it closed. In the other case, a discharger transferred its allocation to a sewage treatment plant after it ceased directly discharging wastewater into the river and started sending its wastewater to the treatment facility.

CHAPTER V

IMPROVING ENVIRONMENTAL DECISIONMAKING FOR PUBLIC WORKS

Task Force Five of the ACIR project to develop recommendations for a federal infrastructure investment strategy examined the literature and agency documents related to environmental decisionmaking for public works. The focus of this task force effort was to help improve environmental protection while reducing unnecessary burdens in the permit and approval processes. The results of this effort are presented in the first selection of this chapter.

Other documents in this chapter are organized into two sections. The **Environmental Integration** section presents the text of the *National Environmental Policy Act* (NEPA), part of the text of Council on Environmental Quality's assessment of environmental compliance in the 1990s, selections from a Department of Interior Environmental Quality manual and the "Principles, Findings, and Recommendations" from an ACIR policy report on improving intergovernmental decisionmaking for environmental protection and public works.

Selections in the **Interagency Coordination** section contain illustrations of how several agencies have acted jointly to ensure cooperation related to environmental evaluation and permitting, particularly those dealing with transportation and wetlands.



HIGH PERFORMANCE PUBLIC WORKS

A New Federal Infrastructure Investment Strategy for America



**U.S. Advisory Commission
on Intergovernmental Relations
SR-16
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IMPROVING ENVIRONMENTAL DECISIONMAKING FOR PUBLIC WORKS

I OBJECTIVES

More effective, efficient, consistent, and predictable environmental decisionmaking processes need to be applied throughout the nation's infrastructure programs. Practical and consistent steps need to be taken by both environmental protection agencies and infrastructure agencies, working together, so that the goals of each can be achieved to the greatest extent possible with less cost and less delay.

More specifically, opportunities should be sought and action taken to (1) fully integrate and simplify the process of applying for and deciding on environmental protection permits and other environmental approvals needed to authorize public works projects, (2) reduce the time and cost involved in this decisionmaking, and (3) more fully integrate the consideration of environmental quality values and requirements into infrastructure programs.

II FINDINGS

The findings of the 1992 ACIR study *Intergovernmental Decisionmaking for Environmental Protection and Public Works* are sound. As necessary environmental protection statutes and requirements have been enacted and promulgated over the past two decades, they have:

- 1) Created a set of complex decisionmaking processes with many separate, often sequential and inconsistent, and sometimes duplicative steps taken by many different agencies;
- 2) Stretched out the process of making infrastructure and environmental decisions, limited the flexibility available to find problem-related and performance-based means of reaching environmental and infrastructure goals, and sometimes lacked a sound scientific basis;

- 3) Increased the unpredictability of the planning and decisionmaking processes, sometimes causing steps in the process to be repeated;
- 4) Led to inefficient uses of limited resources;
- 5) Created unaffordable, unachievable, inefficient, and sometimes ineffective environmental processes and compliance requirements for non federal parties (especially small local governments); and
- 6) Created tensions within and among federal, state, and local environmental and development agencies.

This chain of events is counterproductive to the achievement of both environmental protection goals and infrastructure goals.

Steps are needed to overcome these unintended results of the efforts to foster greater environmental sensitivity, improved protection from environmental pollution and health hazards, and the transformation of development programs into programs that are compatible with nature.

III PRINCIPLES

The processes for reviewing, coordinating, and approving environmental permits for infrastructure should be guided by the following five principles:

1. A high-quality environment and continued economic development both are legitimate, high-priority national goals. These goals are compatible if pursued within a "sustainable development" framework.
2. A single, integrated, multimedia, governmentwide environmental quality ethic based on Title I of the National Environmental Policy Act (NEPA) should be

an integral part of all development programs—federal, state, and local.

3. Environmental analysis and compliance processes should be better integrated.
4. Environmental permits and approvals for public works should be based on sound, peer-reviewed science, and should be evaluated using performance measures of environmental outcomes. They also should be based on priorities for reducing environmental risks most effectively and efficiently, considering their true costs to society, their affordability, and the need to set achievable priorities for compliance.
5. Achieving consistency between environmental goals and development goals, and ensuring the affordability of these goals, should be based on a process that provides for wide-ranging public involvement, interagency and intergovernmental cooperation, and coordinated political action.

These principles are elaborated on below.

Legitimate and Compatible Goals. Defusing the tension between environmental protection and development programs depends on seeing both sets of goals as having legitimacy and seeking compatibility between them. This compatibility should not be seen as a simple compromise, but as an opportunity to find new ways to achieve both sets of goals at once. The President's Council on Sustainable Development should play an important role in identifying and promoting this opportunity.

Environmental Ethic. Many of the difficulties in receiving environmental approvals for public works projects have occurred as a result of inadequate consideration of environmental factors in the earliest stages of planning and designing public works. Thus, environmental problems sometimes come as a surprise late in the process of seeking approval to proceed, when permits or other types of approval are applied for. This can create the need to replan and redesign projects—activities that take considerable additional time and incur additional costs. To avoid this problem, each infrastructure agency should institutionalize a single, integrated environmental quality ethic throughout its entire leadership and professional staff so that environmental quality factors will be routinely and actively pursued throughout the agency's analytical and decisionmaking processes, and passed on to the state and local governments that they assist, regulate, or work with as co-regulators.

Integrated Environmental Processes. Many infrastructure projects must undergo general

environmental analysis within the framework of NEPA as well as other federal, state, and local environmental requirements, including more specific types of analysis and review related directly to individual environmental permits and approvals that must be obtained. Currently, these are quite different, and frequently separate, processes. Time and money could be saved in many cases if these separate processes were better integrated to avoid procedural and substantive duplications, and conflicting approaches and decisions by multiple agencies. Joint and concurrent environmental reviews should be the goal. This integration should be established within and among all federal agencies in accordance with CEQ regulations (40 CFR 1502.25).

Performance Based Evaluation of Environmental Outcomes. Environmental compliance too often is judged largely, or even primarily, as a matter of legal compliance with specified activities or "end of the pipe" specifications. This type of compliance may be unnecessarily costly and adversarial, and does not always yield significant improvements in the environment. Provisions for flexibility in complying with environmental goals offer opportunities for comparable, or even superior, improvements in the environment for the same or less cost. Such opportunities should be identified and pursued.

Costs of Compliance. Promising to achieve more than can be reasonably accomplished in any given time period creates frustration and a loss of confidence in government. Yet, the amount of infrastructure work that needs to be done to clean up the environment, prevent pollution, and avoid damage to the nation's ecological resources is prodigious, and the full costs of compliance often must be and should be included in the costs of infrastructure projects. Available technical, financial, and other resources to pursue these projects are limited. Therefore, compliance with environmental goals in infrastructure programs should be pursued through prioritization that makes best use of available resources in reducing environmental risks as quickly as possible over a period of years.

Public Involvement. All public works and environmental decisions should be made with active involvement of citizens and other affected parties. NEPA requires that all federal agencies provide opportunities for such involvement.

Public involvement should be institutionalized in all environmental and infrastructure programs as a process of two-way communication in which there is mutual education of the public and the government at every stage of the planning and decisionmaking process. This "close to the customer" approach should

be designed to restore confidence in government and provide support for well justified and achievable goals.

The need for making reasoned choices and justifying supportable choices should be communicated to the public in terms that can be readily understood and responded to constructively.

Governmental Partnerships. Multiple federal agencies frequently regulate a single infrastructure project. In addition, state and local governments may be co-regulators with the federal government, as well as regulated entities. It is essential, therefore, for all of these governmental units to be working within similar principles and guidelines. Otherwise, unnecessary confusion, inconsistencies, tensions, delays, and conflicts are likely. Common principles and guidelines, frequent consultations, and a spirit of cooperation and partnership among these entities should be developed.

IV. GUIDELINES

To put these principles into action, at least the following ten types of guidelines are needed:

1. Integrate and improve the effectiveness, efficiency, consistency, and timeliness of the environmental planning and decisionmaking processes;
2. Institutionalize the integrated environmental decisionmaking process and environmental quality ethic in each federal agency;
3. Provide better coordinated, more complete, and higher quality information to support improved environmental analysis, planning, and decisionmaking;
4. Strategically manage agency resources to support integrated environmental decisionmaking;
5. More fully develop and apply sound, peer-reviewed science in support of integrated environmental decisionmaking;
6. Enhance public involvement programs;
7. Forge stronger federal interagency linkages among environmental and infrastructure agencies;
8. Develop, facilitate, and strengthen intergovernmental partnerships for environmental decisionmaking and infrastructure;
9. Improve training for environmental decisionmaking in the federal, state, and local governments; and

10. Revise environmental legislation and regulations to more fully support integrated environmental decisionmaking.

These guidelines are elaborated on below.

Integrate and Improve the Environmental Decisionmaking Process. In accordance with the principles set forth above, top priority should be given to (a) integrating the many elements of the environmental decisionmaking processes with each other to promote efficient and effective concurrent reviews by all the responsible agencies; (b) balancing environmental requirements with development infrastructure, and jobs goals; (c) bringing environmental requirements into line with good, peer-reviewed science and performance monitoring oriented toward desired environmental outcomes; and (d) providing the flexibility needed to get maximum performance for the investment of available resources.

To achieve these goals, the first step is to inventory document, and compare the existing environmental decisionmaking processes. Some are broad analytical processes that seek public involvement in preparing comprehensive assessment of societal and physical circumstances, while others are more narrowly focused on specific, single-factor, legal requirements. Levels of detail in these two types of processes differ, as do provisions for timing, public disclosure, and the factors to be considered. The preparation of flow charts for each of these processes should be undertaken to facilitate comparisons among them.

The second step should be to identify and pursue opportunities for integrating appropriate processes with one another. For example:

- CEQ, or its successor agency, should continue its seminars on NEPA integration and follow up by issuing guidance to integrate environmental analysis and compliance processes.
- The coordinated, multimedia permit process for major projects being developed by the state of New Jersey should be evaluated as a potential model for other states and the federal government.
- The recommendation of EPA's Science Advisory Board that ecological regions be managed as a whole, perhaps using regional organizations, should be pursued.
- Risk-based models for comparing and managing clusters of environmental regulations, so that the worst risks would be dealt with first, should be given a high priority.

- The Arkansas model of NEPA integration should be considered by other states. In Arkansas, the in-house, multidisciplinary planning staff of the state Highway and Transportation Department works closely with the engineering staff from the beginning of the design stage to include environmental considerations, prepare environmental impact statements, and avoid most conflicts with federal environmental regulations.
- The FHWA and FAA NEPA integration model should be considered for use by other federal agencies. Both of these agencies use NEPA as the umbrella for all environmental requirements to be considered concurrently at the planning, design, and implementation stages.
- Alternative dispute resolution techniques for facilitating environmental decisions and avoiding litigation should be used frequently.
- Special permit processes should be used for cases in which innovative technologies for improving the environment are proposed. Such innovations often cannot be tried under standard permit requirements because of the uncertainties introduced by the innovative technology. Closer monitoring and other special conditions might allow these innovative projects to proceed.
- Federal interagency memoranda of understanding such as the one signed on May 1, 1992, by the secretary of Transportation, the administrator of EPA, and the assistant secretary of the Army for Civil Works, to facilitate the consideration of Section 404 Clean Water Act permits for transportation projects, should be used as models for developing other memoranda of understanding on issues for which infrastructure and environmental protection agencies have common needs and interests.

Institutionalize the Environmental Ethic.

Lessons learned from demonstration projects and individual examples of process integration should be applied broadly to institutionalize and infuse the environmental ethic into infrastructure agencies and to make the integrated environmental decisionmaking process more consistent, effective, efficient, timely, and predictable. These lessons should be published in clear and understandable language, with practical guidelines for implementation.

Provide Better Information to Support Integrated Environmental Decisionmaking. Access to baseline information on natural and cultural resources, similar to that provided for geological resources by the U.S. Geological Survey, can save time and costs in completing required NEPA analyses and

documentation as well as in satisfying other environmental permit and approval processes. Ongoing programs, such as the National Wetlands Inventory and the Soil Conservation Service's Soil Survey have proven extremely useful for these purposes. Proposed initiatives for a Bureau of Environmental Statistics within a Department of Environment that could come about from the elevation of EPA, and a National Biological Survey under the Department of the Interior, hold the potential for contributing significantly to more effective and efficient environmental analyses and compliance decisions.

The federal government, in cooperation with state and local governments, should continue to initiate, complete, and maintain national inventories of all of the natural and cultural resources required to be considered in the environmental decisionmaking process. User-oriented procedures should be developed and made widely available to transform these data into a sound and objective basis for required analyses and decisions at both the program and project-specific levels affecting ecosystems of various sizes.

Strategically Manage Resources for Environmental Decisionmaking. Innovative management practices that prove successful should be identified and transferred into widespread usage. For example, strategic use of permit processing personnel to put their time where it will do the most good has shown promise in the Corps of Engineers and the state of New York.

- In the Corps, the practice of issuing "general permits" for large areas in which specific permits that are consistent can be issued automatically saves a great deal of processing time and energy.
- In the New York case, a recent study found that the bulk of the time of the environmental compliance staff was being spent on the review and processing of relatively routine permit applications, while too little time was left for projects of major significance and for participating in preapplication environmental analyses where preventive advice could expedite later permit processing. It was found that breaking out of routine permit processing systems that required a thorough review of every application on a first-come, first-served basis could make more effective use of scarce resources and make the jobs of staff more interesting and productive.

Some environmental review staffs also have been expanded with financing from permit processing fees. Legislation and training funds maybe needed to authorize some management improvements.

More Fully Develop and Apply Environmental Science. Not enough is known about such subjects as how to manage large ecological systems, how to measure and communicate relative environmental risks, and how to estimate the environmental outcomes of specific regulatory practices. Research should be done to provide needed answers.

Enhance Public Involvement Programs. Many federal programs in addition to NEPA provide for public involvement or citizen participation. One of the most recent to require enhanced public involvement is the *Intermodal Surface Transportation Efficiency Act of 1991*.

Many state and local governments also have active programs of this nature. Often, they have been established, in part, to satisfy federal requirements.

In 1979, the Advisory Commission on Intergovernmental Relations completed a comprehensive study of citizen participation in which it identified 45 different types of involvement being used by governments. Many other surveys, handbooks, training courses, and other sources of help are available on this topic.

Forge Interagency Links. Federal agencies can and do learn from each other when they are in contact. Greater frequency of contact among federal infrastructure and environmental agencies should be arranged to facilitate improved environmental decisionmaking processes, sharing of baseline data, and exchanges of information about advances in developing and applying improved environmental science. Sharing the results of pilot studies and demonstrations also should be facilitated through these contacts. In addition, exchanging personnel among federal agencies and with state and local governments can have attitudinal as well as technical benefits. Personnel exchanges are authorized by the *Intergovernmental Personnel Act of 1970*, and Rural Development Councils in many states may offer convenient mechanisms for arranging personnel exchanges in rural areas.

Develop and Facilitate Intergovernmental Partnerships. Some federal and federally required environmental analyses are prepared by state and local governments, and most federal regulation of the environment is applied by state and local governments. Additional opportunities for developing these intergovernmental partnerships—most notably the potential state responsibility for issuing Section 404 permits—should be sought out and developed where the capacity exists in state and local governments to undertake these responsibilities.

Advantages include administration of requirements by officials who are closer to and more familiar with local conditions, and who are better able to supply and respond to other relevant information in the community. State and local governments also may be more able to combine diverse permit and approval decisions in an integrated review process, as is being demonstrated in New Jersey.

Where state and local governments need help in complying with federal requirements, that help should be supplied through the intergovernmental partnership. The federal government has a responsibility under the Regulatory Flexibility Act to give special recognition to the problems of small governments in responding to federal requirements. The establishment of a small-community coordinator in EPA, and a local government/small community dialogue group to advise EPA on these special needs, has been helpful to the federal and non-federal partners. This EPA example should be considered for adoption by other federal agencies.

Provide Environmental Training. The improved decisionmaking processes, more fully developed data bases, and new environmental science called for by this task force are significant departures from much current practice. If they are to be successfully implemented, many federal officials—from top management to operational practitioners—will need to be trained in new concepts and new methods of operating. The new guidelines will not be self-implementing. Adequate training for all those who need it should be supplied.

Revise Legislation and Regulations. Although some of the integration of processes recommended here, and the development of better baseline data, can be accomplished under existing legislation, it should be recognized that the full implementation of these principles and guidelines will not be possible without revising present legislation and related regulations. Pilot projects and special demonstrations should be used to set the stage for needed legislative revisions. For example, the Government Performance and Results Act of 1993 may provide a convenient vehicle for testing outcome-based evaluations of the performance of environmental programs on a pilot project basis. That act also would provide for broader application of the pilot project findings at a later time. Opportunities to enact legislation that would more fully integrate environmental decisionmaking processes should be sought.

National Environmental Policy Act

Citations:

42 U.S.C. §§4321-4347; enacted January 1, 1970 by Pub. L. No. 91-190; 83 Stat. 852.

Lead Agency:

Council on Environmental Quality, Executive Office of the President, 722 Jackson Place NW, Washington, DC 20503 (202) 395-5750.

Overview:

The National Environmental Policy Act (NEPA) was the first federal statute to use the "impact statement" approach in federal regulation. Its purpose was to require federal agencies to analyze and take into account the environmental impact of their actions in an open and public process. The Act also created the Council on Environmental Quality within the Executive Office of the President.

Environmental Impact Statements. The procedural core of NEPA is found in section 102(2)(C) (codified at 42 U.S.C. §4332(2)(C)), which creates the environmental impact statement (EIS) requirement. The provision requires that:

all agencies of the Federal Government . . . include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on--

- (i) the environmental impact of the proposed action,
- (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,
- (iii) alternatives to the proposed action,
- (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
- (v) any irreversible and irremediable commitments of resources which would be involved in the proposed action should it be implemented.

The provision goes on to require the responsible federal official to consult with and seek comments from other affected agencies. Copies of the statements and relevant comments are required to be made public and to accompany the proposal through the agency review process.

Council on Environmental Quality Role. The Council on Environmental Quality (CEQ), created by title II of the Act, has become the primary overseer of NEPA. In addition to preparing extensive annual environmental quality reports (42 U.S.C. §4341), the Council also has taken the lead in developing appropriate procedures for EIS preparation. The CEQ first was given the authority to issue guidelines to agencies for the preparation of statements in President Nixon's almost-contemporaneous Executive Order 11,514 (March 5, 1970). The CEQ's original guidelines (36 Fed. Reg. 7724-29, April 23, 1971) were nonbinding but were relied upon by most federal agencies when promulgating their own procedures. In 1977 President Carter significantly expanded CEQ's authority by giving it the power to issue binding regulations in Executive Order 11,991 (May 24, 1977). These regulations, issued on November 28, 1978 (43 Fed. Reg. 55978-56007), are codified at 40 CFR Parts 1500-1508. The Supreme Court has since treated these regulations as deserving substantial deference (*Andrus v. Sierra Club*, 442 U.S. 347 (1979)).

The CEQ regulations cover many of the procedural issues that have emerged in the extensive litigation over the meaning of the Act's terms. Comprehensive guidance is provided on what constitutes a "major federal action" requiring an EIS, the

preparation of draft, supplemental and final statements, page limits, recommended format and content (all in 40 CFR Part 1502); the comment process (Part 1503), predecision referral of interagency disputes to CEQ (Part 1504); integration with agency decisionmaking (Part 1505); elimination of duplication with state and local requirements and procedures for filing with EPA (Part 1506); and agency compliance (Part 1507).

Although the regulations have been only amended once since their promulgation in 1978¹ the CEQ has continued to provide additional guidance to agencies as interpretive problems arise. In 1981 it published a "Memorandum to Agencies Containing Answers to 40 Most Asked Questions on NEPA Regulations."² In April 1981 it issued a "Memorandum for General Counsels, NEPA Liaisons and Participants in Scoping" on the subject of "scoping guidance." And in 1983, after a solicitation of comments on the existing regulations and a 2-year review process, the Council published a supplemental memorandum giving further guidance to agencies.

The CEQ also compiles annual data on the number of environmental impact statements filed by agencies and the trends in NEPA litigation.³

Legislative History:

S. 1075, the original NEPA legislation, was introduced by Senators Jackson and Stevens on February 18, 1969. It authorized the Secretary of the Interior to conduct a research program on environmental problems and created the Council on Environmental Quality. A hearing was held April 16, 1969 during which witnesses (primarily Lynton Caldwell, professor of political science at Indiana University) urged the creation of an "action-forcing" mechanism, which later became the environmental impact statement. S. 1075 was reported with amendments and the accompanying report of the Senate Committee on Interior and

¹The amendment modified 40 CFR 1502.22, dealing with incomplete or unavailable information, 51 Fed. Reg. 15625 (April 25, 1986).

²The modification to the regulations, *id.*, in effect rescinded the answer to Question #20.

³See Council on Environmental Quality, *Environmental Quality 1990 395* (Table B-6b, showing 370 EISs filed in 1989), and the number of NEPA-based lawsuits filed (*id.*, at page 395 (showing 91 cases filed in 1988)).

National Environmental Policy Act**Title 42, U.S. Code****§4321. Congressional declaration of purpose.****Subchapter I Policies and Goals**

- §4331. Congressional declaration of national environmental policy.**
- §4332. Cooperation of agencies; reports; availability of information; recommendations; international and national coordination of efforts.**
- §4333. Conformity of administrative procedures to national environmental policy.**
- §4334. Other statutory obligations of agencies.**
- §4335. Efforts supplemental to existing authorizations.**

Subchapter II Council on Environmental Quality

- §4341. Reports to Congress; recommendations for legislation.**
- §4342. Establishment; membership; Chairman; appointments.**
- §4343. Employment of personnel, experts and consultants.**
- §4344. Duties and functions.**
- §4345. Consultation with Citizens' Advisory Committee on Environmental Quality and other representatives.**
- §4346. Tenure and compensation of members.**
- §4346a. Travel reimbursement by private organizations and Federal, State, and local governments.**
- §4346b. Expenditures in support of international activities.**
- §4347. Authorization of appropriations.**

§4321. Congressional declaration of purpose

The purposes of this chapter are: To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.

(Pub. L. No. 91-190, §2, Jan. 1, 1970, 83 Stat. 852.)

§4331. Congressional declaration of national environmental policy

(a) The Congress, recognizing the profound impact of man's activity on the interrelations of all components of the natural environment, particularly the

profound influences of population growth, high-density urbanization, industrial expansion, resource exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man, declares that it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

(b) In order to carry out the policy set forth in this chapter, it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may-

(1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

(2) assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;

(3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;

(4) preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice;

(5) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and

(6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

(c) The Congress recognizes that each person should enjoy a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment.

(Pub. L. No. 91-190, title I, §101, Jan. 1, 1970, 83 Stat. 852.)

§4332. Cooperation of agencies; reports; availability of information; recommendations; international and national coordination of efforts

The Congress authorizes and directs that, to the fullest extent possible: (1) the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this chapter, and (2) all agencies of the Federal Government shall-

(A) utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decisionmaking which may have an impact on man's environment;

(B) identify and develop methods and procedures, in consultation with the Council on Environmental Quality established by subchapter II of this chapter, which will insure that presently unquantified environmental amenities and values

may be given appropriate consideration in decisionmaking along with economic and technical considerations;

(C) include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on—

- (i) the environmental impact of the proposed action,
- (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,
- (iii) alternatives to the proposed action,
- (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
- (v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Prior to making any detailed statement, the responsible Federal official shall consult with and obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved. Copies of such statement and the comments and views of the appropriate Federal, State, and local agencies, which are authorized to develop and enforce environmental standards, shall be made available to the President, the Council on Environmental Quality and to the public as provided by section 552 of title 5, and shall accompany the proposal through the existing agency review processes;

(D) Any detailed statement required under subparagraph (C) after January 1, 1970, for any major Federal action funded under a program of grants to States shall not be deemed to be legally insufficient solely by reason of having been prepared by a State agency or official, if:

- (i) the State agency or official has statewide jurisdiction and has the responsibility for such action,
- (ii) the responsible Federal official furnishes guidance and participates in such preparation,
- (iii) the responsible Federal official independently evaluates such statement prior to its approval and adoption, and

(iv) after January 1, 1976, the responsible Federal official provides early notification to, and solicits the views of, any other State or any Federal land management entity of any action or any alternative thereto which may have significant impacts upon such State or affected Federal land management entity and, if there is any disagreement on such impacts, prepares a written assessment of such impacts and views for incorporation into such detailed statement.

The procedures in this subparagraph shall not relieve the Federal official of his responsibilities for the scope, objectivity, and content of the entire statement or of any other responsibility under this chapter; and further, this subparagraph does not affect the legal sufficiency of statements prepared by State agencies with less than statewide jurisdiction.¹

(E) study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources;

¹So in original. The period probably should be a semicolon.

(F) recognize the worldwide and long-range character of environmental problems and, where consistent with the foreign policy of the United States, lend appropriate support to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of mankind's world environment;

(G) make available to States, counties, municipalities, institutions, and individuals, advice and information useful in restoring, maintaining, and enhancing the quality of the environment;

(H) initiate and utilize ecological information in the planning and development of resource-oriented projects; and

(I) assist the Council on Environmental Quality established by subchapter II of this chapter.

(Pub. L. No. 91-190, title I, §102, Jan. 1, 1970, 83 Stat. 853; Pub. L. No. 94-83, Aug. 9, 1975, 89 Stat. 424.)

§4333. Conformity of administrative procedures to national environmental policy

All agencies of the Federal Government shall review their present statutory authority, administrative regulations, and current policies and procedures for the purpose of determining whether there are any deficiencies or inconsistencies therein which prohibit full compliance with the purposes and provisions of this chapter and shall propose to the President not later than July 1, 1971, such measures as may be necessary to bring their authority and policies into conformity with the intent, purposes, and procedures set forth in this chapter.

(Pub. L. No. 91-190, title I, §103, Jan. 1, 1970, 83 Stat. 854.)

§4334. Other statutory obligations of agencies

Nothing in section 4332 or 4333 of this title shall in any way affect the specific statutory obligations of any Federal agency (1) to comply with criteria or standards of environmental quality, (2) to coordinate or consult with any other Federal or State agency, or (3) to act, or refrain from acting contingent upon the recommendations or certification of any other Federal or State agency.

(Pub. L. No. 91-190, title I, §104, Jan. 1, 1970, 83 Stat. 854.)

§4335. Efforts supplemental to existing authorizations

The policies and goals set forth in this chapter are supplementary to those set forth in existing authorizations of Federal agencies.

(Pub. L. No. 91-190, title I, §105, Jan. 1, 1970, 83 Stat. 854.)

§4341. Reports to Congress; recommendations for legislation

The President shall transmit to the Congress annually beginning July 1, 1970, an Environmental Quality Report (hereinafter referred to as the "report") which shall set forth (1) the status and condition of the major natural, manmade, or altered environmental classes of the Nation, including, but not limited to, the air, the aquatic, including marine, estuarine, and fresh water, and the terrestrial

environment, including, but not limited to, the forest, dryland, wetland, range, urban, suburban, and rural environment; (2) current and foreseeable trends in the quality, management and utilization of such environments and the effects of those trends on the social, economic, and other requirements of the Nation; (3) the adequacy of available natural resources for fulfilling human and economic requirements of the Nation in the light of expected population pressures; (4) a review of the programs and activities (including regulatory activities) of the Federal Government, the State and local governments, and nongovernmental entities or individuals, with particular reference to their effect on the environment and on the conservation, development and utilization of natural resources; and (5) a program for remedying the deficiencies of existing programs and activities, together with recommendations for legislation.

(Pub. L. No. 91-190, title II, §201, Jan. 1, 1970, 83 Stat. 854.)

§4342. Establishment; membership; Chairman; appointments

There is created in the Executive Office of the President a Council on Environmental Quality (hereinafter referred to as the "Council"). The Council shall be composed of three members who shall be appointed by the President to serve at his pleasure, by and with the advice and consent of the Senate. The President shall designate one of the members of the Council to serve as Chairman. Each member shall be a person who, as a result of his training, experience, and attainments, is exceptionally well qualified to analyze and interpret environmental trends and information of all kinds; to appraise programs and activities of the Federal Government in the light of the policy set forth in subchapter I of this chapter; to be conscious of and responsive to the scientific, economic, social, esthetic, and cultural needs and interests of the Nation; and to formulate and recommend national policies to promote the improvement of the quality of the environment.

(Pub. L. No. 91-190, title II, §202, Jan. 1, 1970, 83 Stat. 854.)

§4343. Employment of personnel, experts and consultants

(a) The Council may employ such officers and employees as may be necessary to carry out its functions under this chapter. In addition, the Council may employ and fix the compensation of such experts and consultants as may be necessary for the carrying out of its functions under this chapter, in accordance with section 3109 of title 5 (but without regard to the last sentence thereof).

(b) Notwithstanding section 1342 of title 31, the Council may accept and employ voluntary and uncompensated services in furtherance of the purposes of the Council.

(Pub. L. No. 91-190, title II, §203, Jan. 1, 1970, 83 Stat. 855; Pub. L. No. 94-52, §2, July 3, 1975, 89 Stat. 258.)

§4344. Duties and functions

It shall be the duty and function of the Council—

(1) to assist and advise the President in the preparation of the Environmental Quality Report required by section 4341 of this title;

(2) to gather timely and authoritative information concerning the conditions and trends in the quality of the environment both current and prospective, to analyze and interpret such information for the purpose of determining whether such conditions and trends are interfering, or are likely to interfere, with the achievement of the policy set forth in subchapter I of this chapter, and to compile and submit to the President studies relating to such conditions and trends;

(3) to review and appraise the various programs and activities of the Federal Government in the light of the policy set forth in subchapter I of this chapter for the purpose of determining the extent to which such programs and activities are contributing to the achievement of such policy, and to make recommendations to the President with respect thereto;

(4) to develop and recommend to the President national policies to foster and promote the improvement of environmental quality to meet the conservation, social, economic, health, and other requirements and goals of the Nation;

(5) to conduct investigations, studies, surveys, research, and analyses relating to ecological systems and environmental quality;

(6) to document and define changes in the natural environment, including the plant and animal systems, and to accumulate necessary data and other information for a continuing analysis of these changes or trends and an interpretation of their underlying causes;

(7) to report at least once each year to the President on the state and condition of the environment; and

(8) to make and furnish such studies, reports thereon, and recommendations with respect to matters of policy and legislation as the President may request. (Pub. L. No. 91-190, title II, §204, Jan. 1, 1970, 83 Stat. 855.)

§4345. Consultation with Citizens' Advisory Committee on Environmental Quality and other representatives

In exercising its powers, functions, and duties under this chapter, the Council shall—

(1) consult with the Citizens' Advisory Committee on Environmental Quality established by Executive Order numbered 11472, dated May 29, 1969, and with such representatives of science, industry, agriculture, labor, conservation organizations, State and local governments and other groups, as it deems advisable; and

(2) utilize, to the fullest extent possible, the services, facilities, and information (including statistical information) of public and private agencies and organizations, and individuals, in order that duplication of effort and expense may be avoided, thus assuring that the Council's activities will not unnecessarily overlap or conflict with similar activities authorized by law and performed by established agencies.

(Pub. L. No. 91-190, title II, §205, Jan. 1, 1970, 83 Stat. 855.)

§4346. Tenure and compensation of members

Members of the Council shall serve full time and the Chairman of the Council shall be compensated at the rate provided for Level II of the Executive Schedule Pay Rates (5 U.S.C. 5313). The other members of the Council shall be

compensated at the rate provided for Level IV or the Executive Schedule Pay Rates (5 U.S.C. 5315).
(Pub. L. No. 91-190, title II, §206, Jan. 1, 1970, 83 Stat. 856.)

§4346a. Travel reimbursement by private organizations and Federal, State, and local governments

The Council may accept reimbursements from any private nonprofit organization or from any department, agency, or instrumentality of the Federal Government, any State, or local government, for the reasonable travel expenses incurred by an officer or employee of the Council in connection with his attendance at any conference, seminar, or similar meeting conducted for the benefit of the Council.
(Pub. L. No. 91-190, title II, §207, as added Pub. L. No. 94-52, §3, July 3, 1975, 89 Stat. 258.)

§4346b. Expenditures in support of international activities

The Council may make expenditures in support of its international activities, including expenditures for: (1) international travel; (2) activities in implementation of international agreements; and (3) the support of international exchange programs in the United States and in foreign countries.
(Pub. L. No. 91-190, title II, §208, as added Pub. L. No. 94-52, §3, July 3, 1975, 89 Stat. 258.)

§4347. Authorization of appropriations

There are authorized to be appropriated to carry out the provisions of this chapter not to exceed \$300,000 for fiscal year 1970, \$700,000 for fiscal year 1971, and \$1,000,000 for each fiscal year thereafter.
(Pub. L. No. 91-190, title II, §209, formerly §207, Jan. 1, 1970, 83 Stat. 856, renumbered §209, Pub. L. No. 94-52, §3, July 3, 1975, 89 Stat. 258.)

EXECUTIVE OFFICE OF THE PRESIDENT
Council on Environmental Quality
Washington, D.C. 20503

Summary of the Proceedings of a Workshop on

**NEPA Integration: Effective, Efficient
Environmental Compliance in the 1990s**

conducted at

Hyatt Fairlakes, Fairfax, Virginia
March 13-15, 1991

Prepared by Carl Bausch
Assistant General Counsel
Council on Environmental Quality

December, 1991

FROM THE CHAIRMAN

At the close of 1969 Congress charted a bold, imaginative course for safeguarding and improving environmental quality when it enacted the National Environmental Policy Act (NEPA). What distinguished NEPA--and still does--from all other environmental legislation was Congress' departure from the traditional, single-solution approach to environmental problems. The prime significance of NEPA is centered in its expressed determination to move the nation comprehensively toward the act's major goal--"to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans." In a statutory scheme that reflects great balance, NEPA endeavors to secure that goal through integrating the entire range of environmental values meaningfully into society's pursuit of other important policies and values in a variety of ways, including open, thought-provoking governmental decisionmaking procedures, education, research, and data gathering. Yet, throughout the 21-year history of NEPA, citizens have focused primarily on a solitary provision of the act--the environmental impact statement requirement contained in section 102(2)(C).

A number of indicators--systematic agency-wide consideration of environmental factors; widespread public involvement in federal decisionmaking that affects environmental quality; and proliferation of environmental policy legislation at the state and local levels of government--suggest that NEPA has achieved a large measure of success. At the same time, however, there is evidence that a principal function of NEPA--dealing comprehensively with environmental problems on a preventative and an anticipatory basis--has given way to a tendency on the part of agencies tasked with carrying out that function simply to catalogue reasonably expected impacts of projects that have already been planned. A preoccupation with "process" may account for some operational weakness in the act, although the self-interest with which society has generally approached environmental management practices is probably equally to blame. Despite the successes of NEPA over the past two decades, there is little doubt among observers today that the act is not functioning at its full potential--the achievement of which, most agree, will not require lengthier documents containing greater detail or a more protracted process; quite the contrary.

It was for the purpose of exploring ways in which NEPA could more effectively and efficiently contribute to achieving the national goals of a high quality environment and economic progress that a special workshop, sponsored jointly by the Council on Environmental Quality (CEQ) and the United States Environmental Protection Agency (EPA), was convened in March 1991. The theme of the workshop was "integration," a concept that is central to the vitality of NEPA, as explained more fully in the section that follows. More than 100 experts, collectively possessing nearly 1,000 years of experience in all phases of environmental management, participated in the three-day workshop. The material that follows represents a synthesis of the best thinking of participants concerning NEPA and how it can meet society's current needs.

Environmental quality as a public policy issue is complex and emotional, one that defies summary treatment. The material that follows does not reflect every sentiment, however worthy, that was expressed at the workshop. Rather, only those ideas that bear directly and consequentially on the ability of NEPA to achieve its goal—a productive, mutually beneficial, and lasting relationship between humankind and its environment—are set forth below. If progress toward making NEPA more effective and efficient is to be made, then attention and resources must be focused on the most compelling environmental management needs.

Finally, this initiative is just the beginning of what I hope will become an ongoing dialogue among representatives of government, industry, nongovernmental organizations, and the public on methods to improve environmental management practices under NEPA. There are likely to be disagreements along the way—environmental quality is after all a personal as well as a collective affair and every citizen is apt to approach it a little differently depending on his or her own subjective experiences. Still, if meaningful, lasting improvements are to be effected in the administration of NEPA, then society must seek to act in concert toward that end.

A handwritten signature in black ink, appearing to read "Michael R. Deland". The signature is fluid and cursive, with a large initial "M" and a long, sweeping underline.

Michael R. Deland, *Chairman*

INTEGRATING ENVIRONMENTAL CONSIDERATIONS UNDER NEPA

Congress designed NEPA to provide a flexible framework within which the goal of a high quality environment for all citizens can be achieved in balance with other essential needs of society. The act was not intended to straightjacket agencies of the federal government, to add inordinately to administrative burdens, or to detract in any way from their primary missions and functions. Rather, federal agencies in cooperation with other authorities and interests are expected through the provisions of NEPA to manage for the long term those aspects of the human environment that are affected by their activities. The basic objective of NEPA is straightforward--integrate environmental quality objectives comprehensively into planning and decisionmaking activities. It is environmental quality as a public policy issue--a combination of technologic, socio-economic, legal, institutional, and political challenges--that tends to complicate the nation's collective pursuit of environmental management objectives.

In the public policy arena environmental quality competes with other essential societal needs and values. Indeed, it was for the purpose of enabling environmental quality to compete on an equal footing with other important policies that Congress enacted NEPA. Experience with NEPA demonstrates, however, that environmental quality often suffers a competitive disadvantage for a variety of reasons, including an absence of agency-wide methods and procedures which will insure, consistent with section 102(2)(B) of the act, "that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations."

The operative provisions of NEPA were constructed around the concept of integration which may be considered at two levels. At one level, integration contemplates merging under the NEPA "umbrella" all environmental laws and regulations that apply to a particular proposal. At another level, the merged environmental considerations or values must be "balanced" with other important policies and goals that flow from agencies' existing authorizations. But each process--merging applicable environmental laws and regulations and rationalizing and coordinating environmental and nonenvironmental policies that apply to planning and decisionmaking activities--requires an overarching policy and efficient integrative procedures. NEPA and the CEQ regulations supply both.

For purposes of federal agency decisionmaking, the concept of integration under NEPA is most evident in the environmental impact statement (EIS) requirements contained in section 102(2)(C) of the act. Those requirements are further refined in the CEQ implementing regulations which seek to standardize the basic approach to EIS development without depriving agencies of necessary discretion. CEQ incorporated into its regulations a system of procedures that can be adapted to the decisionmaking practices of any agency for the purpose of integrating environmental considerations meaningfully and efficiently into its more mission-oriented activities.

Although the CEQ regulations concentrate on the EIS process, "major federal actions" to which that process applies account for just a fraction of all decisionmaking which, in a cumulative sense, may very substantially affect environmental quality. But integration of environmental considerations into planning and decisionmaking is not reserved exclusively for major federal actions or the agencies that undertake them. Section 102(2)(E) of NEPA requires federal agencies to develop alternatives for all proposals in which the disposition of available resources is at issue. And under title II of the act, CEQ is assigned a leadership role in information gathering and reporting, program review, and policy development, all for the purpose of integrating concern for environmental quality into the sociocultural fabric of the nation's system of free enterprise democracy.

NEPA is not a one-dimensional statute any more than environmental quality is a one-dimensional issue. Sound environmental management contemplates more than just "process." NEPA, read as a whole, clearly supports the need for a balanced approach, one that combines education, research, and practical management techniques, including a system of incentives, to integrate environmental and nonenvironmental policies. Striking that balance requires organizational initiative and resourceful, imaginative strategies.

Meaningful integration of environmental considerations under NEPA need not be difficult, mysterious, or ultrasophisticated; it is simply a matter of efficiently and effectively informing policy and value choices that must be made in the context of planning and decisionmaking processes. The vehicle through which necessary information is conveyed will vary depending on the circumstances, including type of planning process (e.g., policy, program, or project) and its initiator, the magnitude of the undertaking, and the stage of development. In any case, attaining the goals and objectives of NEPA requires great forethought and cooperation on the part of both the public and private sectors to meet the ever-changing needs of a dynamic society.

PLANNING FOR AND MANAGING THE ENVIRONMENT UNDER NEPA

A. *Agency Planning and Decisionmaking*

1. The NEPA process is much less likely to achieve environmental quality objectives in cases where it is employed, not as a planning tool, but simply as a tabulator of impacts for projects already in the design stage. There is a tendency on the part of federal agencies today to use the NEPA process primarily as a tabulator of impacts.

2. Early environmental planning assures that all reasonable alternatives are explored and that there is ample time to identify and resolve difficult issues so that agency action is not unduly delayed. In an ideal world, NEPA would be effectively employed in the planning process to avoid environmental degradation and thus the felt need to prepare bloated, unavailing EISs. When used as a planning tool, the NEPA process will not produce the type of document that citizens have come to expect. There is a dearth of agency-wide case studies available that illustrate the NEPA process in action as a planning tool.

3. Agencies are often reluctant to use the flexibility inherent in NEPA and the CEQ regulations. Many agencies have failed to update their NEPA procedures for the purpose of keeping pace with ever more complex contexts to which the NEPA process must be applied. Existing regulations, if utilized by agencies to full advantage, are entirely adequate to resolve most integration problems.

4. In an era of increasingly leaner federal budgets it is essential that the NEPA process be undertaken in the most efficient manner possible. Integrating environmental considerations into agency policies and programs may help to stem—but will not eliminate altogether—inefficient project-by-project application of the NEPA process for which most agencies have demonstrated a preference. Applying the NEPA process at the policy and program levels will promote environmental quality objectives on a broader, more cost-effective scale.

5. There is a tendency to undertake examination of anticipated environmental effects in near-microscopic detail which may help to explain why agencies are somewhat reluctant to apply NEPA to policies and programs. The depth to which those effects are examined in various settings is not always reasonably related to the nature and scope of the activity under review and the capacity to influence that activity in a productive, meaningful way from the standpoint of environmental quality.

6. There is no special "formula" for analyzing cumulative effects or indirect impacts. If the NEPA process is used as a planning tool, then common sense--the "rule of reason"--will normally provide sufficient guidance for such analyses. Good examples of the NEPA process in action as a planning tool are always useful and need to be sought out and showcased by CEQ.

7. Many agencies do not provide written instructions or guidelines of what is needed to satisfy environmental planning and documentation requirements, whether from the standpoint of prospective applicants or participants in the NEPA process, including the public. While many agency officials may be reluctant to give advice that might be construed as prejudging the merits of a particular project, some advice, based on practical knowledge gained in similar settings, could often help project planners avoid mistakes of the past. Likewise, the entire administrative process would benefit from structured, informed participation by the public and other interests in the environmental component of that process. Agencies need to publish and continually update guidance for participating in the NEPA process.

8. The public and private sectors are not completely aware of the fact that using NEPA as a planning tool makes good economic sense. Avoiding environmental degradation in the planning stages--a principal purpose of NEPA--is often far less costly than applying NEPA after the fact--after projects have been planned--to mitigate environmental harm.

9. Agencies do not always devote enough effort to facilitating integration of environmental factors into early (prefiling) project planning by applicants and sponsors, not for the purpose of dictating results, but simply to assure that the NEPA process is conducted in the most effective, efficient manner possible. Applicants and sponsors should be, but are not always, given full credit for all early (prefiling) environmental planning undertaken consistent with the principles and mandates of NEPA.

10. Agencies that confer benefits--grants, licenses, and the like--on applicants or sponsors are normally required to recoup the cost of processing applications, including the cost of preparing required environmental studies. Such agencies generally have not given sufficient consideration to allowing applicants

- to proceed under the more efficient third-party contracting arrangement where EISs are required; or
- to prepare environmental assessments where that form of documentation is called for.

Under options described above, agencies could not charge a document-preparation fee but necessary environmental documentation could be expeditiously prepared pursuant to agency guidance and with assistance in advance of application filing, thereby greatly reducing administrative delay while developing a more meaningful product at less overall cost.

11. Highly competitive industries that make application to the federal government for licenses and grants may be reluctant to broadcast their plans to potential competitors in advance of application filing. As a consequence, it may not be possible for NEPA to be integrated fully into the early planning processes of such industries.

12. The extent to which the general prohibition against *ex parte* communications must be applied, if at all, in the context of the NEPA process is not entirely clear, although its application does not promote efficient environmental planning.

B. *Agency Coordination and Cooperation*

1. There is need for greater cooperation in the NEPA process within and among agencies at all levels of government. The barriers to effective, efficient cooperation are largely attitudinal. Considerable time and money are wasted arguing about the propriety of a particular agency position instead of trying to reach a reasonable accommodation-- a constructive compromise.

2. Outside assistance is often needed--but not always pursued--to resolve differences among and between agencies. Alternative means of securing such assistance might include

- consultation with CEQ;
- compacts to facilitate integration of agency responsibilities;
- standardized procedures or model memoranda of agreement;
- an administrative framework or matrix that would allow two or more agencies to share decisionmaking responsibilities; and
- alternative dispute resolution measures.

3. Frequent personnel and organizational changes within the bureaucracy require that the CEQ listing of agency contacts and areas of expertise be periodically updated to assist policy, program, and project sponsors in identifying other agencies whose cooperation may be required in the early planning stages.

4. A single, reliable set of environmental indicators, comparable to economic indicators used to communicate economic trends in cost of living, national product, and other areas, is needed and should be developed and made available to all agencies as quickly as possible. This measure will help to build consistency--not redundancy--into environmental analyses under NEPA and other environmental laws. Such indicators are also essential to enable officials to assess with some degree of confidence the effectiveness of ongoing environmental policies and programs.

5. Cooperating agencies are generally reluctant to commit funds to studies in which they have been asked to participate, especially in the very early stages of development.

C. *Education*

1. An education effort is needed to reinforce within the federal family a sense of environmental responsibility. It is especially important that decisionmakers and top-level managers understand NEPA and its process so that potential gains at the staff level are not frustrated by a lack of support at higher levels of government. Effective integration under NEPA requires that all levels of government manage the environment cooperatively.

2. NEPA is generally equated with the EIS process which for many citizens (including those who would use that process to try to defeat unpopular projects) stands for administrative delay, excessive, often incomprehensible paperwork, and high costs. Society must relearn that NEPA was designed primarily as a planning tool, the effective use of which will often obviate the need for preparing the type of documentation that has become the hallmark of the EIS process over the past two decades.

D. *Public Participation*

1. Insufficient opportunity for public participation in the NEPA process can lead to misunderstandings, delays, and litigation. A *fully* informed public with adequate opportunity to participate in environmental planning is much more likely to accept the policy and value choices on which decisionmakers may settle, even when such choices do not meet the desires or expectations of particular segments of society.

2. There is need for more readable NEPA documents. The public cannot meaningfully participate in environmental planning if documents are couched in technical terms that laypeople cannot understand.

E. *Other*

1. There is concern over the extent to which material contained in program statements may be challenged or revisited in documents prepared for projects that are spawned by those programs. The need for finality must somehow be balanced with the need to take into account changed circumstances. It should not be impermissible to treat weaknesses in program documents, whether caused by changed circumstances or simply the passage of time, in subsequent project-oriented documents as long as the fundamentals of the NEPA process are otherwise observed.

2. Judicial review of the environmental process is unpredictable. As a consequence, there is a tendency on the part of many agencies to prepare lengthy, nonanalytic environmental documents designed to "withstand" judicial scrutiny and not necessarily provide decisionmakers and the public with good, useful environmental data.

THE WHITE HOUSE

Office of the Press Secretary

April 11, 1994

EXECUTIVE ORDER

12906
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COORDINATING GEOGRAPHIC DATA ACQUISITION AND ACCESS:
THE NATIONAL SPATIAL DATA INFRASTRUCTURE

Geographic information is critical to promote economic development, improve our stewardship of natural resources, and protect the environment. Modern technology now permits improved acquisition, distribution, and utilization of geographic (or geospatial) data and mapping. The National Performance Review has recommended that the executive branch develop, in cooperation with State, local, and tribal governments, and the private sector, a coordinated National Spatial Data Infrastructure to support public and private sector applications of geospatial data in such areas as transportation, community development, agriculture, emergency response, environmental management, and information technology.

NOW, THEREFORE, by the authority vested in me as President by the Constitution and the laws of the United States of America; and to implement the recommendations of the National Performance Review; to advance the goals of the National Information Infrastructure; and to avoid wasteful duplication of effort and promote effective and economical management of resources by Federal, State, local, and tribal governments, it is ordered as follows:

Section 1. Definitions. (a) "National Spatial Data Infrastructure" ("NSDI") means the technology, policies, standards, and human resources necessary to acquire, process, store, distribute, and improve utilization of geospatial data.

(b) "Geospatial data" means information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the earth. This information may be derived from, among other things, remote sensing, mapping, and surveying technologies. Statistical data may be included in this definition at the discretion of the collecting agency.

(c) The "National Geospatial Data Clearinghouse" means a distributed network of geospatial data producers, managers, and users linked electronically.

Sec. 2. Executive Branch Leadership for Development of the Coordinated National Spatial Data Infrastructure. (a) The Federal Geographic Data Committee ("FGDC"), established by the Office of Management and Budget ("OMB") Circular No. A-16 ("Coordination of Surveying, Mapping, and Related Spatial Data Activities") and chaired by the Secretary of the Department of the Interior ("Secretary") or the Secretary's designee, shall coordinate the Federal Government's development of the NSDI.

(b) Each member agency shall ensure that its representative on the FGDC holds a policy-level position.

(c) Executive branch departments and agencies ("agencies") that have an interest in the development of the NSDI are encouraged to join the FGDC.

(d) This Executive order is intended to strengthen and enhance the general policies described in OMB Circular No. A-16. Each agency shall meet its respective responsibilities under OMB Circular No. A-16.

(e) The FGDC shall seek to involve State, local, and tribal governments in the development and implementation of the initiatives contained in this order. The FGDC shall utilize the expertise of academia, the private sector, professional societies, and others as necessary to aid in the development and implementation of the objectives of this order.

Sec. 3. Development of a National Geospatial Data Clearinghouse. (a) Establishing a National Geospatial Data Clearinghouse. The Secretary, through the FGDC, and in consultation with, as appropriate, State, local, and tribal governments and other affected parties, shall take steps within 6 months of the date of this order, to establish an electronic National Geospatial Data Clearinghouse ("Clearinghouse") for the NSDI. The Clearinghouse shall be compatible with the National Information Infrastructure to enable integration with that effort.

(b) Standardized Documentation of Data. Beginning 9 months from the date of this order, each agency shall document all new geospatial data it collects or produces, either directly or indirectly, using the standard under development by the FGDC, and make that standardized documentation electronically accessible to the Clearinghouse network. Within 1 year of the date of this order, agencies shall adopt a schedule, developed in consultation with the FGDC, for documenting, to the extent practicable, geospatial data previously collected or produced, either directly or indirectly, and making that data documentation electronically accessible to the Clearinghouse network.

(c) Public Access to Geospatial Data. Within 1 year of the date of this order, each agency shall adopt a plan, in consultation with the FGDC, establishing procedures to make geospatial data available to the public^A to the extent permitted by law, current policies, and relevant OMB circulars, including OMB Circular No. A-130 ("Management of Federal Information Resources") and any implementing bulletins.

(d) Agency Utilization of the Clearinghouse. Within 1 year of the date of this order, each agency shall adopt internal procedures to ensure that the agency accesses the Clearinghouse before it expends Federal funds to collect or produce new geospatial data, to determine whether the information has already been collected by others, or whether cooperative efforts to obtain the data are possible.

(e) Funding. The Department of the Interior shall provide funding for the Clearinghouse to cover the initial prototype testing, standards development, and monitoring of the performance of the Clearinghouse. Agencies

shall continue to fund their respective programs that collect and produce geospatial data; such data is then to be made part of the Clearinghouse for wider accessibility.

Sec. 4. Data Standards Activities. (a) General FGDC Responsibility. The FGDC shall develop standards for implementing the NSDI, in consultation and cooperation with State, local, and tribal governments, the private and academic sectors, and, to the extent feasible, the international community, consistent with OMB Circular No. A-119 ("Federal Participation in the Development and Use of Voluntary Standards"), and other applicable law and policies.

(b) Standards for Which Agencies Have Specific Responsibilities. Agencies assigned responsibilities for data categories by OMB Circular No. A-16 shall develop, through the FGDC, standards for those data categories, so as to ensure that the data produced by all agencies are compatible.

(c) Other Standards. The FGDC may from time to time identify and develop, through its member agencies, and to the extent permitted by law, other standards necessary to achieve the objectives of this order. The FGDC will promote the use of such standards and, as appropriate, such standards shall be submitted to the Department of Commerce for consideration as Federal Information Processing Standards. Those standards shall apply to geospatial data as defined in section 1 of this order.

(d) Agency Adherence to Standards. Federal agencies collecting or producing geospatial data, either directly or indirectly (e.g. through grants, partnerships, or contracts with other entities), shall ensure, prior to obligating funds for such activities, that data will be collected in a manner that meets all relevant standards adopted through the FGDC process.

Sec. 5. National Digital Geospatial Data Framework. In consultation with State, local, and tribal governments and within 9 months of the date of this order, the FGDC shall submit a plan and schedule to OMB for completing the initial implementation of a national digital geospatial data framework ("framework") by January 2000 and for establishing a process of ongoing data maintenance. The framework shall include geospatial data that are significant, in the determination of the FGDC, to a broad variety of users within any geographic area or nationwide. At a minimum, the plan shall address how the initial transportation, hydrology, and boundary elements of the framework might be completed by January 1998 in order to support the decennial census of 2000.

Sec. 6. Partnerships for Data Acquisition. The Secretary, under the auspices of the FGDC, and within 9 months of the date of this order, shall develop, to the extent permitted by law, strategies for maximizing cooperative participatory efforts with State, local, and tribal governments, the private sector, and other nonfederal organizations to share costs and improve efficiencies of acquiring geospatial data consistent with this order.

Sec. 7. Scope. (a) For the purposes of this order, the term "agency" shall have the same meaning as the term "Executive agency" in 5 U.S.C. 105, and

shall include the military departments and components of the Department of Defense.

(b) The following activities are exempt from compliance with this order:

(i) national security-related activities of the Department of Defense as determined by the Secretary of Defense;

(ii) national defense-related activities of the Department of Energy as determined by the Secretary of Energy; and

(iii) intelligence activities as determined by the Director of Central Intelligence.

(c) The NSDI may involve the mapping, charting, and geodesy activities of the Department of Defense relating to foreign areas, as determined by the Secretary of Defense.

(d) This order does not impose any requirements on tribal governments.

(e) Nothing in the order shall be construed to contravene the development of Federal Information Processing Standards and Guidelines adopted and promulgated under the provisions of section 111(d) of the Federal Property and Administrative Services Act of 1949, as amended by the Computer Security Act of 1987 (Public Law 100-235); or any other United States law, regulation, or international agreement.

Sec. 8. Judicial Review. This order is intended only to improve the internal management of the executive branch and is not intended to, and does not, create any right to administrative or judicial review, or any other right or benefit or trust responsibility, substantive or procedural, enforceable by a party against the United States, its agencies or instrumentalities, its officers or employees, or any other person.

WILLIAM J. CLINTON

THE WHITE HOUSE,
April 11, 1994.

Department of the Interior
DEPARTMENTAL MANUAL

Environmental Quality Part 516 National Environmental
Policy Act of 1969

Protection and Enhancement
Chapter 1 of Environmental Quality 516 DM 1.2F

F. To provide, to the fullest extent practicable, timely information to the public to better assist in understanding Departmental plans and programs affecting environmental quality and to facilitate their involvement in the development of such plans and programs; and

G. To cooperate with and assist the CEQ.

1.3 General Responsibilities. The following responsibilities reflect the Secretary's decision that the officials responsible for making program decisions are also responsible for taking the requirements of NEPA into account in those decisions and will be held accountable for that responsibility:

A. Assistant Secretary--Policy, Budget and Administration.

(1) Is the Department's focal point on NEPA matters and is responsible for overseeing the Department's implementation of NEPA.

(2) Serves as the Department's principal contact with the CEQ.

(3) Assigns to the Director, Office of Environmental Project Review, the responsibilities outlined for that Office in this Part.

B. Solicitor. Is responsible for providing legal advice in the Department's compliance with NEPA.

C. Assistant Secretaries.

(1) Are responsible for compliance with NEPA, E.O. 11514, as amended, the CEQ regulations, and this Part for bureaus and offices under their jurisdiction.

(2) Will insure that, to the fullest extent possible, the policies, regulations, and public laws of the United States administered under their jurisdiction are interpreted and administered in accordance with the policies of NEPA.

Department of the Interior
DEPARTMENTAL MANUAL

Part 516 National Environmental
Environmental Quality Policy Act of 1969
Protection and Enhancement
Chapter 1 of Environmental Quality 516 DM 1.4A(1)

and decisions often require recognition of complements and resolution of conflicts among interrelated uses of these natural, cultural, and human resources within technological, budgetary, and legal constraints.

(2) Departmental project reports, program proposals, issue papers, and other decision documents must carefully analyze the various objectives, resources, and constraints, and comprehensively and objectively evaluate the advantages and disadvantages of the proposed actions and their reasonable alternatives. Where appropriate, these documents will utilize and reference supporting and underlying economic, environmental, and other analyses.

(3) The underlying environmental analyses will factually, objectively, and comprehensively analyze the environmental effects of proposed actions and their reasonable alternatives. They will systematically analyze the environmental impacts of alternatives, and particularly those alternatives and measures which would reduce, mitigate or prevent adverse environmental impacts or which would enhance environmental quality. However, such an environmental analysis is not, in and of itself, a program proposal or the decision document, is not a justification of a proposal, and will not support or deprecate the overall merits of a proposal or its various alternatives.

B. In Internally Initiated Proposals. Officials responsible for development or conduct of planning and decisionmaking systems within the Department shall incorporate to the maximum extent necessary environmental planning as an integral part of these systems in order to insure that environmental values and impacts are fully considered and in order to facilitate any necessary documentation of those considerations.

C. In Externally Initiated Proposals. Officials responsible for development or conduct of loan, grant, contract, lease, license, permit, or other externally initiated activities shall require applicants, to the extent necessary and practicable, to provide environmental information, analyses, and reports as an integral part of their applications. This will serve to encourage applicants to incorporate environmental considerations into their planning

Department of the Interior
DEPARTMENTAL MANUAL

Part 516 National Environmental
Environmental Quality Policy Act of 1969
Protection and Enhancement
Chapter 1 of Environmental Quality 516 DM 1.5B(3)

programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of the world environment.

C. Plans and Programs of Other Agencies and Organizations

(1) Officials responsible for protecting, conserving, developing, or managing resources under the Department's jurisdiction shall coordinate and cooperate with State, local, and Indian tribal governments, other bureaus and Federal agencies, and public and private organizations and individuals, and provide them with timely information concerning the environmental effects of these entities' plans and programs.

(2) Bureaus and offices are encouraged to participate early in the planning processes of other agencies and organizations in order to insure full cooperation with and understanding of the Department's programs and interests in natural, cultural, and human resources.

(3) Bureaus and offices will utilize to the fullest extent possible, existing Departmental review mechanisms to avoid unnecessary duplication of effort and to avoid confusion by other organizations.

1.6 Public Involvement. Bureaus and offices, in consultation with the Office of Public Affairs, will develop and utilize procedures to insure the fullest practicable provision of timely public information and understanding of their plans and programs with environmental impact including information on the environmental impacts of alternative courses of action. These procedures will include, wherever appropriate, provision for public meetings or hearings in order to obtain the views of interested parties. Bureaus and offices will also encourage State and local agencies and Indian tribal governments to adopt similar procedures for informing the public concerning their activities affecting the quality of the environment. (See also 301 DM 2.)

DEPARTMENT OF THE INTERIOR
DEPARTMENTAL MANUAL

Part 516 National Environmental
Environmental Quality Policy Act of 1969

Chapter 2 Initiating the NEPA Process 516 DM 2.1

2.1 Purpose. This Chapter provides supplementary instructions for implementing those portions of the CEQ regulations pertaining to initiating the NEPA process.

2.2 Apply NEPA Early (1501.2).

A. Bureaus will initiate early consultation and coordination with other bureaus and any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved, and with appropriate Federal, State, local and Indian tribal agencies authorized to develop and enforce environmental standards.

B. Bureaus will also consult early with interested private parties and organizations, including when the Bureau's own involvement is reasonably foreseeable in a private or non-Federal application.

C. Bureaus will revise or amend program regulations or directives to insure that private or non-Federal applicants are informed of any environmental information required to be included in their applications and of any consultation with other Federal agencies, and State, local or Indian tribal governments required prior to making the application. A list of these regulations or directives will be included in each Bureau Appendix to Chapter 6.

2.3 Whether to Prepare an EIS (1501.4).

A. Categorical Exclusions (CX) (1508.4).

(1) The following criteria will be used to determine actions to be categorically excluded from the NEPA process: (a) The action or group of actions would have no significant effect on the quality of the human environment; and (b) The action or group of actions would not involve unresolved conflicts concerning alternative uses of available resources.

(2) Based on the above criteria, the classes of actions listed in Appendix 1 to this Chapter are categorically excluded, Department-wide, from the NEPA process. A list of CX specific to Bureau programs will be included in each Bureau Appendix to Chapter 6.

(3) The exceptions listed in Appendix 2 to this Chapter apply to individual actions within CX. Environmental documents must be prepared for any actions involving these exceptions.

(4) Notwithstanding the criteria, exclusions and exceptions above, extraordinary circumstances may dictate or a responsible Departmental or Bureau official may decide to prepare an environmental document.

B. Environmental Assessment (EA) (1508.9). See 516 DM 3.

C. Finding of No Significant Impact (FONSI) (1508.13). A FONSI will be prepared as a separate covering document based upon a review of an EA. Accordingly, the words include(d) in Section 1508.13 should be interpreted as attach(ed).

DEPARTMENT OF THE INTERIOR
DEPARTMENTAL MANUAL

Part 516 National Environmental
Environmental Quality Policy Act of 1969

Chapter 2 Initiating the NEPA Process 516 DM 2.3D

D. Notice of Intent (NOI) (1508.22). A NOI will be prepared as soon as practicable after a decision to prepare an environmental impact statement and shall be published in the Federal Register, with a copy to the Office of Environmental Project Review, and made available to the affected public in accordance with Section 1506.6. Publication of a NOI may be delayed if there is proposed to be more than three (3) months between the decision to prepare an environmental impact statement and the time preparation is actually initiated. The Office of Environmental Project Review will periodically publish a consolidated list of these notices in the Federal Register.

E. Environmental Impact Statement (EIS) (1508.11). See 516 DM 4. Decisions/actions which would normally require the preparation of an EIS will be identified in each Bureau Appendix to Chapter 6.

2.4 Lead Agencies (1501.5).

A. The Assistant Secretary-Policy, Budget and Administration will designate lead Bureaus within the Department when Bureaus under more than one Assistant Secretary are involved and will represent the Department in consultations with CEQ or other Federal agencies in the resolution of lead agency determinations.

B. Bureaus will inform the Office of Environmental Project Review of any agreements to assume lead agency status.

C. A non-Federal agency will not be designated as a joint lead agency unless it has a duty to comply with a local or State EIS requirement that is comparable to a NEPA statement. Any non-Federal agency may be a cooperating agency by agreement. Bureaus will consult with the Solicitor's Office in cases where such non-Federal agencies are also applicants before the Department to determine relative lead/cooperating agency responsibilities.

2.5 Cooperating Agencies (1501.6).

A. The Office of Environmental Project Review will assist Bureaus and coordinate requests from non-Interior agencies in determining cooperating agencies.

B. Bureaus will inform the Office of Environmental Project Review of any agreements to assume cooperating agency status or any declinations pursuant to Section 1501.6(c).

2.6 Scoping (1501.7).

A. The invitation requirement in Section 1501.7(a)(1) may be satisfied by including such an invitation in the NOI.

B. If a scoping meeting is held, consensus is desirable; however, the lead agency is ultimately responsible for the scope of an EIS.

2.7 Time Limits (1501.8). When time limits are established they should reflect the availability of personnel and funds.

DEPARTMENT OF THE INTERIOR

DEPARTMENTAL MANUAL

Chapter 2 Appendix 1. Departmental Categorical Exclusions

The following actions are categorical exclusions (CX) pursuant to 516 DM 2.3A(2). However, environmental documents will be prepared for individual actions within these CX if the exceptions listed in 516 DM 2, Appendix 2, apply.

1.1 Personnel actions and investigations and personnel services contracts.

1.2 Internal organizational changes and facility and office reductions and closings.

1.3 Routine financial transactions including such things as salaries and expenses, procurement contracts, guarantees, financial assistance, income transfers, audits, fees, bonds and royalties.

1.4 Law enforcement and legal transactions, including such things as arrests, investigations, patents, claims legal opinions, and judicial activities including their initiation, processing, settlement, appeal or compliance.

1.5 Regulatory and enforcement actions, including inspections, assessments, administrative hearings and decisions; when the regulations themselves or the instruments of regulations (leases, permits, licenses, etc.) have previously been covered by the NEPA process or are exempt from it

1.6 Non-destructive data collection, inventory (including field, aerial and satellite surveying and mapping), study, research and monitoring activities.

1.7 Routine and continuing government business, including such things as supervision, administration, operations, maintenance and replacement activities having limited context and intensity; e.g. limited size and magnitude or short-term effects

1.8 Management, formulation, allocation, transfer and reprogramming of the Department's budget at all levels. (This does not exclude the preparation of environmental documents for proposals included in the budget when otherwise required.)

1.9 Legislative proposals of an administrative or technical nature, including such things as changes in authorizations for appropriations, and minor boundary changes and land transactions; or having primarily economic, social, individual or institutional effects; and comments and reports on referrals of legislative proposals.

1.10 Policies, directives, regulations and guidelines of an administrative, financial, legal, technical or procedural nature; or the environmental effects of which are too broad, speculative or conjectural to lend themselves to meaningful analysis and will be subject later to the NEPA process, either collectively or case-by-case.

1.11 Activities which are educational, informational, advisory or consultative to other agencies, public and private entities, visitors, individuals or the general public.

DEPARTMENT OF THE INTERIOR
DEPARTMENTAL MANUAL

*Chapter 2 Appendix 2. Exceptions to
Categorical Exclusions*

The following exceptions apply to individual actions within categorical exclusions (CX). Environmental documents must be prepared for actions which may:

2.1 Have significant adverse effects on public health or safety.

2.2 Have adverse effects on such unique geographic characteristics as historic or cultural resources, park, recreation or refuge lands, wilderness areas, wild or scenic rivers, sole or principal drinking water aquifers, prime farmlands, wetlands, floodplains or ecologically significant or critical areas including those listed on the Department's National Register of Natural Landmarks.

2.3 Have highly controversial environmental effects.

2.4 Have highly uncertain and potentially significant environmental effects or involve unique or unknown environmental risks.

2.5 Establish a precedent for future action or represent a decision in principle about future actions with potentially significant environmental effects.

2.6 Be directly related to other actions with individually insignificant but cumulatively significant environmental effects.

2.7 Have adverse effects on properties listed or eligible for listing on the National Register of Historic Places.

2.8 Have adverse effects on species listed or proposed to be listed on the List of Endangered or Threatened Species, or have adverse effects on designated Critical Habitat for these species.

2.9 Require compliance with Executive Order 11988 (Floodplain Management), Executive Order 11990 (Protection of Wetlands), or the Fish and Wildlife Coordination Act.

2.10 Threaten to violate a Federal, State, local or tribal law or requirement imposed for the protection of the environment.

DEPARTMENT OF THE INTERIOR
DEPARTMENTAL MANUAL

Part 516 National Environmental
Environmental Quality Policy Act of 1969

Chapter 3 Environmental Assessments 516 DM 3.1

3.1 Purpose. This Chapter provides supplementary instructions for implementing those portions of the CEQ regulations pertaining to environmental assessments (EA).

3.2 When to Prepare (1501.3).

A. An EA will be prepared for all actions, except those covered by a categorical exclusion, covered sufficiently by an earlier environmental document, or for those actions for which a decision has already been made to prepare an EIS. The purpose of such an EA is to allow the responsible official to determine whether to prepare an EIS.

B. In addition, an EA may be prepared on any action at any time in order to assist in planning and decisionmaking.

3.3 Public Involvement.

A. Public notification must be provided and, where appropriate, the public involved in the EA process (1506.6).

B. The scoping process may be applied to an EA (1501.7).

3.4 Content.

A. At a minimum, an EA will include brief discussions of the need for the proposal, of alternatives as required by Section 102(2)(E) of NEPA, of the environmental impacts of the proposed action and such alternatives, and a listing of agencies and persons consulted (1508.9(b)).

B. In addition, an EA may be expanded to describe the proposal, a broader range of alternatives, and proposed mitigation measures if this facilitates planning and decisionmaking.

C. The level of detail and depth of impact analysis should normally be limited to that needed to determine whether there are significant environmental effects.

D. An EA will contain objective analyses which support its environmental impact conclusions. It will not, in and of itself, conclude whether or not an EIS will be prepared. This conclusion will be made upon review of the EA by the responsible official and documented in either a NOI or FONSI.

3.5 Format.

A. An EA may be prepared in any format useful to facilitate planning and decisionmaking.

B. An EA may be combined with any other planning or decisionmaking document; however, that portion which analyzes the environmental impacts of the proposal and alternatives will be clearly and separately identified and not spread throughout or interwoven into other sections of the document.



Intergovernmental Decisionmaking for Environmental Protection and Public Works

Executive Summary

As the population and economy of the United States grow, the nation needs new highways, airports, dams, wastewater treatment plants, and solid waste facilities. At the same time, the United States is committed to meeting increasingly rigorous environmental goals to improve the quality of air, water, and wildlife habitat; to halt wetlands conversions; to preserve wilderness areas; and to eliminate the emission of toxic substances.

Federal environmental laws and review processes (permitting, licensing, approval or veto, impact reviews) have helped reduce the adverse environmental effects of public works projects during the past two decades. Yet, Americans' lifestyle choices—how we live, produce, consume, farm, travel—continue to threaten the health of the environment.

This study, *Intergovernmental Decisionmaking for Environmental Protection and Public Works*, identifies conflicts between proposed state and local public works projects and the federal environmental decisionmaking process. The two goals of protecting the environment and providing adequate infrastructure are compatible in theory, but often they do not mesh well under existing policies.

The principal findings of the study are:

1. With respect to infrastructure, federal rules and procedures governing decisionmaking for protecting the environment often are complex, conflicting, difficult to apply, adversarial, costly, inflexible, and uncertain.
2. Federal decisionmaking rules and procedures too often result in delay, wasted effort and money, lost opportunities to accommodate both environmental protection and infrastructure objectives, prolonged litigation, and more process without necessarily providing more environmental protection.
3. There are five main reasons for the current difficulties in environmental decisionmaking:
 - (a) Some environmental standards, or their application, are unnecessarily arbitrary.
 - (b) Federal decisionmaking frequently has too many sequential steps and too many potential veto points, and is too detailed, pervasive, and distant from the site to be efficient, effective, and realistic.
 - (c) There are many agencies having different environmental responsibilities, multiple veto points, and diverse triggers for vetoes, but not enough data, analyses, expertise, money, time, and personnel to coordinate their activities.
 - (d) Mechanisms for balancing diverse needs and values and avoiding impasses and litigation are underdeveloped.
 - (e) Frequently, there is a failure to internalize full environmental costs within the total project costs that should be shared among all of the benefited parties.

Federal legislation establishing a framework for integrating federal environmental review actions has been in place for two decades in the *National Environmental Policy Act* (NEPA). Federal and state agencies seek to coordinate federal permit, license, and review requirements—including studies and data gathering, public review, and agency consultation—within the environmental impact statement process. Sometimes, public officials have difficulty doing this because of competing and incompatible statutory and regulatory mandates.

Under some federal laws, such as the *Clean Air Act*, *Clean Water Act*, *Endangered Species Act*, and *Department of Transportation Act*, a federal permit, license, or grant may not be approved if the project does not comply fully with specific uniform standards. Federal environmental laws and regulations also encompass two types of criteria for approving a public works project or for selecting the "best" alternative. For example, laws such as NEPA, the *Federal Power Act*, and the *Electric Consumers Protection Act* call for balancing environmental, economic, and social objectives. Others, such as the *Clean Air* and *Clean Water* acts' emissions and effluent standards, the *Clean Water Act* Section 404 wetlands "dredge-and-fill" regulations, and the *Endangered Species Act*, apply definitive environmental standards regardless of other needs.

Integration and coordination of the federal review and decisionmaking requirements and procedures can reduce project delays and costs while improving services to the public and protecting the environment. Several federal and state agencies have recently demonstrated that coordination, combined with consideration of the environment at every stage of project development, can increase the efficiency and effectiveness of the federal environmental review process.

The intergovernmental review process should clarify the environmental protection and infrastructure responsibilities of the federal, state, and local governments. Moreover, it should recognize a key role for the states in reconciling and mediating the interests of citizens, local governments, states, Indian tribes, and the federal government.

Although federal, state, and local agencies have made progress toward streamlining the process, more could be done within the present regulatory framework. It has been suggested that government officials get diverse public and private parties together early and often; foster and reward cooperation and compromise; conduct a single set of studies, analyses, and public hearings to meet multiple environmental requirements; and integrate review and decision criteria and methods. Other proposals include encouraging the use of administrative dispute resolution in place of litigation (*Administrative Dispute Resolution Act of 1990* and the *Negotiated Rulemaking Act of 1990*), and allocating adequate federal funding to implement federal environmental review requirements.

Changing our expectations about how public works and environmental goals can mesh satisfactorily will require additional education and training, research and development, and taxpayer/citizen commitment. It will also require changes in government processes.

Principles, Findings, and Recommendations

PRINCIPLES

1. *The nation's environment requires protection.*

The nation is committed to achieving increasingly effective protection of the environment. Federal government review processes have reduced the adverse environmental effects of public works projects during the past two decades; yet, our lifestyle choices—how we live, consume, farm, travel, and produce products—continue to threaten the health of the environment.

2. *The nation's economic well-being requires public and private infrastructure investment.*

America requires new highways, airports, drinking water supplies, sewage treatment plants, and solid waste facilities to meet growing population, economic development, international competitiveness, and quality of life needs.

3. *The intergovernmental processes used to achieve environmental protection and infrastructure goals in mutually satisfactory ways should be clear, cooperative, consistent, efficient, flexible, definitive, responsive, and fair to all concerns.*

These two goals—protecting the environment and providing adequate infrastructure—are compatible in theory, but often do not mesh well under existing policies. Changing our expectations about how public works and environmental goals can mesh satisfactorily will require additional education and training, research and development, and taxpayer/citizen commitment. It will also require changes in government processes.

Federal legislation establishing a framework for integrating federal environmental review actions has been in place for two decades in the form of the *National Environmental Policy Act* (NEPA). Federal and state agencies seek to coordinate federal permit, license, and review requirements—including studies and data gathering, public review, and agency consultation—within the environmental impact statement (EIS) process. Sometimes, public officials have great difficulty doing this because of competing and incompatible statutory and regulatory mandates.

Integration and coordination of federal review and decisionmaking requirements and procedures concerning state and local public works projects can reduce project delays and costs while improving services to the public and protecting the environment. Several federal and state agencies—especially in highway programs—have recently

demonstrated that agency coordination, combined with consideration of the environment at every stage of project development, can increase the efficiency and effectiveness, and decrease the time required for, the federal environmental review process.

4. *The intergovernmental review process also should clarify the environmental protection and infrastructure responsibilities of the federal, state, and local governments. Moreover, it should recognize a key role for the states in reconciling and mediating the interests of citizens, local governments, states, Indian tribes, and the federal government.*

Although federal, state, and local agencies have made progress toward streamlining the process, more could be done within the present regulatory framework. It has been suggested that government officials get diverse public and private parties together early and often; foster and reward cooperation and compromise; conduct a single set of studies, analyses, and public hearings to meet multiple environmental requirements; and integrate review and decision criteria and methods. Other proposals include encouraging the use of administrative dispute resolution in place of litigation, and allocating adequate federal funding to implement federal environmental review requirements.

FINDINGS

1. *With respect to infrastructure, present federal rules and procedures governing decisionmaking for protecting the environment often are complex, conflicting, difficult to apply, adversarial, costly, inflexible, and uncertain.*

Federal environmental laws affect the nature and timing of state and local public works by requiring (1) environmental permits (or licenses), (2) approval for grant funding subject to environmental constraints, and/or (3) environmental impact reviews. Although NEPA requires federal and state agencies to integrate and coordinate the review and decision processes, many projects go through a long series of sequential and distinct review and/or decision steps to satisfy federal environmental requirements.

For example, approval for dam construction may include the licensing review requirements of the Federal Energy Regulatory Commission (FERC); the preparation of an environmental impact statement (EIS); a *Clean Water Act* Section 404 permit from the U.S. Army Corps of Engineers and review of that permit by the Environmental Protection Agency; determination of impacts on endangered species by the U.S. Fish and Wildlife Service; and separate state and local government reviews.

The reasons for lack of coordination include separate and overlapping federal environmental laws, legislative committee jurisdictions, and implementing agency responsibilities; the large number of federal, state, and local agencies involved in decisionmaking; the gap between environmental agency responsibilities and the staff and budget resources to undertake the job; inadequate processes for accommodating differences; and insufficient communication and public participation.

2. *The present federal decisionmaking rules and procedures too often result in delay, wasted effort and money, lost opportunities to accommodate both environmental protection and infrastructure objectives, prolonged litigation, and more process without necessarily providing more environmental protection.*

Some experts contend that many conflicts between federal environmental decisionmaking and state and local public works projects could be avoided by considering the environment at all stages of planning, design, and implementation; identifying and addressing environmental priorities based on the degree of health and environmental risk; and developing public works designs and non-structural solutions to public works needs that do not create environmental permit and review problems.

Proponents say these actions will reduce the number of cases in which state and local projects generate difficult or adverse federal environmental funding and permit decisions; help avoid surprises at the permit or funding stage; decrease the potential for conflict between public works needs and environmental needs; and reduce project delays and unnecessary costs. Some public works agencies—but too few—view a healthy environment as a design criterion. The Federal Highway Administration, for example, is sponsoring pilot projects for state and local governments to encourage early and continuing inclusion of environmental considerations in transportation and road planning and design.

3. *There are five main reasons for the current difficulties with environmental decisionmaking:*
 - (a) *Some environmental standards, or their application, are unnecessarily arbitrary.*
 - (b) *Federal government decisionmaking frequently has too many sequential steps and too many potential veto points, and is too detailed, too pervasive, and too distant from the site to be efficient, effective, and realistic.*
 - (c) *There are many agencies having different environmental responsibilities, multiple veto points, and diverse triggers for vetoes, but not enough data, analyses, expertise, money, time, and personnel to coordinate their activities.*
 - (d) *Mechanisms for balancing diverse needs and values, and avoiding impasses and litigation, are underdeveloped.*
 - (e) *Frequently, there is a failure to internalize full environmental costs within the total project*

costs that should be shared among all of the benefited parties.

The EIS and permit processes are fundamentally different from each other. An EIS may provide valuable information for project design, open the review process to public comment, delay a project, add to a project's costs, or stop a project on procedural grounds. The permit (or license or grant review) decision focuses on two alternative results: either a project is allowed to proceed or it is stopped. Although mitigation can be negotiated in the permit process, there is frequently much greater opportunity for affected parties to be involved in the EIS process. In some instances, permitting, licensing, and funding requirements take precedence over the findings of an EIS.

Under some federal laws, such as the *Clean Air Act*, *Clean Water Act*, *Endangered Species Act*, and *Department of Transportation Act*, a federal permit, license, or grant may not be approved if the project does not comply fully with very specific uniform standards for protecting wetlands, endangered species, and air or water purity. Assessments prepared to support federal permits and grantmaking decisions often include data gathering and analysis similar to, but separate from, an EIS. However, the permit or grant review analysis is designed to determine on much narrower grounds whether the proposed project meets specific regulatory requirements.

In addition to these procedural differences, federal environmental laws and regulations encompass two types of criteria for approving a public works project or for selecting the "best" project alternative. First, laws such as NEPA and the *Federal Power Act* (and *Electric Consumers Protection Act*) call for balancing environmental, economic, and social objectives. But others, such as emissions and effluent standards under the *Clean Air* and *Clean Water* acts, wetlands "dredge-and-fill" regulations under Section 404 of the *Clean Water Act*, and the *Endangered Species Act*, apply definitive environmental standards regardless of other needs. These definitive standards emphasize the potential to veto rather than to suitably accommodate public works projects. They may be highly prescriptive and inflexible and may leave little room to account for site-specific differences or for the resource limitations of small communities.

When disagreements over public works projects cannot be resolved through normal channels, alternative dispute-resolution methods offer another means of avoiding costly and lengthy litigation. Dispute resolution has been used in several cases that included political controversies, a long time horizon, many stakeholders, and complex issues. Implementation of the federal *Administrative Dispute Resolution Act of 1990* and the *Negotiated Rulemaking Act of 1990* may encourage use of dispute resolution in cases where compromise or accommodation can be reached. The agreement recently reached between the Environmental Protection Agency, oil companies, and environmental advocacy groups on the reformulated fuels required by the 1990 *Clean Air Act* is an example of how this process can work.

These coordination activities, however, are labor intensive. It takes "up front" money and staff resources to

save money later in the form of reduced project delays and associated costs. The widening gap between growing environmental agency responsibilities and shrinking staff and budget resources to undertake the job (one of the principal causes of conflicts and delays) will make coordination activities increasingly difficult and unreliable in the future, unless changes are made in the system.

Adjustments in federal cost sharing for environmental mandates should be based on objective principles, with the federal government responsible for paying the costs of benefits that cross state lines, adjusting costs among states based on the relative strengths of their combined state and local tax bases, and absorbing the costs of repairing environmental damage done in the past as a result of federal programs and policies. Private parties gaining specific identifiable benefits should pay the costs of providing those benefits, and state and local governments should share in paying the remaining costs.

RECOMMENDATIONS

Recommendation 1 Integrated Administration of Federal Environmental Protection Laws through the National Environmental Policy Act and the Council on Environmental Quality

The Commission finds that the *National Environmental Policy Act*, administered by the Council on Environmental Quality (CEQ) and frequently identified with the environmental impact statement (EIS) process, provides principles for integrating a wide range of environmental decisionmaking requirements. Most concerns about environmental decisionmaking and public works can be addressed through the EIS process. Council regulations cover the following problems: integration of interagency requirements, coordination, length of documents, delay, duplication, and arbitration. However, the Council does not have statutory authority for the regulations, nor does it have adequate resources to properly implement the act. Additional explicit statutory language could make the process work better for all governments—federal, state, and local. Such statutory authority also might help reduce the judicial challenges that frequently cause uncertainty and delay in the decisionmaking process.

The Commission recommends, therefore, that the National Environmental Policy Act (NEPA) be strengthened to make the intergovernmental decisionmaking process more cooperative, consistent, flexible, definitive, and fair to all concerns. The U.S. Council on Environmental Quality (CEQ) should be given statutory authority over the NEPA regulations and adequate resources for coordinating implementation by agencies. Administrative procedures should be reviewed, under authority of the amended act, to improve decisionmaking by:

(a) *Developing a coherent strategy for avoiding or mitigating conflicts between environmental protection and public works goals, based on:*

- *Consideration of environmental protection goals at all stages of planning, design, and implementa-*

tion, beginning from the earliest stages before alternative projects are developed or considered;

- *Comparative environmental risk assessments;*
- *Nonstructural and other project designs that do not lead to environmental permit and review problems;*
- *Sound ecosystem management practices; and*
- *A clear, scientifically informed understanding of the environmental and project costs;*

(b) *Requiring federal agencies to cooperate with all the parties to identify as early as possible a project-specific list of the criteria to be applied to the evaluation of a project, including the benefits inherent in the need and purpose of the project and the benefits to accrue from mitigating the environmental impacts of projects. The criteria should be clearly related to federal statutory authorization and sufficiently specific for the state or local government project sponsor to make responsive decisions regarding alternatives, mitigation, and project modifications. State and local governments should be able to rely on the fact that these criteria, to be applied to the evaluation of a project, once established, will not change except as required by law or modification of the project application;*

(c) *Directing each federal agency to exercise its permitting, grantmaking, licensing, and evaluation responsibilities in a cooperative, consultative fashion; to be receptive to state and local requests for administrative dispute resolution under P.L. 101-552; and to provide assistance to state and local governments to advance the public purposes of proposed infrastructure projects by helping to identify cost-effective alternatives that can be granted permits;*

(d) *Requiring federal agencies to set forth complete information, including all of the required elements for an application and procedures for appeals;*

(e) *Establishing a single point of contact for processing the application;*

(f) *Setting a schedule that will be followed—and not arbitrarily extended under threat of a negative decision—to produce timely decisions clearly justified by the record;*

(g) *Mandating notification at the earliest possible time about any delays in processing the application;*

(h) *Giving CEQ clear authority to serve as mediator in disputes among federal agencies to resolve and eliminate inconsistencies among policy interpretations, definitions, standards, agency procedures, data requirements, and project evaluation criteria; and*

(i) *In the event of a proposed federal decision overriding state or local decisions implementing federal environmental standards, require the federal government to provide the parties at interest reasonable access to and time to review and rebut information in the public record on which a federal decision is to be based. In addition, the final decision should be required to be accompanied by a written explanation setting forth specifically the decision and the basis for that decision in relation to the criteria established for evaluating the project. The "record of decision" requirement in NEPA provides a good model for this procedure.*

Recommendation 2 Administration of Environmental Decisionmaking by Executive Order

The Commission finds that additional coordination of federal environmental decisionmaking activities can be achieved within the statutory framework of the *National Environmental Policy Act* if that goal is supported by strong presidential leadership. Indeed, improved coordination under this act was begun with an executive order in 1977 (E.O. 11991) that expanded the role of the Council on Environmental Quality. Additional steps under this act still need to be taken.

The Commission recommends, therefore, that the President issue an executive order going as far as present law will allow to achieve a coherent strategy within the executive branch for avoiding or mitigating conflicts between environmental protection and public works goals as outlined in Recommendation 1 of this report. This executive order should be administered by the Council on Environmental Quality.

Recommendation 3 Integration of Federal Pollution Control Laws

The Commission finds that the nation's pollution control laws are fragmented, overlapping, and often contradictory. State and local governments seeking the best answers to air quality, water quality, and waste disposal problems find it difficult to administer their programs in ways that are responsive to the natural relationships that exist between these three media because they are separated legally. These separations between discharge laws have proven to be counterproductive and frustrating.

The Commission recommends, therefore, that the Congress enact a multimedia environmental law covering discharges to air, water, and land. The Commission recommends, furthermore, that the President issue an executive order directing the Environmental Protection Agency to integrate its regulations for controlling pollution of air, water, and land.

Recommendation 4 State Implementation of Federal Environmental Protection Laws

The Commission finds that federal law often provides for state administration of federal environmental laws when the federal government certifies that state administration is substantially equivalent to the federal requirements. The delegation of federal programs to the states was instituted to take advantage of the benefits of decentralization: state and local governments have first-hand knowledge of the project needs, issues, and constituents, and have greater understanding of local conditions; state implementation avoids federal-state agency overlap and duplication of effort; and local approaches stimulate innovation. However, states do not always exploit this opportunity fully.

Federal confidence in its delegation to a state requires that the state have a clear understanding of federal expectations. Only then can there be a phasing out of day-to-day federal involvement. State interest in assuming a federal delegation of authority requires assurance to the states that

their good faith and lawful activities under this delegation will not be arbitrarily reversed by the federal government. Increased technical and other support for state programs by the federal government and innovative ways to monitor state activities without undue paperwork are additional factors in encouraging states to seek delegated powers.

The Commission recommends, therefore, that the federal government encourage the states to administer a greater number of federal environmental standards with appropriate safeguards and oversight. Furthermore, to encourage states to accept delegation of federal programs, the federal government should institute funding and program changes and give assurances that the states will not be overruled arbitrarily.

Recommendation 5 Federal and State Use of Environmental Mediation for Dispute Resolution and Negotiated Rulemaking

The Commission finds that when environmental regulations are written with sensitivity to diverse viewpoints on many matters of interpretation, the number and nature of disputes that may arise when the regulations are implemented can be reduced significantly. Negotiated rulemaking procedures are a promising means of achieving this result. The Commission found examples of success with this procedure.

When disagreements over public works projects cannot be resolved through normal administrative channels, alternative dispute-resolution methods offer another means of avoiding costly, lengthy, winner-take-all litigation. Dispute resolution has been used in several cases that included political controversies, a long time horizon, many stakeholders, and complex issues. Dispute resolution can be expected to reduce the need for judicial review in many cases. However, if all else fails, judicial remedies remain available.

The Commission, recommends, therefore, that the federal government (1) create an environmental mediation service to help settle disputes and negotiate new regulations and (2) enhance the capacity of state and local governments to provide for mediation of diverse views. Such a service should provide for public involvement.

The Commission recommends, further, that the federal government take every possible opportunity to rely on state and local governments to convene the parties at interest, help broker suitable compromises, and make the situation-specific decisions necessary to implement standards established by the federal government. Federal agencies participating in this process should respect lawful state and local determinations of infrastructure needs, absent clear evidence of violation of federal law, and refrain from substituting federal agency discretion for the determinations made by the duly elected officials of state and local governments. Means of enhancing the capacity of state and local governments to provide for mediation of diverse views, to help broker mutually satisfactory accommodations of competing goals, to make ecologically and economically sound development decisions, and to apply these decisions fairly, effectively, and efficiently, should include technology transfer, education, training, and financial assistance.

Recommendation 6
Federal Reimbursement
of Mandated Environmental Protection Costs

The Commission finds that the costs to state and local governments of complying with many federal environmental protection requirements are high, and that many state and local governments have difficulty financing the necessary expenditures. In some cases, federal standards and regulations do not allow state and local governments to comply with these requirements in the most efficient and cost-effective ways.

The Commission recommends, therefore, that the Congress and the President enact legislation requiring the federal government to reimburse state and local governments for the additional costs of complying with federal environmental standards, over and above the costs of providing strictly state, local, and private benefits. The costs to be shared equitably among all of the benefited parties should include the full costs of maintaining healthy and stable ecologies over the long run.

Recommendation 7
The Scientific Basis for Ecological Management

The Commission finds that management of specific ecosystems may offer better prospects for balancing

environmental protection and public works needs than a series of individual and unrelated standards for protecting single-media environmental resources. Ecosystem management includes a collection of operational strategies and land use decisions that attempt to sustain the functions of a healthy environment, even if parts of the ecosystem are separated by political or land-ownership boundaries. Government agencies and nonprofit and private sector groups are beginning to manage developed and natural areas together as parts of larger regional ecosystems.

The Commission also finds, however, that the operation of natural and man-made ecosystems and their interrelationships are not fully understood. One result of this inadequate knowledge is the substitution of description for analysis. Documents are sometimes longer than needed, but contain little significant ecological analysis.

The Commission recommends, therefore, a strengthening of the scientific basis for understanding the operation, health, and stability of ecological systems through research, long-term data collection, and development of improved analytical, management, and regulatory techniques. This requires cooperative federal-state-local research and information-sharing programs.



DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL PROTECTION AGENCY
DEPARTMENT OF THE ARMY



MAY 1 1992

MEMORANDUM FOR REGIONAL ADMINISTRATORS AND DISTRICT/DIVISION ENGINEERS

SUBJECT: Implementation of the Intermodal Surface Transportation Act

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) is landmark legislation. It sets new directions for the Nation's highway and transit programs in a post-interstate highway era.

Important provisions of the ISTEA include a new emphasis on comprehensive intermodal planning at the state and metropolitan area levels; greater flexibility in funding for both transit and highways, based on local needs and preferences; and increased attention to compatibility between transportation and environmental protection. Booklets summarizing key overall provisions of ISTEA and summarizing its environmental features are enclosed.

The rapid and successful implementation of ISTEA is a top priority for President Bush and for each one of us. The additional funding available under the Act is an important resource both for the renovation of our transportation infrastructure and as a vital stimulus to our economy. The Department of Transportation has taken steps to assure that the ISTEA funds are immediately made available to state and local agencies so the money can be put to work creating jobs and helping to jump-start the economy.

But making the funds available is only half the job. They have to be put to use on actual construction projects. All three of our agencies are firmly committed to removing any unnecessary impediments to such projects. Recognizing the importance of environmental protection and the necessity to comply with legal requirements, we believe that we can help accomplish the President's objective by, among other measures, streamlining and improving the efficiency of the environmental review and clearance process and taking prompt action on Section 404 permit applications. This is consistent with the President's comprehensive plan announced on August 9, 1991, to improve the protection of the Nation's wetlands and streamline the regulatory process.

In 1988, the Federal Highway Administration (FHWA), Army Corps of Engineers (COE), Environmental Protection Agency (EPA), Fish and Wildlife Service, and National Marine Fisheries Service

jointly published as guidance the document "Applying the Section 404 Permit Process to Federal-aid Highway Projects." Better known as the "Red Book," this document provides numerous measures to improve coordination, emphasize innovative and cost-effective approaches, and integrate the NEPA and Section 404 permit processes. Effective immediately, it will be the official policy of FHWA, the Corps, and EPA to fully implement the intent of the "Red Book."

Where there are interagency issues or problems delaying issuance of Section 404 permits, we urge you to become personally involved in settling disputes, assuring due protection of aquatic resources, and getting the projects moving. Please pass this message, with your personal endorsement, to each member of your staff who is working on transportation projects and permitting.

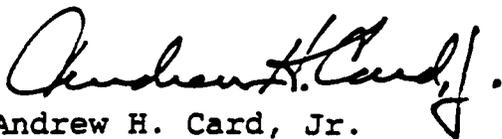
Even as we seek expedited treatment of Section 404 permit applications, we do not expect to see reduced protection of aquatic resources, including wetlands. Costs of avoiding, minimizing and compensating for wetland impacts are an eligible expense under ISTEA for projects and should be included wherever appropriate.

If there are issues on important projects which cannot be promptly resolved at the state or regional levels, please involve appropriate headquarters contacts promptly. They will arrange for review at headquarters level and, if appropriate, on site meetings with all appropriate participants to facilitate a permit decision. Headquarters contacts on this are:

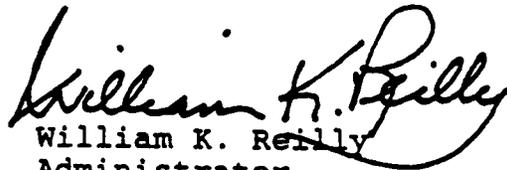
Gene Cleckley (FHWA)	(202) 366-0106
Greg Peck (EPA)	(202) 260-8794
Michael Davis (OASA(CW))	(703) 695-1376

We appreciate your cooperation and assistance on this important initiative.

Sincerely,



Andrew H. Card, Jr.
Secretary
Department of Transportation



William K. Reilly
Administrator
Environmental Protection Agency



Nancy P. Dorn
Assistant Secretary of the Army
(Civil Works)

Implementation of the Intermodal Surface Transportation Efficiency Act

Protecting the Environment and Reducing Regulatory Inefficiencies

Several initiatives currently underway or proposed by the Department of the Army (DA) will improve and streamline the regulation of Federally-aided transportation projects under Section 404 of the Clean Water Act. The DA recognizes the important role that the Intermodal Surface Transportation Efficiency Act (ISTEA) can play in the Nation's economic recovery. It is the belief of the DA that significant administrative improvements in program efficiency can be accomplished without diminishing protection of the Nation's valuable aquatic resources.

To help accomplish the objectives of ISTEA in an environmentally sensitive manner, the action items listed below should be undertaken by the DA and the Department of Transportation, as well as other applicable Federal and state agencies. These items are divided into two categories: those that are specifically designed to improve the regulation of transportation projects; and those that are components of the President's August 9, 1991, wetlands plan that will also benefit transportation projects.

Action Items Designed Specifically to Improve the Regulation of Transportation Projects

1. Effective immediately, it will be the official policy of the Federal Highway Administration (FHWA), the Army Corps of Engineers (Corps) and the Environmental Protection Agency (EPA) to implement fully the intent of the "Red Book."
2. To the extent practical, the NEPA environmental impact statement alternatives analysis and the Clean Water Act Section 404(b)(1) Guidelines alternative analysis will be consolidated.
3. The Corps will issue guidance to its field offices providing that, because of the infrastructure needs of the country and the positive impact on the economy of infrastructure development, evaluation of transportation projects be given high priority.
4. During the analysis of practicable alternatives under NEPA and Section 404, the Corps and EPA will make every effort to provide FHWA and states information on the impacts of various alternative road alignments.

5. The Corps will establish, where appropriate, additional general permits for the repair or replacement of roads and other projects which have only minimal impacts on wetlands.
6. The Corps, FHWA, EPA and other Federal agencies will work to establish wetlands mitigation banks for Federal and state highway projects.
7. The Corps and EPA will coordinate with FHWA and state DOTs to provide additional wetlands delineation training opportunities. The FHWA and state DOTs will request training and subsequently assist the Corps in conducting wetlands jurisdictional determinations.
8. The DA/Corps, FHWA, and EPA will convene, as necessary, a headquarters level team to assist in resolving controversies over NEPA and Section 404 issues. Other agencies such as the President's Council on Environmental Quality, the Fish and Wildlife Service and the National Marine Fisheries Service will be invited to participate as appropriate.
9. The Corps, FHWA and EPA will form regional interagency teams to identify the principal causes of delay during environmental review of transportation projects. Consistent with applicable law and regulation, the teams will propose specific measures to reduce identified delays.
10. The Corps, EPA, and FHWA will evaluate the need for guidance that clarifies that alternatives that would result in significant delays in project initiation will not be considered "practicable."

Components of the President's Wetlands Plan that will Benefit Transportation Projects

1. By mid-May 1992, the Corps will issue a regulatory guidance letter which clearly articulates the role of the Corps as "project manager" and decision maker on Section 404 permits. The guidance letter will also emphasize the need for effective and efficient coordination among prospective permittees, the Corps and Federal resource agencies. The need for project-related comments from the resource agencies will be emphasized.

2. By early summer 1992, the Section 404(q) Memoranda of Agreement between the Army and the Federal resource agencies will be revised to significantly streamline the agency appeal process. This will directly reduce applicant delays associated with interagency disagreements.
3. The Corps and EPA will issue guidance to their field personnel to use flexibility in requiring alternatives analysis when resource values are low (e.g., don't require a detailed alternatives analysis for a project proposed in low value wetlands).

In addition to the 13 items mentioned above, the Corps will complete in Fiscal Year 1993 a 25 percent increase in regulatory personnel. This will result in reduced permit evaluation times for highway projects. Implementation of all of the items noted will significantly streamline the permit evaluation process by minimizing delays and ensuring more timely decisions, while allowing for meaningful opportunity for substantive evaluation by the Corps and other Federal agencies. These streamlining measures are designed to maximize efficiency and are not inconsistent with reasonable environmental protection.

Applying The Section 404 Permit Process To Federal-Aid Highway Projects

**IMPROVING INTERAGENCY COORDINATION
ON FEDERAL-AID HIGHWAY PROJECTS**

AND

**INTEGRATING THE NATIONAL ENVIRONMENTAL
POLICY ACT AND SECTION 404 REQUIREMENTS**

Prepared in cooperation by:

**Federal Highway Administration
National Marine Fisheries Service
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service**

Washington, D.C.

September 1988

INTRODUCTION

Over the past 15 years, Federal legislation, Executive Orders, and subsequent regulation have caused major changes in many aspects of environmental protection. One important change is the now commonplace requirement for agency and public interaction in the decisions leading to government-sponsored projects affecting the environment. Interaction is particularly important whenever agencies propose projects that will affect environmental resources such as air, water, lands, and wildlife. Acting as trustees of these resources, agencies must ensure through interaction that all actions of the Federal Government include appropriate consideration and protection of the public interest. Protection of many resources, such as floodplains and wetlands have become national priorities.

The National Environmental Policy Act of 1969 (NEPA) prescribes coordination and interaction among agencies. Numerous other environmental statutes reflect this element of NEPA by requiring Federal agencies to actively seek comments from all interested organizations when proposing projects. One such statute, reflecting a national concern to abate water pollution, is the Clean Water Act of 1977, as amended (CWA). The primary objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters (lakes, wetlands, streams, and other aquatic habitats). Under Section 404 of the CWA, projects involving the discharge of dredged or fill material into waters of the United States require a permit issued by the U.S. Army Corps of Engineers (COE) or a State that has assumed the program. The COE conducts a public interest review and a Section 404(b)(1) Guidelines compliance determination before deciding whether to issue a permit. The decision is based on an evaluation of impacts and whether the proposal is in the public interest. The comments and cooperation of many agencies and the public are essential to the review.

Many Federal-aid highway projects require Section 404 permits. Therefore, the Federal Highway Administration (FHWA), the State highway agencies (SHAs), and the commenting agencies must recognize that early and continued coordination is imperative to address issues that may affect the processing of permit applications.

Effective coordination, however, is not always a simple task. Both lead and commenting agencies find that the efforts required for good coordination often severely tax available time and personnel resources. In addition, basic policy differences between agencies can hinder the resolution of controversial issues. Consequently, many agencies involved in the Section 404 permitting process see a need for more effective communication and better understanding of legislative roles and responsibilities.

Recognizing this need, the principal Federal agencies involved in the assessment of Section 404 permit applications for Federal-aid highway projects formed a work group in September 1985 to identify methods for improving interagency coordination. The agencies in the work group are the U.S. Fish and Wildlife Service (FWS), Environmental Protection Agency (EPA),

National Marine Fisheries Service (NMFS), COE, and the FHWA. The work group placed particular emphasis on surfacing innovative and cost-effective approaches that could help field offices do their jobs faster and better. This document summarizes the results of that effort.

The purpose of the document is to identify methods of improving coordination before and during the processing of Section 404 permits on Federal-aid highway projects. The guidance should be useful to the personnel of Federal agencies reviewing permits, and to employees of State or local agencies either applying for permits or commenting on permit applications.

As guidance, this document is not prescriptive and does not establish new policy or modify existing agency policies. Instead, it introduces a range of ideas for making the interagency coordination on Section 404 permits more effective. Examples have been used to illustrate these concepts and contacts are provided where further information may be obtained. As such, the document does not address all the issues and requirements which can affect Section 404 processing. Apart from coordination, permit applicants should recognize that a project must comply with all applicable statutes, regulations, and Executive Orders. Although this document focuses on federally assisted highway projects, the coordination techniques would also be valuable for use on State-funded actions requiring Section 404 permits.

The document is divided into three sections, i.e., programmatic activities, project-specific activities, and the integration of NEPA and Section 404. Although the subject matter falls into these three categories, the chapters are independent discussions. The development of new and innovative techniques that can improve agency coordination are encouraged and will be incorporated into subsequent editions of this document. To facilitate revision, the document is in loose-leaf form.

Programmatic Activities (Chapters 1-4)

Although Section 404 permit applications are typically prepared for single projects, many factors transcend these individual actions and apply to an entire program of activities. Agencies may find it more appropriate to address such issues on a programmatic basis rather than in the context of a single permit action.

A programmatic approach offers a number of advantages. First, it allows the affected agencies to explore and seek resolution of broad issues that could benefit a large number of actions. Thus, time can be saved in the long run by eliminating the need to repeatedly address the same issues over and over again on individual permits. Second, issues can be discussed and resolved before they cause critical disagreement or time delays on a specific project. Finally, these activities provide an opportunity for agencies to better understand each other's processes and policies.

Resolution of issues is not the only benefit of coordination. There is a benefit to the professional exchange of technical information among

biologists, planners, and engineers working throughout the government. Coordination allows opportunities for these personal exchanges as well as the exchange of research results and other technical information.

The four programmatic approaches presented in this document are useful vehicles for improving the effectiveness of interagency coordination. However, programmatic techniques cannot always resolve unique, project specific issues arising on individual permit applications. The second section of this document is directed at these project-oriented approaches to coordination.

Project-Specific Activities (Chapters 5-10)

During the development of an individual highway project, many opportunities exist for coordination and resolution of Section 404 permit issues. Agency decisionmakers should recognize and act on the opportunities that produce the most effective coordination results. This requires an understanding of the Federal-aid highway development process, as well as the elements of effective coordination.

The Federal-aid highway program is a federally assisted, State administered program. The States, in cooperation with local governments, establish priorities for meeting their current and future transportation needs through a continuous and comprehensive planning process. From these priorities, States develop concepts for highway projects and identify projects which will be programmed for development using Federal assistance. Once the FHWA has approved a project as programmed, a State can continue with project development including environmental studies and initial design. Subject to various approvals throughout the process, the State eventually completes environmental analyses, design, acquires necessary rights-of-way, and proceeds to construction. As the SHA performs work and expends funds, the FHWA reimburses the State for eligible project costs including those incurred for environmental and other planning studies, design, construction, and approved mitigation measures.

The process used to develop Federal-aid projects varies somewhat among the States. However, all variations have certain elements in common. The figure on page vi presents a generalized version of the development process from early planning through the completion of environmental analyses and subsequent actions. Initially, State and local planning agencies identify the project concept and objectives. The next three steps in the highway development process happen concurrently:

- o coordination with other agencies occurs to identify social, economic, and environmental constraints, including potential Section 404 issues;
- o major design features are explored and preliminary alternatives proposed recognizing those constraints; and
- o detailed studies identify the impacts of each alternative on project area resources.

These early steps of project development offer key opportunities to involve the technical expertise of the commenting agencies and to integrate area-wide resource maps, data bases or other information into the evaluation of feasible alignments. During this time, the lead and resource agencies should consider Section 404 concerns regardless of when the SHA plans to apply for the permit. Early integration of Section 404 concerns into highway project development can assure that issues arise when there is maximum opportunity to resolve them.

The final three steps occur sequentially (see page vi) as the results from the previous work are incorporated into an environmental document which is made available to the public and commenting agencies. After comments are considered and public involvement occurs, a selected alternative is chosen. Joint public involvement and other timesaving communication techniques can be used in these steps.

Integrating NEPA and Section 404 (Chapter 11)

Programmatic and project-specific approaches to coordination can culminate in opportunities to combine the development of Section 404 permit applications with the processing of environmental documents under NEPA. Chapter 11 explores these opportunities and closes the guidance document with a technique to integrate the Section 404 and NEPA processes. The technique describes information and coordination prerequisites necessary for early and more timely consideration of Section 404 permitting concerns. Use of this technique could result in a Section 404 permit being issued as early as the approval of the final project NEPA document.

**An Abbreviated Model of
The Federal-aid Highway Development Process**

<u>Steps</u>	<u>Opportunities for Coordination</u>
1. IDENTIFY PROJECT CONCEPT AND OBJECTIVES	<ul style="list-style-type: none">- Initiate coordination- Identify cooperating agencies <hr/>
2. IDENTIFY SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS	<ul style="list-style-type: none">- Coordinate with agencies to identify resources and problem issues in project study area- Assess the viability of the "no-build" alternative- Establish study techniques and tentative level of NEPA documentation <hr/>
3. DEVELOP PRELIMINARY ALTERNATIVES	<ul style="list-style-type: none">- Define preliminary location and design features or issues <hr/>
4. ANALYZE THE IMPACTS OF THE ALTERNATIVES ON SOCIAL, ECONOMIC, AND ENVIRONMENTAL RESOURCES	<ul style="list-style-type: none">- Perform field investigations of the alternatives- Determine areas of potential significant impacts of each alternative- Determine if Section 404 permit is needed <hr/>
5. INCORPORATE ALTERNATIVE ANALYSIS IN THE ENVIRONMENTAL DOCUMENT; MAKE THE DOCUMENT AVAILABLE FOR COMMENT	<ul style="list-style-type: none">- Document interagency coordination- Offer the public the opportunity for comment- Hold public hearings <hr/>
6. INCORPORATE COMMENTS INTO THE SELECTION OF A PREFERRED ALTERNATIVE;	<ul style="list-style-type: none">- Agency comments will also focus on Section 404 issues- Refine the design details to respond to substantive issues- Make final documents available for comment <hr/>

7. ISSUE THE RECORD OF DECISION OR
FINDING OF NO SIGNIFICANT
IMPACTS (FONSI) AND CONTINUE
WITH DEVELOPMENT

- Send copy to commenting
agencies, as appropriate

8. COMPLETE DESIGN AND DETERMINE
REQUIRED RIGHTS-OF-WAY

- Coordinate with
commenting agencies, as
needed

9. ACQUIRE NECESSARY
RIGHTS-OF-WAY

10. RECEIVE FINAL AUTHORIZATION
TO PROCEED TO CONSTRUCTION

- Review project proposal
and coordinate with
commenting agencies,
if necessary

11. CONSTRUCTION OF PROJECT
AND IMPLEMENTATION OF
APPROPRIATE MITIGATION
MEASURES

- Coordinate with
commenting agencies,
as necessary

CHAPTER 1

PROGRAMMATIC APPROACHES

Programmatic techniques can solve recurring problems affecting all actions or a group of actions (permits, designs, or decisions). This diverse group of techniques includes, for example: nationwide permits, categorical exclusions, mitigation banking, best management practices, special area management plans, and advanced identification of sensitive and non-sensitive areas. These techniques help to keep problems from resurfacing with each new action or project. In particular, programmatic techniques such as nationwide permits allow agencies to efficiently exercise an effective and sensitive consideration of environmental factors when many small projects are processed.

Programmatic techniques can be used at both the national and field office levels. For example, the COE uses regional and general permits to regulate large numbers of minor activities without the major expenditure of Federal resources (dollars and manpower) required for case-by-case evaluations. At the field office level, some individual COE districts participate in Special Area Management Plans. Programmatic approaches at the field level enable agencies to allow for regional variations. Programmatic techniques can have the following advantages:

- o savings of agency time, money, and resources,
- o more effective and sensitive environmental processing,
- o clarification of agency policies and processes, and
- o more predictable coordination.

Discussion

Because recurring problems can be difficult to identify at the national level, programmatic techniques are often most effective when developed and put into place by Federal agency field offices and SHAs. Locally developed techniques can most easily adapt to the variation among field offices with respect to resources and unique project development processes. In addition, field offices often find it easier to agree because there are fewer steps leading to approval. However, some programmatic approaches are useful at the national level, particularly when they result from similar techniques developed by more than one field office. Therefore, operating and management staff at all levels should be alert to identify problems best solved by a programmatic approach.

Many of the other techniques discussed in following chapters of this document can be the subjects of programmatic techniques. In particular, the techniques discussed in Chapter 11, "Permit Considerations During the NEPA Process," are good examples of national programmatic problem solving.

As suggested in Chapter 11, agencies can conduct more rigorous interagency coordination on Section 404 issues during the NEPA process. This could result in a time savings and the elimination of the need for a duplicative effort during a separate permit evaluation process.

How Does It Work?

Resolution of a programmatic problem offers potentially great benefits for both the sponsoring agency and the other agencies affected by the problem (SHA and other Federal agencies). Development of a programmatic approach can require commitments of agency staff resources commensurate with the rewards. A challenging time schedule for completion helps focus efforts. A programmatic approach can take many forms to fit the scope of the problem, ranging from informal agreements to a published plan. Implementation of a programmatic technique usually requires a joint effort by the sponsoring agency, the SHA, and other affected Federal agencies.

Some examples of programmatic agreements are discussed below. See Chapter 11 for a discussion of advanced identification of sensitive and non-sensitive areas.

1. Categorical Exclusions.

The COE can accept another Federal agency's categorical exclusions as qualifying for a nationwide permit. Under this programmatic approach, the COE reviews the agency's categorical exclusion provisions and determines which types of actions are unlikely to result in more than minor individual and cumulative impacts to aquatic resources severe enough to warrant an individual permit review. The COE accepts certain categories of action under the nationwide permit and requires individual permits for others. The COE can also impose whatever procedural safeguards it deems warranted to protect aquatic resources. For example, the COE requires that the Federal agency notify the COE District prior to proceeding with actions that otherwise qualify for a nationwide permit. The nationwide permit for categorical exclusions is defined in 33 CFR 330 (5)(a)(23).

2. Regional Permits.

The COE Norfolk District has issued a Regional Permit for the Virginia Department of Transportation's projects in the waters of the United States. Representatives of the Virginia Department of Transportation, State resource agencies, the FHWA, the FWS, the NMFS, the EPA, and the COE discuss proposed highway projects at regularly scheduled coordination meetings. When there are no objections to a proposed project or when agency recommendations have been incorporated into the final project plan, a list of those projects is sent to the agencies. If the agencies do not respond within 15 days of receipt, then the comments are considered final and the projects may proceed under the Regional Permit. When objections cannot be resolved, an individual permit is required.

The Regional Permit contains standard conditions which protect most agencies' interest. Special conditions may be incorporated into the projects prior to approval under the Regional Permit. Periodic coordination meetings are used to explain the projects and discuss any necessary special conditions. Project planning and development under a Regional permit can save considerable time compared to processing an individual permit.

3. Abbreviated Processing Procedures.

Under 33 CFR 325.2(e)(1), COE Division and District offices may use abbreviated processing procedures (APP) to permit activities with Letters of Permission. The COE Alaska District currently uses this process for oil and gas activities on the North Slope. The District is also considering using APP for highway projects in Alaska. The process places considerable emphasis on early and continued coordination. The procedures require the applicant to hold a pre-application meeting and to provide a copy of the permit application to the resource agencies when submitted to the COE. If the applicant resolves all substantive concerns during the pre-application process, the COE Alaska District will issue a permit within 30 days of receiving the application.

4. Additional Conditioning of Nationwide Permits at the COE District Level.

The COE Norfolk District, for example, has established additional Regional conditions for the use of Nationwide Permit 12 (discharge of material for backfill or bedding for utility lines) through a public notice [33 CFR 330.5(a)(12)]. The conditions describe how excavated material may be temporarily stockpiled in a wetland area. Time limits for temporary stockpiling are also set in the Regional conditions.

5. Best Management Practices (BMPs).

Programmatic aspects of BMPs consist of the routine consideration of potential environmental effects of all parts of highway construction and maintenance, as well as, practical modifications that are intended to reduce or eliminate adverse effects. Usually, there are site-specific ways to undertake the structural and non-structural aspects of highway construction, operation, and maintenance, to reduce or prevent adverse environmental impacts to natural resources. Methods, measures, or practices to prevent, reduce, or correct degradation of aquatic habitats can be developed in the planning stage and applied during project construction and maintenance. Use of BMPs can often satisfy the concerns of resource agencies and individuals regarding environmental aspects such as water circulation, fill, sediment loading, timing, staging areas, pollution control, buffer zones, etc. The BMPs precede and usually are carried out, where possible, in conjunction with other mitigation actions. Standard construction specifications, such as

erosion control practices, are examples of BMPs commonly used on highway projects. Construction contracts should cite the use of such practices and include provisions for periodic inspection and maintenance of all measures used on the project.

6. Wetland Mitigation Banking.

Wetland banking is an experimental, programmatic approach which could be appropriate for highway project planning and development. In mitigation banking, the project sponsor typically restores, enhances, or creates wetland areas in order to "bank" fish and wildlife habitat or the other wetland values. The wetland values may be determined with various evaluation procedures (see Chapter 9). Evaluation procedures help to identify wetland resource values impacted by a project that can be replaced with equally valued wetlands available from the bank. Typically, a wetland bank is established and operated through a contractual Memorandum of Agreement (MOA) between the action, regulatory, and resource agencies. The primary purpose of the MOA is to document the existing resource values in the bank, as well as the increased habitat values that can be obtained through enhancement measures. However, the MOA would also describe agency responsibilities (e.g., maintenance of a bank and its wetland value is typically the responsibility of a state resource agency) and the appropriate justification necessary for using the bank as an off-site mitigation measure. Restoration, enhancement, or creation of the banked wetlands should generally precede the wetland losses to be compensated, thereby providing a higher level of confidence in the success of mitigation. The "payoff" for the action agencies is that an adequate mitigation capability exists independent of individual projects. Under the MOA, the SHAs can arrange to debit the "account" rather than authorizing or funding a new mitigation activity for each project. This is particularly helpful when numerous individual projects require mitigation of wetland resource values. Through wetland banking, a SHA may be able to group a number of individual mitigation actions so as to enhance wetland values beyond the existing values at the scattered, individual project sites.

7. Special Area Management Plans (SAMPs).

The COE has used SAMPs to identify places within a defined geographic area which are or are not allowable for certain activities such as disposal sites or development. Written jointly by Federal, State, and local agencies, a SAMP consists of detailed statements of policies, standards and criteria guiding public and private development plus specific mechanisms for implementation. Thus, SAMPs are like comprehensive plans and provide for natural resource protection and reasonable development, including highway projects. The SAMPs help avoid the problems often associated with case-by-case environmental review.

Implementation of a SAMP will be through an interactive system of local, State, and Federal controls and a COE general permit or expedited individual permits. Controls can include local zoning, State permit restrictions, or conditioning and Federal restrictions such as those falling under Section 404(c) (40 CFR 231). See COE Regulatory Guidance Letter 86-10 dated October 2, 1986, on Special Area Management Plans (SAMPs). The following conditions should be present when agencies undertake a SAMP:

- o An appropriate area whose problems warrant a collective, interagency effort. One highway project in a sensitive area will probably not make a SAMP worthwhile, but several may justify the effort because of current or anticipated growth and development.
- o A local agency to sponsor the SAMP so it is not viewed as an intrusion by Federal or State Governments.
- o Willingness to provide data and to accept or limit some development on the part of the resource agencies and developmental interests.
- o Willingness by all appropriate agencies to support the SAMP with a useful regulatory enforcement mechanism.

8. Denial or Restriction of Disposal Sites

Section 404(c) of the CWA gives the Administrator of EPA authority to prohibit or withdraw the specification of a site as a disposal site or to deny or restrict use of a disposal site. Section 404(c) authority may be exercised before a permit is applied for, while an application is pending, or after a permit has been issued. In each case, the Administrator may prevent any defined area in waters of the United States (including wetlands) from being specified as a disposal site, or may simply prevent the discharge of any specific dredged or fill material into a specified area.

CHAPTER 4

INTERAGENCY AGREEMENTS

By establishing ground rules and agency responsibilities, interagency agreements between field offices on specific elements of Section 404 coordination can measurably improve coordination processes at both the national and field staff levels. Such agreements might include a listing of key contacts, the identification of intermediate steps in the coordination process and mechanisms for resolving issues. For example, some State highway agencies have an interagency agreement on the details of coordination under the U.S. Department of Transportation/Corps of Engineers MOA on Section 404 permit processing.

Discussion

Interagency agreements at the field office level improve coordination and avoid misunderstandings and delays during agency planning and decisionmaking processes. Interagency agreements at the national level may only set the operating rules for solving problems of a national scope. Field offices should take the time and effort to develop local agreements about the types of coordination suggested in other Chapters of this guidance document. This is the same philosophy that went into the current agreements (MOAs) between commenting Federal agencies and the COE under Section 404(q). The MOAs require the development of local procedures for discussing issues between the COE and commenting Federal agencies. The goal for local interagency agreements should be to find a process that allows agencies to complete their actions in a timely manner, while relying on larger, often national agreements to define the process for resolving programmatic problems.

Interagency agreements are similar to the programmatic techniques discussed in Chapter 1 in that both resolve generic, but not project-specific issues. Programmatic agreements deal with coordination processes in a broad context while interagency agreements affect specific, limited steps in coordination. Interagency agreements fill out the details of implementing complex coordination processes. They enable the field offices to get coordination under control. Interagency agreements also help field staff avoid reinventing the wheel on coordination for each project with a Section 404 permit application.

How Does It Work?

Interagency agreements are made in the context of each agreeing agency's statutory mandates and internal processes (regulations, policies, standard operating procedures, etc.) that govern the way things are done. A mutual understanding of this framework is essential to the identification and development of agreements.

There are many potential areas for interagency agreement. Some are topics of discussion in other Chapters of this document and include: Thresholds for Coordination, Joint Public Involvement Activities, Scoping, Programmatic

Approaches, and Permit Considerations During the NEPA Process. National policies and regulations often result in differences between agency programs which cause delay and inefficiency. Local policies and operating procedures can also cause interagency problems, and it is in this area that local agreements can have the most dramatic effect. Staff of coordinating agencies may also identify opportunities for effective interagency agreements in the course of interagency meetings such as joint conferences. (See Chapter 3, Joint Conferences and Training courses). Agreements have been effective particularly where agencies have a history of not working well together.

In developing local interagency agreements, agencies can analyze procedural problems in terms of "with who," "when," and "how" things are done. Timing of most agency interactions is a critical item and should be considered first. Each agency has its own set of priorities based on internal criteria. Local agreements can identify which priority actions are causing problems and set timeframes and procedures which allow agencies to complete their actions with a minimum of delay. Also, interagency agreements must clearly identify the role and function of each agency. Effective local agreements usually set the action at the lowest level possible. Sometimes during the development of an interagency agreement, the exchange of information itself will solve the problem without a formal agreement.

The format for an interagency agreement should reflect the policies and operating procedures appropriate to resolving the problem. Local agreements can be as informal as verbal agreements; however, a written description of what is agreed on helps retain valuable procedures over time and avoid future procedural questions due to personnel changes, sporadic use, etc. The elements of an adequate agreement include:

- o Who is party to the agreement,
- o What is agreed on,
- o When actions will be taken,
- o How parties will maintain contact and how often
- o How long the agreement will be in place, and
- o How the agreement is to be reviewed, updated, or ended.

The following example interagency agreement was developed and signed by representatives of the Arkansas State Highway and Transportation Department, the FHWA Arkansas Division Office and the COE Memphis, Little Rock, and Vicksburg Districts. Developed to implement the March 1980 MOA between the COE and the U.S. Department of Transportation, it has continued in effect under subsequent MOAs. Interagency agreements should include the signatures of approving officials from each agency. In the case of the Arkansas agreement, approval signatures occurred on a separate cover sheet.

TEXT OF AN EXAMPLE INTERAGENCY AGREEMENT

We agree that under normal conditions the Arkansas Highway and Transportation Department (AHTD) and the Federal Highway Administration (FHWA) will serve as the "lead agency" for highway projects as stated in paragraph 3 of the Memorandum of Agreement (MOA).

The AHTD agreed to make the initial contact with the Corps of Engineers (Corps) as early as possible and still provide an indication of the level of documentation (environmental impact statement, environmental assessment, or categorical exclusion) that they felt was appropriate for the proposed highway project. This early contact will include a brief project description including possible involvement that may require a Section 404 permit. The Corps will concur in the environmental processing proposed where possible and scoping type comments will be provided where appropriate.

The AHTD agreed to try to develop the environmental documentation in a way that addressed the Corps concerns to avoid duplication of effort and save time. The Corps agreed to generally accept the highway environmental documentation and limit their public interest review at the permit stage to the geographical vicinity of the Section 404 involvement. In some isolated cases the Corps may find it necessary to prepare additional environmental documentation. However, the AHTD, as lead agency would be given an opportunity to first provide the information.

The Corps agreed to function as a "cooperating agency" when requested. The AHTD agreed to provide the Corps with "pre-draft" copies for their review and input prior to circulation to other agencies and the general public. The State will also provide an early copy of the final document for Corps review prior to approval and making it available to the public.

The AHTD and Corps agreed to joint hearings whenever practicable and the AHTD will provide enough information to the Corps so that they may begin their "public interest review" in advance of a permit application in certain (i.e., sensitive, controversial, etc.) cases. The AHTD will provide the Corps adequate environmental, geometric, and location information on the preferred alternate which would have the Section 404 involvement. The AHTD public notice for the joint hearings will include the information that the Corps needs for their Public Interest Notice. This was agreed to by the AHTD.

The requirements of paragraph 6(e) will provide the AHTD the opportunity to respond to substantive comments prior to permit approval. Both parties agreed that close coordination and communication will be used to resolve any type of situation described in paragraph 6(e) of the MOA.

The 90 days mentioned in paragraph 6(g) will start at the time of the public notice described in paragraphs 6(c) and 6(d).

CHAPTER 11

PERMIT CONSIDERATIONS DURING THE NEPA PROCESS

Typically, SHAs apply for Section 404 permits for major highway proposals after the NEPA document has been approved, and the project is in final design. There are benefits, however, to both the SHA and the COE in developing the permit application earlier in the process. Benefits such as time savings and reduced controversy may outweigh the extra effort required to address Section 404 considerations as an integral part of the NEPA process. When the two processes are integrated effectively, approval of the permit could be concurrent with FHWA's final NEPA action. The COE could adopt the final document when making the permit decision. This action would result in no additional NEPA documentation being required.

Authority and References

23 CFR 771.113 Timing of administrative actions (FHWA)

33 CFR 320 General Regulatory Policies (COE)

40 CFR 230.80 Advanced Identification of Disposal Sites (EPA)

"Regulatory Program: Applicant Information," pamphlet EP 1145-2-1, May 1985, U.S. Army Corps of Engineers

Discussion

If actions under Section 404 and NEPA are to proceed concurrently, existing links between the two processes should be examined and utilized more extensively, if appropriate. Specifically, highway project sponsors should utilize these links to the maximum extent appropriate during the overall highway development process. Beginning on page 11-9, the typical highway development process (as presented in the introduction to this document) is displayed with the possible corresponding steps of the Section 404 permitting process.

There are obvious links between the NEPA process and general permits under Section 404. Integrating NEPA and individual Section 404 permits poses an additional challenge because few obvious links are apparent.

General Permits - Nationwide and other general permits are commonly applicable to highway projects having minor impacts associated with the placement of fill material. Although the majority of these projects are processed under NEPA either as Categorical Exclusions (CEs) or with Environmental Assessments/Findings Of No Significant Impact (EA/FONSI), general permits are not necessarily applicable to all projects of this type. Applicability of a general permit depends on the impacts of the fill activity and not on the level of NEPA documentation required to address all project impacts. However, for

projects processed as CEs there is a specific nationwide permit at 33 CFR 330.5(a)(23) if the activity meets all the conditions and appropriate notification requirements of the permit. Thus, the NEPA considerations for projects of this type have an existing, direct link with Section 404.

Projects properly classified as CEs and having fill activities consistent with the use of nationwide permits are not subject to additional processing relative to Section 404. However, the COE may invoke its discretionary authority to require site-specific conditions or processing with an individual permit.

Highway projects having significant impacts and processed with an EIS can also use a nationwide or general permit, if the conditions of the permit are met. These projects generally will have minor impacts associated with the placement of fill material. It is the significant impacts on resources unrelated to the fill that will warrant the preparation of an EIS.

In all cases, the decision to use a nationwide or general permit must be supported by an examination that ensures the project is properly classified and all the conditions associated with the permit are satisfied. This should be routinely accomplished during early project development with in-house examinations, interagency coordination, the advanced identification process found in Part 230.80 of the Section 404(b)(1) Guidelines, and public involvement as necessary. By the time the project is either categorically excluded or finalized with a FONSI or Record of Decision and sufficient design is available, general permit applicability and any required conditions should be clear to the project sponsors, other interested agencies and the public. If changes are made to a project proposal any time after these approval actions, an applicant must reassess the applicability of the nationwide or general permit.

Individual Permits - Federal-aid highway projects that require individual Section 404 permits have impacts associated with the discharge of dredged or fill material that may play a substantial role in the assessment and selection of location alternatives, design features, and construction techniques. In these situations, the viability of an alternative may depend on whether the SHA believes there is a good possibility that a permit can be obtained. The SHA would draw the conclusion only after considering the alternative in light of input by the COE and resource agencies.

When Section 404 issues play a substantial role in the consideration of project alternatives, the SHA may benefit from any action that leads to an early indication by the COE of whether a permit is likely to be issued. One possibility would be for the COE to provide the SHA with a ranking of alternatives based on the anticipated level of impacts. If a permit is not likely to be issued for a proposed alternative, the SHA and FHWA could eliminate the alignment from further

consideration, modify the project plans to alleviate the concern, or propose alternate mitigation features. Conversely, if a permit is likely to be issued, the SHA and the FHWA can proceed to develop mitigation measures as appropriate and practicable in cooperation with the resource agencies.

The FHWA and a SHA could determine the likelihood of obtaining a permit through the early and continued coordination necessary for preparing an environmental document under NEPA. However, the early coordination must focus on Section 404 issues, as well as the other elements of a normal NEPA review. Furthermore, all participating agencies must be willing to provide input at these early stages of project development if the likelihood of permit is to be determined by the conclusion of the NEPA activity. The SHA should maximize opportunities for early coordination specifically tailored to produce the information necessary for a permit application. This information could then be used to prepare and submit the permit application during the NEPA process.

Concurrent processing of NEPA and Section 404 issues is possible under existing regulations and is supported by agency early coordination policies. Furthermore, elements of the disposal site specification guidelines [Section 404(b)(1)] can facilitate determinations of viable alternatives by both the SHA and COE. For example, early identification of acceptable and unacceptable disposal sites under 40 CFR 230.80 may help determine which alternatives are "permissible" and which are not. An applicant also may gain further insight into the permitting possibilities of project alternatives through predevelopment consultation with Federal and State resource agencies. Such contact is part of early coordination and results in an indication of the resource agency position on each proposed alternative.

The incentive to the applicant is that this approach results in a degree of certainty, i.e., an indication from the COE regarding their ability to permit a certain action. As noted, this determination can reduce the risk which might otherwise be associated with waiting until the late stages of development to apply for the permit, particularly for controversial projects. The approach also benefits the COE in that it allows the COE to effectively contribute to the early development of highway projects which have potentially major aquatic impacts. The COE can be assured that any potential environmental issues are surfaced and addressed as part of both the highway alternative decisions and the permit review.

How Does It Work?

Design Information Requirements - There is a general perception that the permit process cannot be initiated during the NEPA process because not enough design detail is available during the environmental phase to satisfy the permitting agency. This perception fails to recognize that much of the review and analysis by the COE during the permit process does not require detailed design information. Nor does it

recognize the degree to which design may need to be advanced during the NEPA process in order to respond to environmental issues. The FHWA's regulations (23 CFR 771.113) require States to complete whatever engineering studies are necessary during the environmental phase to establish the project's environmental impacts and develop concepts for mitigation.

Advancing design in the NEPA process requires that bridge, hydraulic, and roadway design engineers must be involved early in the development of project concepts and continue to be involved as the concepts are refined. Project sponsors should advance design if details are needed to respond to environmental and related engineering concerns raised as part of the NEPA process or to address Section 404 issues in order to determine the early likelihood of being granted a permit.

Advanced design is most appropriate on projects with few build alternatives and subject to constraints of existing facilities. Often these are projects processed with an EA/FONSI or as a categorical exclusion. A good example is the widening of an existing highway embankment. The widening design, fill amounts and construction limits are largely defined by the size, location, and other features of the existing highway. Providing detailed information at an early stage should be easier with these types of projects than with projects on new alignment. Other site-specific constraints result from safety and design standards which designers must observe.

Early planning for projects on new location emphasizes routing of proposed alignments constrained by broad concepts such as purpose and need, environmental features and engineering feasibility. The SHAs usually complete detailed design after these routing decisions because specific detail is usually not necessary to address project location. Detailed engineering may subsequently cause reassessment and even alteration of location decisions, but major alignment changes most often result from issues other than facility design. Additionally, design for projects on new location is often readjusted several times as the project moves toward construction. Therefore, on these types of projects it may not be possible to generate definite design information early in the project development process.

The perception that sufficient highway design detail is not available during the NEPA process also fails to recognize the latitude which the COE district engineers have in determining the amount of detail necessary to initiate the consideration of permit issues. The SHA could initiate coordination with the COE District and the resource agencies with a letter containing preliminary information about the project. Preliminary information on project location, habitats affected, fill quantities, and facility design should be sufficient to focus attention on major Section 404 issues.

The COE districts receiving early information of this type must recognize the purpose of the preliminary contact. The intention at this stage is not to have all the detailed information necessary to

grant a permit. Instead, preliminary information provided with the letter is intended to direct COE and resource agency attention to Section 404 issues when such input is valuable to the evaluation of the selected alternative. Formal permit application occurs when more detailed information becomes available, possibly as part of the project final environmental document. By the time the SHA prepares the final environmental document, there likely should be sufficient information available to make a permit decision. Hopefully, since Section 404 issues are addressed during the project planning process, the selected alternative should not raise new or insurmountable permit issues. As the project design is refined, the SHA should continue coordination with the resource agencies, particularly on those elements related to project impacts and mitigation.

Advanced Identification of Discharge Areas - An early permit application also would require information on resources that may be potentially impacted. Information on suitable discharge sites and sensitive environmental features must be available for both the applicant and the permitting authority. For certain projects, a way to generate such information is through an advanced identification process. Section 230.80 of the 404(b)(1) guidelines allows the EPA and the COE to identify both suitable discharge sites and areas that should remain free of dredged or fill material. Determinations under the provisions of Section 230.80 should begin early in project planning so that the information will be available when the highway agency considers alignment alternatives. Choosing a preferred alternative should be easier if areas suitable for Section 404 permitting are known during the selection process. Another benefit of advanced identification is that it can be applied to more than one project in a given geographical area.

The advanced identification process, however, can be both very time consuming and costly. Highway sponsors, therefore, should consider its use only on major projects that potentially may affect large areas subject to Section 404 jurisdiction or on projects expected to generate substantial controversy. Such areas may involve important individual wetlands or complexes of high overall values, sensitive floodplain areas, and other valuable aquatic resources. The process may be particularly useful when highway projects are initially analyzed on a broad scale, corridor basis. Advanced identification may aid corridor selection or choices among alternatives within a corridor.

The advanced identification process may be initiated by the EPA, the COE, or any other party. If the FHWA or a SHA wishes to initiate advanced identification at a proposed project location, their request should be directed to the appropriate EPA Regional Administrator and the COE District Engineer. The EPA Regional 404 Coordinators and COE District staff will cooperate with representatives of the requesting agency and others, such as State and Federal resource agencies, to determine if advanced identification is appropriate in the area of the proposed project.

If appropriate areas are identified, the EPA Regional Office or the COE District Office will begin the advanced identification process by sending letters to the appropriate FHWA and State offices. This will normally occur during the NEPA scoping process or as soon thereafter as possible.

The regulation requires an appropriate public notice of the proposed advanced identification of areas as possible future discharge sites and those that are generally unsuitable for site specification. The timing of this notice is flexible. The most opportune time could be in combination with the Notice of Intent or other scoping notification, as discussed in Chapter 5.

Although it is not required, the public could be involved through a meeting to receive public and agency comments about an advanced identification study. A meeting would likely cover area boundaries, proposed analyses, offers to gather or supply certain types of information or participation, anticipated discharge activities and their specific locations, and landowner concerns. The public meeting could be held in conjunction with any other public meetings conducted by the SHA.

The EPA and the COE, as the Section 404 permitting agency, will evaluate the likelihood that the use of the area in question for the discharge of dredged or fill material complies with the Section 404(b)(1) Guidelines. If certain best management practices are required to make it possible to identify an area as a possible future discharge site, they should be specified in the advanced identification.

The COE District Engineer will maintain a public record of the identified areas and a written statement of the basis for identification. When the advanced identification is complete, a letter specifying the areas and stating whether they are possible as future discharge sites or not will be sent to the highway agency by the Section 404 permitting agency. Areas considered as possible future specified sites, may also have conditions limiting discharge of dredged or fill material.

The information in the written statement of the basis for advanced identification can be made available for inclusion in the EIS, and is expected to furnish the bulk of the material necessary to evaluate any subsequent Section 404 individual permit applications and general permit determinations.

The letter formalizing advanced identification sent from the COE to the SHA should be timed to arrive no later than distribution of the draft EIS for public comment. If that timetable is met, Section 404 permit application and evaluation could proceed expeditiously with confidence that all concerned individuals and agencies have had an opportunity to contribute, and that representatives of EPA and the COE have been involved throughout the process.

Integrating NEPA and Applications for Individual Permits - Applying for an individual Section 404 permit during the NEPA process should be rather straight forward. The normal requirements for submitting a permit application are followed. The complicated aspects, however, involve the timing of the application. The SHA can submit the permit application only after sufficient information is available concerning the proposed project and the affected environment. Therefore, the application can occur as early as the information is available. The other important aspect of permit timing involves the duration of the authorized work. If application is made during the NEPA process, starting and completion dates should be specifically tailored to fit the SHA's estimated construction schedule.

The following outline describes a method to initiate Section 404 applications during the NEPA process. The method is presented as an example procedure resulting in application at or following the point in the NEPA process where either an EA is made available for review or an draft EIS is circulated for comment.

1. During scoping, the SHA specifically requests comments from the COE and the resource agencies concerning Section 404 permit possibilities, applicable resource information, and the need for additional environmental studies. Inputs from the resource agencies regarding fish and wildlife resource values are most beneficial to the SHA prior to the selection of the preferred alternative. Important and sensitive habitats are highlighted and can be targeted for mitigation. The SHA requests advanced identification determinations, if appropriate. Also, the COE and other appropriate agencies are requested to be cooperating agencies at this time.
2. The SHA provides Section 404 information generated by environmental studies during scoping to the COE and the resource agencies when the EA is available for review or when the draft EIS is circulated for comment. The SHA may also find it advantageous to supply the information at an earlier time, such as with a predraft document. If it is clear that there are few build alternatives available for consideration at this point and sufficient information exists for a permit application, the SHA may apply to the COE. Sufficient design detail would include project location, estimated fill quantities, and cross section sketches. The information also should include wetland types to be affected, acreage, possible mitigation, and comments received from the scoping request during Step 1.
3. The EA notice of availability or draft EIS notes that Section 404 information was submitted concurrently to the COE, thereby alerting the concerned agencies to direct comments to both Section 404 and NEPA issues. If a permit application was made, separate mention of this information is

not necessary. The SHA should provide copies of EAs to the resource agencies who will be commenting on the permit application.

4. Notices for hearings on the environmental document and Section 404 permit notice can be combined if a permit application is submitted when the draft EIS is circulated or EA made available. If the application will come later, combined hearings are not appropriate. However, the SHA and FHWA should request that the COE attend and observe the highway public hearing. (See Chapter 6)
5. During the period when the SHA and FHWA are considering the comments received on the draft NEPA document, the COE will process the permit application if submitted as indicated in paragraph 2 above.
6. If the application will occur later, the COE will consider scoping comments from the resource agencies, any advanced identification of suitable disposal sites, results of other environmental studies, and pertinent design information to prepare comments on each alternative. A priority ranking from most likely to the least likely to be permitted could be provided. Possible permit conditions also may be included as appropriate.
7. The SHA and FHWA will consider the COE and resource agencies comments when selecting the alternative to be presented in the final environmental document as the intended action. The final document should contain responses to Section 404 permit comments and discussion of commitments affecting a permit application. Commitments should include mitigation features (such as potential mitigation sites) which are appropriate and practicable as well as an indication by the COE and the resource agencies that the analysis of project alternatives is sufficient to satisfy Section 404 application requirements.
8. If not done earlier, the SHA submits the permit application when the final environmental document is prepared or as soon as sufficient design is available to satisfy the information requirements of the COE. Revisions to the permit application or possible reapplication to the COE may also be needed if subsequent design changes are made. Such changes may require readvertisement of a public notice for the permit application.
9. After the environmental process is complete, the COE can adopt the FHWA document and issue the Section 404 permit. The length of time after approval of the final document and before the permit will vary. On projects processed with an EA/FONSI the permit may be issued concurrently with the signed FONSI. On EIS projects 30 days must elapse before the Record of Decision can be signed and a permit issued.

**Possible Integrated Steps of
The Federal-aid Highway Development and
Section 404 Permit Processes**

Highway Development Process

Section 404 Process

1. IDENTIFY PROJECT CONCEPT AND OBJECTIVES

2. IDENTIFY SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSTRAINTS

3. DEVELOP PRELIMINARY ALTERNATIVES

4. ANALYZE THE IMPACTS OF THE ALTERNATIVES ON SOCIAL, ECONOMIC, AND ENVIRONMENTAL RESOURCES

5. INCORPORATE ALTERNATIVE ANALYSIS IN THE ENVIRONMENTAL DOCUMENT; MAKE THE DOCUMENT AVAILABLE FOR COMMENT

6. INCORPORATE COMMENTS INTO THE SELECTION OF A PREFERRED ALTERNATIVE;

1. Jurisdictional determination

2. Pre-application consultation

3. Application acceptance
4. Public Notice
5. 30-day comment period
6. Agency coordination
7. Satisfy environmental requirements

7. ISSUE THE RECORD OF DECISION OR FINDING OF NO SIGNIFICANT IMPACTS (FONSI) AND CONTINUE WITH DEVELOPMENT

|
8. Evaluate comments
9. Complete Section 404 (b)(1) compliance determination
10. Issue or deny permit
|

8. COMPLETE DESIGN AND DETERMINE REQUIRED RIGHTS-OF-WAY

9. ACQUIRE NECESSARY RIGHTS-OF-WAY

10. RECEIVE FINAL AUTHORIZATION TO PROCEED TO CONSTRUCTION

11. CONSTRUCTION OF PROJECT AND IMPLEMENTATION OF APPROPRIATE MITIGATION MEASURES

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If project changes occur, re-examine relevant permit issues. Permit conditions may be revised or re-application necessary.
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U.S. Department
of Transportation
**Federal Highway
Administration**

Memorandum

Subject: INFORMATION: Revised Guidance on
Cooperating Agencies

Date: MAR 19 1992

From: Director, Office of Environment
and Planning

**Reply to
Attn of:** HEP-31

To: Regional Federal Highway Administrators
Federal Lands Highway Program Administrator

On December 23, 1987, this office sent out guidance on how to identify and work with cooperating agencies. Subsequently, we conducted a series of reviews of how the cooperating agency concept was being implemented around the country. Based on the results of the reviews and our growing experience with the cooperating agency concept, we developed a draft revision of the guidance. This was distributed to relevant Federal agencies and to the field in 1990 for review and comment. The draft revised guidance has been modified and sufficient copies are attached to provide one each for the Regional Office, each Division Office and each State highway agency. We suggest you file this paper in the Environmental Guidebook replacing the original guidance. It will be incorporated in the next annual update.

The Environmental Policy Statement, the results of the 1990 Regional Administrators' Workshop on Section 404, and our new surface transportation bill stress communication and cooperation to help assure that transportation programs protect and enhance the environment. This guidance reflects the overall commitment of the FHWA to involve and utilize the expertise of other agencies. Among other things, the revised guidance expands and clarifies the responsibilities of the lead agency and the cooperating agencies, particularly those involved in the Section 404 permitting process. This includes the resolution of essential issues prior to approval of the final environmental document, such as concurrence that there is no practicable alternative that avoids wetlands. In addition, the paper includes sample letters which can be utilized to request cooperating agencies and promote the desired interaction.

As always we welcome your feedback on experience involving cooperating agencies and your suggestions on how to use the cooperating agency concept to the greatest benefit of the highway program.


Kevin E. Heanue

Attachments

INTRODUCTION

The need for early coordination and cooperation with Federal, State, and local agencies in the development of Federal-aid highways has been evident for many years. In 1963, the Federal Highway Administration (FHWA) established a unit in its Headquarters Office to improve interagency coordination and public involvement for highway projects. The FHWA regulations and directives have continually emphasized the importance of interagency coordination and cooperation.

The 1978 Council on Environmental Quality (CEQ) regulations introduced the concepts "lead agency" and "cooperating agency." Effective interagency coordination and cooperation are needed to properly implement these concepts. A lead agency supervises the preparation of an environmental impact statement (EIS) if more than one Federal agency is called upon to take an action on the same project. Federal, State, or local agencies may act as joint lead agencies to prepare the EIS. The lead agency should request all Federal agencies which have an action to take on the project (for example, permit approval) to be a cooperating agency. Agencies with special expertise may also be requested to be a cooperating agency.

The CEQ regulations also encourage (1) the reduction of paperwork and delay, (2) the elimination of duplication with Federal, State and local procedures and environmental documents, and (3) the integration of National Environmental Policy Act (NEPA) requirements and other Federal environmental review and consultation requirements. The lead agency and cooperating agency concepts contribute to the achievement of these objectives. Lead and cooperating agencies can use one environmental document to meet each agency's NEPA responsibilities at the same time satisfying Federal, State, and local environmental requirements.

The cooperating agency concept is most readily applicable to the preparation of EISs, which normally requires the intensive use of time, money, and personnel resources. Normally, the preparation of environmental assessments (EAs) should not require a comparable commitment of resources. Consequently, there is usually not as much to be gained in the use of cooperating agencies on EAs solely for NEPA compliance. However, on projects where a permitting agency is willing to accept an EA as a vehicle for issuing a permit, the cooperating agency concept should be employed.

Being a cooperating agency is more than just being identified as such in a project's environmental document. It is a commitment to a process in which agencies have assigned roles and a mutual understanding of the process, roles, and issues. It does not necessarily mean that the cooperating agency will make a substantial commitment of resources or will even prepare portions of

the environmental document. Lead and cooperating agencies should work out specific responsibilities on each project. Inherent in our goal of cooperation is the necessity to resolve issues as early as possible in the project development process. The FHWA and the State highway agency (SHA) should identify and address the concerns of the public and all agencies with jurisdiction.

The FHWA developed its procedures to make the NEPA process an integral part of its longstanding highway planning, location, and design activities and State transportation agency operations. The FHWA process is a comprehensive "umbrella" focusing on integrating numerous requirements of 23 U.S.C. (e.g., Section 109(h), 128, 138, etc.); the requirements of NEPA; executive orders; and over 32 other Federal laws, regulations, (e.g., Uniform Relocation Assistance and Real Property Acquisition Policies Act, Title VI of 1964 Civil Rights Act, Section 404 of the Clean Water Act, Farmland Protection Policy Act, Endangered Species Act, etc.). These requirements are integrated to allow FHWA, State transportation agencies, and other Federal and State review agencies' procedures to run concurrently rather than sequentially. The FHWA's Environmental Policy Statement, published April 20, 1990, emphasizes "the need for effective communication and working with others in a cooperative approach." When conflicting interests are brought together under a creatively open process, the synergistic efforts will often produce positive results.

IDENTIFYING COOPERATING AGENCIES

In accordance with 23 CFR 771, any agency with jurisdiction by law must be requested to be a cooperating agency. Agencies exercising their jurisdictional authority can prevent a highway project from advancing if they do not agree that the environmental impacts and jurisdictional responsibilities have been adequately addressed. Actively participating as a cooperating agency, an agency can identify those environmental impacts and responsibilities it considers most critical and work with FHWA to ensure that the NEPA document adequately addresses them.

Furthermore, active participation by a cooperating agency increases the likelihood that the agency would adopt FHWA's document to satisfy its concerns and jurisdictional responsibilities. Examples of the most frequently encountered agencies with jurisdiction are the U.S. Coast Guard (USCG), the Corps of Engineers (Corps), the U.S. Forest Service and the Department of the Interior. Table 1 lists these and other examples of Federal agencies having jurisdiction. On many occasions the development of a project could benefit

from having an agency with special expertise in a particular environmental area become a cooperating agency. A request would usually come from the lead agencies when it would be advantageous for the agency with special expertise to assume a role greater than simply contributing to the scoping process. Table 2 lists several examples of situations where an agency may become a cooperating agency based on special expertise. In deciding whether or not to invite an agency with special expertise to be a cooperating agency, FHWA and the SHA should carefully assess the extent of coordination required for a successful arrangement. If, due to other program commitments, it appears that the agency will not be able to participate in critical activities, then a cooperating agency request may be inappropriate.

WORKING WITH COOPERATING AGENCIES

The cooperating agency concept is a team concept. By bringing a cooperating agency onto the project development team, the FHWA is offering the cooperating agency an in-depth understanding of the project and is requesting the cooperating agency to do its part by assuring that its responsibilities associated with the project are fulfilled. It is important that the lead agency identify and begin working with the cooperating agency at the earliest possible stage of project development. It is at the initial planning stages, long before scoping is completed, when the input of the cooperating agency can help the most in expediting the project.

The extent of participation and responsibility of a cooperating agency on any particular project depends on how the FHWA, SHA, and cooperating agency wish to approach it. Where an agency will frequently serve as a cooperating agency on highway projects, the FHWA, SHA, and cooperating agency might establish ground rules by means of a general (programmatic) agreement. This approach is described in the document, Applying the Section 404 Permit Process to Federal-Aid Highway Projects. In dealing with an agency that is seldom a cooperating agency, the FHWA and SHA might come to an agreement with the cooperating agency at the beginning of each project. A basic element to such an agreement is a mutual understanding of lead agency and cooperating agency responsibilities. These responsibilities should be established before the scoping phase of the project. Items on the following list are not statutory requirements but obligations, and may provide a good starting point.

Lead Agency Responsibilities

- Determine project purpose and need.
- Identify potential cooperating agencies.
- Invite agencies to become cooperating agencies. (Appendix A contains an example letter of invitation that outlines the proposed level of involvement expected of the cooperating agency and explains whether the request is being made because of the agency's special expertise or its legal jurisdiction.)
- Invite cooperating agencies to scoping and coordination meetings as early as possible in the project development process.
- Consult with each cooperating agency with jurisdiction by law on the type of environmental document and any special technical studies needed for its action.
- Determine whether it would be desirable to ask the cooperating agencies to perform any major environmental analysis or write a portion of the environmental document.
- Organize joint field reviews.
- Share project information, including the results of technical and environmental studies.
- Consider conducting joint public involvement activities.
- Identify environmentally preferable alternative (in Record of Decision).
- Determine project mitigation utilizing input from cooperating agencies.
- Give each cooperating agency the opportunity to review the pre-draft and pre-final environmental document and to express its views on the adequacy of the documents, alternatives considered, anticipated impacts, and project compliance with other applicable policies and statutes.

- Permit cooperating agencies to use the environmental document to express their views on subjects within their jurisdiction or expertise.
- Select preferred alternative.
- Include in the final environmental document the information needed by the cooperating agency to fulfill its responsibilities to discharge NEPA and other requirements on its approvals, permits, licenses and/or clearances for the proposed action. Draft documents should demonstrate that the scope and content of both the alternatives and impacts analyses are acceptable to the cooperating agency.

Cooperating Agency Responsibilities

- Respond to the invitation to be a cooperating agency. (The response letter should indicate agreement/disagreement with the lead agency's concept of the cooperating agency's involvement, and should describe any constraints on the cooperating agency's participation.)
- Assist in identifying interest groups.
- Attend scoping and coordination meetings and joint field reviews.
- Provide meaningful and early input on issues of concern.
- Participate in joint public involvement activities.
- Review pre-draft and pre-final environmental documents, making sure that the lead agency is informed of any changes needed to reflect the views and concerns of the cooperating agency.
- If needed, perform analyses or write a portion of the environmental document, if requested by the lead agency (This would occur only rarely).
- Adopt the final environmental document if, after an independent review, the cooperating agency concludes that the document satisfies NEPA and other requirements for its approvals, permits, licenses and/or clearances on the proposed action (appropriate only for those agencies with jurisdiction by law).

Additional Agency Responsibilities with the CLEAN WATER ACT Section 404 Permit

In addition to the normal cooperating agency responsibilities listed above, these agencies would be expected to:

- Provide assistance to the lead agency during development of the project purpose and need.
- Provide information on alternatives. This includes the "no practicable alternative" finding.
- Assist the lead agency in determining appropriate and practicable mitigation, including "all practicable measures to minimize harm." These measures should reflect avoidance, minimization, and compensation.
- Cooperate in the application of principles for integration of NEPA and Section 404 Permits contained in Chapter 11 of Applying the Section 404 Permit Process to Federal-aid Highway Projects.

The lead agency should make every effort to identify and attempt to resolve cooperating agency concerns during early coordination and scoping activities. Deferring such concerns to later stages of project development will only delay or possibly jeopardize the project. Although some concerns may not be completely resolvable despite concerted efforts to reach agreement, there are certain aspects of the project that require concurrence before moving ahead. For example, on projects requiring a permit under Section 404 of the Clean Water Act it is essential to obtain resource and permitting agency concurrence that there is no practicable alternative to locating the alignment in waters of the United States. Furthermore, the Final EIS must adequately support this determination. A cooperating agency does have a right to expect that the highway project's NEPA document will meet its needs, and an obligation to tell the lead agency if, at any point in the process, its needs are not being met. Thus it must be reiterated, that it is in the best interests of all concerned for issues to be resolved as early as possible during project planning. Nevertheless while a cooperating agency has a greater role and a greater interest in the project than other "commenting" agencies, control of the project always rests ultimately with the lead agency.

Appendix B contains an example letter that is suggested for use in initiating the final coordination with the Environmental Protection Agency (EPA) and the Corps. Similar letters should be prepared for the final coordination with other cooperating agencies.

With the travel and personnel constraints that confront all Federal agencies, working effectively with cooperating agencies is more challenging now than ever. Arranging face-to-face meetings and field reviews is often difficult to accomplish. To overcome such obstacles to coordination, the FHWA and the SHA will have to resort to innovative methods. Multi-project coordination meetings are one way to make the travel budget stretch further. Other these include conference calls, and the use of visual aids, such as maps, approaches include conference calls, and the use of visual aids such as maps, graphics, and videotapes or slides of project features, which can be mailed to the cooperating agency to give it a better visual understanding of the project. Nevertheless, a certain amount of personal contact is critical to building the mutual understanding and trust that is vital to successful lead agency and cooperating agency interaction. Many of these techniques are explained in Applying the Section 404 Permit to Federal-aid Highway Projects. . Also, Appendix C of this paper contains an, example letter that is suggested when another agency declines to be a cooperating agency or does not respond.

This guidance provides a brief overview of what is involved in working with cooperating agencies. Additional considerations are addressed in the questions and answers which follow. For more information on the subject, the reader is referred to the references listed after the question-and answer section.

Table 1. Examples of Federal Agencies with Jurisdiction By Law

<u>Federal Agency</u>	<u>Jurisdiction</u>
U.S. Army Corps of Engineers	Section 10, Section 404 Permits
U.S. Coast Guard	Bridge Permits
Environmental Protection Agency (EPA)	Section 404 Permits, Sole Source Aquifers, Hazardous Waste Sites
National Park Service	Areas funded under Land and Water Conservation Fund Act
U.S. Fish and Wildlife Service	Areas funded under various fish and wildlife related grant programs
Rural Electrification Administration (REA)	Relocation of utilities constructed or assisted with REA loans
<u>Agencies that Manage Federal Lands:</u>	<u>Land Transfer From:</u>
National Park Service	National Park System
U.S. Fish and Wildlife Service	National Wildlife Refuge System
Bureau of Land Management	Public Lands
Forest Service	National Forests
Department of Defense	Military Installations
General Service Administration	Federal Buildings
Bureau of Indian Affairs	Indian Reservations

Table 2. Examples of Federal Agencies Having Special Expertise

<u>Agency</u>	<u>Expertise</u>
U.S. Fish and Wildlife Service or National Marine Fisheries Service	Fish and Wildlife Habitat Wetlands, Stream Relocations, Estuaries, Endangered Species
Advisory Council on Historic Preservation	Historic Sites and Districts, Archeological Sites and Districts
Environmental Protection Agency	Water Supply Reservoirs, Drinking Water, Air Quality, Wetlands
Federal Emergency Management Agency	Regulatory Floodways
National Park Service	Park, Recreation and Cultural Resources

NOTE: For a complete list of Federal agencies with jurisdiction by law or special expertise, see Appendix II to the CEQ regulations (49 CFR 49750).

Questions and Answers Regarding Cooperating Agencies

1. Question: Should a formal request be made asking an agency to become a cooperating agency if interagency coordination is working well?

Answer: Yes. Cooperating agency status has special meaning attached to it. The cooperating agency is an active participant in the NEPA process and has certain responsibilities to participate in the development of environmental documentation.

The Federal cooperating agency may adopt an EIS prepared by the lead agency after an independent review without having to recirculate it (40 CFR 1506.3). This option is not available to Federal agencies which are not cooperating agencies.

2. Question: Does an agency have to be a Federal agency to be a cooperating agency?

Answer: No. While the CEQ regulations developed the cooperating agency concept primarily with Federal agencies in mind, the benefits of designating State or local agencies as cooperating agencies are similar. Entities such as Indian tribes may also become cooperating agencies.

3. Question: Do the CEQ and the FHWA requirements on cooperating agencies apply only when a project is being processed with an EIS or do they also apply to projects processed as categorical exclusions (CEs) or with Findings of No Significant Impact (FONSIs)?

Answer: In deciding whether to request another agency to be a cooperating agency on projects processed by FHWA with an EA or a CE, the focus should be on the type of documentation needed by the other agency to satisfy its NEPA responsibilities. If a Federal agency with jurisdiction by law indicates in writing it can satisfy its NEPA review responsibilities with a CE or a FONSI, then a cooperating agency request need not be made. On the other hand, if there is any possibility that the agency may require that an EIS be prepared, FHWA should request it to be a cooperating agency.

Interagency agreements bearing on the question of cooperating agencies should be adhered to. For example, the joint Memorandum of Understanding by the FHWA and USCG states that the USCG will be a cooperating agency on projects requiring a bridge permit that are processed with either an EA or an EIS. The Memorandum of Agreement between the Department of Transportation (DOT) and the Department of the Army is less specific, indicating only that in the vast majority of cases DOT will be the lead agency and Army will be the cooperating agency.

4. Question: What should we do when another Federal agency declines to be a cooperating agency?

Answer: If that agency is requested to be a cooperating agency based on special expertise, it may decline without recourse. On the other hand, Federal agencies with jurisdiction by law do not have the option of declining, according to the CEQ regulations and guidance. Nevertheless, a Federal agency may feel uncomfortable with being a cooperating agency on a highway project being processed with an EIS where the agency's action (permit or land transfer) constitutes a small part of the overall project. Some agencies feel that being a cooperating agency in such a situation means that they must assume responsibility for the entire project and EIS. In such cases, FHWA should attempt to persuade the agency that the CEQ regulations allow an agency to be responsible for only its portion of the project. If this approach fails, FHWA is willing to accept the agency's declining to be a cooperating agency provided the agency is willing to respond, in writing, that under its own NEPA regulations a separate EIS will not be required in conjunction with its action. If a Federal agency which has jurisdiction by law refuses to be a cooperating agency, this matter should be brought to the attention of FHWA Regional and Headquarters Offices.

5. Question: What are the project obligations for reimbursing a cooperating agency for resources expended in carrying out its responsibilities as a cooperating agency?

Answer: The CEQ regulations are quite specific on this point. Section 1501.6(b)(5) clearly states that a cooperating agency should normally use its own funds and resources. The principal exception to this rule would be where an agency is a cooperating agency because of special expertise, its work assignment on the project is substantial, and it would not be able to carry out the work without reimbursement.

6. Question: How should FHWA handle the long turnaround times from cooperating agencies in the review of preliminary documents?

Answer: At the beginning of the project, FHWA and the cooperating agencies should agree to specific time periods for coordination activities such as the review of preliminary documents. The FHWA should make every reasonable effort to assist agencies in meeting deadlines. Nevertheless, cooperating agencies should be aware that failure to reasonably adhere to these schedules could result in their comments not being incorporated in the documents.

7. Question: How should FHWA respond when another Federal agency asks to be a cooperating agency?

Answer: If that agency has jurisdiction by law, then FHWA should invite it to become a cooperating agency. If the agency has special expertise, then the two agencies should discuss why the agency wants to be a cooperating agency, and whether or not a cooperating agency designation is the most appropriate mechanism for involving the agency in the project.

8. Question: What happens when an agency is not identified as having jurisdiction by law until late in the project development process?

Answer: If this happens prior to the completion of the NEPA process, an attempt should be made to have the agency officially become a cooperating agency prior to the completion of the final environmental document. If this occurs after completion of the final environmental document, the FHWA should work with the other agency to assist it in satisfying NEPA requirements pertaining to its action.

9. Question: Can a cooperating agency adopt a lead agency's environmental document, then several years later require that a new document be prepared because new issues have arisen?

Answer: Yes, just as FHWA requires that new issues be addressed in a re-evaluation or in a supplemental environmental document, a cooperating agency can require whatever supplemental evaluation or document is appropriate under its procedures. In such cases, FHWA should work closely with the cooperating agency to avoid unnecessary duplication.

10. Question: What is the SHA's responsibility with regard to cooperating agencies?

Answer: As with satisfying most environmental requirements, the SHA can assume many of the responsibilities in dealing with cooperating agencies; however, FHWA must ensure that all Federal requirements are met. Project-specific or State-specific procedures can be developed for assigning responsibilities between the SHA and the FHWA.

11. Question: Under what circumstances would FHWA be a cooperating agency?

Answer: This would typically occur when FHWA is funding a small portion of a project sponsored by another Federal agency or when FHWA approves, without providing funding, a change in access to the Interstate System for a project sponsored by another Federal

agency. In either case, FHWA could satisfy its NEPA responsibility by being a cooperating agency and adopting the lead agency's environmental document.

12. Question: How does a cooperating agency adopt a lead agency's environmental document?

Answer: If the cooperating agency feels that the lead agency's document adequately addresses the project and its impacts, it may simply execute its own decision document (FONSI or Record of Decision) which states that the agency has completed an independent review and is adopting the lead agency's environmental document.

13. Question: Under what circumstances would FHWA be a joint lead agency with another Federal agency?

Answer: This would generally occur when both agencies have a substantial role in a major portion of the project. For example, FHWA and the Urban Mass Transportation Administration have been joint lead agencies on combined highway/mass transit projects.

14. Question: Must the Corps be requested to be a cooperating agency when a nationwide permit is involved?

Answer: No.

15. Question: Should EPA be requested to be a cooperating agency based on its Section 404 jurisdiction?

Answer: Yes. Even though EPA does not have day-to-day jurisdiction, it does have ultimate jurisdiction through its authority, under Section 404(c), to veto permits. Having EPA be a cooperating agency can be an effective way of identifying and addressing EPA's Section 404 concerns early in the process.

16. Question: Does the Advisory Council on Historic Preservation (ACHP) or the State Historic Preservation Officer (SHPO) need to be invited to be a cooperating agency in order to facilitate compliance with Section 106 of the National Historic Preservation Act?

Answer: No, but the ACHP's Section 106 review process should be integrated into the NEPA process so that the two proceed in tandem. Generally speaking, the SHPO should be contacted during scoping or during the early stages of preparing an EIS, EA, or CE documentation. Depending on the complexity of the project, and its effects on historic properties, the requirements for effect determination and consultation set forth in 36 CFR 800.5 should be carried out either during the latter stages of producing a draft environmental document, with the results presented in the draft document, or after the preparation of the draft document, with the results presented in the final document. For an outline of historic preservation information to be included in NEPA documents to ensure that they will fulfill Section 106 review purposes, see 36 CFR 800.8.

17. Question: How do exchanges between FHWA, a SHA and cooperating agencies relate to the Freedom of Information Act (FOIA)?

Answer: All Federal agencies are subject to the FOIA and most have their own implementing policies. The FHWA has determined that exchanges with cooperating agencies may be exempted pursuant to exemption 5, because of the detrimental effect that public release would have on the conduct of government business. This applies to release of pre-decisional working copies of EAs and EISs. It also applies to exchanges of information (between cooperating agencies) containing advice, comments, opinions and recommendations that are part of the deliberative process. Consequently, when preliminary draft or final EISs are provided to cooperating agencies, they should be apprised of FHWA's position and should be asked not to release such documents.

References

CEQ Regulations, 40 CFR Parts 1500-1508

Section 1501.6 Cooperating Agencies: This section lays out the basic ground rules for designating cooperating agencies.

Section 1503.2 Duty to comment: This section indicates that a cooperating agency that is satisfied with a draft EIS should respond with a "no comment."

Section 1503.3 Specificity of comments: This section indicates the types of comments a cooperating agency with jurisdiction by law should make in reviewing a draft EIS.

Section 1506.3 Adoption: This section provides for a cooperating agency to adopt a final EIS without recirculating it.

CEQ's 40 Questions and Answers, March 16, 1981

Questions 14a, 15, and 30 address various points relating to cooperating agencies. Question 14a concerns itself with the rights and responsibilities of lead and cooperating agencies. Question 15 talks about how EPA's responsibilities to review EISs under Section 309 of the Clean Air Act relate to its being a cooperating agency. Question 30 addresses how a cooperating agency with jurisdiction by law could approach the adoption of an EIS where it is not satisfied with the adequacy of the document.

CEQ "Scoping Guidance," April 30, 1981

Pages 16 and 17 of this CEQ memorandum discuss the fact that lead and cooperating agencies still feel uncomfortable in their respective roles. It goes on to give additional CEQ philosophy regarding lead and cooperating agency responsibilities.

CEQ Guidance Regarding NEPA Regulations, 48 FR 34263, July 28, 1983.

This guidance reiterates lead and cooperating agency responsibilities. It emphasizes the cooperating agency's responsibility to participate fully in scoping and that agencies with jurisdiction by law must accept designation as a cooperating agency if requested.

Appendices to the CEO Regulations, 49 FR 49750, December 21, 1984.

Appendix II contains a comprehensive list of agencies with jurisdiction by law or special expertise on environmental issues.

Note: The above references are available from the Council on Environmental Quality, 722 Jackson Place N.W., Washington, D.C. 20503.

"Applying the Section 404 Permit Process to Federal-aid Highway Projects,"
September 1988.

Chapter 11 of this interagency publication provides guidance for the integrating of NEPA and Section 404 Permits. It also provides guidance on the level of design detail that is needed to accomplish such integration.

**APPENDIX A
EXAMPLE COOPERATING AGENCY
REQUEST LETTER**

Dear Sir or Madam:

The Federal Highway Administration (FHWA) in cooperation with the Pennsylvania Department of Transportation is initiating an environmental impact statement (EIS)¹ for State Route 33 in Northampton County, Pennsylvania. Since the project [will almost certainly require a Section 404 permit and because of your agency's legal jurisdiction over such permits] [may effect fish and wildlife habitat and because of your agency's special expertise] we are requesting you to be a cooperating agency.

Route 33 is... [describe project location and need, alternatives under consideration, potential environmental impacts, etc.].

Your agency's involvement should entail those areas under its [jurisdiction] [expertise] and no direct writing or analysis will be necessary for the document's preparation.² The following are activities we will take to maximize interagency cooperation:

- 1) Invite you to coordination meetings;
- 2) Consult with you on any relevant technical studies that will be required for the project;
- 3) Organize joint field reviews with you;
- 4) Provide you with project information, including study results;
- 5) Encourage your agency to use the above documents to express your views on subjects within your jurisdiction or expertise; and
- 6) Include information in the project environmental documents that cooperating agencies need to discharge their National Environmental

¹Substitute environmental assessment (EA) for EIS when the proposed NEPA document is an EA.

²If the agency has not already received FHWA's cooperating agency guidance, a copy should be enclosed.

Policy Act (NEPA) responsibilities and any other requirements regarding jurisdictional approvals, permits, licenses, and/or clearances.

You have the right to expect that the EIS will enable you to discharge your jurisdictional responsibilities. Likewise you have the obligation to tell us if, at any point in the process, your needs are not being met. We expect that at the end of the process the EIS will satisfy your NEPA requirements including those related to project alternatives, environmental consequences and mitigation. Further, we intend to utilize the EIS and our subsequent record of decision as our decision making documents and as the basis for the permit application. We expect the permit application to proceed concurrently with the EIS approval process.³

We look forward to your response to this request and your role as a cooperating agency on this project. If you have any questions or would like to discuss in more detail the project or our agencies' respective roles and responsibilities during the preparation of this EIS, please contact _____

Sincerely yours,

Division Administrator
Federal Highway Administration

³Delete this paragraph for agencies having special expertise.

Appendix B
Example Wrap-Up Letter to
Agencies Have Section 404 Permit Jurisdiction

Dear Sir or Madam:

The final environmental impact statement (EIS) for the proposed _____ highway project has been completed and submitted to the Federal Highway Administration (FHWA). A copy of that document is enclosed for your use.

Your will note that the EIS has examined several alternative corridors. To the best of our ability, the State DOT and the FHWA have developed this project in compliance with the Section 404(b)(1) guidelines. In this regard several alignment shifts have been examined in an effort to avoid or minimize harm to sensitive water resources. The final EIS contains the wetland finding required by Executive Order 11990. Approval of the document by FHWA will (1) document our approval of the project alternative selected by the State Department of Transportation, (2) constitute our finding that the selected alternative has no practicable alternative, and (3) conclude that the mitigation concepts described in the EIS will provide all practicable measures to minimize harm to wetlands. Before we take action on the EIS, we would appreciate your views on our proposed wetland finding since it is similar to a finding necessary pursuant to issuing a Section 404 Permit.

You will note that the EIS contains a statement that the document contains sufficient information and commitments to demonstrate compliance with the 404(b)(1) guidelines. We would appreciate your views on whether we have met the requirements of the 404 (b)(1) guidelines. It is our intent to submit our 404 permit application to you concurrent with our transmittal of the approved final EIS.

We would appreciate your review of the document, concurrence in our conclusions, and determination whether the EIS will satisfy your needs pursuant to the National Environmental Policy Act. Knowing the State is prepared to make a substantial commitment of resources in the development of

'When the NEPA document is an environmental assessment (EA) that is to be concluded as a finding of no significant impact (FONSI), substitute EA/FONSI for EIS in this letter.

detailed information needed for the permit process, we are requesting that you complete your review, and respond to us within thirty days.

The FHWA has determined that this preliminary document is an intergovernmental exchange that may be withheld under exemption 5 of the Freedom of Information Act. Premature release of this material to any segment of the public could give some sectors an unfair advantage and would be detrimental to orderly decisionmaking, intergovernmental coordination and the success of the cooperating agency concept. For these reasons, we respectfully request that the public not be given access to this document.

Further, to facilitate your review, we would request an opportunity to meet with you and members of your staff at a mutually agreeable time and place. We will contact your office shortly to discuss arrangements for such a meeting.

Sincerely yours,

Division Administrator
Federal Highway Administration

APPENDIX C
Example Letter to an Agency with
Jurisdiction by Law which Declines,
or Fails to Respond to, a Cooperating
Agency Request

Dear Sir or Madam:

Our letter of _____ requested that your agency be a cooperating agency on _____ project because of the probable need to obtain a section 404 permit which is under your legal jurisdiction. The letter described the project and our agencies' respective roles and responsibilities in developing the project's environmental impact statement (EIS).'

This request was declined [or not responded to] by your agency. Because of your jurisdictional responsibility we would like you to reconsider your position and be a cooperating agency, since we believe that your agency's involvement is critical to the expeditious approval and implementation of this project. Furthermore, it is very important to have interagency agreement on the alternatives analysis as early as possible, in order to expedite both the project and the permitting process.

If you still wish not to be a cooperating agency on this project, we request that you inform us in writing that a separate EIS will not be required under your agency's National Environmental Policy Act (NEPA) regulations in conjunction with your agency's permit action.

Sincerely yours,

Division Administrator
Federal Highway Administration

6

'Substitute environmental assessment (EA) for EIS when the proposed NEPA document is an EA.

CHAPTER VI

IMPROVING THE FINANCING OF INFRASTRUCTURE

Task Force Six of the ACIR project to develop recommendations for a federal infrastructure investment strategy examined the literature and agency documents related to the financing of infrastructure investments. This effort sought to help make financing more effective, efficient, and equitable by identifying and evaluating alternative financing sources, and by planning how financial needs will be met by all the responsible parties. The result of this effort is the set of principles and guidelines presented in the first selection of this chapter.

The documents which follow are organized into two topics. The **Financial Analysis** section contains selections that analyze financing needs and the common means of meeting them.

The **Alternative Sources of Funds** section provides examples of the types of financial options available, including some innovative approaches to financing.

HIGH PERFORMANCE PUBLIC WORKS

A New Federal Infrastructure Investment Strategy for America

**U.S. Advisory Commission
on Intergovernmental Relations
SR-16
November 1993**

Statement of Principles and Guidelines, Federal Infrastructure Task Force VI
IMPROVING THE FINANCING OF INFRASTRUCTURE

I. OBJECTIVES

The purpose of this statement of principles and guidelines is to improve the effectiveness, efficiency, and equity of the financing for federal infrastructure programs. The approach taken is to establish financial planning and the selection of appropriate sources and amounts of funds and financing mechanisms as an integral part of infrastructure planning and decisionmaking, spanning the entire process from goal-setting to implementation. Financial planning should not be brought in just at the end of the process, as an afterthought or simply as an element of the implementation process, accepting all the goals, programs, and projects that may have been developed without consideration of their financial consequences.

II. FINDINGS

1. **Rising Requirements for Funds.** Very often, grand visions of infrastructure are framed, social policies are adopted, programs are developed, general requirements are mandated, and it is assumed that the necessary financing will come from somewhere. That assumption frequently no longer rings true. The costs of infrastructure programs (designed to accommodate growth, improve effectiveness and competitiveness, and provide adequate maintenance of existing facilities and equipment) and unfunded federal mandates (to protect the environment, accommodate the handicapped, and alleviate overcrowding in correctional facilities and other public institutions, for example) have accumulated faster than revenues have grown, sending infrastructure agencies, and the governments to which they belong, in search of additional funds.

2. **Heavy State and Local Government Responsibility for Funding.** State and local governments traditionally have been responsible for planning, designing, building, owning, operating,

maintaining, and financing most public works. As federal aid has declined in recent years and unfunded federal mandates have increased, the financial responsibilities of state and local governments have increased even more. The traditional funding sources and mechanisms—including the general fund (containing revenues from such sources as property, sales, and income taxes), long-term borrowing (such as general obligation bonds and revenue bonds), dedicated taxes (such as the gasoline tax), and intergovernmental grants—often are insufficient.

3. **The Search for Alternative Sources of Funds.** During the 1980s, and even in the early 1990s, there has been increasing interest in using nontraditional mechanisms for raising funds to pay for infrastructure. For example:

- The U.S. Department of Transportation joined that search in a major way in the 1980s through its Rice Center studies.
- The U.S. Environmental Protection Agency has prepared a major new inventory of alternative financing techniques, *Alternative Financing Mechanisms for Environmental Programs* (1992).
- Cost sharing and dedicated infrastructure trust funds became a regular part of the U.S. Army Corps of Engineers' financial planning in 1986.
- State and local governments are negotiating more frequently with developers to fund all or portions of essential infrastructure.
- Alternative pricing policies for western water are being examined.
- The access of state and local governments to the debt capital markets has been affected significantly as the federal tax-exempt status of their bonds was relaxed in 1981, then

tightened significantly in 1986. Congress now is considering whether to permit greater use of the tax-exempt bond market for infrastructure under the persistent prodding of the Rebuild America Coalition, the Anthony Commission on Public Works Finances, and others.

- EPA has underwritten state revolving loan funds for wastewater treatment plants in every state.
- The mixing of federal gas tax dollars with private toll road funds—illegal for many years—was authorized in 1991.
- In 1993, a special federal study commission recommended a series of innovative federal actions to attract pension fund investments into infrastructure.

One of the strongest forces driving this search for additional infrastructure funds is rapid growth of unfunded federal mandates. These mandates are imposed by federal laws, court decisions, and administrative regulations, with little or no thought given to their costs. Many of these mandates are for environmental protection. Others are for the purpose of benefiting Americans with disabilities, reducing the crowding of prisoners, and ensuring fair wages and working conditions for infrastructure workers. The cumulative costs of these mandates are high and growing, but they have not been systematically estimated or provided for with planned funding. They have begun to displace other important state and local priorities without weighing the relative merits of competing priorities. Legally speaking, all mandates are of the highest priority but, scientifically speaking, EPA's Science Advisory Board has observed that not all mandates are of equal urgency or necessity.

4. Inefficient Uses of Funds. Some features of infrastructure programs, built in by the political process, have resulted in inefficient uses of scarce funds. For example, funding that is available only for capital improvements, in times when adequate maintenance funding is not available, has resulted in too much construction and reconstruction, and too frequent replacement of capital equipment, incurring greater costs than would have been incurred if routine maintenance had been performed.

Economies also can be introduced by making the ways in which funds are raised in the capital markets more efficient. Pooling of securities, use of credit enhancements, and the restructuring of debt-payment cash flows to meet the needs of existing investors and to attract new ones can all contribute to more cost-effective ways of raising capital. Applications of

securitization, for example, can restructure pools of loans into securities that find global markets consisting of both institutional and individual investors. Federally sponsored securitization is being applied increasingly to several different types of debt instruments, including municipal bonds, and could be applied to leverage limited federal grant moneys to capitalize state revolving loan funds and bond banks more adequately.

The method of revenue collection also can lead to an inefficient use of funds. For example, the current system of fuel taxes and highway tolls favors vehicles with high weight-to-axle ratios, increasing road wear and maintenance costs. In the case of toll roads, frequent stops to pay small fees may result in traffic delays that represent a private cost and add to air pollution. On the other hand, new technologies can change the equation. New collection devices are being introduced that can calibrate use, permit congestion pricing, and make tolls a very efficient way of exacting user charges.

5. Inequities of Funding. Responsibilities for funding infrastructure frequently fall unequally and inequitably on individuals and governments. For example, when general taxes pay for infrastructure services that are not used to the same extent by everyone, it is generally agreed that some users pay too much, while others pay too little. An example is unmetered public water. If payment for a service that is essential to the general public's health and safety is beyond the means of certain parties, then the case can be made for subsidized or even free service for some selected people. Again, public health and safety may dictate that individuals who cannot pay for water may receive basic service at reduced rates or even free until they (or others on their behalf) can pay.

At the governmental level, examples of inequity arise frequently in the distribution of intergovernmental aid and in the imposition of intergovernmental mandates. Although it is generally agreed that aid should be distributed in relation to needs and ability to pay, many current funding formulas do not follow these two principles very closely, and mandates seldom consider these principles at all. Numerous examples of unequal impacts of environmental costs have been presented to EPA.

III. PRINCIPLES AND GUIDELINES FOR FUNDING INFRASTRUCTURE

In order to improve the funding of infrastructure programs, three principles should be followed:

- A financial planning process should be established and applied consistently to all federal programs affecting infrastructure

either directly, through federal aid, or by regulation.

- A standard set of criteria for evaluating the effectiveness, equity, and efficiency of infrastructure funding sources and mechanisms should be established and applied consistently throughout the federal government as part of the financial planning process.
- Mechanisms for funding infrastructure should be chosen after a thorough evaluation of alternatives is performed using the standard criteria.

These three basic principles are elaborated on below and supported with preliminary guidelines.

The Financial Planning Process

The ability to put together a practical package of diverse funding mechanisms may be the key to finding the resources needed to support established federal infrastructure objectives. For each federal infrastructure program being proposed, mandated, budgeted, or reevaluated, a financial feasibility/affordability analysis should be prepared. The purposes of this analysis should be to gauge the financial feasibility and relative effectiveness of alternative infrastructure proposals from the viewpoint of all the parties responsible for funding the improvement and its subsequent operation amount of available funds can and should help shape how much can be required and how the requirements can be met. Risk estimates based on worst-case scenarios may have to be tempered by assessments of costs and resulting improvements in performance.

The requirement for financial feasibility analysis should apply equally to judicial, legislative, and executive decisions affecting the demand for infrastructure. If funds cannot be raised without jeopardizing the fiscal health of the responsible parties, programs and mandates should be redesigned or stretched out to make them feasible.

The May 1992 report of EPA's Environmental Financial Advisory Board (EFAB), entitled *Narrowing the Gap: Environmental Finance for the 1990s*, provides a blueprint for the kind of financial feasibility that all federal infrastructure agencies should consider. Clear estimates of the financing needs are the first step, to be followed by an evaluation of potential funding sources and mechanisms, and the differing capacities to pay possessed by the governments and agencies responsible for implementing infrastructure proposals. It is likely that a package of several revenue sources will be needed to meet identified needs.

A multiyear time frame is particularly important for infrastructure planning. In part, this is because bringing capital projects into existence requires extensive engineering, long lags in acquiring various permits and completing public hearing and approval processes, and long construction periods. In addition, the large amount of investment in a typical infrastructure project requires payments to be spread over many years and provides benefits over long periods of time.

Criteria for Evaluating Alternative Funding Mechanisms

Generally, sources of funds can be judged by three criteria:

Equity: The attribute of raising revenues from those who benefit from the expenditure in proportion to their benefit or the costs they impose on society, with due regard to shared benefits and consistent with prevailing notions of ability to pay.

Efficiency: The attribute of raising the needed funds at a minimum administrative and transaction cost and avoiding unintended distortions in the programs and financial markets.

Effectiveness: The attribute of raising funds in a sufficient amount and timely fashion when needed to meet the costs. In other words, a source of funds may in theory be equitable and efficient, but unless it yields sufficient funds in a dependable fashion when they are needed and has the elasticity needed to respond to changing demands, it is not effective. Legal restrictions, political acceptability, interjurisdictional economic competition, and, in the case of borrowing, financial market acceptability, all may limit the effectiveness of various sources of funds.

Guidelines for Applying the Benefit Principle. In general, those who benefit from infrastructure services should be asked to pay for them. User fees, dedicated taxes, trust funds, and special districts are commonly used to apply this principle. This works well when most of the benefits are identifiable, measurable, and direct, and when the beneficiaries can be billed conveniently at the point of use or where they live.

However, when many of these socially beneficial services are widely dispersed, indirect, or difficult to measure, general taxes may be the only efficient means of funding. In addition, when some people needing services do not have the ability to pay, or have only limited ability to pay, general taxes also may be the most equitable means of funding.

A special case of responsibility to pay for infrastructure occurs when identifiable parties cause pollution or impose other externalized infrastructure

costs on society. In this case, the polluter or imposer of the cost should pay the costs they impose on society to the extent that those costs can be clearly identified and measured.

Selecting Funding Mechanisms

Selection among alternative sources of funding should be guided by the criteria of effectiveness, equity, and efficiency. The application of these criteria is seldom clear-cut, nor are the outcomes of analysis unambiguous; people and governments can disagree over the level and distribution of benefits of programs and projects and how their costs should be apportioned and revenues collected. Nonetheless, there is an overriding need to analyze financing implications and options at the very outset of the infrastructure investment analysis process (see Task Force I Statement), not as an afterthought. Only in this way can the benefits and costs be compared, and the concepts of equity, effectiveness, and efficiency of funding options be recognized.

Another tier of concern has to do with the selection of the source of funds and traditional versus nontraditional financing techniques. Governments have many alternatives in the selection of specific revenue sources and in the choices of facility operations and revenue collections. Much of the innovation that has occurred in the financing of infrastructure has been to establish new entities in the public sector or to enlist the private sector in the development, financing, construction, and/or operation of capital facilities formerly provided by the public sector.

There also are several intergovernmental concerns involved in transfers, mandates, and tax policy relationships. In our federal system, governments that own and operate infrastructure may find themselves in receipt of financial assistance (the fiscal carrot) or under mandate (the stick) when it comes to providing services. Furthermore, federal tax policy and federal securities laws and regulations have pervasive effects on the cost and availability of financing techniques used by state and local governments.

The Principal Choices. There are four major choices when selecting among potential mechanisms for funding infrastructure: (1) current revenues, (2) borrowing (pledging future revenues), (3) intergovernmental assistance, and (4) private-sector options.

It is important to recognize that all expenditures, including those on capital items, will ultimately need to be paid from revenues in somebody's budget, either today or in the future. Thus, the selection of sources of

funds breaks down into a decision to finance improvements either from revenues currently collected by governments or others on their behalf or by promising to use future revenues to pay debt service or lease payments.

Deciding from what sources infrastructure will be funded is vital not only in deciding on the relative merits of one resource over another but also in the practical affairs of designing a financing plan. It is important at the outset to understand the distinctions between (1) own-source revenues that governments raise themselves and over which they have some degree of control and (2) intergovernmental payments that are funded by others and over which the recipients may have little or no control. Intergovernmental assistance is decided on by the assisting government, and its use may carry numerous conditions that limit its flexibility.

Alternatively, governments may elect to borrow or contract for the provision of infrastructure and related services with the private sector. In every case, again, revenues to pay for the facility and services will need to be raised sooner or later, by one government or another or by private parties. When raised either through taxes or charges, these revenues will most likely represent a cost in forgone opportunities to spend funds on other things. It is important, therefore, at the outset of infrastructure policy and planning processes to focus on sound criteria for selecting the appropriate sources of funding.

Traditional vs. Nontraditional Funding Mechanisms to Consider. Governments typically have relied on a limited number of traditional revenue sources, such as the local property tax and various forms of sales taxes (general and selective) and income taxes (usually state). In addition, governments have commonly financed utilities (water, sewer, waste disposal) through user charges based on consumption and/or availability of service. Increasing pressure on raising sufficient funds through traditional mechanisms, greater acceptance of the benefit principle, and technological advances have all combined to increase the use of nontraditional sources of revenues. These include developer exaction's, special taxing districts, and innovative user charges, such as congestion fees and differential waste disposal fees. As technology for recording usage and levying requisite charges (such as in highway user charges) improves, other opportunities will present themselves to better attune charges to benefits.

Both traditional and nontraditional mechanisms should be considered to fill any funding gaps. The advantage of traditional funding mechanisms is that they are in place and known—administratively,

politically, and in terms of predictable productivity. However, they may be their limits of effective use, economically, politically, or legally. If that is the case, the nontraditional mechanisms may offer the only alternatives available for generating additional revenues. Experimentation with alternative funding mechanisms should be encouraged.

In any event, whether traditional or nontraditional mechanisms are used, there are limitations beyond which spending of any unit cannot go, no matter what sources are enlisted in the effort. The nontraditional sources, at least up to now, have accounted for less than 20 percent of infrastructure budgets.

Pay as You Go vs. Borrowing. When making choices between using current revenues or deferring their collection until the future through borrowing or lease-purchase arrangements, there is the added dimension of timing of benefits and payments. The arguments between the advisability of borrowing versus using current revenues (pay-as-you-go) are well understood, but are especially pertinent in the case of infrastructure financing. Whereas reliance on current revenues saves on interest costs and conserves borrowing capacity, it frequently is not an effective option because it provides insufficient funds to pay the large costs of an infrastructure project. Perhaps more important is the desirability of aligning costs to the benefits received over time. Capital improvements produce their benefits over many years, and it is logical that those who benefit from services over time should pay for them as they are used, especially when the users may vary from year to year.

State and local governments rely heavily on the capital markets to finance their infrastructure needs. While the realities of the federal budget place limits on the encouragement that can be provided for such borrowings through tax preferences and securities regulation, there is an overriding obligation to make such access as economical and efficient as possible and to focus on the public benefits of the expenditures to be financed, as opposed to the particular legal form of the borrower or its obligation. Where, for example, there may be incidental or derivative benefits to private parties as a result of financing arrangements, these should not unduly inhibit the use of tax-exempt borrowing for facilities that principally benefit the general public. To the extent possible, broad program objectives should be set and the states and localities should have freedom from detailed restrictions in accomplishing them as best they can.

Guidelines for Determining Who Should Pay. When governments, as distinct from identifiable private parties, pay for infrastructure, the question is which governments should raise the revenues from

their own sources. Local benefits should be paid for locally; regional or metropolitan benefits should be paid for at that level (generally through a special district); statewide benefits should be paid for by the state; and national benefits should be paid for by the federal government. Often, however, a single facility serves more than one clientele, as when a single highway accommodates local, regional, and long-distance trips. In such cases, costs should be shared.

When one government mandates another government to provide infrastructure, it may have responsibility to pay part or all of the costs. When the mandating government is simply regulating services that would be provided in any event, the need is not so compelling. But when the mandate is to meet a national need or involves substantial spillovers, then the need for assistance is compelling.

The key to determining who should pay, and how much, is a careful analysis of who benefits (both directly and indirectly), over what period of time, in what proportions they benefit, and how able they are to pay in proportion to their benefits (or to the costs they impose on others). Governments, like private parties, have differing abilities to pay that should be considered when costs are mandated on them, when intergovernmental grants are distributed, and when revolving loan funds are set up and administered. Representative revenue capacity, tax effort, and expenditure needs (such as prepared by the U.S. Advisory Commission on Intergovernmental Relations) should be consulted when considering the ability of governments to pay a fair share of infrastructure costs. Governmental analyses also can be strengthened significantly by reference to the publications and evaluations of the credit rating agencies and municipal credit analysts who provide helpful guidance on the feasibility and reliability of various financing mechanisms, as well as the credit worthiness of governments that wish to employ them.

**FRAGILE FOUNDATIONS: A REPORT ON
AMERICA'S PUBLIC WORKS**

FINAL REPORT TO THE PRESIDENT AND THE CONGRESS

**National Council on
Public Works Improvement
February 1988**

Finding the Money

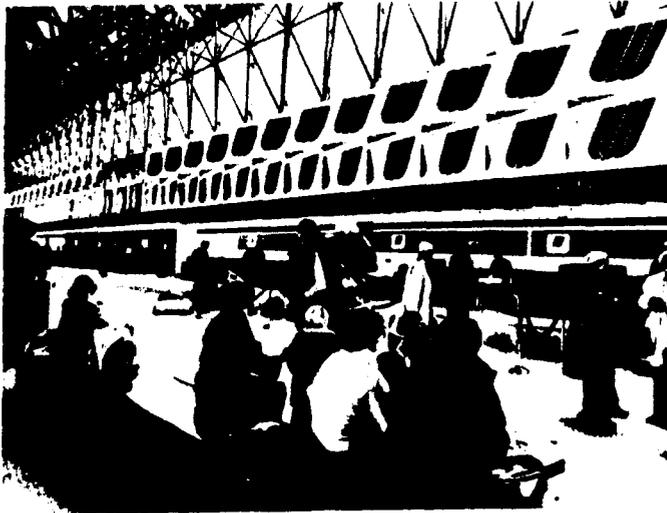
Much of the discussion about public works in recent years has focused on choosing appropriate finance mechanisms—e.g., revolving loan funds, intergovernmental grants, tax-exempt debt techniques, or various forms of privatization. While these options may differ in terms of the attractions they offer to public officials, they all draw on two basic sources of funds—*general tax revenues* and *user fees*.

Mobilizing adequate financing to meet our current and future public works needs requires participation by all levels of government. The Council endorses the following principles to guide this effort:

- Users and other beneficiaries should pay a greater share of the cost of infrastructure service.
- The federal government should be a reliable partner in financing public works.
- States should develop comprehensive infrastructure finance strategies.
- Local governments should give budgetary priority to funding the maintenance of existing facilities.

Emphasis on the Beneficiaries

Today almost 75 percent of public capital spending on infrastructure is derived from



users. Yet only about 50 percent of spending on operations and maintenance comes from this source. Significant elements of transportation, water supply, wastewater treatment, and solid and hazardous waste systems serve identifiable consumers on a continuing basis. Use can be measured and priced; those who do not pay can be excluded from services. Linking financing to use can produce a steady and predictable revenue stream, encouraging better maintenance, rehabilitation, and replacement.

"New strategies like public-private partnerships will help. So will federal initiatives. . . . But what I think is really needed first is a national consensus. We need to better define the scope of the problem—what are the specific needs for all levels—and then identify what resources can be marshalled and by whom."

Mayor Don Erickson,
Cheyenne, Wyoming
Council Hearing,
Los Angeles, July 29, 1987

The Council recognizes important limitations to the user fee principle. Many smaller communities lack the financial base necessary to finance a facility—especially when new capital investment is required. Fees for certain types of essential services, such as water supply, sewage treatment, and solid waste disposal, also can be excessively expensive for lower income residents or hard-to-serve areas.

Options to address these problems may include guarantees or insurance for small-issue debt; state bond banks that combine small bond issues into larger, more credit-worthy statewide issues; selected increases in grants targeted to smaller facilities or those serving lower income areas; and re-

gionalization of services to achieve economies of scale. Providing a threshold level of service and a safety net in these instances also may require general revenues to supplement user fees.

Public works produce both direct and indirect benefits. For example, a mass transit system benefits the transit riders as well as the motorists who travel in the area. In addition, mass transit often benefits business and commercial interests. Thus, the cost of transit development or expansion should be borne by all three groups.

"Twenty years ago developers looked almost entirely to the public sector for infrastructure. Today with increasing population and migration of people and businesses to the cities and surrounding counties of Nashville growing so much faster, the public sector can no longer provide total infrastructure needs. The future must be a joint effort."

George Volkert, President,
Southeast Venture Company,
Nashville, Tenn.
Council Hearing, Nashville, June 9, 1986

User fees may prove inadequate for major new investments in infrastructure technology and economic development. Such projects have few immediate or easily identifiable beneficiaries. Instead, they represent long-term commitments to the future, and rightfully are a matter of common responsibility, to be financed out of general funds or a user fee base that includes both present and future beneficiaries.

The Council endorses the general principle that developers should pay an equitable portion of the cost of new facilities necessary to service commercial, industrial, and residential development. State and local officials should exercise due care to see that the allocation of such costs is fair and reasonable

and does not result in undue private influence over public development policies and priorities. Further, it should be recognized that developer fees and exactions will have an impact on the cost and availability of housing.

The Council urges that federal user fees paid in good faith by beneficiaries to preserve and protect public works systems be spent for that purpose. The accumulation of unspent balances in the federal highway, transit, aviation, and waterways trust funds—nearly \$24 billion in the 1987 budget—is at odds with this principle. **The Council supports a determined, incremental effort to reduce these balances—in line with responsible management and planning—so that the funds can be used for necessary infrastructure improvements.**

Federal Partnership

Between 1960 and 1975, federal grants-in-aid as a portion of total state and local capital spending remained relatively stable at about 33 percent (Figure 5). In the late 1970s, federal aid rose to more than 50 percent; since then it has leveled off at 40 to 45 percent. These patterns reflect a decline in capital spending by state and local governments as well as shifts in federal grant policy.

In the realm of infrastructure finance, the federal government traditionally has focused on providing public works capital. Because of its limited involvement in maintenance and operations, the federal government accounts for less than 30 percent of all public works spending.

The Council urges the President and the Congress to recognize the importance of maintaining a continuing federal role in infrastructure finance. Intergovernmental aid still is necessary to launch major projects of national interest, or to help governments with limited fiscal capacity. However, some changes in the form of federal spending may be necessary to accommodate shifting federal, state, and local roles and relative fiscal capacities.

"I think we have seen the end of . . . massive amounts of federal dollars returning to local governments through federal revenue sharing and any grant program. I think at the state and local levels we must . . . go to Washington and ask for programs and policies that are feasible in light of the changed fiscal circumstances."

Ronald Bean, Executive Director,
Illinois Development Finance
Authority
Council Hearing,
Chicago, Sept. 30, 1987

Whatever form federal assistance takes, it should offer state and local governments:

- Stability over several years to aid long-range planning;
- Flexibility in the use of funds through such mechanisms as block grants; and
- Incentives for increased efficiency and improved maintenance.

In addition, the federal government should exercise restraint in adopting legislation that would limit the revenue-raising capacities of state and local governments.

Federal tax policy also has a significant impact on infrastructure finance. For example, the Tax Reform Act of 1986 drastically limits arbitrage earnings on borrowed funds and restricts the use of municipal bond proceeds for quasi-public projects by imposing ceilings on allowable issues. These and other provisions are expected to limit the growth of tax-exempt

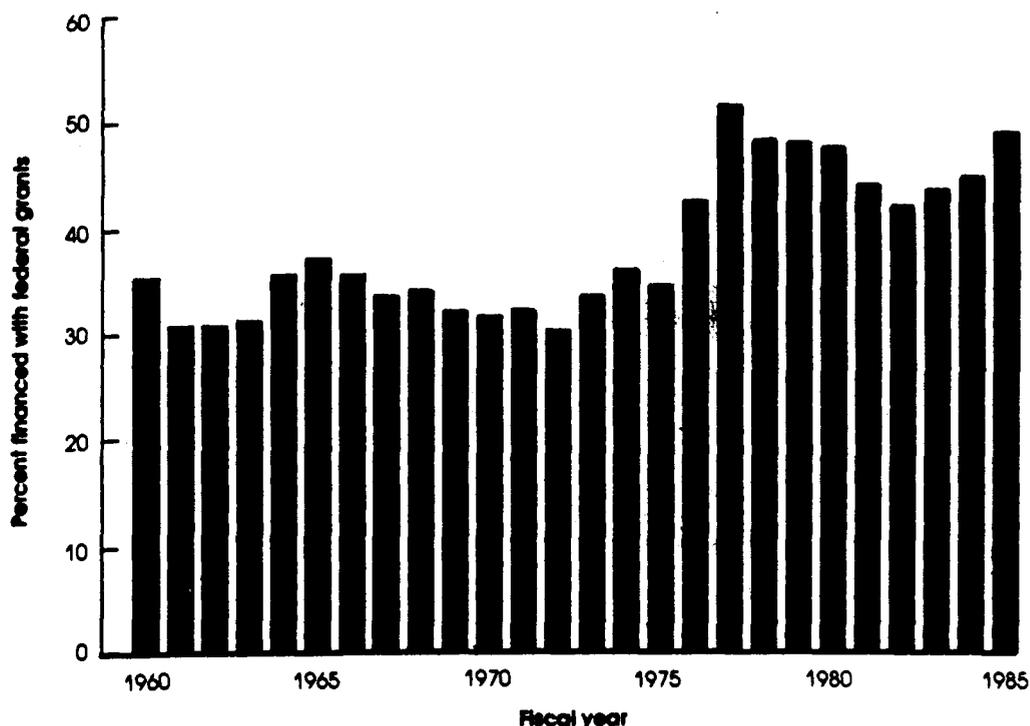
bonds, and to increase state and local borrowing costs. The law also lengthens depreciation schedules and repeals investment tax credits, which will increase the cost of joint development of certain public works with the private sector. In combination, the provisions of the 1986 law may impede the financial plans of state and local governments, reduce their fiscal capacity, and limit their ability to finance necessary improvements.

The Council urges the President and the Congress to pay close attention to the effects of tax reform, and to remove unwarranted limitations on the power of state and local governments to finance public works.

State Strategies

Although a number of states have instituted innovative financing programs, the state share of overall spending on infrastructure dropped from 32 percent in 1970 to 23 percent in 1985. At \$25 billion annually, state

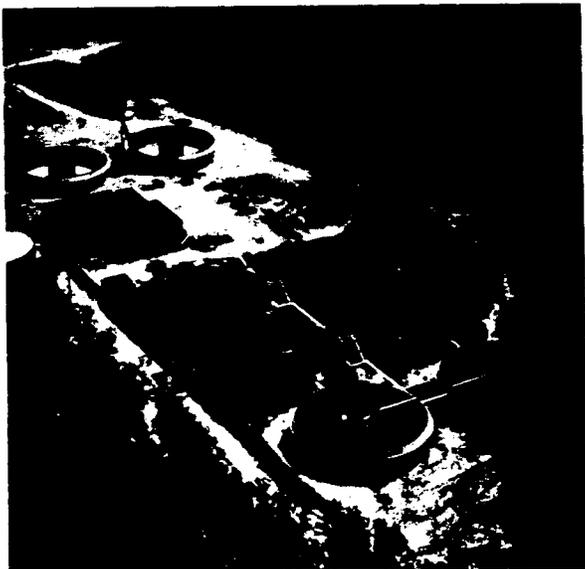
Figure 5—Percent of state and local public works capital spending financed with federal grants



Source: Apogee Research, Inc., Government expenditures databases.

taxes and fees now finance less than one-third of expenditures on state and local public works programs.

While localities are under pressure to fund an increasing portion of total public works spending, often they must contend with state restrictions on taxation or bonding. For example, as of 1985, 31 states had imposed specific property tax rate limits on local governments. Six states had either constitutional or statutory limits on the total amount of revenues that local governments could collect annually.



The Council encourages governors and state legislatures to examine the impact of such restrictions on state and local public works.

Where state constitutional or statutory limitations hinder the ability of the state and local jurisdictions to deliver essential services or adversely affect their credit ratings and finance capacity, states should assume responsibility for either remedying the situation or providing compensatory assistance.

Future Finance Options

The Council has called for a substantial increase in the capacity and effectiveness of the nation's public works. This goal is not attainable unless we first make better use of existing financial resources. In most cases, however, we cannot rely simply on wiser spending; we also must generate additional sources of funding. This burden will fall on all levels of government and involve virtually every category of public works.

The Council supports the concept that the unit of government responsible for service delivery should be the one that levies the fees or taxes to the extent possible and practical.

This will strengthen accountability for the cost and quality of public works service. Local governments already bear the lion's share of operating and maintenance costs and a growing portion of capital costs as well. But to carry out their responsibilities, they must have the proper tools, such as taxing and bonding authority and access to the tax-exempt municipal bond market.

"One point seems to be very clear. The people are willing to dig into their own pockets to pay for better roads, more schools, clean water, expanded airports, improved transportation, and the items which help shape the quality of life in the Golden State."

Don McGrew, President,
Griffith Company,
Long Beach, California
Council Hearing,
Los Angeles, July 29, 1987

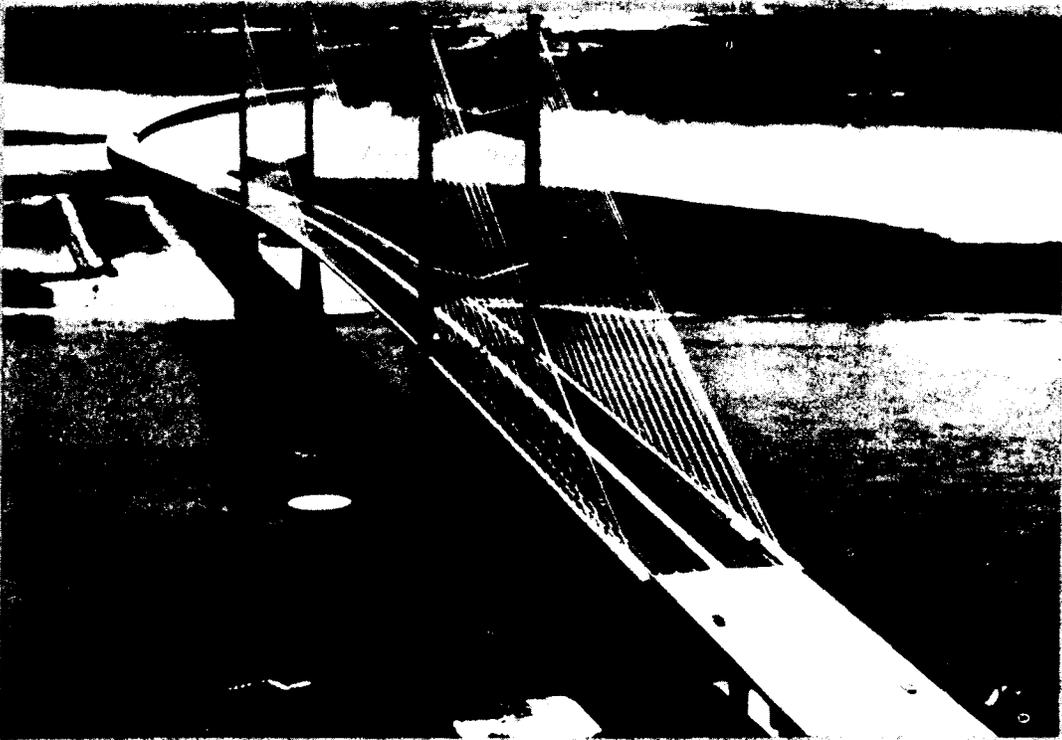
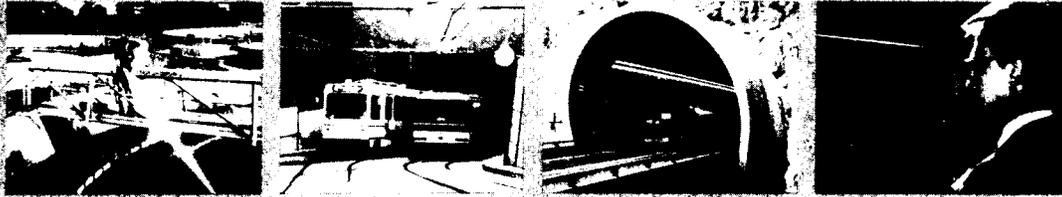
It is not appropriate for the Council to propose a specific legislative program of new fees and taxes to finance public works improvements. The most equitable and efficient mechanisms will depend on the type of infrastructure problem being addressed and on local conditions, traditions, and institutions. These trade-offs are made through the political process at all levels of government. The menu of possible revenue sources listed in Table 1 provides a starting point for assembling such a program.

Many of the options in Table 1 represent simple expansions of existing user fees or related excise taxes. The largest potential sources of funding are motor fuel taxes used by the federal and state governments to support highways and some transit spending, and developer exactions and related fees imposed by many local governments. Local exactions are perhaps the fastest growing means of infrastructure finance, as well as the least well known.

"We as local communities are property tax dependent. We have no access . . . and it is true in most all New England states, to any other forms of taxation."

Pam Plumb, City Council
Member, Portland, Maine,
and 1988 President of the
National League of Cities
Council Hearing,
Boston, Aug. 4, 1987

DELIVERING THE GOODS
Summary



**Public Works Technologies, Management,
and Financing**



CONGRESS OF THE UNITED STATES
OFFICE OF TECHNOLOGY ASSESSMENT

cluded as part of legislation to make EPA a Cabinet department to bolster his efforts. However, whether or not the Agency becomes a department, legislative direction could help the EPA administrator (or secretary) to improve policy coordination and communications between the sections of the Agency and ensure that environmental public works requirements reflect the ways natural systems interact. Congress could enact legislation requiring EPA to protect and manage the environment as a complex system and to clarify the role of the Agency in assisting public jurisdictions in complying with environmental standards. Such a mandate would not guarantee improvement; as discussed elsewhere in this chapter, DOT has such a mandate for transportation, which it has not fulfilled. Nonetheless, such an action would provide additional leverage for broadening the present media-specific programs. Consideration could also be given to establishing formal mechanisms for regular review of cooperative programs for EPA, the Corps of Engineers, and the Bureau of Reclamation to avoid duplication and maximize resources.

OTA concludes that the fragmented congressional and executive branch responsibilities for public works impede setting policy goals that could lead to better investment decisions, more effective management, and better use of technologies. Research for this study showed that better data collection and program management changes are needed now, to address the needs of State and local governments and industry and ensure adequate investment and wise policy and technology decisions.

Difficult as management changes are, it would be unrealistic to assume that efforts made now to update Federal activities would continue to be appropriate for the indefinite future. Rather, the reverse is true; Federal public works programs and policies must be understood as dynamic and subject to rigorous periodic review and revision to keep them relevant and focused appropriately.

Congress

The current, atomized congressional oversight structure for public works is both inefficient and counterproductive. To cite a recent example, during the course of research for this study, OTA searched

in vain for staff members on the committees with authority for financing or tax matters who had consulted with staff on public works committees about the impacts on States and municipalities of changes to the tax requirements for municipal bonds. The response from every committee staffer contacted was the same, "No, we didn't look at that." It took more than 2 years of sustained effort on the part of local officials to reverse sections of 1986 tax legislation that severely hampered their revenue raising ability.¹⁰ Financing, budget, and appropriations committees need to take into account the broad impacts of Federal tax and fiscal policies on the other governmental levels responsible for public works operations, areas in which authorizing committees have expertise.

More thoughtful consideration of the complexities of public works issues and better policymaking might occur if Congress chose to review and consolidate widely dispersed committee responsibilities and develop better communications between committees of jurisdiction. If a complete overhaul of committee responsibilities is too daunting a task, special or ad hoc committees could be established to develop legislation on system problems—for example, to clarify EPA's mandate and identify important future directions for the agency.

Congressional oversight and responsibility for transportation needs reevaluating, with the goal of diminishing modal rivalries and developing legislation that leads to integrating the modes into an effective, national transportation system. At a minimum, mass transit responsibility could be consolidated with that for highways in the Senate, and the committees responsible for railroads could develop close working relationships with those with jurisdictions over highways and ports. Annual joint authorizing committee meetings and more frequent joint staff meetings to hammer out legislation that reflects the actual intermodal connections of the transportation system are other options.

Investment and Financing: Who Pays and How

[the State's duty includes] . . . erecting and maintaining certain public works and certain public institutions . . . because the profit could never repay the expense to any individual . . . though it may

¹⁰A detailed discussion may be found in *Office of Technology Assessment*, op. cit., footnote 6, p. 49.

Table 4—Federal Outlays, 1960-90 (in percent)

	1960	1970	1975	1980	1985	1990 ^d	1995 ^d (projected)
National defense	52	42	26	23	27	25	22
Human resources ^a	28	39	52	53	50	51	56
Physical resources ^b	9	8	11	11	6	7	4
Net interest	8	7	7	9	14	15	9
Other ^c	3	4	4	4	3	2	9
Total Federal outlays (in billions of current dollars)	\$92	\$196	\$332	\$591	\$946	\$1,197	\$1,477

^aIncludes Medicare, income security, and social security.

^bIncludes transportation, natural resources, and environmental and community development.

^cIncludes general government and undistributed offsetting receipts.

^dEstimated.

SOURCE: Office of Technology Assessment, 1991, based on Office of Management and Budget data.

frequently do much more than repay it to a great society.¹¹

Federal infrastructure programs have developed over many years to meet the concerns of the period, usually for purposes of national defense and economic development. As industrial and societal patterns have changed, the Federal Government has, with a few exceptions, found it far easier to add programs and requirements than to refocus or eliminate the existing ones. (Presidents Carter and Reagan were among the exceptions; each was quite successful in reducing the number of Federal support programs.) Although the importance of modern, well-maintained public works systems to National, State, and local economies should be a powerful impetus for changing outdated Federal policies, tremendous unmet needs accumulate well before Federal programs can be restructured to take account of them.

While several national studies over the past decade have recommended substantially greater investment in public infrastructure,¹² no sense of emergency has developed to spark the kinds of changes in social and fiscal policies and political attitudes that could make this happen. Over the last 30 years, Federal budget priorities have emphasized payments to individuals for social and health programs (see table 4) over investment in infrastructure. To ensure that some support for public works continues, dedicated trust funds fed by Federal user fees have been developed for transportation projects.

Despite these funds, however, the overall trend in Federal policy and budget decisions has been to turn, slowly but steadily, to greater cost sharing by States and local governments.

Investment Issues

Federal programs have long supported economic development by providing capital support for construction of new facilities and heavily subsidizing some types of infrastructure while leaving States and local governments responsible for others. Never robust, Federal support for environmental public works, has dropped steadily, while at the same time, numerous strict environmental requirements affecting suppliers of municipal service providers have been enacted. Laws mandating Federal standards for environmental public works that dramatically raise local government costs while simultaneously phasing out most remaining Federal aid seem perverse. Moreover, the emphasis on capital construction and the prohibition of assistance for improving operations in most Federal transportation programs is outdated. Lack of space, high costs, and environmental considerations sharply limit the opportunities to build new highways or airports in urban areas where more capacity is most needed. Other solutions are called for. As Congress considers refocusing Federal investment policies for public works, the following issues are important to keep in mind.

¹¹Adam Smith, *The Wealth of Nations* (Bungay, Suffolk, England: The Chaucer Press, 1979), p. 379.

¹²National Council on Public Works Improvement, *Fragile Foundations: A Report on America's Public Works* (Washington, DC: February 1988) is the most recent. The Council called for up to a doubling of public works expenditures, a general guideline which has since been supported by several studies of special segments of public works, particularly the U.S. Environmental Protection Agency, Office of Municipal Pollution Control, *1988 Needs Survey—Report to Congress* (Springfield, VA: National Technical Information Service, February 1989).

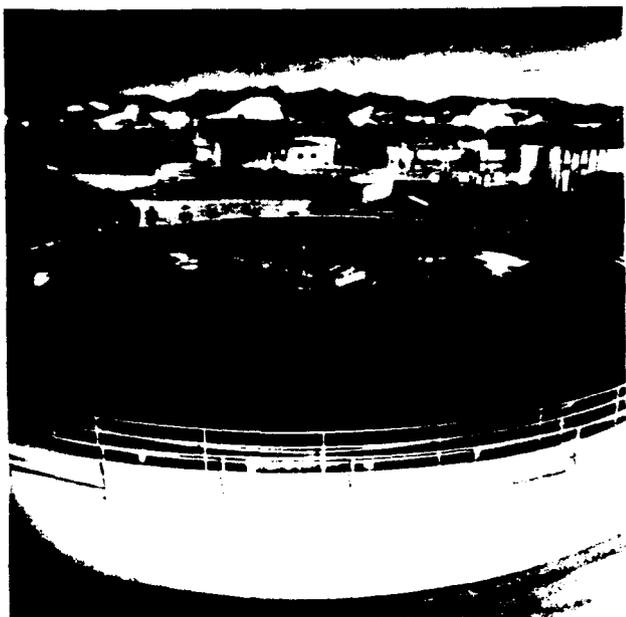


Photo credit: American Consulting Engineers Council

As communities in the South and West, such as Las Cruces, NM, grow at a rapid rate, expansion of environmental public works becomes necessary.

Fiscal Capabilities

State and local governments must balance their budgets annually, and right now, many face serious budget problems, exacerbated by the economic slowdown in late 1990 and early 1991.¹³ Competition for revenue is keen among State agencies, with costs for Medicaid consuming a full 30 percent of some State budgets—in New York and Massachusetts, for example. Major population shifts and economic changes, such as the growth in the sunbelt States and the losses in some “rustbelt” cities and farm and prairie States, mean that some States will have much greater difficulty than others increasing their support for public works.

State fiscal problems can have a devastating effect on local governments, although some jurisdictions are in more vulnerable positions than others. Financing public works improvements is difficult for major urban areas, where public funds must meet other urgent demands, such as adequate housing, police protection, and schools. For some older cities where populations and tax bases are declining, maintenance has been deferred because of tight funding, causing serious decay in public works. As a consequence, public facilities provide inadequate service

or function inefficiently, and are very costly to rehabilitate (see box B). These cities need help, but not every State is willing or able to provide it.

In other large urban areas, particularly in the South and West, rapid suburban growth and weak planning and land-use requirements have made developing an efficient transportation network seem impossible. In many such cities traffic congestion has slowed rush hour highway travel to 10 miles per hour averages. While their infrastructure needs are growth-related, they are likely to be as great as those of older cities. However, the economic base they can tap for funding is both broad and deep—and it includes private sector firms eager to participate in a growing market (see box C).

Another type of problem marks the poorest States and those with many small, rural systems. These barely have the resources to maintain existing systems and will find new construction to meet Federal environmental requirements prohibitively costly. (States in this category are indicated in figure 2 shown earlier.) Because Federal transportation grants have targeted capital construction and because of population and economic changes, some States have more of some types of public works than they can afford to maintain—such as the miles of Interstate highways in large Western States like Montana. Both small and large jurisdictions in rural States and large, older jurisdictions with huge public works backlogs and inadequate economic bases need more financial and technical aid.

As it reexamines public works investment policies, Congress could consider giving more Federal support to those States (and cities) where economic resources are limited and service needs are very high. How high a tax burden a State already places on its citizens (see table 5 for a summary) is another factor that could be considered. OTA concludes that Federal investment in selected segments of public works must be increased to leverage State and local investment in growth areas and supplement resources in economically weak areas. Otherwise, the gap between local jurisdictions’ ability to provide essential public services and the need for the services will continue to grow, with potentially serious consequences for the National, State, and local economies. The most important targets for higher Federal spending for infrastructure

¹³Office of Technology Assessment, *op. cit.*, footnote 6, pp. 57-61.

Box B—Predicaments of an Older City

The condition of public works in Philadelphia epitomizes the predicament of many large, older central cities. Capital outlays needed to replace and upgrade its public works contrast starkly to the city's fragile fiscal condition.

Water and Sewer Needs—Parts of the city's drinking water and wastewater treatment systems are over 100 years old and need extensive restoration and replacement. The City Water Department has proposed a \$456-million capital improvement program for 1991-96.¹ Although drinking water currently satisfies U.S. Environmental Protection Agency regulations, officials are concerned about the feasibility and costs of meeting anticipated Federal standards for byproducts of corrosion (lead and copper) and disinfection. Under court order since 1979 to improve its wastewater treatment system, the city has rebuilt and upgraded treatment plants and eliminated ocean dumping of sludge, but the system, especially the supply piping, still needs major rehabilitation.

To finance the sewer and water improvement package, the Water Department must raise an additional \$44 million annually beginning this year. The department initially proposed a 56-percent rate hike on top of a 20-percent raise in 1986, but recently adopted a plan to raise \$27 million through increased rates and to cut expenditures by \$16 million.² The department's high percentage of low-income customers makes covering all improvement costs through rate increases practically impossible. In fiscal year 1990, department collections fell \$20 million below expenditures.

Transportation Needs—The capital cost to maintain and improve the regional highway and transit system and build some additional capacity is estimated at \$14 billion spread over the next 20 years.³ Projected operating costs, which include maintenance, are \$4 billion for highways and \$19 billion for transit. The city must bear most of the cost because many central city highways and subway facilities are in poor condition, exacerbated by years of inadequate maintenance. A 1985 study showed the city investing only 35 percent of the funds needed annually for street and highway maintenance and rehabilitation and 62 percent of those for mass transit's capital and maintenance needs. Comparing current outlays for regional transportation with recent needs estimates, the region will have a 40-percent investment shortfall.⁴

Fiscal Status—Philadelphia's fiscal problems are as serious as its infrastructure deficit. While employment in Center City Philadelphia continues to expand, the jobs are increasingly for high-level executives, managers, and technical support personnel, many of whom live and pay their taxes outside the city. The city's tax base is eroding, and fully 60 percent of all work trip travel is now intrasuburban.⁵ In August 1990 the city's chief accounting officer warned that in 9 months the city might not have enough money to pay its bills, despite plans to borrow heavily.⁶ The city's bond rating has been downgraded to junk-bond level, precluding new long-term borrowing and forcing officials to put together short-term credit packages to avoid insolvency.⁷ To reduce expenditures, officials have cut operating programs; the police force is down 2,200 officers from its high in 1977,⁸ for example. For help, local officials are looking for State and Federal aid and authority to raise local taxes and fees.

¹Standard & Poor, "Philadelphia Water and Sewer System," *Creditweek — Credit Analyses*, August 1990.

²Timothy Tattam, Standard & Poor, personal communication, Jan. 31, 1991.

³U.S. Department of Transportation, *National Transportation Strategic Planning Study* (Washington, DC: 1990), p. 17-2.

⁴*Ibid.*, p. C-5.

⁵"Septa Studies Cross-County Commuting," *Railway Age*, vol. 191, No. 7, July 1990, p. 82.

⁶"Controller Warns on Philadelphia Funds," *New York Times*, Aug. 15, 1990, p. A-24.

⁷Frank Shafroth, National League of Cities, personal communication, Jan. 30, 1991.

⁸"Philadelphia's Jails and Courts Are Overwhelmed," *New York Times*, Aug. 15, 1990, p. A-24.

are indicated in table 6; those with stars need the largest relative increases.

Although budget negotiations are always arduous, a 20-percent increase in total national infrastructure investment seems both achievable and relatively modest. Congress increased Federal appropriations

for transportation by about that amount in the 1990 budget, which should raise State expenditures, since most Federal appropriations require State matches. Moreover, State and local public works administrators should be able to spend 20 percent more without being overwhelmed, as they might be by a sudden, giant leap in funding.

Box C—Keeping Up With Growth

Population in the Houston metropolitan area more than doubled between 1960 and 1980 and now totals about 3.2 million, although the rate of growth has moderated. Houston has no zoning regulations, and unregulated development and unswerving devotion to private automobiles have created a low-density land-use pattern hard to serve efficiently with public transportation and sanitary facilities and have overloaded local streets and highways.

Highways and Public Transit—In 1980 voters approved a 1-percent sales tax to support the struggling Metro Transit Authority (METRO). Now 10 years later, METRO is spearheading a voter-approved metropolitan “mobility plan,” that includes purchase of new buses to replace the existing, aging fleet, completion of a system of transitways to speed bus service, and a \$600-million roadway improvement package to widen and resurface existing streets and build overpasses and underpasses at congested intersections. The roadway improvements were started first, and over 70 of 200 street projects are complete or under way, financed by the dedication of 25 percent of the sales tax revenues.¹

Development of a rail transit system is the most controversial plan element. Critics complain that a rail system is not needed in Houston and that ridership can never justify the \$1 billion investment, but METRO officials point to Los Angeles’ freeway gridlock and air pollution problems as an example of what happens when a growing city relies exclusively on automobiles and highways for too long. The alignment for the rail line is still under discussion but a decision is expected in spring 1991; the financing package includes Federal funds (\$115 million has already been committed), private sector contributions, and METRO funds.²

Drinking Water—During its years of rapid growth, Houston relied heavily on developer-built groundwater-based systems, but when subsidence (a sinking of the earth caused by groundwater loss) problems became acute, the State stepped in, setting up a regional authority to regulate water withdrawal from aquifers. Houston must switch to drawing its drinking water predominately from local lakes and rivers and is investing millions of dollars, in new facilities, including a new treatment plant and miles of additional pipelines to transport water to the city. Furthermore, costs for electrical power for treatment plants and chemicals used in treatment are expected to increase.³ In addition, the city is replacing lead paint-lined storage tanks and 2,500 miles of small (less than 6-inch) pipe with larger more reliable lines.⁴ To finance these improvements, Houston has increased user charges steadily:

¹Anthony W. Hall, Jr., “We Don’t Need Another Vote on Rail,” *Houston Chronicle*, May 27, 1990, p. 1F.

²Gunter Koetter, “Rail Can Help Houston Avoid Los Angeles’ Mistake,” *Houston Chronicle*, June 24, 1990, p. 5F.

³City of Houston, Texas, “Preliminary Official Statement,” regarding Water and Sewer System Revenue Bond Issue, Aug. 15, 1990.

⁴City of Houston Public Utilities Department, “Water Production,” August 1990.

Regulations and Compliance

EPA estimates that total annual costs for the Nation’s municipalities must rise from about \$33 billion in 1987 to at least \$54 billion (in 1988 dollars) by 2000 to meet some, but not all, of the new and proposed solid waste, water supply, and combined sewer overflow standards.¹⁴ Small systems, serving fewer than 10,000 people, will be required to fund \$6 billion in capital improvements to meet just one set of requirements, those of the 1986 amendments to the Safe Drinking Water Act. Many will need financial assistance to do so,¹⁵ and meeting the standards or deadlines may be impossible.¹⁶ How-

ever, the legislation gives little flexibility for responsible Federal, State, local, or private sector officials to develop innovative or cost-effective ways to comply. Policies that make local governments responsible for meeting Federal environmental mandates without commensurate Federal investment raise questions of fairness.

User Fees

Policymakers at all levels of governments must continually balance the objective of user pays with development goals and issues of ability to pay. To encourage development and because public works are regarded as a necessary service, user charges

¹⁴Apogee Research, Inc., *The Cost of Environmental Protection* (Washington, DC: U.S. Environmental Protection Agency, Office of the Comptroller, January 1990), p. 14.

¹⁵U.S. Environmental Protection Agency, Office of Drinking Water, unpublished summary data based on the Regulatory Impact Analyses prepared in accordance with Executive Order 12291, Nov. 27, 1989.

¹⁶Office of Technology Assessment, *op. cit.*, footnote 6, p. 117.

21 percent in 1987, 9 percent in 1988, and 6 percent in both 1989 and 1990. The typical residential customer uses 7,000 gallons per month.⁵

While the scale of Houston's water system requires enormous capital investment, its size also supports the scientific and management capability to cope with Federal and State compliance requirements, which can overwhelm smaller systems. After finding that local laboratories could not provide the sophisticated water quality tests required by the U.S. Environmental Protection Agency (EPA) at a reasonable price, the city expanded its own laboratory, increased staff, and invested in automated equipment to do the testing. A special research and regulatory evaluation group evaluates the effects of proposed regulations on Houston's system, investigates technologies, and develops new treatment schemes. City officials maintain the staff work has paid off, because their unit costs are down,⁶ but they remain concerned about complying with proposed standards for contaminants such as radionuclides and disinfection byproducts.

Wastewater Treatment—In 1987 the Texas Water Commission issued an administrative order fining the city \$500,000 for permit violations and sewer overflows and establishing a compliance schedule for operational and capital improvements to meet Federal effluent discharge limits.⁷ Since then, Houston has invested about \$800 million in plant upgrading, consolidation, and new construction, and extensive sewer expansion and rehabilitation.⁸ While the system now meets all EPA and State standards, the city plans to spend an additional \$1.1 billion between 1991 and 1995 to replace narrow, worn-out lines and rebuild lift stations. These improvements are being financed by EPA grants, revenue bonds, developer impact fees, and user charges. As part of its financing package, the system will issue approximately \$174 million in low-interest revenue bonds through the EPA-financed State Revolving Fund in 1990. User charges, which back the bonds, are set annually by the city council and currently average \$19 a month.⁹ Rates climbed 22 percent in 1985 and 1986 and more recently have risen about 8 percent a year—a trend that is expected to continue unless new Federal environmental regulations for cyanide, pesticides, and toxic metals require larger increases.

⁵City of Houston, *op. cit.*, footnote 3.

⁶*Ibid.*

⁷*Ibid.*

⁸City of Houston Public Utilities Department, "Improvements in the City's Wastewater System 1982-1990," August 1990.

⁹Prior to 1974, Houston charged a flat household rate of 75 cents for wastewater treatment.

have traditionally been set below full capital, operating, maintenance, and replacement costs.¹⁷ General revenue subsidies are usually necessary to cover capital costs, although in growth areas, beneficiaries may contribute land or cash to capital projects, reducing government costs. While user fees can be increased by every level of government to correct existing underpricing, Federal and/or State financial assistance for local governments will be essential for most capital projects, especially for those jurisdictions with low per-capita incomes and large public works backlogs.

Privatization and Private Sector Financing

Under circumstances where demand for certain services is likely to be high, private entities find investment in public works, particularly environmental services, attractive. Private water supply

companies, for instance, have long flourished in many jurisdictions, as have private solid waste disposal companies. If private companies providing environmental public services can meet EPA and State standards, overcome public opposition on issues such as siting for waste disposal facilities, and make a reasonable return on investment, they can find multiple market opportunities.

However, private firms succeed in providing low-cost services primarily in situations where the market is large, and stable or growing. Many communities that must make major investments in public works are simply unable to generate adequate revenue from user fees to attract private capital. In other areas, private firms capture the lucrative segments of the market, leaving the less profitable ones for public agencies.

¹⁷U.S. Congress, Congressional Budget Office, *New Directions for the Nation's Public Works* (Washington, DC: U.S. Government Printing Office, September 1988).

Table 5—State Fiscal Summary

State	Per-capita income, 1989 (in dollars)	Fiscal ^a effort rank, 1988 (1 = highest effort)	Personal income tax revenue per capita, 1987	Sales tax rate, 1988	Gas tax rate, 1990 (in cents)	Number of interstate miles rated deficient, 1988	Wastewater ^d needs, 1988
Alabama	\$13,625	31	Average	Low	13¢	Low	Average
Alaska	21,656	3	No tax	No tax ^b	8	High	Low
Arizona	15,802	29	Average	Average ^b	17	High	Average
Arkansas	12,901	48	Average	Low ^b	14	Low	Low
California	19,929	27	High	Average ^b	14	High	High
Colorado	17,553	36	Average	Low ^b	20	Low	Low
Connecticut	24,683	49	Low	High	22	Low	High
Delaware	18,483	37	High	No tax	16	Low	Low
District of Columbia	23,491	2	High	High	18	Low	Low
Florida	17,647	46	No tax	High ^b	10	Average	High
Georgia	16,053	26	Average	Low ^b	8	High	Average
Hawaii	18,472	8	High	Low	11	Low	Low
Idaho	13,707	24	Average	Average ^b	18	Average	Low
Illinois	18,824	35	Average	Average ^b	19	Average	High
Indiana	15,779	30	Average	Average	15	Low	High
Iowa	15,487	4	Average	Low ^b	20	Average	Average
Kansas	16,498	15	Average	Low ^b	16	Average	Low
Kentucky	13,743	43	Average	Average ^b	15	Low	High
Louisiana	12,921	28	Low	Low ^b	20	Low	Average
Maine	16,248	22	Average	Average	17	Low	Low
Maryland	21,013	19	High	Average	19	Low	Average
Massachusetts	22,174	44	High	Average	17	Low	High
Michigan	17,444	7	Average	Low	15	High	High
Minnesota	17,657	5	High	High ^b	20	Low	Average
Mississippi	11,724	10	Low	High	18	High	Low
Missouri	16,292	47	Average	Average ^b	11	High	Average
Montana	14,078	18	Average	No tax	20	Average	Low

(continued on next page)

Table 5—State Fiscal Summary—Continued

State	Per-capita income, 1989 (in dollars)	Fiscal effort rank, 1988 (1 = highest effort)	Personal income tax revenue per capita, 1987	Sales tax rate, 1988	Gas tax rate, 1990 (in cents)	Number of interstate miles rated deficient, 1988	Wastewater ^c needs, 1988
Nebraska	\$15,446	12	Average	Low ^b	22¢	Low	Low
Nevada	19,269	50	No tax	High ^b	18	High	High
New Hampshire	20,267	51	No tax	No tax	16	Low	Average
New Jersey	23,778	34	Average	High	11	Low	High
New Mexico	13,401	17	Low	Average ^b	16	Low	Low
New York	21,073	1	High	Low ^b	8	Average	High
North Carolina	15,198	39	Average	Low ^b	22	Low	High
North Dakota	13,563	11	Low	High ^b	17	High	Low
Ohio	16,373	25	Average	Average ^b	20	High	High
Oklahoma	14,154	33	Low	Low ^b	16	High	Low
Oregon	15,919	16	High	No tax	18	High	Average
Pennsylvania	17,269	38	Average	High	12	Average	High
Rhode Island	17,950	23	Average	High	20	Low	Low
South Carolina	13,654	20	Average	Average	16	Low	Low
South Dakota	13,685	32	No tax	Low ^b	18	Low	Low
Tennessee	14,694	42	No tax	High ^b	21	High	Average
Texas	15,702	45	No tax	High ^b	15	High	High
Utah	13,079	9	Average	Average ^b	19	Low	Low
Vermont	16,371	21	Average	Low	16	Low	Low
Virginia	18,927	40	Average	Low ^b	18	High	Low
Washington	17,649	13	No tax	High ^b	22	Low	High
West Virginia	12,345	41	Average	High ^b	20	Low	Average
Wisconsin	16,449	6	High	Average ^b	21	High	High
Wyoming	14,508	14	No tax	Low ^b	9	Low	Low

^a Fiscal effort measures how much a State chooses to tax its revenue base compared with other States. (See app. A for a full explanation.)

^b Local option sales tax permitted.

^c Estimate of the relative State cost to build all needed publicly owned wastewater treatment facilities to meet the requirements of the Clean Water Act.

SOURCE: Office of Technology Assessment, 1991, based on variety of Federal and State data summaries.

Table 6—Priorities for Increased Annual Federal Infrastructure Spending

(*) Star indicates priorities for largest increases.

	1989 Federal spending ^a (in billions of dollars)	Priorities	20-percent increase in spending ^b (in billions of dollars)
Surface transportation total	\$17.9		\$21.5
Highways and bridges	13.8	*Maintain and improve condition of existing facilities. *Expand system capacity through implementation of existing traffic management techniques, HOV and smaller lanes, signalization, and automated toll facilities. R&D on advanced technologies, e.g., intelligent vehicle/highway systems. Improve intermodal connections.	
Mass transit	3.5	Expand transportation system capacity and efficiency by adding transitways and improving intermodal connections, stations, terminals, and parking facilities. Modernize equipment and rehabilitate rails.	
Rail (passenger)	0.6	Modernize capital equipment. *Implement high-speed rail in overcrowded corridors.	
Airports and airways total	6.6	Complete National Airspace System Plan. Expand system capacity through other advanced surveillance, guidance, and communications technologies. Expand system capacity with airport and runway construction. *Improve intermodal connections.	7.9
Ports and waterways total	1.0	Continue to maintain and rehabilitate existing facilities. Expand capacity on a selective basis. Improve landside (intermodal) connections. Address environmental issues	1.2
Transportation total	25.5		30.6
Environmental public works, including wastewater and drinking water	2.8	*Construct, rehabilitate, and upgrade treatment facilities and collection and distribution systems, especially in large, older cities and small communities. *R&D of low-cost technology and technical assistance for small communities and to overcome widespread resistance to innovation. Data collection and analysis of environmental system risk and assessment of regulatory consequences.	3.4^c
Total Federal spending	28.3		34.0
Total all levels of government	140.0		168.0

^a Federal spending totals include some noninfrastructure expenditures, such as for safety.^b A 20-percent increase is hypothetical. However, for surface transportation, it approximates the impact of spending the current Highway Trust Fund balance over a 5-year period.^c Because Federal budget projections forecast decreased funding for environmental public works, the \$3.4 billion would be more than a 20-percent increase over current plans for Federal spending.

SOURCE: Office of Technology Assessment, 1991.

The "... potential advantages of privatization are probably slightly greater in solid waste disposal than toll roads, ..." ¹⁸ and transportation may or may not provide equally appealing private investment opportunities. The elapsed time between project conception, approval, and completion of construction is often a matter of years; work has just begun on publicly funded highway reconstruction projects that have been on the drawing boards for more than a decade, for example. This lengthy and uncertain timeframe poses difficulties for private investors. In addition to acquiring a site or right-of-way, the challenges facing private entrepreneurs wishing to participate in the large public works market include meeting Federal environmental requirements and obtaining approval of State supervisory bodies. Developers seeking to build a private toll road in Virginia, for instance, encountered numerous delays, first, in acquiring State permits, and subsequently in the Federal environmental impact assessment process. In addition, a real estate slowdown made some land owners, who had been eager to donate land for the highway hoping to reap returns on future development, much less interested in the deal, and some have held out for payment. ¹⁹

Nonetheless, California plans four private transportation projects for construction on State-owned rights-of-way; arrangements permit return on investment from tolls and the value added by the privately developed transportation facilities. ²⁰ Time will tell in both States whether the returns will be adequate to satisfy the private investors and also acceptable to State administrators charged with protecting the public interest.

Financing Transportation

The Federal trust funds for highways, mass transit, aviation, and waterways provide States and localities with more substantial Federal support for transportation projects than environmental public works enjoy. However, the variety of ways that Federal aid supports each transportation mode has led to different modal infrastructure problems (see table 7). When the Federal Government takes financial responsibility for maintenance and opera-

tions as well as assisting with capital costs for construction, transportation infrastructure has generally been kept in good condition. Infrastructure for harbors, inland waterways, and aviation falls into this category. While delays occur on the most heavily used portions of these (basically Federal) systems, more active demand or traffic management techniques can eliminate most of these capacity problems.

Surface Transportation

Surface transportation has drastically different characteristics, because Federal financing and investment have shaped actions taken by the State and local governments and some private entities (in the case of railroads and transit) that are responsible for infrastructure. State governments provide slightly more than 50 percent of highway funds, with about 22 percent coming from the Federal side, and the remainder from local governments. The emphasis in Federal programs on capital construction has made the State and local governments the owners of a far flung road system and a number of bridges, all of which need regular maintenance if they are to provide acceptable service. However, operations and maintenance are left almost entirely to the State or local owner (for further details, see chapter 3 of the full report), and fiscal constraints have caused almost universal cutbacks and deferrals for maintenance and rehabilitation programs.

Because their revenue raising options are limited by State laws, many local governments have not been able to fund road and bridge maintenance programs adequately. Many systems need operating improvements, too, to relieve delays caused by increases in traffic. But most large cities simply have not invested adequately in basic operational improvements, such as advanced traffic signal systems, largely because Federal grants are not available for the purpose.

Intercity passenger rail (Amtrak) receives Federal support for capital expenditures and about 30 percent of its operating costs. Intercity freight rail receives virtually no Federal support, except for

¹⁸Jose A. Gomez-Ibanez and John R. Meyer, "The Prospects for Privatizing Infrastructure: Lessons From U.S. Roads and Solid Waste," paper presented at the Conference on The Third Deficit: The Shortfall in Public Investment, sponsored by the Federal Reserve Bank of Boston, Harwich Port, MA, June 27-29, 1990.

¹⁹William H. Allen, vice president, Parsons Brinckerhoff Quade & Douglas, Inc., unpublished remarks at the OTA Workshop on Transportation Infrastructure Technologies, July 25, 1989.

²⁰California Department of Transportation, Office of Privatization, "Privatization," unpublished document, October 1989, p. 1.

Table 7—Major Issues and Problems in Transportation Public Works

Transport mode	Condition	Capacity	Environment	Management and Investment
Highways and bridges . . .	10 percent of roads and 42 percent of bridges rated deficient.	Congestion and delays increasing in many urban and suburban areas; excess capacity in rural areas.	Air quality; land use; noise	Life-cycle management needed; large capital investment would be required to expand urban roadways to meet demand—a temporary solution, at best.
Mass transit	Structural deterioration of rail systems in older, urban areas.	Excess capacity available in most rail and bus systems.	Bus emissions	Roadway management enhancement needed to improve bus transit; life-cycle management and financing for rail transit; little recent R&D investment.
Rail	Generally good for large railroads; problems due to deferred maintenance on some regional and shortline railroads.	Excess capacity on most lines.	Waste disposal on Amtrak trains; for high-speed trains: noise, land use	Federal operating subsidies are needed for Amtrak to ensure reliable commuter rail services. Adequate, stable capital equipment funding could be established to help modernize the fleet and to expand capacity.
Ports and waterways . . .	With a few exceptions, locks, dams, protective works, and channels are generally in good condition.	Locks are the bottlenecks on the inland waterways; delays can exceed 2 days at a few locks.	Dredging and dredged material disposal; noise, land use, and surface traffic problems at ports	Transportation users, especially on the inland waterways, require much greater General Fund subsidy than other transport modes; no cost sharing by nontransportation beneficiaries of navigation projects.
Airports and airways	The condition of airport and airway facilities rarely impedes traffic.	The number of available runways at the busiest airports is the greatest capacity constraint. The staffing levels and technological capabilities of certain airway sectors can be sources of delay.	Aircraft noise in communities surrounding airports; surface traffic congestion due to airports	Constructing new airports or physically expanding existing airports will be difficult for most communities. Technology advances could effectively expand existing capacity by up to 20 percent.

SOURCE: Office of Technology Assessment, 1991.

small amounts to construct safety improvements at grade crossings and intermodal transfer facilities, where highway monies have been used for some construction. Services provided by both Amtrak and freight railroads help relieve road congestion in major metropolitan areas.

Federal Grant Programs—Existing categorical grant programs for highways, which require only a 10 percent match for Interstate highway construction and up to a 25 percent match for other types of projects, have made States target capital construction and Interstate projects in particular, even when these may not be their most pressing requirements. To ensure that States also increase their own funding and that Federal funds are used for projects that are local priorities, Congress could establish larger and more uniform match requirements for grants. For example, if the State and local match were set at 70 percent for all projects, from Interstate highways and railroad improvements to mass transit and airports, local priorities would not be skewed by the availability of Federal money for capital construction or for one mode over another. A slightly higher Federal match could be made available for States with the fewest resources. Still a further possibility is to recognize the level of effort expended by each State to fund public works programs. For a profile of State resources and expenditure levels, see table 5 again. Some economists suggest that significantly higher State match requirements should be accompanied by open-ended Federal grants to provide maximum leverage for State spending; however, such a program would be politically very difficult to shape.²¹

User Pays v. General Fund Subsidies

Many major capital projects could never be built without Federal support, but the wide variation in Federal support for transportation modes has meant that some projects have been constructed that will never bring adequate financial return on investment measured in strict economic terms. Some of these projects, especially mass transit, commuter rail, and intercity passenger rail, bring transportation system and other societal benefits that justify even greater public subsidies. However, users of heavily subsidized systems that have excess capacity, such as

many ports and waterways, and those that provide premium service, such as peak-hour aviation and commuter expressways, could pay more of their own way.

A comparison of the transportation problems summarized in table 7 with the funding patterns in table 8 highlights the need for revising Federal transportation investment and program policies. One option is to raise waterway user fees, particularly for recreational boaters, who are not now subject to the Federal marine fuel tax. Imposing a Federal axle-weight tax on heavy trucks is an equitable way to recoup the costs these vehicles impose for highway maintenance and rehabilitation above the amount they pay in fuel taxes.²² Other options include eliminating restrictions on highway tolls and other forms of user funding for public works constructed with Federal funds. Tax treatment of parking and mass transit subsidies for employees could be equalized.

A Federal transportation pricing policy reflecting the full spectrum of system costs would incorporate operating and maintenance costs, as well as calculation of pollution and other indirect costs. It would encourage higher capacity passenger transport operations, such as car pooling, mass transit, and commuter rail, and mechanisms to reduce total energy use and environmental damage.

Fuel Taxes—are the major source of Federal revenues for transportation. Ideally, raising the Federal gasoline tax would encourage higher vehicle occupancy and more efficient use of the highway system, help address traffic congestion and air pollution problems, and reduce the need to build new highways. However, politically the Nation does not seem ready to accept fuel tax hikes of the magnitude necessary to make these sorts of impacts. Slow, steady, annual increases are more acceptable politically than large, sporadic escalations, especially when coupled with plans to raise appropriations yearly. Furthermore, annual Federal fuel tax increases could assure States of a more reliable funding stream and enable them to do better long-range transportation planning. For example, a 4-cents per gallon increase in Federal motor fuels taxes could be followed by increases of 2 cents per

²¹Edward M. Gramlich, "Financing Infrastructure Investment: Should Money Be Thrown at the Third Deficit?" paper presented at the Conference on The Third Deficit: The Shortfall in Public Investment, sponsored by the Federal Reserve Bank of Boston, Harwich Port, MA, June 27-29, 1990, p. 5.

²²Kenneth A. Small et al., *Road Work* (Washington, DC: The Brookings Institution, 1989), p. 21.

Table 8—Federal Expenditures and User-Fee Revenue for Transportation, 1988 and 1989

	Federal expenditures		User-fee revenues ^a		Revenues as percent of expenditures	
	(in millions of dollars)					
	1988	1989	1988	1989	1988	1989
Highway	\$14,424 ^b	\$13,898 ^b	\$14,288	\$15,856	99%	114%
Transit	3,316 ^c	3,595 ^c	1,019 ^d	1,017 ^d	31	28
Rail	570 ^e	594 ^e	NA	NA	NA	NA
Aviation	5,192 ^f	5,748 ^f	3,189	3,664	61	64
Ports and waterways	1,383 ^g	1,436 ^g	203 ^h	223 ^h	15	16

^a Does not include interest received on trust fund balances.

^b Includes funds outlayed for Federal Highway Administration, National Highway Traffic Safety Administration, Forest Service for forest roads and trails, and Bureau of Indian Affairs for road construction.

^c Includes capital and operating grants and limited research and development (R&D) spending.

^d Revenue source is 1-cent per gallon from motor fuel tax.

^e Amtrak funding and limited Federal R&D spending.

^f Does not include expenditures for National Aeronautics and Space Administration, National Transportation Safety Board, or Department of Transportation Office of the Secretary.

^g Corps of Engineers outlays for harbors waterways. Does not include Maritime Administration, Federal Maritime Commission, Coast Guard, or Panama Canal Company outlays.

^h Includes Inland Waterway Trust Fund, Harbor Maintenance Trust Fund, and St. Lawrence Seaway Tolls.

SOURCE: Office of Technology Assessment, 1991, based on U.S. Department of Transportation, Office of Economics, *Federal Transportation Financial Statistics, Fiscal Years 1979-1989* (Washington, DC: May 1990).

year until the amount dedicated to transportation doubles the current 14 cents.

Because user-pays policies can adversely affect some classes of users, Federal decisions about raising user fees may require complementary actions to ensure that transportation is available to all. For instance, if an axle weight or other special tax were enacted for heavy trucks, this should be considered when other surcharges affecting trucks are evaluated.

Trust Fund Balances

Regardless of other steps taken to equalize national transportation support, Congress will need to find a way to address the issue of the transportation trust fund balances. Set up to be reliable mechanisms for financing highways, mass transit, aviation, and ports and waterways, transportation trust funds currently have large balances that are constant irritants to State and local officials facing massive project backlogs. Simply stated, Federal budget problems have so restricted expenditures that trust fund revenues (user fees paid for transportation services) have substantially outpaced allocations for transportation programs. Congress took a step toward addressing this issue when it raised 1991 spending ceilings for transportation programs; highway appropriations for 1991, for example, are close to 20 percent higher than those for 1990. By sustaining Federal spending for transportation at a level above trust fund revenues, fund balances can be effectively eliminated over 4 or 5 years. However, the overall domestic spending limits set in the 1990

Omnibus Budget Reconciliation Act require transportation to compete with other domestic programs for increased dollars. Thus, continued controversy seems inevitable unless a new budget agreement is forged.

Spending Priorities

The biggest problems for transportation infrastructure are inadequate capacity in major metropolitan regions and substandard conditions in many facilities across the country. For the short term, the top priorities are to redirect Federal investment toward programs for maintaining, upgrading, and extending the lives of existing systems and for increasing system capacity through technologies and management techniques. Under some circumstances, capital construction may be the best option. Broadening categorical grant programs to permit greater flexibility for State and local governments in using trust fund monies, especially for maintenance programs, is probably the best way to ensure that short-term capacity and condition needs are met.

Next in importance are reshaping Federal policies so that they encourage fair pricing and efficient infrastructure use and increase State and local spending, thus raising the total national investment. Making more Federal monies available for passenger and commuter rail and mass transit are options for improving the efficiency of transportation system use. Although commuter rail and transit have long been considered primarily regional or local services, a compelling case can be made for their

importance to interstate commerce, since each represents an alternative way to increase highway capacity in urban areas. Congress could also permit States and jurisdictions to use surface transportation grant funds for mass transit and passenger and freight rail improvements, if doing so is a priority to their regional or State transportation system plans. Because Amtrak provides an invaluable alternative in heavily urbanized regions that have crowded highways and airports, a portion of an increase in Federal surface trust fund monies could be allocated to Amtrak for capital expenditures to enhance rail service. Surface access improvements that smooth connections to ports and airports and intermodal connections and transfers are other potential projects. Traffic signal improvements using some of the advanced vehicle and highway technologies reviewed in chapter 3 of the full report could reduce surface traffic congestion somewhat in urban areas. For rural areas, special attention could be paid to the mobility and freight transport needs of small communities, where no alternatives exist to private vehicles. Table 9 shows the trade-offs associated with the choices.

For the longer term, an intensive Federal effort should be started now aimed at developing and implementing a strategic policy and applied research agenda for transportation to evaluate the trade-offs of alternative ways of addressing overcrowded intercity corridors and urban traffic congestion. This program must have funding support and participation from all the transportation modal administrations and from the industries that will benefit.

Financing Environmental Public Works

As Federal support for environmental public works has declined and new environmental requirements have become effective, many local governments will be hard pressed to meet the costs of upgrading their systems (see box D). Costs will more than double for about 20 percent of small, rural systems and some older, urban areas, the very jurisdictions that are least attractive to private

investment and are hardest hit by declining Federal funding.²³ Under these circumstances, such cities are likely to find the aggregate fiscal impacts of combined sewer overflow control, solid waste disposal, and hazardous waste requirements more than they can handle in the immediate future. Funding for programs to comply with the new standards will compete with higher costs for schools and mandated social programs.²⁴ Moreover, real interest costs for public infrastructure have more than tripled over the last two decades, creating a bias toward short-lived, lower cost alternatives, which may cost more over the long term.²⁵

OTA concludes that EPA has not come to grips with the compliance issues likely to occur because of the fiscal impacts of multiple new requirements on public works providers. Furthermore, widespread noncompliance with the new regulations is likely, especially among small systems and the Nation's oldest and largest cities, unless State and Federal financial and technical assistance is increased.²⁶ Options for technical assistance include development and field demonstrations of new, durable, and cost-effective technology options for both small and large systems and development by EPA of guidelines, based on addressing the most serious health and safety problems first and staging those projects where no unreasonable health risk exists (see chapter 4 of the full report for further details). Such guidelines could be useful for EPA, States, and local jurisdictions alike for setting priorities to schedule compliance and avoid enforcement actions.

Dedicated Revenue

Federal budget constraints notwithstanding, OTA concludes that the costs of compliance will be so burdensome that a congressional effort to address the issue is warranted. Congress could consider establishing a dedicated source of Federal revenue to support State programs that assist localities in complying with EPA standards. The source could be a broad-based tax, such as a dedicated

²³Policy Planning and Evaluation, Inc., "Municipal Sector Study: Impacts of Environmental Regulations on Municipalities," unpublished report prepared for the U.S. Environmental Protection Agency, September 1988, p. ii.

²⁴Office of Technology Assessment, *op. cit.*, footnote 6.

²⁵According to estimates by the U.S. Army Corps of Engineers. L. George Antle, chief, Navigation Division, Institute for Water Resources, U.S. Army Corps of Engineers, personal communication, July 20, 1990.

²⁶Environmental Protection Agency officials consulted by OTA are concerned about potential noncompliance, but warn of the difficulty of making accurate predictions. One agency expert estimated that the number of jurisdictions in noncompliance might quadruple.

Table 9—Policy Choices for Transportation

Goal	Action	Trade-offs
Coordinate national transportation policies and treat transportation as a system.	Institutionalize a multimodal system by restructuring the Department of Transportation (DOT). Consolidate policymaking along broad modal lines (aviation, surface, and water) or functional categories (metropolitan passenger and intercity freight). Make commensurate changes to congressional committees.	Could reduce the number and extent of conflicting Federal policies and encourage decisions that address both competing and complementary aspects of transportation systems. <i>But:</i> Structural change is difficult and can be disruptive in the short term. No guarantee of effectiveness.
	Transfer fiscal and management authority for water transportation from the Army Corps of Engineers to DOT.	Would consolidate all civilian transportation authority within DOT. Problems in Integrating Corps functions should disappear over time. <i>But:</i> Water resources aspects must be considered.
Encourage proper maintenance and management of existing and future public infrastructure. Improve condition and ensure longevity of systems.	Modify spending restrictions on Federal funds to favor maintenance over new construction, where appropriate; establish incentives for implementation of systematic maintenance programs.	Would encourage local authorities to give priority to maintenance. Using Federal funds for operations and maintenance, training, and supporting technologies could reduce total infrastructure costs over the long term. <i>But:</i> Does not address capacity issues.
	Give State and local authorities flexible options for generating revenues for transportation.	Could elicit substantial funds from tolls on federally funded highways, passenger facility charges at airports, congestion pricing, direct charges for infrastructure wear. <i>But:</i> Programs would require close oversight to ensure that new charges are equitable and that the monies are invested in transportation.
Ensure that future transportation investments reflect economic and social needs but are cost-effective.	Link Federal General Fund payments for transportation more closely to national transportation benefits and needs.	Would provide Federal incentives for more efficient system use. <i>But:</i> Would require new revenue sources to keep aviation and water systems operating. Service for hardship communities depends on continued general subsidies.
	Tie Federal capital investment to long-term planning and financial support of system.	Should encourage transportation system construction appropriate to the financial resources of users and other non-Federal interests. <i>But:</i> Requires State and regional planning and funding.
Reduce congestion and delay, and increase capacity.	Encourage physical expansion of infrastructure.	Could be a cost-effective option for increasing capacity. <i>But:</i> Environmental concerns, land-use restrictions, and high capital costs limit this option. In congested areas, delay reductions may be temporary as latent demand fills the new capacity.
	Support technology development and implementation to increase capacity of existing systems with technologies.	Can provide marginal (generally less than 20 percent total) gains in infrastructure capacity. <i>But:</i> In most cases, users would need to invest in new equipment.
	Implement market policies that change transportation demand patterns, such as congestion pricing, access restrictions on low-occupancy vehicles, and eliminating tax bias in favor of parking lots and employee parking.	Could shift traffic to underused times and locations and carry the same passenger or cargo volume on fewer vehicles. <i>But:</i> Complementary actions and Federal oversight to ensure affordable transportation options to all users would be necessary.

SOURCE: Office of Technology Assessment, 1991.

income tax surcharge, or a special-purpose fee, such as a carbon product or waste generator surcharge. If financial assistance is not feasible, a search for other solutions should be undertaken.

State Revolving Funds

Short-term options include expanding funding and functions for EPA's State Revolving Fund (SRF) program. Rather than phasing out Federal

contributions by 1994 as currently scheduled, Congress could double the remaining authorization to \$7 billion and expand the programs eligible for funding from SRFs to include drinking water and solid waste management. Although both water supply and solid waste have traditionally been financed locally, the scale of investment needed to meet new standards is beyond the capacity of many communities and their State governments.

Narrowing
**THE
GAP**
Environmental
Finance
For The 1990s

 Printed on recycled and recyclable paper

EXECUTIVE OVERVIEW

EFAB was Established to Advise the Administrator on Environmental Financing Issues

The Board, chartered in 1989 under the authority of the Federal Advisory Committee Act, is comprised of 33 members of the public and private finance community. Through meetings and workshops, the Board develops independent analysis and advice for the Administrator. These Advisories suggest policies to help ensure that all Americans invest appropriately in a clean environment and a healthy economy.

"Environmental improvements must keep pace with economic growth, for our prosperity is inextricably linked to our nation's environmental health; from our national wealth comes the wherewithal to pay for environmental protection."

—William K. Reilly

EFAB Addresses the Critical Environmental Finance Challenges of the 1990s

THE ENVIRONMENTAL FINANCE GAP IS WIDENING

The real costs of environmental protection are growing rapidly. Yet our nation's ability to meet these rising costs is falling behind — *and the financing gap is widening*. Financial constraints threaten attainment of national environmental goals. At risk are the health of ecosystems, human health, and community well-being — in short, the quality of life in America.

THE BOARD OFFERS REALISTIC SOLUTIONS TO CLOSE THE GAP

The Board believes we can close the environmental financing gap by pursuing actions that:

- ◆ *Lower the costs of environmental protection* — by removing financial and programmatic barriers that raise costs and by improving the efficiency of needed investments;
- ◆ *Build state and local financial capacity* — to carry out environmental mandates; and
- ◆ *Increase public and private investment* — in environmental facilities and services.

LOWER THE COSTS OF ENVIRONMENTAL PROTECTION

The Board has examined several policy options that would lower state and local costs to finance federal environmental mandates. The Board concludes, for example, that reclassification of all state and local environmental bonds as governmental bonds, provided proceeds are used to finance public-purpose environmental facilities, would directly lower state and local costs of borrowing and increase state and local investments. The Board also recommends the use of economic incentives to promote pollution reduction.

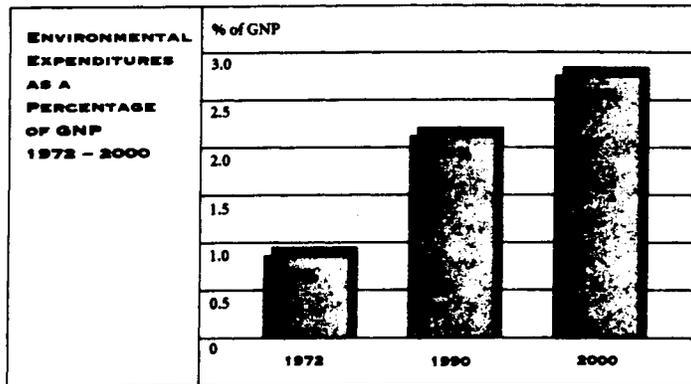
FINDINGS AND RECOMMENDATIONS OF THE BOARD

The Board has Addressed the Key Environmental Finance Challenges of the 1990s

EFAB has addressed the main environmental financing problems facing state and local governments today. Through its advisory role to the Administrator and the EPA, the Board has drawn attention to the growing gap between the costs of environmental protection and our nation's ability to meet those costs and the critical need to make environmental financing issues a priority for EPA and Congress in the 1990s.

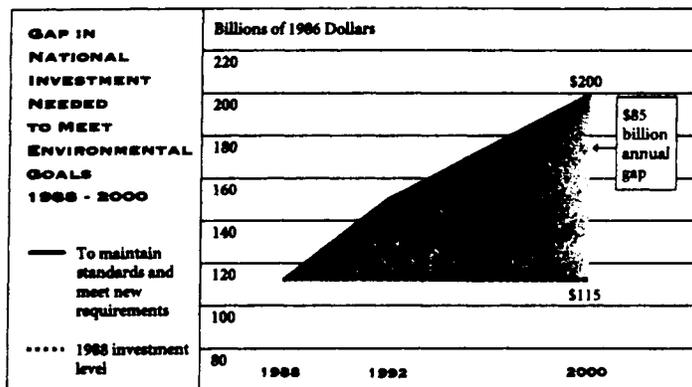
ENVIRONMENTAL PROTECTION COSTS ARE RISING

Total public and private environmental expenditures, as a percentage of gross national product (GNP), grew from 0.9 percent in 1972 to 2.1 percent in 1990. In that same period, the GNP grew from \$3.0 to \$4.7 trillion (in 1986 dollars). By 2000, environmental expenditures are projected to rise to 2.8 percent of GNP, estimated to be \$7.1 trillion.



THE FUNDING GAP IS GROWING

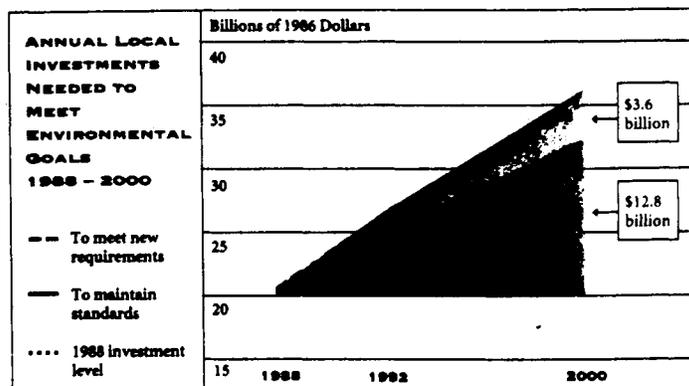
The gap between current resources and the investments needed to maintain existing standards and meet new requirements is increasing. By the year 2000, total annual environmental spending requirements (public and private) will be about \$200 billion, compared to a 1988 level of \$115 billion. This huge difference can be met only through greater efficiency, expanded public and private investment, and increased state and local capacity to implement programs.



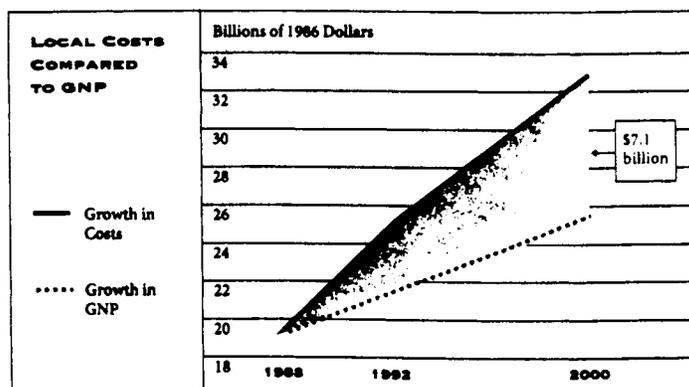
In the final decade of this century, the nation faces serious financial constraints that may prevent attainment of national environmental goals. At risk are the health of ecosystems, human health, and community well-being — in short, the quality of life in America.

At the local level, the funding gap is even more dramatic. In the year 2000, local governments will have to spend an extra \$12.8 billion per year, or 65 percent more than they did in 1988 just to maintain current levels of environmental quality. They will need to spend at least another \$3.6 billion per year to comply with new regulations. In all, communities may need to spend 83 percent more per year by the year 2000.

Local governments will not even be afforded the luxury of maintaining environmental expenditure as a percentage of real income. The environment's share of the pie will have to shrink.



Even if state and local governments could borrow enough to pay for capital investments, annual cash flow requirements to repay their debts will outstrip their financial capacity. Between now and the end of the century, local governments will need to raise 32 percent more money to cover operating and debt service costs. This amounts to an increase in cash requirements of over 3.5 percent per year. Yet over the same period, U.S. GNP is estimated to grow by only 2.37 percent per year and population to grow by only 0.66 percent per year.



IMPACTS ARE HARSHTEST FOR SMALL COMMUNITIES

The nation's smallest communities will be hit especially hard. For communities of less than 500, the annual cost per household of environmental protection will double, from 2.5 percent of household income in 1987 to 5.6 percent by the year 2000. At the same time, federal environmental aid to local governments is declining, leaving communities an increased share of a growing financing burden.

Historically, national debates on environmental infrastructures have paid relatively little attention to "how to pay" or financing issues. Given the magnitude of environmental funding needs, policymakers in the 1990s will inevitably have to confront the growing gap between future needs and currently available resources.

THE NATION NEEDS TO IMPROVE ITS ENVIRONMENTAL INFRASTRUCTURE FINANCING POLICIES

America's lack of a viable national strategy for financing environmental investments manifests itself in several areas:

- ◆ *Tax and Environmental Policies Should Complement Each Other* — the 1986 Tax Reform Act, while promoting greater tax equity, increased the costs of financing environmental facilities;
- ◆ *Federal Grant Policies Should be More Flexible* — inflexible federal grant policies inhibit private sector participation in the financing of environmental facilities;
- ◆ *State and Local Administrative Capacity is Eroding* — federal participation in the fiscal partnership with state and local governments is declining without sufficient institution building at the state and local level to take its place;
- ◆ *The Special Financing Problems of Small Communities Have Been Largely Underestimated* — small communities cannot afford or lack access to the financial markets. Part of the problem is structural — the fixed costs of bond issues are higher as bond issues are small; unit costs of service provision are high as small facilities cannot achieve economies of scale in operation; the user base may be too small to allow full-cost pricing, and a low credit rating (or lack thereof) discriminates against small communities in the debt markets; and
- ◆ *The Environmental Equity of Economically Disadvantaged Communities Must Be Resolved* — many urban areas face serious environmental and public health risks, making neighborhoods less livable and discouraging economic growth and development.

THIS EXACERBATES THE FISCAL CRISIS ALREADY TAKING PLACE AT THE STATE AND LOCAL LEVEL

With few exceptions, governments at all levels are in fiscal crisis. The lack of a national environmental financing policy will aggravate this already difficult situation. In 1991:

- ◆ Thirty-five states reported operating shortfalls or accumulated deficits;
- ◆ One in four city governments faced budget deficits in excess of 5 percent — more than twice as many cities as in 1990; and
- ◆ Even states' "rainy day" funds are being depleted. State budget stabilization funds totalling \$4.15 billion in 1989 fell to approximately \$1.74 billion by the end of 1991.

The current fiscal crisis does not leave much promise for bridging the state and local environmental funding gap in the future. In fact, these fiscal trends exacerbate the problem; in this climate the capital markets are growing increasingly concerned over state and local credit worthiness, further limiting the ability of these government units to issue bonds and secure loans.

The federal government must be a full partner in the near and long term national effort to increase investment in public-purpose environmental infrastructure.

LOCAL GOVERNMENTS ARE FORCED TO RAISE RATES DRAMATICALLY

The results are rate shock and an undue burden on households. Rate shock is translating into rate resistance and the postponement or cancellation of environmental projects. The ultimate result is noncompliance with federal environmental mandates. Economically disadvantaged households may find they are unable to pay for water, sewer, and solid waste management services, and hence face an increasing risk to public health.

Inadequate public investment in environmental infrastructure is translating into a reduction in the productivity of the private economy. Empirical evidence suggests that insufficient public investment over the past two decades can account for as much as 60 percent of the decline in the growth of private productivity during that period. The result is a decline in our international competitiveness. At the local level, loss of product sales may mean plant closures, loss of jobs, and loss of local tax revenues.

Rate Shock — Between 1986 and 1991, water and sewer rates in New York City more than doubled, although water consumption rose only 6.5 percent and inflation grew only 28.5 percent. In the Boston area, average household water and sewer rates are expected to rise from about \$500 per year in 1992 to more than \$1600 per year by 2000. Rate shock can severely affect small communities as well. For example, in Ironwood, Michigan (pop. 7741), average annual sewer rates rose 44.6 percent per year from 1984 to 1989 to equal over \$454 per household. Rates are expected to rise sharply in many communities around the country.

Rate Burden — According to an extensive study of the effects of rising sewer and water rates on economically disadvantaged households in Eastern Massachusetts, inability to pay will result in an increasing incidence of service shutoffs, especially among disadvantaged households. The combined cost of these services plus home heating will consume 29 percent of household income for such families by 1998. According to the Boston Water and Sewer Commission, city water and sewer bills have risen 39 percent in the past two years, and over the same period, water shutoffs tripled as a result of nonpayment of water bills.

A Weakened Private Economy — In the absence of public investment in adequate environmental facilities, growth in the private economy is constrained. Consider, for example, the benefits to the private economy of adequate public facilities. A beverage producer using publicly supplied water from a large, central facility, pays less per gallon of water and has greater productivity than would result from a comparable producer self-supplying water on a smaller scale. The economy benefits through higher private profits, enhanced public tax revenues, or lower prices to the consumer. Public investments, such as enlargements of wastewater treatment plants, allow private factories to operate at higher capacity with no net new investment in capital plant. This, in turn, increases the productivity of private capital in the short run and stimulates new private investment in the long run.

Everybody
loses with loss
of primacy—
states, utilities,
consumers, EPA.

STATES ARE HAVING DIFFICULTY IMPLEMENTING FEDERALLY MANDATED PROGRAMS

States environmental programs are caught in a vise between more costly requirements and insufficient resources. The situation appears to be worsening. Some states are seriously considering the return of federally mandated programs to the federal government. Others are resisting taking on new programs without additional federal funding. Many have sought to develop dependable alternative funding sources, primarily via increased use of fees. However, such funding sources are themselves at best supplementary and often meet stiff resistance.

The reluctance or inability of states to run federally mandated programs themselves not only has an impact on the federal government but also affects local compliance as states cut their enforcement activities. It encourages local noncompliance as an environmental investment option.

EFAB Has Delivered Four Advisories to Date

In response to the growing crisis in environmental financing, the Board has spent considerable time developing viable components of a national environmental financing strategy. Its proposals provide a starting point for a national debate. That such a debate takes place is critical, for in the absence of a credible and workable national environmental financing strategy, our nation risks losing many of the air, land, and water quality gains that have been achieved over the past 20 years. EFAB has delivered four Advisories for the Administrator's consideration:

- ◆ *Incentives for Environmental Investment: Changing Behavior and Building Capital* — which looks at tax and other economic incentives to lower the public costs of environmental investments as well as at ways to improve EPA's environmental financing capabilities;
- ◆ *Small Community Financing Strategies for Environmental Facilities* — which focuses on the special problems of small communities and suggests actions to increase their access to affordable capital;
- ◆ *Private Sector Participation in the Provision of Environmental Services: Barriers and Incentives* — which considers federal, state and local opportunities to ease restrictions on private sector participation in the financing of environmental investments; and
- ◆ *Public Sector Options to Finance Environmental Facilities* — which examines ways to increase the knowledge base of EPA and Congress regarding the costs of environmental protection as well as institutional changes and initiatives that would speed investments in environmental facilities.

The Board is changing the perception of environmental spending from dollars spent with few returns to investments yielding dividends in health, the environment, and our nation's economy.

In addition to the Advisories, in May 1991, the Small Community Financing Strategies Workgroup held a field hearing in Albuquerque, New Mexico. The New Mexico Environment Department hosted the field hearing and Senator Domenici was the honorary chair. The Workgroup heard local officials discuss a range of small community environmental infrastructure financing issues. Other speakers discussed additional small community financing issues during an open session. The Workgroup and the speakers found the field hearing a useful forum for exchanging ideas about small community financing problems.

Sound, Viable Alternatives are Available to Meet the Financing Challenges Ahead

Through its Advisories, the Board has focused on three ways to close the environmental financing gap. The Advisories offer practical policy initiatives that would help:

- ◆ Lower the costs of environmental protection — by removing financial and programmatic barriers that raise costs and by improving the efficiency of needed investments;
- ◆ Build state and local financial capacity to implement environmental programs; and
- ◆ Increase public and private investment in environmental facilities and services.

LOWER THE COSTS OF ENVIRONMENTAL PROTECTION

The Board investigated a number of opportunities for lowering the costs of environmental protection:

- ◆ *Reclassify all state and local environmental bonds as governmental bonds provided proceeds are used to finance public-purpose environmental facilities.* This reclassification would lower the costs of borrowing for state and local governments;
- ◆ *Broaden the use of economic incentives to prevent pollution. These incentives could include a change in depreciation schedules in the tax code, the imposition of waste taxes, or the provision of tax credits for environmental investment.* Such incentives would lower investment costs and encourage pollution reduction; and
- ◆ *Improve coordination among federal small community financial assistance programs to maximize flexibility and efficiency in developing financing strategies for small communities.* This coordination would help small communities pursue the least-cost solution to their environmental investment needs.

Tax exempt municipal bonds are the basic tool used by states, cities, counties, and towns to pay for needed public facilities and services. This ability to sell debt with interest exempt from federal income taxes is critical to state and local borrowers.

BUILD STATE AND LOCAL FINANCIAL CAPACITY TO CARRY OUT ENVIRONMENTAL MANDATES

The Board examined several policy initiatives that would help build and strengthen state and local financing capacity, enabling states and localities to successfully meet the financing challenges they face. The Board developed six options that (1) recognize the need to institutionalize, at the federal level, the critical role financing plays in the achievement of environmental goals, and (2) provide initiatives to facilitate state and local financing efforts. The Board recommends that policymakers:

- ◆ *Strengthen the role of financial analysis in EPA's planning, budgeting, and regulatory processes.* This would augment the Agency's capacity to provide administrators, legislators, and state and local officials with advice on environmental finance;
- ◆ *Take regular inventories of the costs and impacts of complying with national environmental mandates.* Regular inventories would expand Congress' understanding of the financing challenges faced by state and local governments and help Congress select appropriate environmental goals. It also would help state and local governments allocate limited funds to competing environmental priorities;
- ◆ *Improve the effectiveness of the SRF program in financing wastewater treatment through both administrative and legislative changes to the Title VI SRF program.* This would result in the targeting of funds to small and economically disadvantaged communities, facilitating investment by these communities and helping them overcome the financing barriers they face;
- ◆ *Evaluate the feasibility of establishing new mechanisms for the disbursement of financial assistance, including expansion of the SRF to other media and establishment of a national trust fund or state trust funds.* Expanding the SRF program would help local governments overcome capital constraints they currently face in these media by providing low-cost loans. A national trust fund or state trust funds could provide assistance by offering grants to economically disadvantaged communities and additional capital to state and local infrastructure financing agencies. In both capacities, this kind of institution would increase the availability of capital to local governments for environmental investment;
- ◆ *Increase the use of bond banks to improve access to the bond market for small communities.* This would help small communities overcome the special barriers they face in trying to issue debt. Technical assistance could be provided to states without bond banks to assist them in developing this type of institution. Alternatively, EPA could investigate opportunities for creating regional or multi-state bond banks. The development of either state or regional bond banks would facilitate small community issuance of tax-exempt bonds for environmental purposes; and

To mitigate the impending crisis in environmental financing, the federal government can add to its roles of regulation and enforcement that of being a catalyst to effective transition management.

Congress needs to understand the consequences of its policy actions — the costs of a command and control regulatory process are high indeed.

- ◆ *Use fee systems to raise revenues for environmental investments.* This would directly encourage and stimulate environmental investments.

INCREASE PUBLIC AND PRIVATE INVESTMENT IN ENVIRONMENTAL FACILITIES AND SERVICES

Once the costs of environmental protection have been lowered and the financial capacity of state and local governments bolstered, our nation is still left with a need to increase our investment in the environment in order to achieve national environmental goals. Such investment must come from state and local governments and the private sector.

Investment can be increased by focusing efforts to encourage traditional players to invest, or by providing attractive opportunities for new entrants in environmental investment — in particular — by inviting the participation of the private sector. The Board investigated a number of options for encouraging both increased activity on the part of state and local governments, and new activity on the part of the private sector. The Board recommends that we:

- ◆ *Interpret federal grant policies more flexibly to lower the barriers to private sector investments in publicly owned treatment works.* A more flexible interpretation of federal grant policies is critical to make the provision of wastewater treatment more attractive to private parties;
- ◆ *Promote full-cost pricing of environmental services to reflect the true costs of providing those services.* Full-cost recovery would remove a fundamental barrier to private sector participation;
- ◆ *Provide information and technical assistance to reduce the real and perceived risks associated with private investment in public environmental facilities.* This would encourage greater private lending for environmental projects;
- ◆ *Expand EPA's demonstration projects for public-private partnerships involving the financing of environmental facilities or services, technical assistance to local governments in forming partnerships, and possibly funding to help overcome start-up costs associated with public-private partnerships in environmental services.* This option is essentially educational, and would provide guidance for public and private partners looking to work together to provide environmental services; and
- ◆ *Encourage states and localities to modify laws that are disincentives to private sector participation.* This too would foster private sector participation in the provision of environmental services.

Each of the Board's 14 recommendations are presented in greater detail in Appendix A. Each recommendation is structured to help increase the capacity to finance needed environmental investments that will preserve and protect the quality of life in America.

APPENDIX A: FOURTEEN KEY FINDINGS AND RECOMMENDATIONS

The Board's 14 recommendations are presented in greater detail below. Each recommendation will help close the environmental financing gap facing the nation by lowering the costs of investment, building state and local capacity, or by increasing state and local investment in environmental facilities. In short, each will help to preserve and protect the quality of life in America.

RECLASSIFY ALL STATE AND LOCAL ENVIRONMENTAL BONDS AS GOVERNMENTAL

Current Policy

The 1986 Tax Reform Act, while promoting greater tax equity and ending abuses within the tax system, had the unintended effect of increasing the cost of financing public-purpose environmental facilities. The Act:

- ◆ Required state and localities to offer higher tax-exempt interest rates on some types of bonds;
- ◆ Narrowed the market for tax-exempt bonds by eliminating certain types of large-volume institutional buyers; and
- ◆ Limited the volume of private-activity, tax-exempt bonds that states can issue each year, which resulted in delayed financing for environmental projects or forced states and localities to issue public-purpose bonds as taxable bonds, accompanied by higher rates.

The Board's Alternative

EPA could urge Congress to reclassify all state and local environmental bonds as tax-exempt governmental bonds, if the proceeds of the bonds are used exclusively to finance the provision of public-purpose environmental services.

The Result

Reclassifying public-purpose bonds for environmental projects would:

- ◆ Save state and local governments billions in financing costs;
- ◆ Increase investment as it would increase the volume of environmental bonds issued; and
- ◆ Yield a net gain in federal tax revenues by the year 2000 — Losses would be offset by private sector productivity (and hence profitability) gains resulting from increased investment in environmental infrastructure.

BROADEN THE USE OF ECONOMIC INCENTIVES AND MARKET ALTERNATIVES TO PREVENT POLLUTION

Current Policy

Few economic incentives exist to encourage pollution prevention. The U.S. tax code treatment of depreciation schedules, for example, actually favors "end-of-pipe" treatment over pollution prevention and may be biased against investments in pollution reduction equipment. The code's treatment of deduction eligibility for plant and equipment allows deductions for equipment that discharges wastes in violation of permitted levels, as well as expenses arising from payment of punitive damages in connection with environmental malfeasance. Accelerated depreciation allowances are limited to equipment that controls rather than reduces or prevents pollution. Finally, the code's depreciation methods for extracted raw materials encourages the use of toxic raw materials at the expense of less toxic substitutes.

There are few direct incentive programs either. There is no federal and few state hazardous waste tax programs, and the use of credits to encourage the purchase of pollution reduction or conservation equipment by homeowners or businesses is almost nonexistent.

The Board's Alternative

There are several policies that could reduce pollution or prevent its generation, ranging from information transfer and technical assistance, to regulatory mandates, to economic incentives. The Board endorses both voluntary and compulsory pollution prevention policies, including:

- ◆ Imposing economic penalties, such as effluent fees or hazardous waste taxes, to reduce the volume or toxicity of discharges — Taxes or fees could be levied on inputs, such as feedstock taxes, or outputs, at either the point of generation or disposal;
- ◆ Offering tax or other credits for investment in waste-reducing technologies or activities — Credits could be offered for the purchase of pollution reduction equipment or for research and development efforts into pollution reduction technologies and methods; and
- ◆ Removing biases in the U.S. tax code that inhibit waste reduction.

The Result

The imposition of financial penalties for pollution would raise revenues and discourage pollution, as the charge could be designed to reflect true production costs, which include the disposal costs of pollutants generated. Tax credits directly lower the cost of investing in pollution reduction equipment. Finally, revision of the tax code's treatment of deduction eligibilities, accelerated depreciation for plant and equipment, and its use of raw materials depletion allowances for extracted toxic materials would lower financial barriers to investment in pollution reduction equipment and encourage substitution of less toxic raw materials.

IMPROVE COORDINATION AMONG FEDERAL SMALL COMMUNITY FINANCIAL ASSISTANCE PROGRAMS

Current Policy

While there are a myriad of federal financial assistance programs to assist small communities in financing their environmental programs, no network connects these programs to one another. As a result, small communities may not be able to access or use effectively, assistance delivered in a fragmented fashion. Within EPA, for example, small community activities traditionally have been carried out separately by the various environmental media offices.

The Board's Alternative

The Board examined several existing programs to determine potential coordination opportunities. It determined that EPA should take a lead role in marshalling multiple funding sources for small community environmental facilities, including:

- ◆ Developing a catalogue highlighting the financial services and programs available to small communities in complying with environmental mandates;
- ◆ Convening a roundtable of representatives of small community financial assistance programs to discuss and develop small community initiatives; and
- ◆ Improving coordination between the SRF program and the Farmers Home Administration Water and Waste Disposal Loan and Grant program at the state level and providing the latter with specific information on small community needs.

The Result

Improving the exchange and availability of information on small community financial assistance programs, among federal agencies and within EPA itself, would help small communities develop cost-effective financing strategies. It would facilitate their use of the most appropriate funding sources and help them leverage available funds.

STRENGTHEN THE ROLE OF FINANCIAL ANALYSIS IN EPA'S PLANNING, BUDGETING, AND REGULATORY PROCESSES

Current Policy

The EPA Administrator has articulated a series of themes intended to guide the Agency's environmental programs. The implementation of these priorities and the realization of benefits from these initiatives will require major investments by all levels of government. EPA must strengthen its own capacity to provide a financial perspective on environmental goals for the Agency to remain a leader among federal agencies, the Congress, states, localities, and the private sector in developing the capacity to finance environmental services.

The Board's Alternative

The Agency could improve awareness of the importance of environmental finance in all media and increase its interaction with decision makers and legislators on issues of financial capacity by:

- ◆ Adding environmental finance to its list of priorities, thus building its capability to contribute to administrative and legislative debates on financing environmental public works;
- ◆ Strengthening and expanding its role of financial analysis in rulemaking by amending Regulatory Impact Analyses and Regulatory Flexibility Analyses to include analyses of affordability of new rules and the development of fiscal plans to assure that compliance is not impeded by questions of ability to pay; and
- ◆ Strengthening EPA's capacity to provide advice on environmental finance to administrators and legislators.

The Result

Institutionalizing environmental finance by integrating an environmental finance ethic in EPA's day-to-day activities would send a strong message to all senior managers about the importance of ensuring that adequate financing for environmental investments is available. It would ensure that those concerned with fiscal and tax policies fully understand the effects that their proposals may have on seemingly unrelated areas of environmental policy, and it would allow EPA to effectively assist state and local governments trying to finance environmental investments with limited resources.

TAKE REGULAR INVENTORIES OF THE COSTS AND IMPACTS OF COMPLYING WITH NATIONAL ENVIRONMENTAL MANDATES

Current Policy

The joint EPA/State biennial Needs Survey provides information about the cost of complying with federal mandates for wastewater treatment. Comparable information is not required by statute and is unavailable for drinking water or solid waste programs. Policy-makers are thus generally unaware of the costs they impose on state and local governments in complying with federal mandates.

The Board's Alternative

The Board identified several ways of communicating the costs of complying with federal environmental mandates including:

- ◆ Expanding the biennial Needs Survey to include estimates of related water quality needs such as stormwater runoff controls, nonpoint source programs, and estuary management activities. In addition, EPA could initiate separate but similar needs surveys for community water supply and municipal solid waste management facilities; and
- ◆ Annualizing EPA's report *Environmental Investments: The Cost of a Clean Environment* (the Cost of Clean Report), which covers all media and projects capital as well as operating and maintenance costs over a 10-year period for several compliance scenarios.

The Result

Taking regular multi-media inventories of the costs and impacts of complying with national environmental mandates would inform Congress of the financial consequences of its policy actions. It would also provide a basis from which to measure progress in achieving environmental goals. In addition, it would help states administer various geographic initiatives, including, for example, the Great Lakes Initiative, the Gulf of Mexico Program, the Chesapeake Bay and Puget Sound Programs, and the Long Island Sound Program.

IMPROVE THE EFFECTIVENESS OF THE SRF PROGRAM IN FINANCING WASTEWATER TREATMENT

Current Policy

Overall, the SRF program has proven a successful model for financing wastewater treatment. However, not all wastewater treatment needs are being met, especially in the case of small and economically disadvantaged communities. This is due in part to the structure of the SRF in terms of project rankings, federal requirements, requirements on the part of potential loan recipients, and the need to ensure the financial integrity of the funds.

The Board's Alternative

The Board examined several administrative and legislative changes that could be made to the SRF program to improve its effectiveness in reaching more communities, especially those that are small or economically disadvantaged, including:

- ◆ Seeking flexibility in the 4-percent restriction on use of funds, to allow states to use some portion of overall fund assets for program administration after 1994, as several states could otherwise face temporary deficits in their budgets for administration;
- ◆ Allowing the SRF to support public-private partnerships for wastewater services;
- ◆ Funding the SRF program at the authorized levels for FY 1993-94 and appropriating the difference between those amounts authorized under Title II and Title VI, and those actually appropriated to date; and
- ◆ Seeking legislative changes under the Title VI SRF program — This could include creating special set-asides for particular loan recipient groups, extending the SRF loan term beyond 20 years where recipients may have difficulty in paying back the loan, or creating a separate revolving fund for small and economically disadvantaged communities in water quality, drinking water, and solid waste management.

The Result

The administrative changes in the SRF program would facilitate lending to all communities for wastewater treatment. The legislative changes to the program would target small and economically disadvantaged communities for assistance and help ensure that they do not lag behind other communities in protecting their environment.

EVALUATE THE FEASIBILITY OF ESTABLISHING NEW MECHANISMS FOR THE DISBURSEMENT OF FINANCIAL ASSISTANCE

Current Policy

While the SRF program provides low-cost loans for financing wastewater treatment programs, capital assistance is needed in other media as well, such as drinking water and solid waste management programs. This is especially the case in small and economically disadvantaged communities. Further, while state infrastructure authorities, including SRFs, provide financial assistance for a myriad of programs, the speed with which we reach our environmental goals would be enhanced if their capacity to offer financial assistance were expanded.

The Board's Alternative

The Board examined several options to expand and improve our nation's institutional capacity to provide financial assistance for environmental programs. Two alternatives could be implemented in conjunction with one another or individually. The Board recommends EPA evaluate:

- ◆ Expanding the eligibilities of the SRF program for economically disadvantaged communities. This could be extended to other media, contingent on continued federal funding beyond the current authorization period; and
- ◆ Development of a national trust fund or state trust funds. These could provide financial assistance to state and local environmental programs and to regional environmental planning and regulatory commissions, as well as provide liquidity to state environmental facility financing authorities, including the SRF.

The Result

Expansion of the SRF program would establish, in each state that so chooses, a multi-media environmental financing authority capable of directing assistance to the most critical state environmental priorities. A federal trust fund, or state trust funds, would help close the financing gap in two ways. It could provide grants (or other kinds of assistance — including loans, credit enhancement, or even technical assistance) to economically disadvantaged communities for investment in water quality, drinking water, and solid waste management facilities. In addition, trusts would improve the liquidity of state environmental facility financing authorities including SRFs by:

- ◆ Having the statutory authority to issue environmental revenue bonds exempt from federal taxation, which would lower the cost of financing;
- ◆ Making loans to state environmental facility financing authorities;
- ◆ Purchasing debt instruments, including short-term notes, and pooling issues;
- ◆ Providing guarantees or issuing letters of credit backing debt instruments; and
- ◆ Acting as a secondary market by purchasing state loan portfolios.

INCREASE THE USE OF BOND BANKS TO IMPROVE ACCESS TO THE BOND MARKET FOR SMALL COMMUNITIES

Current Policy

Small communities that need to borrow money for environmental projects often are unable to do so in the national bond market because of poor credit ratings, little financial expertise, and relatively small capital needs. Where access to the national bond market is available, interest rates are often very high.

The Board's Alternative

Bond banks could bring more debt financing opportunities within the reach of small communities and help reduce the dependence of such communities on subsidized assistance.

The Board recommends that EPA:

- ◆ Provide technical assistance on the establishment and use of bond banks. This could include identifying their advantages and pitfalls, clarifying bond bank operational structures, and explaining how a bond bank could be used to meet small community environmental facility needs in their state. Such assistance could be delivered through publications, workshops, or conferences;
- ◆ Identify barriers to effective bond bank operations and develop strategies to overcome those barriers, such as working with existing bond banks to exchange information about how they have handled these barriers; and
- ◆ Explore the financial, legal, and administrative feasibility of creating regional or multi-state bond banks to facilitate issuance of tax-exempt bonds by small communities. This could offer greater savings as issues would be pooled over an even larger number of small issues.

The Result

Helping states that have not yet created bond banks establish new bond banks and helping states that already have bond banks improve the effectiveness of these financial institutions would build financing capacity in small communities. In particular, it would help small communities gain access to the municipal bond market at lower interest rates and with lower issuance costs.

USE FEE SYSTEMS TO RAISE REVENUES FOR ENVIRONMENTAL INVESTMENTS

Current Policy

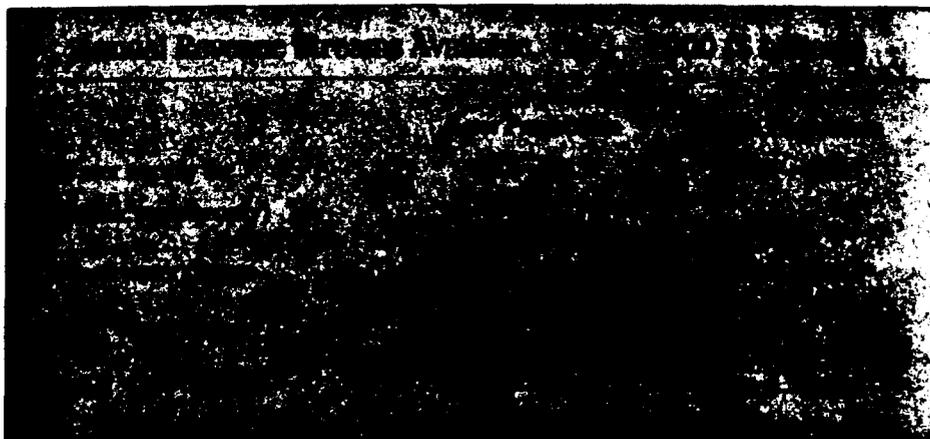
Even with aggressive capitalization of the SRF program, states may still face funding shortfalls in their water quality programs. Moreover, there is currently no self-sustaining source of funds available for drinking water and solid waste management programs.

The Board's Alternative

Dedicated fee systems could help raise funds needed to finance investments in these media and could finance program costs, or cover debt service on capital costs. Fees (and taxes) can be designed to raise revenues and/or act as an incentive to reduce pollution generated. The Board concluded specific opportunities exist to impose fees or taxes on water use, effluent discharge, and solid waste disposal or generation. While several issues would have to be resolved in developing and implementing a fee or tax program, the Board determined that the issues are not insurmountable.

The Result

The Board estimates that states could realize significant revenues from modest fees on water supply, water treatment, and solid waste services. These revenues would be affected by several factors, including fee design, reduction in service use from fee imposition, and the ability to avoid/enforce fee payment. Potential revenues are listed below:



Dedicated tax and fee programs would directly assist state and local governments in financing environmental investments and could also result in a reduction in pollution generated.

REINTERPRET FEDERAL GRANT POLICY

Current Policy

Current interpretation of federal grant policy found in OMB Circular A-102 has effectively eliminated private financing of federally grant-funded wastewater treatment facilities. Under the policy, any recipient of a federal grant to fund a capital facility must hold title to the grant-funded property.

If the property is privatized, the federal government must be reimbursed for its share of the funding for the property, based on the fair market value of the property at that time. The compensation requirement limits the ability of a private owner to leverage the value of the facility because a portion of the capital raised upon refinancing must be used to repay the federal government. This displaces capital that could otherwise increase the value of the facility or its capacity to provide service. This can result in increased user fees without an offsetting increase in services provided or improved water quality.

The Board's Alternative

There are several actions that can be taken to promote private financing of wastewater treatment facilities that have been funded by federal grants. We can:

- ◆ Accept private reinvestment in the grant-funded facility as partial or full compensation for the federal share — displacement of capital would not take place;
- ◆ Redefine the period of federal interest — let it coincide with the design life of the facility;
- ◆ Redefine public ownership of such facilities — allow private equity participation thus permitting public-private partnerships to participate in federally funded SRF programs restricted by statute to publicly owned treatment works (POTWs); and
- ◆ Permit encumbrance of such facilities (that is, offering of the facility as collateral) — securing debt financing from a private source may require that the POTW owner offer the facility as collateral. Permitting encumbrance would therefore increase debt financing opportunities.

The Result

The elimination or modification of grant repayment requirements has significant potential to increase net capital investment in wastewater treatment facilities. Some \$100 billion invested in POTWs would leverage significant amounts of private investment and result in a potential reduction in the cost of capital improvements. In addition, compliance would increase as financing opportunities expanded.

PROMOTE FULL-COST PRICING OF ENVIRONMENTAL SERVICES TO REFLECT THE TRUE COSTS OF PROVIDING THOSE SERVICES

Current Policy

Local governments finance their environmental facilities and services with general revenues, dedicated taxes, federal and state grants and loans, and user fees for the services provided. Historically, many communities have not relied on user fees to cover the full costs of providing services. Rather, they have subsidized service provision from one or more of the other possible sources of revenue. Aside from distorting the true costs of providing these services, subsidizing environmental services acts as a disincentive to private sector participation, as the private sector would not view public subsidies of a private venture as stable revenues and would base investment decisions on user fee revenues only.

The Board's Alternative

Full-cost pricing of environmental services would ensure that consumers' demand for services is proportionate to the cost of providing them. It could also encourage private investment as an alternative to public financing of local environmental facilities. To promote full-cost pricing, EPA could:

- ◆ Endorse the practice in EPA publications as a matter of public policy and as a necessity for financial and operational efficiency, and provide technical assistance to localities in implementing full-cost pricing. Assistance could include helping localities set up effective cost-accounting procedures and estimating techniques to determine (1) capital and operating costs per unit of service delivered and (2) appropriate discounts. It could also include providing support for public outreach and information programs to explain the benefits of full-cost pricing; and
- ◆ Encourage states to consider the adequacy of fees in programs seeking new or renewal of permits. EPA could provide guidance to states on how to best incorporate a review of the adequacy of user fees in their permitting process.

The Result

Full-cost pricing would promote efficient resource allocation and would act as a direct incentive to the private sector to increase its involvement in the provision of environmental services. It would also free public funds currently being used to subsidize environmental services.

PROVIDE INFORMATION AND TECHNICAL ASSISTANCE TO REDUCE THE RISKS ASSOCIATED WITH PRIVATE INVESTMENT IN PUBLIC ENVIRONMENTAL FACILITIES

Current Policy

Lack of adequate information on the real financial risks associated with environmental investments as well as insufficient or reasonably priced insurance for these investments has resulted in the perception that investments in environmental facilities are highly risky. This perception discourages private lending for many types of environmental projects. Where investments are made on the basis of inflated perceived risks rather than much lower actual risks, communities will pay too much to finance their environmental projects.

The Board's Alternative

EPA could reduce the perceived risks of investment by providing detailed information on the probability of activities occurring for which investors would be liable, along with suggested measures to minimize the risks of these events. It could also provide technical assistance to independent agencies so that they could assign "risk ratings", not unlike Moody's or Standard and Poors, to environmental investments.

EPA could reduce the real risks associated with environmental investments by promoting and facilitating private sector insurance efforts that offered insurance to either the capital investor or the insured facility.

The Result

Adequate information on the risks associated with particular environmental investments accompanied by independent risk ratings of these investments would help correct perceptions of the actual risks of such investments. It would encourage more private sector participation in low-risk environmental projects. It would also encourage the setting of user fees that more accurately reflect the actual risks posed by a given project.

An increase in privately available liability insurance for environmental projects would help lower the real risks of such investments. It would promote private sector participation and would encourage banks and other lending institutions to offer private loans for environmental facilities.

EXPAND EPA'S DEMONSTRATION PROJECTS FOR PUBLIC-PRIVATE PARTNERSHIPS

Current Policy

State and local governments are increasingly constrained in their ability to pay for environmental investments. Traditional sources of revenue are becoming insufficient to allow states and localities to comply with environmental mandates in a timely manner.

The Board's Alternative

Greater private sector involvement in the provision of environmental services would assist state and local governments in meeting the financing challenge they face. In particular, public-private partnerships have proven a successful model in the provision of public services.

The Board recommends that EPA:

- ◆ Expand its demonstration program for public-private partnerships involving the development and implementation of partnerships for financing environmental facilities or services. It should also include a project evaluation component to assist the future development and implementation of independent public-private partnerships;
- ◆ Investigate the establishment of an independent authority to make low-interest loans or grants to finance key stages of the formation of public-private partnerships; and
- ◆ Provide assistance to local governments that are interested in establishing public-private partnerships. This assistance could include seminars, publications, and direct consultation on specific projects.

The Result

Private sector involvement can reduce the costs of providing environmental services. It would also free public funds for use in other areas. (Indeed, when public financial resources are inadequate or nonexistent, or when municipal debt has already reached its limit under current law, private investment may effectively be the only source of funds for expanding the capacity of environmental services.) Public-private partnerships would also find creative ways to leverage available resources to achieve environmental quality goals. Action by EPA to promote these partnerships would facilitate their use and success.

ENCOURAGE STATES AND LOCALITIES TO MODIFY LAWS THAT ARE DISINCENTIVES TO PRIVATE SECTOR PARTICIPATION

Current Policy

Some state and local government practices, such as those aimed at ensuring accountability and public control over decision-making, indirectly discourage private involvement in the provision of environmental services.

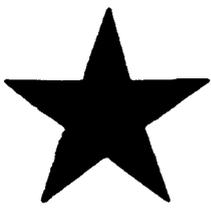
The Board's Alternative

To encourage private sector involvement, the Board recommends that EPA:

- ◆ Provide guidance to states that are considering revision of their procurement laws to enable local governments to adopt the American Bar Association (ABA) Model Procurement Code and Ordinance. EPA could also provide guidance to local governments on facilitating private sector participation through the use of the ABA Code. The Code provides voluntary standards that states and local governments can use to revise their procurement statutes to allow greater sophistication and flexibility, including the option of using a competitive negotiation process whereby contract awards are not limited to the lowest cost bidder; and
- ◆ Establish guidance on effective privatization legislation. This would authorize long-term contracts between local governments and the private sector where feasible, practical, and desirable.

The Result

Increased flexibility in procurement laws would allow local governments to hire the private sector firms that, while not the lowest bidder, would provide the best overall package in terms of service provision and cost-effectiveness. Use of long-term contracts would attract private sector investment since it would allow private firms to lower the fees they charge by spreading amortization costs over a longer period and would reduce the premium on risk included in user fees. Both actions would foster increased private sector involvement in the provision of environmental services.



INVESTING IN OUR FUTURE:

Report of the Public Infrastructure Subcouncil to the Competitiveness Policy Council

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III. Financing

Infrastructure problems cannot be solved through a one-time infusion of funds. The deficit in spending on vitally needed public works stems from years of underfunding. It cannot be corrected with a short-term fix. The Subcouncil strongly believes that consistent, stable funding is absolutely necessary for a productive infrastructure sector. Two recommendations in infrastructure financing are offered in this section: first, to ensure the adequacy of funds for infrastructure investment, and second, to ensure that investments are appropriately and reliably financed.

Adequate and Sustained Financing

The Subcouncil believes that a package of infrastructure investment should contain its own financing proposals.³⁹ Various options for financing infrastructure investments were considered, including raising taxes, deficit financing, and reducing services elsewhere. Despite the unpopularity of raising taxes, the Subcouncil believes there is a growing understanding on the part of the

public that our infrastructure is in need of investment and that in the face of the current deficit, taxes must be raised to cover the necessary costs. The Subcouncil recommends using an energy (carbon) tax or raising the gasoline tax to levels necessary to meet transportation and other infrastructure needs.

A broad-based energy or carbon tax (sometimes called an air pollution tax) has certain advantages over a gasoline tax, such as allowing clear linkages to be drawn between the use of fossil fuel energy sources and pollution.³⁹ On the other hand, a gasoline tax has several compelling advantages: it is well-understood, relatively easier to implement, and it has established revenue collection and management mechanisms.

Each penny per gallon of a gasoline tax is estimated to result in about \$1 billion in revenues, with revenues decreasing as the tax increases (the precise elasticity is open to debate). The amount of taxes to be raised should be based on a more detailed needs assessment.⁴⁰ This effort has identified approximately \$12.5 billion in additional annual investments above ISTEA authorized levels. (see Table 2).

As an example of what might be done, therefore, the current 2.5 cents of the gas tax that is used for deficit reduction could be reapplied to infrastructure and extended into the future, and the federal gas tax itself raised another 10 cents and earmarked for infrastructure. That would supply funding for the top-priority transportation investments called for by the Subcouncil.

It should be stressed that this is not the sum total of the nation's needs for transportation, let alone other types of infrastructure; it merely indicates areas of priority. Other funding requirements may include other types of transportation infrastructure; environmental water and wastewater facilities;⁴¹ new infrastructure along the US/Mexico border; and public facilities, including schools and universities, and federal buildings (particularly for energy efficiency measures). As new transportation technologies move into the implementation stage, we must have sufficient funds available, as well as funding mechanisms, to move forward rapidly. This is particularly true for technologies such as IVHS and high speed ground transportation that may ultimately involve large-

**Table 2
Increased Infrastructure Investments**

	Annual Increase in Investment Above ISTEA Authorizations
National Highway System (highways and bridges)	\$ 9 billion
Other Bridges	\$ 1 billion
Intermodal	\$ 1 billion
Public Transit	\$ 1.5 billion
Total	\$12.5 billion

Capital Budget

Capital budgets are maintained by many other countries as well as by state governments in the US. The US federal government, however, lumps capital expenditures in with operating expenses in the annual budget. The Subcouncil strongly believes that capital investments should be accounted for and financed on a long-term basis. This makes intuitive sense since by definition, capital projects are designed to yield benefits over a period of time. Accounting for the entire capital investment in one year in the same manner as operating expenses skews the decision-making process away from appropriate long-term decisions.

A capital budget for the US would include an inventory assessment, estimates of capital requirements, estimates of operations and maintenance, sources of financing, and allocation of responsibility. Accounting definitions and procedures should be consistent with generally accepted accounting procedures. Any special issues unique to the federal government should be resolved in a manner acceptable to the Federal Accounting Standards Board. Depreciation and other capital consumption costs should be included as expenses in the operating account. This effort should build on recent work by the Commerce Department in collecting data on capital assets.

The Subcouncil does not minimize the work involved in develop-

scale deployment. Further funding might be reserved for human capital investments in education and training, for community development banks and enterprise zones, or other items. Some Subcouncil members have suggested more ambitious public capital investments at the level of \$50 billion annually over the next ten years, over and above current investment levels.⁴²

Federal Financing Mechanisms

Financial mechanisms for infrastructure investment are needed that will: (a) take capital outlays for infrastructure out of

the federal operating budget; (b) facilitate rapid and flexible funding of infrastructure projects; (c) strengthen the selection process of infrastructure investment to work against "pork barrel" tendencies; and (d) ensure the reliability and availability of revenues committed to infrastructure purposes.

The Subcouncil actively considered a number of mechanisms for meeting these goals, and focused primarily on two: a capital budget and a National Infrastructure Bank. These two mechanisms could be considered as either complementary or alternative approaches, depending on the scope and timing of their implementation.

ing a capital budget nor the temptations of various interests to define many different types of public spending as capital investment. However, budgetary safeguards can be devised to prevent abuse of the system and technical difficulties can be overcome. While not a panacea for infrastructure problems, the Subcouncil fully supports the implementation of a capital budget for the United States.

National Infrastructure Bank

Creation of a new national bank has been proposed as another type of financial mechanism that would accomplish many of the desired purposes. First and foremost, the Bank would be the repository and manager of federal infrastructure trust funds, thus removing the political pressures to use trust fund monies to mask the federal deficit. The Bank would be a public institution, established by Congress, to which it would report annually.

Thinking more broadly, the Bank could take on additional roles. For example, the Bank could be charged with evaluating and funding transportation demonstration projects; it could operate as, or in conjunction with, the Infrastructure Commission proposed above. The Bank could play a key role on projects of national significance, such as large-scale transportation projects, new technologies, infrastructure in low-income and rural areas, or trade-related infrastructure that do not

currently receive adequate attention because their costs fall outside the scope of the yearly, short-term budget cycle.

The Bank would be able to offer federal agencies market and risk criteria to help evaluate infrastructure projects. The Bank would also issue infrastructure securities, providing a market-determined, taxable rate of return, to be sold on the open market. These bonds would be backed by dedicated revenues from a new gas tax. The federal government would make a permanent commitment to provide this stream of dedicated revenues to support the Bank's ability to raise the necessary capital to finance the investments. Clear lines of responsibility and authority would need to be spelled out to ensure that the Bank functions primarily as a financial mechanism rather than duplicating the policy-making roles of Congress and the federal agencies.

The advantage of a National Infrastructure Bank would lie in its ability to leverage the revenue stream to raise large amounts of capital when needed for major projects. Thus, for example, if a gas tax increase were phased in with small annual increments, the Bank could issue bonds to raise the required amounts of money in early years, to be paid off in later years with revenues from the gas tax increase. The market for the Bank's bonds would be both institutions and large private investors, with an attempt made to

attract private and public pension funds (currently worth about \$2.6 trillion). Under properly-controlled circumstances, the Bank could be authorized to finance additional infrastructure spending as a counter-cyclical measure during a recession, waive the state and local match requirements during such a period, and undertake other types of financing arrangements to attract private capital to invest in state and local infrastructure projects.

Other financial mechanisms have been put forward as well by individuals and organizations studying the issue of infrastructure investment. For example:

► *A capital investment block grant*, administered by the US Treasury, could be issued to states annually for expansion and modernization of capital facilities. Grants would be allocated according to a redistributive formula, favoring communities and regions with the greatest capital deficiencies and economic needs. Oversight committees in each state would report annually on the use of the funds and the state's maintenance of effort.

► *A National Infrastructure Corporation* was proposed by Senator Moynihan in 1991. The Corporation would serve as a regionally-based federal revolving loan fund, making loans (at a 50/50 federal/state match) to state revolving funds for innovative infrastructure projects with revenue-generating potential.⁴³

One group studying the issue at present is the Infrastructure Investment Commission, which was established by ISTEA to conduct a study on the feasibility and desirability of creating a type of security that would permit the investment of public and private pension funds in infrastructure. The Commission's interim report recommends the creation of a national infrastructure

corporation capitalized by an increment of the gasoline tax, direct appropriations, or existing government agency funds.⁴⁴

The corporation would serve as a domestic version of the Overseas Private Investment Corporation, functioning in several ways: (a) by providing direct insurance and reinsurance to issuers of bonds for infrastructure projects; (b) by making

loans to priority projects that have credit-worthy revenue projections but lack historical operating results; (c) by helping to capitalize state infrastructure revolving funds; and (d) by issuing new infrastructure securities that would offer pension funds a competitive, taxable, market rate of return.



Alternative Financing Mechanisms For Environmental Programs

State Capacity Task Force
*The Alternative Financing
Mechanisms Team Report*

FINAL DRAFT

TABLE OF CONTENTS

EXECUTIVE OVERVIEW	i
INTRODUCTION	1
FINDINGS	3
RECOMMENDATIONS	9
ALTERNATIVE FINANCING MECHANISMS	15
FEEs	18
UTILITY CHARGES	20
CONNECTION FEES	21
FACILITY PERMIT FEES/MONITORING FEES	22
APPLICATION/PROCESSING FEES	23
INSPECTION/CERTIFICATION FEES	24
EMISSIONS/DISCHARGE-BASED FEES	25
DISPOSAL FEES	26
PRODUCT REGISTRATION AND INSPECTION FEES	27
RECREATIONAL FEES	28
WETLANDS PERMIT FEES	29
SEPTIC TANK FEES	30
HAZARDOUS WASTE TRANSPORTER FEES	31
LICENSE FEES	32
IMPACT FEES	33
BONDS	34
GENERAL OBLIGATION BONDS	36
REVENUE BONDS	37
MORAL OBLIGATION BONDS	38
DOUBLE BARREL BONDS	39
MANDATE BONDS	40
CERTIFICATES OF PARTICIPATION	41
ANTICIPATION NOTES	42
LOANS	43
COMMERCIAL LOANS	45
WATER POLLUTION CONTROL STATE REVOLVING FUNDS	46
STATE LOAN PROGRAMS	47
COBANK (NATIONAL BANK FOR COOPERATIVES) LOAN PROGRAM	48
RURAL DEVELOPMENT ADMINISTRATION LOAN PROGRAM	49

GRANTS	50
RURAL DEVELOPMENT ADMINISTRATION	
WATER AND WASTE DISPOSAL GRANT PROGRAM ..	52
ECONOMIC DEVELOPMENT ADMINISTRATION PUBLIC	
WORKS AND DEVELOPMENT FACILITIES GRANT	
PROGRAM	53
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT	
COMMUNITY DEVELOPMENT BLOCK GRANTS	54
APPALACHIAN REGIONAL COMMISSION (ARC)	
SUPPLEMENTAL GRANTS	55
EPA GRANTS	56
STATE GRANT PROGRAMS	58
CREDIT ENHANCEMENT MECHANISMS	59
STATE BOND BANKS	61
RURAL DEVELOPMENT ADMINISTRATION LOAN	
GUARANTEES	62
COMMERCIAL CREDIT ENHANCEMENTS	63
COLLATERAL ARRANGEMENTS	64
PUBLIC-PRIVATE PARTNERSHIPS	65
PRIVATE SECTOR OPERATION	68
TURNKEY ARRANGEMENTS	69
BUILD-OPERATE-TRANSFER/BUILD-TRANSFER-OPERATE ..	70
LEASE-PURCHASE/OPERATING LEASE	71
LEASE-DEVELOP-OPERATE/BUILD-DEVELOP-OPERATE	72
SALE/LEASEBACK	73
TAX-EXEMPT LEASE	74
ECONOMIC INCENTIVES	75
LIABILITY ASSIGNMENT	77
TRANSFERABLE DEVELOPMENT RIGHTS	78
FINES AND PENALTIES	79
ASSURANCE/PERFORMANCE BONDING	80
WETLANDS MITIGATION BANKING	81
POINT SOURCE/NONPOINT SOURCE TRADING	82
EMISSIONS TRADING	83
LAND TRUSTS	84
SPECIAL DISTRICTS	85
ENVIRONMENTAL FINANCE CENTERS	87
TAXES	88
INDIVIDUAL INCOME TAX	91
CORPORATE INCOME TAX	92
CORPORATE GROSS RECEIPTS TAX	93

DEATH AND GIFT TAXES	94
AD VALOREM PROPERTY TAXES	95
PERSONAL PROPERTY TAXES	96
SALES AND USE TAXES	97
ALCOHOLIC BEVERAGE TAXES	99
AMUSEMENT TAXES	100
FEEDSTOCK TAXES	101
FERTILIZER TAXES	102
HARD-TO-DISPOSE TAXES	103
HOTEL TAXES	104
INSURANCE PREMIUM TAXES	105
LITTER CONTROL TAXES	106
MARINE FUEL TAXES	107
MOTOR FUEL TAXES	108
REAL ESTATE TRANSFER TAXES	109
RENTAL CAR TAXES	110
SEVERANCE TAXES	111
SPECIAL ASSESSMENTS	112
TOBACCO TAXES	113
WASTE-END TAXES	114
WATERCRAFT SALES TAXES	115
MISCELLANEOUS	116
EXACTIONS	118
TRUST FUNDS	119
WATER AND SEWER ACCESS RIGHTS	120
VOLUNTARY MECHANISMS	121
PRIVATE GUARANTY MECHANISMS	122
ATTACHMENT A: BIBLIOGRAPHY	A-1
ATTACHMENT B: GLOSSARY	B-1
ATTACHMENT C: THE CLEAN AIR ACT OF 1990: A GUIDE TO PUBLIC FINANCING OPTIONS	C-1
ATTACHMENT D: FUNDING STATE ENVIRONMENTAL PROGRAM ADMINISTRATION: THE USE OF FEE-BASED PROGRAMS	D-1

EXECUTIVE OVERVIEW

INTRODUCTION

The State Capacity Task Force was established to examine ways EPA can help states augment their ability to protect the environment. The Task Force is organized around four teams, each exploring a major facet of the funding challenge facing the states. In recognition of his efforts to elevate environmental financing as an EPA priority, John J. Sandy, Director of the Resources Management Division, was asked to chair the team on alternative financing mechanisms (AFMs).

The AFM team addressed the fiscal constraints that hamper the ability of states and localities to finance environmental protection. They recognized the need for a document that provides information aimed at resolving two types of funding shortfalls: state capacity (program personnel) and capital infrastructure needs. They decided to produce a comprehensive encyclopedia of alternative financing mechanisms that could be used as an information resource for states and local governments. To make it "user-friendly," the team developed a format to furnish the information in a uniform fashion.

The Task Force also requested the Environmental Financial Advisory Board (EFAB) to review the draft report of the AFM team. The EFAB was established to provide analysis and advice on environmental finance to assist EPA in carrying out its mission. The EFAB Committee on Paying for Environmental Mandates was briefed on the AFM report in early May and reviewed the draft in mid-June concurrent with the members of the AFM team.

FINANCING CHALLENGE

The report outlines the financing challenge and a range of alternative financing mechanisms at both the state and local level without advocating the use of any specific type. It is intended to provide information about the principal features of AFMs, their relative advantages and disadvantages -- with particular attention given to administrative considerations -- and some of the key questions and issues associated with their use.

FINDINGS

The Findings section is intended to help state and local governments narrow their search for an AFM to a category appropriate for their financing needs. For each of the eleven AFM categories (with the exception of the Miscellaneous and EFC categories), the findings note comparative advantages and disadvantages, outline the circumstances under which the AFMs in a particular category might prove useful, and provide concrete examples illustrating the funding needs for which a given category might be appropriate.

RECOMMENDATIONS

One very important consideration is how to use the information in this report as a tool to help fund environmental programs. At the state and local level, the team recommended that states and localities conduct a study of their financing needs that would identify areas of actual or potential shortfall, and examine their current financing mechanisms to determine which categories of AFMs are not already being used. The governments could then use the information about AFMs provided by the compendium, as well as their own assessments of the viability of an AFM in their jurisdiction, to select a financing mechanism that will meet their needs.

It is essential to assemble the wealth of information on environmental finance and make it available to states and localities through key points of distribution. With this in mind, the following outreach strategies are recommended:

- EPA is currently exploring the use of electronic bulletin boards as avenues for information. As an example, in October, 1991, EPA's Office of Water led the way in disseminating financial information to public entities by opening the Environmental Financing Information Network (EFIN), which provides information on financing alternatives for state and local environmental programs and projects.
- The Agency should hold or sponsor national workshops and seminars to transfer information about hands-on real world solutions. The Agency should also provide publications and other types of technical assistance on environmental finance. For example, EPA could provide technical assistance on establishing certain types of AFMs, or operate a peer match service.
- In addition, EPA is developing Environmental Finance Centers (EFCs) in land grant universities in the ten EPA Regions. EFC activities could include education, technical assistance, and research on environmental finance on a regional level. EPA support to EFCs could include staff assistance through the Intergovernmental Personnel Act (IPA) and the Revitalizing Environmental Infrastructure Through Volunteerism (REV) program, as well as seed money for initial program operations. Two EFCs are being developed for the Universities of Maryland and New Mexico.

INTRODUCTION

THE FINANCING CHALLENGE

Historically, environmental protection has been a shared responsibility between the federal government, the states, and local governments. Increasingly, however, the responsibility of implementing, administering and enforcing federally mandated environmental programs has shifted to the states. This trend places a growing financial burden on state and local governments at a time when the gap is widening between the cost of environmental protection and available resources. To meet this financial challenge, new alternative sources of revenue and capital must be found to finance environmental programs.

Compared with the U.S. economy as a whole, total public and private environmental expenditures, as a percentage of gross national product (GNP), grew from 0.9 percent in 1972 to 2.1 percent in 1990. By the year 2000, environmental expenditures are projected to rise to 2.8 percent of GNP.¹ (In 1986 dollars, the GNP for 1990 was \$4.7 trillion, and for the year 2000, is projected to rise to \$7.1 trillion.)

The gap between current resources and the investments needed to maintain existing standards and meet new requirements is increasing. By the year 2000, total annual environmental spending requirements (public and private) will be about \$200 billion, compared to a 1988 level of \$115 billion.² This huge difference can be met only through greater efficiency, expanded public and private investment, and increased state and local capacity to implement programs.

At the local level, the funding gap is even more dramatic. In the year 2000, local governments will have to spend an extra \$12.8 billion per year, or 65 percent more than they did in 1988 just to maintain current levels of environmental quality. They will need to spend at least another \$3.6 billion per year to comply with new regulations. In all, communities may need to spend 83 percent more per year by the year 2000.

Even if state and local governments could borrow enough to pay for capital investments, annual cash flow requirements to repay their debts will outstrip their financial capacity. Between now and the end of the century, local governments will need to raise 32 percent more money to cover operating and debt service costs. This amounts to an increase in cash requirements of over 3.5 percent per year. Yet over the same period, U.S. GNP is

¹ U.S. Environmental Protection Agency, Office of Policy, Planning and Evaluation, *Environmental Investments: The Cost of A Clean Environment*, December 1990.

² The Environmental Financial Advisory Board, *Narrowing the Gap: Environmental Finance in the 1990s*, Progress Report (revised), May 1992.

estimated to grow by only 2.37 percent per year and population to grow by only 0.66 percent per year.³

The increase in anticipated expenditures coincides with a fiscal crisis in the states. The growing competition among programs for funding from general revenues and the fact that the economic downturn threatens even general revenue levels means that state and local governments are forced to develop additional sources of funding to pay for their share of environmental costs. Uncertain state economies and increasing budget deficits threaten existing environmental programs as newly promulgated federal requirements compete for limited funds and reduced staffing resources.

Financial pressures impose numerous constraints on state environmental programs and investments. Implications include state programs returning to federal administration, non-compliance and non-enforcement of state-run programs, delays in implementation of required regulations and programs, and cancellation or postponement of necessary and mandated environmental investments.

CURRENT APPROACH TO FINANCING

State and local governments typically support their environmental budgets through a variety of revenue sources, including taxes, fee programs, penalties and fines, general state funds, federal funds, and bond funds. State air, water, and solid waste programs have historically relied upon federal grants, fees, and general revenues for the majority of their funds. There is no one common investment mix, as a great deal of variation exists across environmental media and among states.

Trends clearly indicate that funding from federal resources and state general revenues are decreasing. Consequently, states have been turning to alternative financing mechanisms (AFMs) to fund a greater percentage of their environmental budgets. Currently, fees are the most widely used AFM, particularly in air and water quality programs. The trends also suggest that AFMs are being applied to a greater variety of services, are becoming more complex and flexible, and are instituted with the primary purpose of generating revenue and with the secondary aim of achieving particular goals.

FINDINGS

The AFMs included in this compendium can be used to finance a wide variety of capital and operating costs on both the local and state level. However, not all AFMs will be suitable for financing both state and local programs or for meeting all types of costs. To identify an appropriate AFM for a particular need, state and local government officials must

³ The Environmental Financial Advisory Board, *Narrowing the Gap: Environmental Finance in the 1990s*, Progress Report (revised), May 1992.

consider the advantages and limitations of particular AFMs. For example, some AFMs are more appropriate for financing capital costs than operating costs, and vice versa. Bond financing is one AFM that is well-suited to financing capital projects, while other AFMs, such as fees, are more suited to covering ongoing program costs.

When considering an AFM, state or local governments should consider the time and resources required to implement various financing mechanisms. AFMs vary in the process required for approval and the speed at which they can be implemented. For example, loans can often be arranged more quickly than bonds can be issued and fees can often be enacted more quickly than new taxes. Some AFMs inherently cannot be used for certain purposes; a program could not, for example, issue bonds to cover an unexpected shortfall in annual revenues.

The following sections provide concrete examples of circumstances under which a particular category of AFM might be better suited for use by state and local governments. These examples are options only. They are intended purely as a guide, and rely on general statements that may or may not apply to a given state or locality. The usefulness of an AFM as a financing tool will depend on the individual political, fiscal, and legal characteristics of the area where it is implemented.

FEES

- In many states, fees may be administratively imposed without legislative approval, making them a viable option for state and local governments which might face severe political opposition to tax increases.
- Because administrative processes are usually faster than the legislative process, administratively-imposed fees may be particularly well-suited to providing revenues when it is necessary to increase program activities over a short time frame -- to implement a new program or to implement new program requirements to administer new mandates. For example, if a program needs to issue new permits, setting a fee to cover costs of permit issuance can cover costs on a pay-as-you go basis.
- Many states require that fees may not exceed the cost of services rendered. Therefore, fees are best suited to covering those administrative and operating costs that can be defined as services rendered to the feepayer.
- In communities where fees already exist, officials may wish to examine their rates and ensure that fees are covering the full costs of providing these services.
- Communities in fiscal crisis facing the choice of whether to cut services or increase taxes may find that instituting service fees will enable them to maintain services. For example, a county with a budget deficit might enact park user fees rather than eliminate county park and recreation programs.

BONDS

- **Over the years, bonds have been used to finance around 60 percent of environmental infrastructure. Bonds will continue to be a principal source of capital financing. Because bond financing is restricted to capital projects or other large, up-front expenditures, it is not suitable to cover annual operating costs.**
- **Restrictions implemented by the 1986 Tax Reform Act have generally increased the cost of bond financing for environmental infrastructure.**
- **Larger local governments may prefer bond financing to loans for capital projects, since the bond market typically offers capital at lower interest rates than the rates for commercial loans. Larger communities may also find it easier to access the financial and legal expertise required to issue bonds.**
- **Bond financing may be particularly suited to projects where the source of repayment is raised by user charges from the project or facility financed by the bond. For example, bond financing may be an appropriate mechanism to finance a wastewater treatment facility where the debt service is repaid by user charges.**
- **State and local governments have a large amount of flexibility in structuring bond issues to suit their needs. With advice from financial advisors, repayments can be timed to suit the fiscal needs of a given community.**

LOANS

- **Generally, two types of loans are available: commercial loans and federal and state loans. Many of the federal and state loan programs provide subsidies. Loans are more suitable for financing capital projects and up-front expenditures than operating costs.**
- **Except for the SRF, federal loan programs are typically oriented to small, economically disadvantaged, or rural communities. Overall, federal loan programs fall far short of meeting needs.**
- **State and local government officials should consider loans as a financing mechanism if the project to be financed meets eligibility criteria for federal or state low-interest loan programs, since acquiring low-interest capital financing can improve the affordability of the project to the community.**
- **Establishment of loan programs may unintentionally inhibit compliance if communities opt to wait for loan funds.**

- **Smaller and economically disadvantaged communities may want to consider loans since they may find it easier to acquire loan capital and be able to command lower interest rates than on the bond market. Loans are also a viable option for smaller projects, particularly where the costs of bond issuance would represent too high a percentage of the bond proceeds.**
- **Unlike bonds, a government generally does not have to state a specific source of repayment in order to arrange a loan. (The SRF Program authorized under the Clean Water Act, is an exception.) Loans may be a viable option, therefore, when the state or local government has not yet identified the source of repayment, or where multiple revenue sources will be used.**
- **Loan programs may be preferable to grant programs from state and federal perspectives if repayments are available to provide assistance other communities on a revolving basis.**
- **In addition, since loans typically do not require voter approval, they may be suitable for meeting short-term cash needs while the government is identifying the ultimate source of funds.**
- **Depending on the program, loans may be coupled with a grant for a portion of project costs for certain small or economically disadvantaged communities.**

GRANTS

- **State and federal grant programs have been and probably will remain a supplementary source of funds for both operating and capital costs of state and local programs. Grant funding, however, is inherently unstable to the extent that it is dependent on the vagaries of an annual appropriations process.**
- **Establishment of grant programs may unintentionally inhibit compliance for some communities that may opt to wait for grant funds.**
- **Grant awards are often tied to meeting goals and requirements that may increase overall project costs. On the other hand, grants can provide subsidies that have positive incentive effects.**
- **State and local governments should explore the possibility of funding specific eligible activities with grants, as opposed to seeking funds for the entire program. For example, an innovative part of a state air quality program may be eligible for an air pollution control research grant from the EPA's Office of Research and Development.**

CREDIT ENHANCEMENTS

- **Credit enhancements are most useful to communities with no credit history or a poor credit history, enabling them to gain access to capital or to acquire capital at lower interest rates than otherwise anticipated.**
- **Communities with strong credit histories may also find that they can command a lower interest rate on either bonds or loans by using credit enhancements.**
- **Credit enhancements may be particularly useful to help finance innovative projects, where credit providers may require additional reassurance of debt repayment. For example, credit enhancements may be helpful when issuing a bond to finance stormwater drainage improvement, since bondholders may want added reassurance that the stormwater district will indeed raise the anticipated revenues.**

PUBLIC-PRIVATE PARTNERSHIPS

- **Public-private partnerships are typically suited to financing activities that involve the provision of services such as wastewater treatment, drinking water provision, and solid waste collection and disposal.**
- **The President's recent Executive Order on Privatization (# 12803, May 4, 1992) will cause regulatory and policy changes that have a significant potential to increase investment in environmental facilities. States should inform local governments of this potential and may want to consider participating in the rulemaking process. In addition, as the order removes federal regulatory impediments to public-private partnerships, states may wish to examine their own laws and regulations and consider removing state legal and regulatory impediments to public-private partnerships.**
- **Through lease-purchase arrangements, where a private partner leases and operates a public facility, paying debt service on publicly-issued bonds with annual lease payments, state and local governments can gain the benefit of private sector efficiency while retaining the low interest cost of public capital.**
- **Public-private partnerships could also be applied in less traditional areas, such as enforcement and monitoring of environmental regulations.**
- **Public-private partnerships might be particularly well-suited to small communities that can benefit from a private partner's size and specialized experience. For example, due to economies of scale, a small community requiring solid waste disposal services might benefit from a partnership with a company that operated a large solid waste disposal facility for a number of communities. The community may also benefit from the private partner's**

specialized experience in solid waste management. However, without such economies of scale, most small communities might find the transaction costs (e.g., attorney and financial advisor fees) prohibitive.

ECONOMIC INCENTIVES

- **Economic incentive programs allow state and local governments to capitalize on private sector innovations to achieve environmental quality goals. Although incentive programs do not typically provide significant cash revenues, in the long term they reduce program costs by achieving pollution reduction without direct governmental expenditures.**
- **Incentive programs also encourage development of innovative pollution reduction technologies and management techniques that may have wider applications to other state and local programs.**
- **Since incentive programs can sometimes produce pollution reduction, state and local governments facing state or federal deadlines on environmental quality standards may find them particularly useful. For example, state programs needing to meet water quality standards may want to use point source/nonpoint source trading programs as a tool.**

SPECIAL DISTRICTS

- **Special districts are generally formed by local governments or groups of local governments to target costs and benefits of governmental services to a particular population. Since the services provided by the district are paid for only by the recipients, special districts serve as an innovative technique of matching costs to benefits provided. For example, a local government may find that a special wastewater district with taxation powers is the most equitable means of extending municipal wastewater treatment services to a new area.**
- **Since special districts often have the power to issue revenue bonds, districts can finance capital expenditures without straining local debt capacity. Cities or counties with overloaded debt capacity may find special districts a useful tool for meeting their capital financing needs.**
- **Special districts are a particularly useful technique for financing needs that fail to coincide with traditional political boundaries. For example, a number of states have regional solid waste management districts that coordinate response to solid waste problems on a regional basis.**
- **By combining the resources of several local governments, regional special districts can often capitalize on economies of scale. For example, a regional**

solid waste authority can often provide higher quality landfill services at lower cost than individual counties.

TAXES

- Since taxes generally provide ongoing revenues, they are most suitable for financing recurring costs, such as employee salaries or annual debt service payments on a bond or loan.
- The use of tax revenues is typically not restricted to covering the costs of a particular program or activity. Under these circumstances, taxes are well-suited to supporting programs where state and local governments require flexibility to use revenues for different activities from year to year. For example, revenues from a tax on watercraft sales could be used for monitoring water quality one year, and purchasing marine oil spill response equipment the next.
- In most jurisdictions, instituting new taxes requires legislative approval. Achieving such approval may be easier if the proposed tax is earmarked or dedicated to fund a particular program that has strong public and/or legislative support.
- Earmarking taxes need not reduce their flexibility; revenues may still be used for a variety of purposes within any given program depending on how specifically the revenues are dedicated.
- Tax surcharges levied on a temporary basis may be used to help raise revenues for specific projects that may not have been anticipated and are not expected to recur with any regular frequency. A tax surcharge on residential sewer bills, for instance, might finance the replacement of stormwater retention basins that were destroyed during a hurricane.

RECOMMENDATIONS

Closing the gap between funding needs and revenue sources for environmental programs requires action by all levels of government. This compendium suggests a number of mechanisms available to help narrow this gap. Specifically, the State Capacity Task Force recommends the following actions:

- State and local governments should examine their funding needs and determine whether existing revenue sources are adequate to meet these needs. If current resources are found to be insufficient, they should take steps to analyze and characterize the shortfall and then evaluate and implement AFMs such as those included in this compendium.

- **EPA should continue its efforts to provide financial technical assistance to state and local governments through increased use of electronic bulletin boards and national workshops and seminars, and by supporting the creation of environmental finance centers in each of the ten EPA regions. The centers would provide education, technical assistance, and research on environmental finance on a regional level.**

Each of these recommendations is described in more detail below.

SUGGESTED STEPS TO USE THIS COMPENDIUM

This compendium provides valuable information on alternative financing mechanisms. State and local governments should use this information, where appropriate, to expand their financial resources and widen the number of financing options available to them. To help narrow the search for the most appropriate AFMs, state and local governments must first identify their needs and the financing mechanisms that are currently being used to meet them. In areas where shortfalls are identified, special attention should be given to determining their nature and composition, and, where applicable, they should be ranked according to priorities. They can then use the evaluation matrices provided in the compendium, as well as their own assessment of the suitability of different AFMs to their particular situation, to help select an AFM to supplement current means of financing. The steps involved in this process are described below.

Identify Present and Future Costs

First, state and local governments need to identify the type and extent of the present and future costs associated with their environmental programs. Costs must be identified both by dollar amount and by when the costs will need to be paid. For example, some programs involve capital costs, or raising large sums over a relatively short period of time, while other programs involve ongoing operating costs continuing over a period of years. In looking at expenditures that will occur over time, governments should allow for the effects of inflation, future environmental mandates, and potential economic or fiscal changes.

Various financial management techniques can assist state and local governments in identifying the types and extent of environmental costs. For example, local governments may want to use capital budgeting to assist in identifying capital costs. Capital budgets are long-term financial plans that account for the construction and upkeep of the physical facilities owned by public entities. Almost all capital budgets have four basic components:

- **Identifying the scope of services for which the government is responsible;**
- **Identifying assets through a physical inventory, an assessment of condition, and an evaluation of performance;**
- **Integrating the data with estimates of costs to operate and maintain existing facilities and build new ones; and**

- **Drafting a summary plan for distribution to (and concurrence by) all government public works agencies and interested nongovernment groups.**

Another technique that may assist governments in estimating operating costs is **workload analysis**. Workload analyses detail the costs of carrying out particular programs. For example, in support of an appropriations request to the legislature, the Wisconsin Department of Natural Resources prepared a detailed workload analysis demonstrating the costs associated with implementing the Clean Air Act Amendments of 1990. The analysis included estimates of staff time required for the activities mandated by the Act, including permit processing, site reviews, and environmental education.

Examine Current Financing Mechanisms

Once the nature and extent of costs have been identified, state and local governments should examine their current means of financing capital and operating costs. Most states finance their environmental programs through a combination of fees, taxes, bonds, grants, and loans. In some cases, identifying the exact sources of revenues for a given program may be difficult, since many governments fund environmental programs from general revenues, and do not track sources of those revenues directly to their uses.

Examining current financing mechanisms allows governments to compare revenues from existing sources to present and future costs, so that areas of actual or potential shortfall can be identified. For example, some governments may find no shortage of funding to meet day-to-day operating costs, but may have difficulty in meeting anticipated capital costs. Some shortfalls may be caused by exceptional circumstances, such as a budget crisis in a particular year, or localized economic distress causing a reduction in tax revenues. Other shortfalls may occur because a revenue source has not yet been identified for financing new requirements or activities. A survey of current financing mechanisms will also identify which AFMs or which groups of AFMs may have been underutilized, and therefore may be worth exploring as options.

Use the Compendium to Identify Suitable AFMs

State and local governments should examine these categories to see if any of the AFMs might be applicable to their needs. The summary matrices preceding the categories already provide an initial assessment of AFMs based on a number of factors, including their applicability to capital and/or operating costs, applicability to state and/or local programs, revenue potential, revenue stability, administrative feasibility, equity, and incentive effects for pollution reduction. However, governments considering implementation of a particular AFM need to go beyond what is provided in the compendium to determine the suitability of an AFM for their particular situation. First, they need to determine what legislative or regulatory actions may be necessary for implementation of the AFM. Next, they need to perform revenue estimates to determine whether the AFM will provide sufficient and timely revenues for their needs. Finally, the governments need to determine whether the AFM will meet with political acceptance. In addition to using this compendium to identify potential AFMs, state and local governments are encouraged to utilize the variety of resources on environmental finance made available by EPA.

EPA ACTIONS

Electronic Bulletin Boards

The Agency could set up electronic bulletin boards as avenues for information on alternative financing techniques. Currently, the EPA sponsors a number of electronic bulletin boards providing information on various issues, which state and local officials and other interested parties can access with a computer modem. In October, 1991, the Office of Water pioneered the Environmental Financing Information Network (EFIN), EPA's first electronic bulletin board providing information on financing alternatives for environmental programs. As an outreach mechanism, the bulletin board format has the following advantages:

- Swift transmission of information to a wide audience;
- A menu-driven format that allows users to individually select the information appropriate for them;
- Ongoing updating of contact numbers, names, and other rapidly-changing information; and
- Interactive potential, so that users get the benefit of information placed on the bulletin board by other users as well as by the board's sponsor.

Additional electronic bulletin boards could be set up by program offices to follow the EFIN model. Alternatively, Environmental Finance Centers (EFCs) could sponsor bulletin boards providing regionalized information on financing alternatives.

National Workshops and Seminars

The Agency should hold or sponsor national workshops and seminars for state and local government officials on real world solutions to environmental finance issues. The workshops should be interactive, serving both as a means of information transfer and as a forum for officials to express their views on how EPA could make state and local environmental finance easier. The national workshops should have the following characteristics:

- The workshops should provide state and local government officials with hands-on training and practical information on environmental finance issues;
- The interactive forum provided by the workshops should give the Agency a chance to hear the perspectives of the officials who are responsible for financing the execution of federal environmental mandates; and
- Workshop proceedings should serve as seed material for publications that could present environmental finance issues from a national perspective.

Environmental Finance Centers (EFCs)

As part of its ongoing efforts to provide technical assistance on environmental finance, EPA is developing Environmental Finance Centers (EFCs) to work with states and local governments. Pilot efforts are now underway in two states -- New Mexico and Maryland -- with the goal of opening an EFC in each of the ten EPA regions. What follows is a description of the potential functions of EFCs and the ways in which EPA support could be provided to them.

Potential Functions of EFCs

The EFCs could serve as the focal point for federal involvement in education, technical assistance, and research on environmental finance. As federal, state, and local environmental programs have increased in scope and overall cost, new and innovative techniques for environmental finance have developed out of necessity. However, formal academic study has lagged behind the development of these techniques, and few universities are in the position to offer a broad-based introduction to the issues and themes related to environmental finance, particularly an introduction that would be targeted to the needs of state and local officials. The EFCs could integrate economic, political, financial, scientific, and public policy expertise to create a multidisciplinary curriculum on environmental finance. Such a curriculum would serve state and local officials currently on the front lines of financing environmental programs, graduate students who could become future professionals in these areas, and utility officials, investment bankers, and other private individuals who may play crucial roles in financing partnerships for environmental facilities.

In addition to providing a general curriculum for state and local officials and other parties involved in environmental finance, the EFCs could provide technical assistance to communities on a case-by-case basis. This assistance could involve a number of activities:

- **Calling together advisory panels made up of local officials, academic experts, finance professionals, and EPA employees to advise a community on possible solutions to a particular problem;**
- **Sponsoring workshops and forums on regional environmental finance issues, and providing direct consultation and technical assistance to local governments attempting to enter into regional compacts;**
- **Working with nonprofits and national associations such as the Government Finance Officers Association (GFOA) and the International City and County Managers Association (ICMA), operate a peer match service bringing together communities that face similar problems and allowing them to benefit from exchange of ideas and sharing of reports created for different communities;**
- **Serving as a clearinghouse for innovative environmental financing mechanisms, disseminating information and advising states and localities on implementation and other issues;**

- **Managing EPA, federal agency, and privately-funded pilot and demonstration projects employing innovative financing techniques, and providing consultation and assistance on environmental finance and management on a fee basis to existing state and local governments; and**
- **Compiling the results of the above activities into targeted, regionalized publications on environmental finance issues.**

For example, in New Mexico, where a pilot EFC is currently being developed, the EFC could provide valuable technical assistance on regionalized solutions to wastewater treatment provision to unincorporated communities. In New Mexico, a number of *colonias*, or unregulated and unincorporated communities, have sprung up in response to a thriving job market along the U.S./Mexico border. Because they lack taxing power and other financing capabilities of formalized governments, arranging extension of wastewater treatment services to the *colonias* is difficult. If an EFC were established in New Mexico, it could sponsor the creation of an advisory panel to address this issue, bring together the localities that would be involved in the solution, and produce a regionalized solution to the problem.

It is anticipated that the EPA regional offices will work closely with the EFCs in their regions, which could uniquely position the EFCs to examine topics of environmental finance from a regional perspective, and provide the EFCs with the contacts and expertise to integrate research with their educational and technical assistance roles. For example, using EPA regional contacts, an EFC might find it relatively easy to compile case studies of the localities it advises on environmental finance, using their experience to help future clients. A few potential topics for investigation include:

- **The impact on user charges of public-private partnerships in the construction, operation, and maintenance of environmental facilities;**
- **Financing strategies and experiences of local air programs helping to implement provisions of the Clean Air Act Amendments of 1990;**
- **Investigation of regional solutions to solid and hazardous waste disposal problems; and**
- **Innovative incentive programs and financing mechanisms used by localities for nonpoint source pollution reduction.**

EPA Support for EFCs

Siting the EFCs in land grant universities would foster the EFC's educational and analytical functions and provide a regional base for EFC activities. The existing federal interest in these universities would also facilitate the initial arrangements for developing the EFCs. Alternatively, the EPA could seek public-private partnerships with private universities or companies for siting EFCs.

Under the auspices of the Intergovernmental Personnel Act, EPA could provide EFCs with finance experts on a rotating basis. Intergovernmental Personnel Assignments (IPAs) could be a crucial tool for enhancing the ability of EFCs to provide the highest quality of technical assistance to states and localities. The IPAs that participate in these interchanges would also benefit by bringing back to their home offices valuable new perspectives gained from this assignment.

Another possible source of staff for EFCs could be from the REV (Revitalizing Environmental Infrastructure Through Volunteerism) program. EPA is exploring the feasibility of establishing this program, which would match volunteers with communities that need pro bono services. The EFCs could employ this resource in a number of ways. The volunteers, many of whom would be retired engineers, could be invited to serve on advisory panels, assist in developing and facilitating EFC workshops, or be assigned to advise particular states or localities on issues relating to their expertise. The EFCs could employ this resource in a number of ways.

EPA could assist in the development of EFCs by providing seed money to fund initial operating costs and office space, and possibly to endow a professorship in environmental finance. Funds for these purposes could come from fine or penalty revenues, EPA pilot project grant funds, a share of a dedicated federal tax (such as the chemical feedstocks tax or gasoline tax), or grant funds from private corporations. Regardless of source, seed money could also be placed in a trust fund, so that interest payments could provide ongoing support for EFC operations.

Part of the funds for educational programs could be provided by tuition fees charged to the state and local officials who attend the courses sponsored by the EFCs. However, in order to maintain the affordability of EFC courses, some of the costs involved in developing the curriculum should be subsidized. Similarly, some communities may be able to afford modest user fees for technical assistance or targeted research on regional environmental finance issues. However, federal grant funds, fine and penalty revenues, interest on any trust funds capitalized, and/or supplemental grant funds from private corporations would be required to meet the gap between what communities could afford to pay and the cost to the EFC of providing these services.

ALTERNATIVE FINANCING MECHANISMS

The phrase "alternative financing mechanism" (AFM) refers to any technique used to fund environmental programs, facilities, or services, including both capital and operating costs at the state and local level. The principal categories of AFMs identified in this report are listed in Table 1. The AFMs are divided into eleven major categories as follows: taxes, fees, bonds, loans, grants, credit enhancements, public-private partnerships, economic incentives, special districts, environmental finance centers, and miscellaneous.

This report should be particularly useful to states and local governments. It outlines a range of alternative financing mechanisms at both the state and local level and is intended to provide information about the principal features of AFMs, their relative advantages and

limitations -- with particular attention given to administrative considerations -- and some of the key questions and issues associated with their use.

A total of 82 alternative financing mechanisms are presented in this compendium. The entries for each individual AFM provide a description and analysis of each financing mechanism in the following format:

Type: This section classifies the AFM into one of the eleven major categories.

Description: This section describes how the mechanism works. For example, if the AFM is a fee or tax this section discusses the basis for charging a particular fee or tax.

Actual Use: Where possible, this section identifies examples of the current use of the AFM to fund state and/or local environmental programs.

Potential Use: Where possible, this section identifies potential alternative uses for the AFM.

Advantages/Limitations: These two sections describe the most significant advantages and limitations of a particular AFM from the perspective of the implementing government. The following issues were analyzed for each AFM, where applicable:

- Ease or difficulty of implementation and administration,
- Characteristics of the revenue stream (e.g., steady and predictable revenues or periodic revenues),
- Legislative/political issues (e.g., whether the AFM would generally require voter approval), and
- Economic impacts, if any (e.g., if the AFM has a disproportionate impact on small businesses or has a diffuse impact on a broad population).

Reference for Further Information: This section provides either a reference to a document with further discussion of the AFM, or the name of a governmental agency that has some experience with the relevant AFM.

Each of the major categories has an introduction that describes the characteristics and general advantages and limitations of the individual AFMs within that category. To allow for comparison of individual AFMs, both within and among categories, a summary table is included at the end of the introduction to each major AFM category. These summary tables evaluate the AFMs, in very general terms, based on selected criteria. The primary criteria are:

Capital Costs (Applicable, Partially Applicable, Not Applicable). Indicates whether the AFM can easily be used to finance capital expenditures. Generally, this will

depend on whether revenues can be raised in an amount sufficient to finance capital expenditures.

Operating Costs (Applicable, Partially Applicable, Not Applicable). Indicates whether the AFM provides ongoing revenues that can be used to meet annually-recurring costs such as salaries.

State Programs (Applicable, Partially Applicable, Not Applicable). Indicates whether the AFM can be used by state programs.

Local Programs (Applicable, Partially Applicable, Not Applicable). Whether the AFM can be used by local programs.

Revenue Potential (High, Moderate, Low). Where applicable, provides a rough estimate of the revenue-generating potential of the AFM. The estimate is based on the size of the anticipated revenue base, typical rates, and past experience with the AFM. This evaluation is meant only as a guide for comparing AFMs, and may not be accurate for some areas, since the revenue potential of an AFM in a given area will be strongly affected by the characteristics of the revenue base.

Revenue Stability (Stable, Partially Stable, Unstable). Provides a general assessment of the potential revenue stability of the AFM, based on the volatility of the revenue base, methods of collection, and the experience of state and local programs with the AFM.

Administrative Feasibility (Easy, Moderate, Difficult). Provides a general evaluation of administrative feasibility of each AFM, based primarily on whether the implementing government can take advantage of existing administrative structures.

Equity (Who Pays? -- Polluter, Beneficiary, General Public). Evaluates whether the burden of payment falls on parties that contribute to the environmental problem (i.e., the polluter), on parties that benefit from cleanup of an environmental problem (i.e., the beneficiary) or upon the general public.

Incentive Effects (Yes, Uncertain, No). Indicates whether the AFM provides any pollution reduction incentive effects.

TABLE 1: ALTERNATIVE FINANCING MECHANISMS IN THE COMPENDIUM

FEEES	ECONOMIC INCENTIVES
Utility Charges	Liability Assignment
Connection Fees	Transferable Development Rights
Facility Permit Fees/Monitoring Fees	Fines and Penalties
Application/Processing Fees	Assurance/Performance Bonding
Inspection/Certification Fees	Wetlands Mitigation Banking
Emissions/Discharge Based Fees	Point-Source/Nonpoint Source Trading
Disposal Fees	Emissions Trading
Product Registration and Inspection Fees	Land Trusts
Recreational Fees	
Wetlands Permit Fees	SPECIAL DISTRICTS
Septic Tank Fees	
Hazardous Waste Transporter Fees	ENVIRONMENTAL FINANCE CENTERS
License Fees	
Impact Fees	
	TAXES
BONDS	<u>General Taxes</u>
General Obligation Bonds	Individual Income Tax
Revenue Bonds	Corporate Income Tax
Moral Obligation Bonds	Corporate Gross Receipts Tax
Double Barrel Bonds	Death and Gift Taxes
Mandate Bonds	Ad Valorem Property Taxes
Certificates of Participation	Personal Property Taxes
Anticipation Notes	Sales and Use Tax Taxes
LOANS	<u>Selective Sales Taxes</u>
Commercial Loans	Alcoholic Beverage Taxes
Water Pollution Control State Revolving Funds (SRFs)	Amusement Taxes
State Loan Programs	Feedstock Taxes
CoBank (National Bank for Cooperatives) Loan Program	Fertilizer Taxes
Rural Development Administration Loan Program	Hard-to-Dispose Taxes
	Hotel Taxes
	Insurance Premium Taxes
GRANTS	Litter Control Taxes
Rural Development Administration Water and Waste Disposal Grant Program	Marine Fuel Taxes
Economic Development Administration Public Works and Development Facilities Grant Program	Motor Fuel Taxes
Department of Housing and Urban Development Community Development Block Grants	Real Estate Transfer Taxes
Appalachian Regional Commission (ARC) Supplemental Grants	Rental Car Taxes
EPA Grants	Severance Taxes
State Grant Programs	Special Assessments
	Tobacco Taxes
	Waste-End Taxes
	Watercraft Sales Taxes
CREDIT ENHANCEMENTS	MISCELLANEOUS
State Bond Banks	Exactions
Rural Development Administration Loan Guarantees	Trust Funds
Commercial Credit Enhancements	Water and Sewer Access Rights
Collateral Arrangements	Voluntary Mechanisms
	Private Guaranty Mechanisms
PUBLIC-PRIVATE PARTNERSHIPS	
Private Sector Operation	
Turnkey Arrangements	
Build-Operate-Transfer/Build-Transfer-Operate	
Lease-Purchase/Operating Lease	
Lease-Develop-Operate/Build-Develop-Operate	
Sale/Leaseback	
Tax-Exempt Lease	

FINANCING THE FUTURE

**REPORT OF
THE COMMISSION TO PROMOTE INVESTMENT
IN AMERICA'S INFRASTRUCTURE**

FEBRUARY 1993



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FINANCING THE FUTURE:

REPORT OF THE COMMISSION TO PROMOTE INVESTMENT IN AMERICA'S INFRASTRUCTURE

EXECUTIVE SUMMARY

Public sector spending on infrastructure in America amounts to more than \$140 billion annually. Projections of the shortfall range from another \$40 to \$80 billion annually to meet critical infrastructure needs. The U.S. Environmental Protection Agency alone projects the need for \$200 billion in new finance over the next decade to bring communities into compliance with existing federal mandates for clean water and clean air.

Traditional sources of infrastructure finance — government grant programs, tax-exempt bonds and private capital — all face serious impediments in filling the gap. Grants do not leverage enough project activity and the Commission found little indication that general tax increases of a magnitude sufficient to meet forecasted infrastructure development needs are likely to be forthcoming from federal, state and local sources.

Current provisions of the tax code discourage private capital flows into infrastructure development. State and local governments seeking to expand issuance of tax-exempt bonds for new infrastructure are hampered by federal laws, difficulties in finding new revenue sources, obtaining satisfactory credit ratings and limited enhancement alternatives. Project developers face procedural impediments ranging from extended permitting periods to a tight construction lending market.

Current infrastructure finance programs can be strengthened and made more effective. But as federal monies for grant programs become increasingly inadequate, states and localities will require self-renewing sources of finance built on access to large pools of capital, such as the six trillion dollars offered by institutional investors, including pension funds. For many projects, however, particularly projects with the potential to be self-sustaining, but which fall into lower credit categories in the early years, access to these large pools of capital will require application of new financing techniques.

The Commission to Promote Investment in America's Infrastructure has three major recommendations to develop new financing options to facilitate access of these projects to large pools of capital.

◆ Establish a new, federally-chartered financing entity, a national infrastructure corporation.

◆ Create new investment options for institutional investors, including securities issued or guaranteed by the corporation.

◆ More consistent, uniform federal policy treatment for private investment in infrastructure development.

The new national infrastructure corporation would offer credit enhancement through a guarantor subsidiary, subordinated loans and other financial assistance through a lender subsidiary and development phase assistance through insurance-type arrangements. The Commission estimates that each new one billion dollars of federal capital in the corporation has the immediate potential to prompt \$10 billion in infrastructure project activity.

In the second phase, when the Corporation has established an operating history and begins issuing infrastructure securities to pension fund and other investors, each one billion dollars of federal infrastructure money would have the potential to leverage \$18 billion or more in new infrastructure project activity. If Congress devotes one billion dollars annually to this vehicle for five years, the federal government would build a self-renewing source of finance with the potential to leverage up to \$100 billion of infrastructure projects.

These estimates build on three categories of recommendations adopted by the Commission after reviewing a decade of studies on infrastructure needs and hearing testimony from 46 witnesses in seven public hearings in 1992. The alternate financing mechanisms that emerge will supplement existing grant and tax-exempt bond finance programs and attract the tens of billions of new dollars annually needed to finance the future infrastructure of America. While the actual leverage ratios will vary according to assumptions on minimum capital criteria and other factors, the Commission found a clear possibility to leverage federal dollars in a self-sustaining program.

As the six trillion dollars in assets held by institutional investors continue to grow, the Commission found that investors will seek additional investment options. New investment opportunities in infrastructure projects, where pension funds now do not invest, can further diversify the investments that currently make up the

majority of portfolio assets. More consistent, uniform federal tax policy treatment for private investors in infrastructure projects would prompt additional capital flows into this sector.

In making this report to the President of the United States and the Congress, the Commission meets the charge "to conduct a study on the feasibility and desirability of creating a type of

infrastructure security to permit the investment of pension funds in funds used to design, plan, and construct infrastructure facilities in the United States. Such study may also include an examination of other methods of encouraging public and private investment in infrastructure facilities." The return on this financing of future investment will be a more productive, competitive and economically strong America.



RECOMMENDATION 1.

CREATE A NATIONAL INFRASTRUCTURE CORPORATION TO LEVERAGE FEDERAL DOLLARS AND BOOST INVESTMENT IN INFRASTRUCTURE PROJECTS WITH A CAPACITY TO BECOME SELF-SUSTAINING THROUGH USER FEES OR DEDICATED REVENUES.

1.1

A national infrastructure corporation, in partnership with state infrastructure revolving funds and other local and private sources of capital, would be able to implement national infrastructure priorities, leverage more dollars with federal funds and employ innovative financing techniques to get priority projects underway.

A national infrastructure corporation will provide new leadership and supplementary approaches for the multiple departments, agencies and authorities involved in infrastructure finance. This federally chartered enterprise will provide a focal point for infrastructure that is essential to a timely, effective national policy response to the infrastructure financing challenge.

The corporation would be authorized to promote infrastructure investment by evaluating and offering several forms of financial assistance and technical advice to infrastructure projects with self-supporting revenue potential.

An **infrastructure insurance company**, established initially as a subsidiary of the corporation, would provide a mix of direct insurance and reinsurance to issuers of senior debt on infrastructure projects that existing bond insurers and other credit enhancers cannot or will not insure. Insured debt of projects eligible for tax-exempt financing would become more attractive to the municipal market. Insured debt of taxable-rate projects would become more attractive to pension funds and other fixed-income investors. The company would charge premiums and operate on a self-supporting basis, similar to the successful College Construction Loan Insurance Association (Connie Lee).

An **infrastructure finance division** of the corporation would use funds borrowed by or appropriated to lend directly to priority projects

that have credit-worthy revenue projections, but lack historical operating results or to those that may not be able to demonstrate sufficient credit strength immediately. Such financial assistance would be available on a basis subordinated to other lenders in a manner similar to that authorized by Congress in the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), but not yet utilized by the states. There are a significant number of startup projects seeking financing that lack only subordinated debt to get underway.

Subordinated debt would be recycled within a few years as projects are constructed, achieve operating stability and can be refinanced. Loan repayments would allow the corporation to function as a revolving loan fund.

A **development insurance service** would provide insurance, subject to appropriate retention of risk by the project sponsor, to cover the initial development phase of projects, where permitting, financial feasibility and regulatory approvals pose specific risks. The corporation would work to provide services to public and private project sponsors as a domestic version of the Overseas Private Investment Corporation (OPIC).

The national infrastructure corporation will seek to become self-sustaining by charging fees for its services and by receiving project loan repayments. Among the other mechanisms the corporation would consider are loan guarantees and assistance to infrastructure revolving funds and national projects where financing is scarce.

The corporation's funding activities could be leveraged further as it issues its own debt obligations to investors. This program would benefit from a limited line of credit to the U.S. Treasury, similar to other federally chartered enterprises, to expedite the entry of new investors in the near term.

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RECOMMENDATION 2.

CREATE A NEW RANGE OF INVESTMENT OPTIONS TO ATTRACT INSTITUTIONAL INVESTORS, INCLUDING PENSION FUNDS, AS NEW SOURCES OF INFRASTRUCTURE CAPITAL.

2.1

The national infrastructure corporation will offer institutional investors the opportunity to take equity in the infrastructure insurance company and to invest in the senior debt in taxable projects insured by the company.

Institutional investors are valuable not only as potential sources of capital, but as potential new players in infrastructure finance that can bring the discipline of investment risk and return evaluations to infrastructure decision-making.

The **infrastructure insurance company** recommended by the Commission would offer institutional investors the opportunity to participate as equity investors, along with other public or private investors, in an insurance business that would be maintained at the highest standards, with prudent credit criteria, and supported by necessary management expertise and financial performance to maintain a Triple-A rating.

As the insurance company evaluated and insured project senior debt up to the highest investment grade, institutional investors would find it easier to participate directly in project finance by purchasing long-term, taxable rate debt instruments with established credit, liquidity and rates of return.

2.2

The corporation will broaden the market in investment grade infrastructure securities to attract institutional investors, including four trillion dollars in pension fund assets, and to provide liquidity for project lenders.

The Commission's attempt to identify a new infrastructure security which would be attractive to both project borrowers and pension investors led it to consider new options for both taxable and tax-exempt rate securities. Pension funds clearly indicated the desire to have an option to invest in a new infrastructure security paying a competitive, taxable, market rate of return.

The Commission recognizes that project sponsors who are eligible for tax-exempt financing generally will seek funding in the municipal market, rather than the taxable bond market, thereby precluding any meaningful participation by pension funds and certain other institutional investors. However, there are many projects which for legal or market reasons will still seek taxable debt financing.

Aside from investing in individual project loans guaranteed through the corporation's bond insurance program, institutional investors will have an opportunity at a later stage to invest in taxable debt securities issued directly by the corporation. The corporation would use the proceeds to acquire project-specific debt, including that insured by the infrastructure insurance company.

Some securities would be general obligations when guaranteed by the corporation, while others could be pass-through securities. Such obligations of the corporation would be of federal agency caliber if the corporation had access to a limited line of credit of the U.S. Treasury. The Commission does not foresee a need for a full faith and credit guarantee from the U.S. government.

Purchases of these securities would be on a purely voluntary basis in accordance with the fiduciary duties set forth in the federal ERISA statute for private plans and comparable state and local laws for state and local government plans. Experts indicate that there are no restrictions against such investments in infrastructure securities.

2.3

A security whose tax-free benefits flow through to fund beneficiaries at the time of distribution from retirement plans could attract investments from defined contribution pension programs, 401(k) plans and individual retirement accounts.

The Commission recommends that Congress consider amending federal tax laws to allow part or all of the investment earnings attributable to infrastructure securities to be distributed tax-free to pension plan participants upon retirement. Such a tax-free pass-through from a fund to its participants would produce a competitive after-tax market rate of return for the retirement fund participants, yet allow a project to obtain funding at levels commensurate with municipal bonds.

The security could be even more attractive if it were structured as a deferred annuity, thereby satisfying both early project cash flow requirements and the typical payout profiles on pension benefits. It is noteworthy that this sort of investment security would be particularly appropriate for defined contribution and 401(k) plans, which are the fastest growing sector of retirement assets.

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RECOMMENDATION 3.

STRENGTHEN EXISTING INFRASTRUCTURE FINANCING TOOLS AND PROGRAMS BY MAKING FEDERAL INCENTIVES MORE CONSISTENT AND BY PROVIDING UNIFORM TREATMENT FOR INVESTMENT IN INFRASTRUCTURE PROJECTS.

3.1

Reviewing and modifying federal restrictions on the use of tax-exempt bonds for infrastructure projects could stimulate additional infrastructure bond finance activity.

Tax-exempt bonds are used by more than 16,000 issuing authorities as primary tools for financing infrastructure projects, often supported by tolls, user charges and other dedicated funds. But the ability to utilize tax-exempt debt is circumscribed if the private sector is involved in developing or operating new facilities.

The Congress has reviewed many of these contradictory restrictions in recent months. Among the specific steps considered favorably by Congress in H.R. 4210 and H.R. 11 in 1992, but not signed into law, were provisions to increase the annual issuance limit for bank-qualified tax-exempt bonds and to expand use of private-activity redevelopment bonds in areas designated as enterprise zones.

The Commission encourages further Congressional review and modification of federal restrictions on the use of tax-exempt bonds for infrastructure projects to broaden the development options for these projects and to promote efficient allocation of federal tax expenditures.

To stimulate investment in new transportation and environmental projects, the Commission encourages consideration of a new class of tax-exempt debt, a public benefit bond, in instances where the benefits to the general public are substantial, notwithstanding private sector participation. This would have the effect of applying the definition of facilities exempt from volume cap restrictions evenly across all environmental and transportation projects.

Among the additional steps recommended to the Commission are modifying arbitrage rebate rules where proceeds return to support infrastructure projects, returning the private involvement threshold to 25 percent and changing the definition of a qualified small bond issuer for bank investment purposes to one which issues under \$25 million per year.

While a full-scale study of the fiscal impact of these recommendations is beyond the scope of the Commission, the consensus of the Commissioners is that new economic activity and the attendant

potential increase in federal tax revenues over the long-term may prove cost-effective from a federal budgetary viewpoint, notwithstanding any temporary costs in the near-term of actual or foregone revenues. Changes of this kind also may contribute to greater policy consistency and serve to renew cooperative effort among various levels of government in infrastructure finance.

3.2

Reviewing and making incentives for taxable infrastructure investment more consistent, particularly depreciation rules, would prompt additional capital flows into infrastructure projects.

Even with some changes to the private activity restrictions on issuance of tax-exempt bonds, the Commission concluded that a significant portion of America's infrastructure is likely to be financed in the future on a taxable-rate basis. The defined depreciable life of assets, therefore, should be short enough to encourage investments in these assets and not penalize infrastructure projects which have government participation. The concept of a shorter "useful life" may attract new investment where emerging technologies hold promise for future infrastructure efficiencies.

INTRODUCTION

“**F**inancing the Future: Report of the Commission to Promote Investment in America's Infrastructure” is only the most current addition to a continuing national discussion on infrastructure investment and finance. It certainly will not be the last word. The debate about infrastructure finance and the appropriate roles for different levels of government and the private sector is as old as the Republic, itself.

Two hundred years ago the discussion occurred among loose and strict constructionists, federalists and states-righters over what then were called “internal improvements.” The earliest prevailing view was that a federal role in internal improvements might properly exist only when projects were beyond the capabilities of the individual states and when private finance was not available. Serious questions, such as whether the Constitutional words, “promote the general welfare,” could give the federal government authority to open roads and canals without the permission of states, were resolved politically for the first, though hardly the last time.

In 1802, for example, Congress approved a plan that allowed two percent of the net proceeds from the sale of public lands in Ohio to be used to finance construction of roads to Ohio and another three percent for roads within Ohio. When in March 1806 Congress authorized the beginning of the first interstate road from Cumberland, Maryland to the Ohio River, it was considered so unique that it was named, simply, “The National Road.”

President Thomas Jefferson in a message to Congress later that year (December 2, 1806) set forth what became the underlying rationale for a more active, continuing federal role. “By these operations new channels of communications will be opened between the States; the lines of separation will disappear, their interests will be identified, and their union cemented by new and indissoluble ties.”

It was a time of innovation in the newly united several states, and pragmatists ultimately prevailed. The levels of the public sector and the private sector began to work in ever shifting partnership arrangements to provide the ports and docks, then the roads, canals, rail, highways, bridges, tunnels, mass transit and airports that make up America's infrastructure. Throughout, these efforts centered on movement of people and goods. Transportation was communications.

With America's great cities came public buildings, streets and sidewalks, housing, health facilities, power generation and distribution

systems, even street lighting and signage. The public environmental structures to support a growing, spreading population provided safe drinking water, sewage systems, solid waste disposal and, now, hazardous waste management. Public finance and public operation of infrastructure facilities became the norm.

Today ideas move faster than Americans or their machines. Fiber optic lines and air waves are networks of the future. Still the questions about finance and roles and the very definition of infrastructure continue.

No one placed the question of financing the infrastructure of the future, not of the past, more forcefully than Patricia Eckert of the California Public Utilities Commission in the Commission hearing of October 30, 1992. “Is it time that we reexamine our spending paradigm?” Commissioner Eckert asked. “Are we making the most efficient spending decisions? Are there alternative infrastructure investments that will provide a greater return to society as a whole on that investment?”

“We are already in the third quarter of our information age, yet many people still refer to this as the impending information age,” she continued. “The next big infrastructure push should be to build the super highways that carry information across our country and around the world.”

Stephen Coyle, Chief Executive Officer of the AFL-CIO's Pension Investment Program, argued with similar conviction on October 8, 1992 for a broad definition that looks ahead and could include even the basic research facilities needed to spawn industries of the future.

Early in its deliberations, the Commission faced this need to define infrastructure in a way that would allow the Commission to make useful recommendations in a timely manner. Since the term “infrastructure” has now come to describe not only public works and facilities, but even personal skills and attitudes, this was no easy task. As was pointed out by John A. Tatom, Vice President of the Federal Reserve Bank of St. Louis on November 19, 1992, much of America's infrastructure is largely a private sector activity, including telecommunications, utilities and certain forms of transportation. But the charge of the Commission was squarely on finance and on new responses to financing needs.

The Commission chose to define infrastructure as capital-intensive, long-lived physical assets that provide benefits to the general public or promote economic development and traditionally have

benefited from expanding federal grant programs. This definition includes highways, bridges and tunnels; mass transit, intercity rail and airports; waterways, docks and wharves; water, sewer and wastewater systems; and solid and hazardous waste disposal facilities.

This definition is not without a downside, excluding as it does much of the normal facilities of government and significant privately-owned assets that serve the public. The Commission certainly does not underestimate the needs in other areas, such as the estimated \$125 billion shortfall in funds provided for primary and secondary school facilities or the more than \$500 billion experts indicate may be necessary to link American businesses and homes with fiber optic cable.

But the Commission's ability to say something conclusive about infrastructure finance required an initial focused look at transportation and, importantly, environmental infrastructure project finance. The Commission is confident, however, that many of its conclusions and recommendations will be useful to future arrangements in other areas, such as telecommunications and pollution control facilities.

What the Commission found was a significant need to facilitate new investment to repair, renew and develop these systems for a new century. The challenge is made greater by the realization that both public and private capital are finite in a slow-growing economy. Governments continue to reduce the percentage of their resources devoted to the task. The global economy focuses on a worldwide competition for private capital.

The processes by which priorities among infrastructure needs are defined and political decisions made are often arcane and unresponsive. These processes discourage innovation, new technologies and efficiencies.

Bureaucracy, legal hurdles and delay have become risks, themselves, for project development and construction. Americans question the public sector's ability to deliver and the private sector's motives in wanting to enter the field more aggressively. And finally, federal grant programs sponsored by leading infrastructure agencies, the U.S. Department of Transportation and the U.S. Environmental Protection Agency, are reaching maturity.

All these developments invite new methods to encourage institutional investors, including pension funds to bolster our nation's infrastructural integrity. The Commission's interest in the potential for

greater private financing of infrastructure projects remained focused on private capital, not on the separate and distinct question of privatization of existing infrastructure and other public assets.

At its best, America's infrastructure connects Americans, bringing new opportunities, productivity, competitiveness, pride and satisfaction. The Commission set about to produce a report and recommendations that would further these goals which remain so similar to those of the national leadership two hundred years ago — building a strong economy and welding a nation.



ONE SOLUTION TO CAPITAL BUDGET SHORTFALLS: A Primer for Public-Private Ventures

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CHAPTER 2

Issues in Privatization

In this chapter, we first review the meaning of PPVs within the larger context of privatization and then review, in general, the major issues surrounding cooperative efforts between the public and private sectors. Because PPVs necessarily involve a close, active contractual relationship and risk-sharing between the two sectors, they typically place those issues in boldest relief and require a feasible solution to them in the negotiating process.

PUBLIC-PRIVATE VENTURES AND OTHER FORMS OF PRIVATIZATION

In the course of our study, we found a wide disparity in the usage of the term public-private venture (or public-private partnership). To understand PPVs, we must first understand the differences in the types of PPVs and then how they differ from the other forms of privatization.

In the broadest sense, privatization involves private-sector participation in some activity that has traditionally been reserved for the government. Such a definition does not fix the activities because what governments take responsibility for and do are very much matters of tradition and local choice. For example, either the government or the private parties may perform many activities such as collecting garbage, servicing motor fleets, supplying water, and constructing and maintaining streets.

On another, more analytical level, one might view the phases and component parts of a service that might be provided – its design, financing, and operating and the capital requirements – and the possible choices between the public or private sectors performing those services. Along those lines, privatization alternatives for a service requiring the use of facilities (which most do to some degree) can be classified by the division of responsibilities into the following phases:

- Design and construction of a facility

- Financing of a facility
- Ownership of a facility or land
- Operation of a facility or the performance of a service
- Ultimate transfer of a facility to public ownership and operation.

A venture is an enterprise that may experience a loss and has a chance for gain. Thus, the concept of public-private ventures has its most precise meaning when it is applied to the active participation of both the public and private sectors in an undertaking wherein each party experiences risks and has the opportunity to be rewarded. To meet the requirement for active participation, a public entity cannot simply go to the private capital markets to secure a loan or license a service to be provided by a private entity; along with its private-sector partner, it must play an active role in negotiating an agreement that defines the nature, scope, and costs of a facility or service. The nature of the rewards and risks is normally, *if not necessarily*, monetary for the private-sector participant. The public participant may or may not realize a monetary reward or may or may not reap a public benefit in the activity being performed. Thus, as an example, a government may sell (or simply give away) excess or abandoned property to a private developer simply to get it off its books or to encourage beneficial development. The government runs the risk that the property will not be developed as planned and that the asset could have been used more productively in an alternative way. If things work out according to plan, it realizes the reward of having useless or unsightly property attain an economic value or be put to a use that is beneficial to the public.

The concept of risks and rewards in an undertaking also conveys the fact that, in most cases, PPVs are multiyear activities and so are the terms of

calculating the gains and losses for both sectors. Therefore, the definition of a PPV given in Chapter 1 is appropriate.

“Design-build” or “turnkey” construction projects are a special case under our definition. Under such projects, one contractor designs, builds, and possibly installs equipment in a facility that is turned over to the public sector for operation. The concept of mutual benefit and risk is present in such an arrangement. However, in most cases, private design and construction is merely the provision of a service and more a matter of procurement policy than one of a multiyear sharing of rewards and risks. Therefore, under our definition, design-build and turnkey projects are not PPVs.

Our definition of PPV is illustrated in Figure 1. The vertical axis (the Y-axis) measures the proportion of the venture’s economic value of *capital assets* contributed by the private partner; the horizontal axis (the X-axis) measures the proportion of the venture’s *operations* handled by the private partner. It is not possible to indicate a specific point on either axis that shows where PPVs begin. However, our definition of a PPV clearly eliminates the four corners of this capital asset contribution square. As labeled in Figure 1, corner *a* is a function that is totally owned and operated by the government and

does not involve the private sector. Corner *b* denotes a pure lease whereby the government operates a function in an asset leased from the private sector. Corner *c* is a function that is totally owned and operated by the private sector and does not involve the government. Finally, corner *d* denotes a commercial activities contract whereby the private sector operates a function at its own risk in a government asset and contributes no capital assets of its own. You have to move away from the four corners to get a mix of public-private risk sharing and capital ownership.

A REVIEW OF MAJOR PRIVATIZATION ISSUES

As a subset of privatization, PPVs share in many of the concerns raised about greater levels of involvement of the private sector in the delivery of services or the provision of facilities. The force of those issues depends on how “governmental” the nature the activity to be provided is and whether the activity is currently being provided by a government. The major issues are as follows:

- Responsibility and policy control
- Operational control
- Operating costs

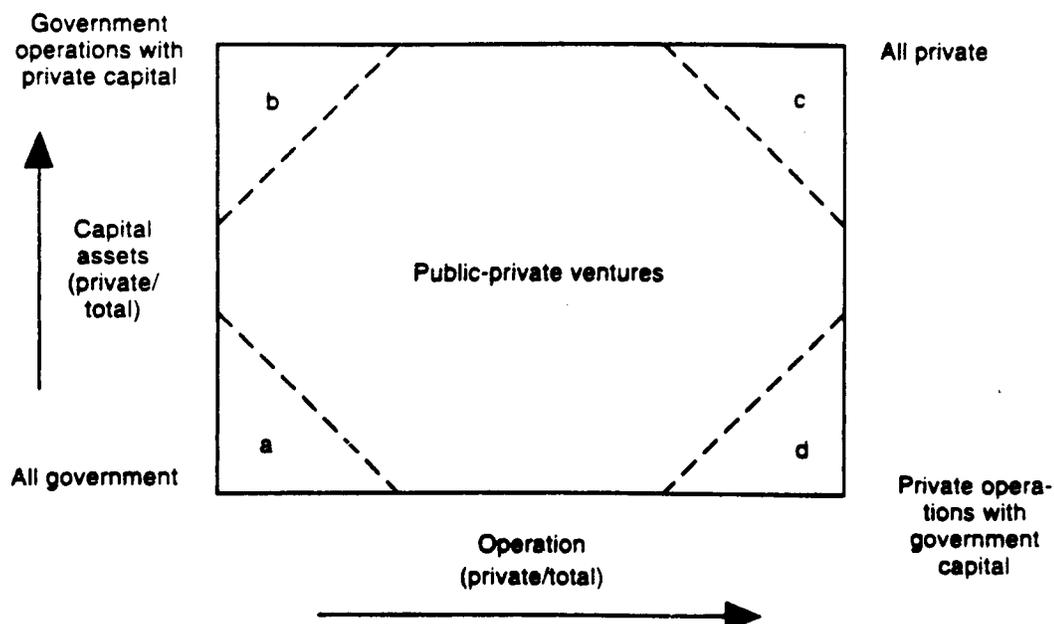


Figure 1. The Boundaries of Public-Private Ventures

- Capital costs
- Liability and risk
- Accountability
- Contractual complexity and monitoring of performance
- Special interests
- Disposition of assets.

We discuss each of these major issues in the following subsections.

Responsibility and Policy Control

This issue entails the responsibility and ability of the public sector to establish priorities in the allocation of resources and the regulation of private activity for the public benefit. Activities have historically fallen to the public sector because of their economic characteristics of joint consumption, an inability of the market mechanism to operate effectively, their essentiality, or because they were viewed as socially meritorious. Governments are unique in that they define social objectives and then regulate private activities and raise and expend resources to attain those objectives. The prime example of the latter process is the annual budget, in which trade-offs are exercised among various forms of raising revenues and approving expenditures. Privatization of major activities, while not inconsistent with regulation, may be seen in practice as inconsistent with maintaining public responsibility and retaining public decisions on production and pricing. This apparent inconsistency arises when the government under contract with a private company grants that company latitude for setting its own rates or following its own procedures; it may also arise when the government gives the private company certain guarantees that limit its (the government's) discretion and flexibility. Examples are "take or pay" contracts in the area of solid waste whereby the government agrees to pay a private company for that service whether it is used or not. The competition between solid-waste-to-energy plants and recycling plants presents another example of potential conflict. On the one hand, the waste-to-energy plants seek abundant high-grade (energy-rich) waste; on the other, the recycling

plants wish to reduce the supply of waste. These problems are not unique to PPVs, but the activities become a matter of contract and less susceptible to the political alteration they might face if public bodies performed them.

Operational Control

Operational control entails the day-to-day decision making on the level and price of a service or the operation of a facility. Private control, it may be argued, is influenced by a different set of criteria and motivations than those found in a public entity. In the private sector, emphasis is placed on financial results (efficiency and profit maximization), whereas in the public sector, emphasis is placed on political goals (equity and service satisfaction); thus, the array and cost of services will differ depending on who provides the service. Under private control, costlier inputs will be minimized and unprofitable services will be eliminated. Thus, unless contracts are tightly drawn and output regularly inspected, they will tend to drive down costs and skimp on services to maximize financial results. The counterargument is that this behavior by private providers is desirable in that it reflects the "true" market-determined costs of service provision which are needed to make rational decisions about the quantity and price of those services. Furthermore, it is argued that where benefits are to be conferred to particular factors of production or classes of users, that choice should be addressed through redistributive policies not through inefficient operational procedures that bury actual costs and lead to uneconomic choices. Examples of such redistributive policies are abatements of charges to the elderly and preferential hiring practices.

Under a PPV, customer satisfaction need not be sacrificed; in fact, it may increase if the contractor's revenue is critically dependent on customer satisfaction. For this to happen, customers must have alternatives from which to choose or they must have an explicit way to penalize the contractor financially for poor customer service.

A special area of concern for PPV facilities is physical maintenance, especially towards the end of the contract period. Given a fixed-length contract, the private partner has an incentive to mini-

minimize maintenance expenditures as long as the facility is minimally functional. That attitude is in direct contrast to the objective of the public partner if the facility is to be turned over to the government at the end of the contract term.

Operating Costs

Operating costs are the costs of maintaining and operating a service or a facility. One of the major advantages seen in privatization is the incentive to minimize operating costs, linking the price system closer to the provision of public services. Operating economies are driven by the desire of the private sector to minimize costs to maximize profits. An advantage frequently touted is that a businesslike operation, free from the labor and procurement policies and restrictions frequently found in government, can produce the same or better services at lower costs. Examples of restrictive procurement policies are those that specify quotas for certain groups (minority and women-owned businesses, for example), specify prevailing wage rates (as does the Davis Bacon Act), or require certain types of labor or materials (as with "buy America" requirements or the use of union labor only). The counterargument is that costs that reflect socially desirable objectives are appropriate for governments and the services they provide.

Firms specializing in services and facilities also claim greater expertise and economies of scale. For example, certain forms of managerial and technical expertise are too costly to employ on a regular basis in individual governments but can be shared by several governments through a contract. Examples are sewer treatment operating contracts whereby professional chemists and engineers can oversee several installations.

Capital Costs

A major argument in favor of government ownership is that governments are able to provide services, especially those that are capital intensive, at lower costs because of their access to capital at lower costs. This argument arises from three sources. First, governments typically have stronger underlying credit capacity because of their ability to tap into a larger and much more diversified economic

base than the private sector. Second, governments effectively have natural monopoly positions, regulatory controls, and taxing powers and thus can mandate payments to meet obligations. Last, and unique to the United States, state and local governments can borrow at preferential rates of interest because of the tax-exempt nature of their debt obligations. Private businesses, on the other hand, need to earn competitive rates on their equity and must pay higher rates of interest on their equity capital.

Counterarguments favoring privatization are that governments can conserve their borrowing capacity (and lower their borrowing costs) by shifting part of the load to private-sector capital providers and that the private sector will use more capital-efficient means of production. Special tax advantages have been available to private capital employed in public-sector activities in the past and may reappear. For example, the 1986 Tax Reform Act greatly reduced benefits to private firms undertaking privatization techniques to finance public works. However, groups such as the Anthony Commission have argued for restoration of tax preferences to encourage privatization.² Another argument frequently encountered is that private ownership can often acquire and construct facilities more rapidly than governments and that this speedy construction not only brings the facility on line faster but in periods of inflation, means a lower cost.

Liability and Risk

A major argument advanced in favor of privatization has been the notion that PPVs give the two sectors the opportunity to share in the risks of new ventures as well as reap their rewards. New ventures, especially those employing innovative or complicated technologies, carry an assortment of risks, and a partitioning of liabilities may lower the overall risk to any one party. For example, the building of a waste-to-energy plant involves the risk of timely completion of construction, of attaining prescribed levels of operation, and of a major

²Rep. Beryl Anthony, "Preserving the Federal-State-Local Partnership: The Role of Tax-Exempt Financing," Anthony Commission of Public Finance, 1989.

calamity. One common arrangement is for the private party builder to construct, test, and perhaps operate a facility for a limited time before turning it over to the government (a turnkey project with limited burn-in operating responsibility). Effectively, the government is protected against design and construction risk and only absorbs risk when the project is completed (and receives the required permits). By the same token, the private party is guaranteed payment (often with incentives) if it completes the project on time. The notion is to affix the liability and risk to that party that has control and can effectively protect against risks.

On the other hand, the equity component is usually small in relationship to the overall capitalization and in most cases, the government with its lower cost of capital is usually able to protect (insure) against most risks at a lower cost than the private entity.

Another aspect of risk is that of the financial stability of the private party and any underlying guarantee. Most private parties will limit their liability and will retain the right to sell off their interests in the facility. If they default, the facility will typically revert to the public entity.

Accountability

A common assertion is that accountability in the public sector ultimately rests with the voter-consumers, whereas in the private sector, it rests with the private owners. That assertion is overly simplistic. In the public sector, accountability may or may not reside with the elected officials in the services area. For example, the level and performance of many services is mandated by superior levels of government, with little latitude given to the actual operators of the services. In other cases, publicly owned facilities may be controlled by boards and commissions that are distant if not wholly removed from the elected officials. In the private sector, providers of financial capital (bondholders) may essentially dictate the bond contract basis levels of the pricing, quality, and continuity of the service provided and the condition of the capital stock. For example, an independent public authority, financed by revenue bonds, may be established to own and operate the facilities, and its

operations may be strictly controlled by the terms (covenants) of the bond contract. Similarly, in the private sector, accountability may be jointly shared with public entities through contracts with the host or partner government and/or regulation of its activities by regulatory bodies other than the host or partner jurisdiction. An example is wastewater utilities. Accountability to the sponsoring public body may be obtained through contractual provisions. However, such contract provisions may cause the loss of efficiencies or greater uncertainties of future operation and pricing policies due to the increased restrictions.

Contractual Complexity and Monitoring of Performance

Public-private cooperative relationships involve the assignment of responsibilities to the private sector through contractual relationships. The length and complexity of a contract depends, of course, on the degree of control and accountability that the public sector wishes to exert, the nature and complexity of the service being provided, and the distribution of liabilities and risks. Contracts entail expense in their drafting and negotiation and also in their effective oversight and enforcement by each party. Governments in particular tend to be at a disadvantage in drafting and negotiating contracts because they have fewer in-house resources and skills and they hesitate to incur costs often needed for good representation. Examples of the consequences abound in the private negotiation of solid waste disposal agreements with local governments where large, private firms have been able to get major concessions from small, rural governments. Contracts also entail a cost for monitoring to ensure the private provider performs in accordance with the agreement. Monitoring can be difficult where the service has many dimensions and subjective factors are heavily weighted.

Special Interests

Privatization can meet with problems when it affects special interest groups, either public or private, significantly. A major inducement to privatize may be to circumvent governmental labor costs and work rules. In areas in which public employee unions or the civil service are strong, privatization

may be used as a way to employ lower-wage, less-restrictive, more-productive labor. While economizing on labor or other costs may lower the cost of a particular service, it may threaten the political interest groups both in this area and as a matter of public policy.

On the other side of the transaction, privatization may be seen as a way to acquire activities and markets that can be manipulated to benefit private interests. For example, private control of service levels and acquisition policies of a privatized service may be used to earn ancillary profits for the operating or other private parties. For example, a contract with a private provider who uses a proprietary technology may result in a monopoly market for subsequent supplies and replacement parts produced by that vendor. Of course, the problem of selection of a particular system or process may be technologically endemic, whether the provider is public or private. Satisfaction or

preferences for particular groups is not unique to privatization but permits the decisions to be further removed from public review than would occur with public body oversight.

Disposition of Assets

Both the public and private partners contribute material capital assets to the venture. The assets contributed by the government generally remain the property of the government at the end of the contract term. However, the assets contributed by the private partner may be given or sold to the government, given or sold to another private partner, removed completely, or retained by the private partner, depending on the terms of the contract. The precise contract terms for disposition of assets are not always clear and may be influenced by statutes, regulations, or various goals of the department's PPV program.



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The President appoints 20 members—three private citizens and three federal executive officials directly, and four governors, three state legislators, four mayors, and three elected county officials from slates nominated by the National Governors' Association, National Conference of State Legislatures, National League of Cities, U.S. Conference of Mayors, and National Association of Counties. The three Senators are chosen by the President of the Senate and the three Representatives by the Speaker of the House of Representatives. Each Commission member serves a two-year term and may be reappointed.

As a continuing body, the Commission addresses specific issues and problems the resolution of which would produce improved cooperation among federal, state, and local governments and more effective functioning of the federal system. In addition to examining important functional and policy relationships among the various governments, the Commission extensively studies critical governmental finance issues. One of the long-range efforts of the Commission has been to seek ways to improve federal, state, and local governmental practices and policies to achieve equitable allocation of resources, increased efficiency and equity, and better coordination and cooperation.

In selecting items for research, the Commission considers the relative importance and urgency of the problem, its manageability from the point of view of finances and staff available to ACIR, and the extent to which the Commission can make a fruitful contribution toward the solution of the problem.

After selecting intergovernmental issues for investigation, ACIR follows a multistep procedure that assures review and comment by representatives of all points of view, all affected governments, technical experts, and interested groups. The Commission then debates each issue and formulates its policy position.