



Office of Inspector General

Program Evaluation Report

Design for Objective 8.4 Could Be Improved by Reorienting Focus on Outcomes

Goal 8 - Sound Science and Innovative Approaches

EPA will develop and apply the best available science for addressing current and future environmental hazards, as well as new approaches toward improving environmental protection.

Objective 8.4 - Pollution Prevention and New Technologies

By 2006, develop and verify improved tools, methodologies, and technologies for modeling, measuring, characterizing, preventing, controlling, and cleaning up contaminants associated with high priority human health and environmental problems.

**Inspector General Office
Conducting the Review:**

Office of Program Evaluation

Program Office Involved:

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC 20460

OFFICE OF THE
INSPECTOR GENERAL

November 21, 2001

MEMORANDUM

SUBJECT: Program Evaluation Report:
Design for Objective 8.4 Could Be Improved by Reorienting Focus on Outcomes
Report No. 2002-P-00002

FROM: Kwai-Cheung Chan 
Assistant Inspector General
Office of Program Evaluation

TO: Henry L. Longest II
Acting Assistant Administrator
Office of Research and Development

We are pleased to provide the results of our program evaluation of the research portion of the Environmental Protection Agency's Goal 8 program, with special emphasis on the design of Objective 8.4. This pilot evaluation was conducted by the Office of Inspector General, in collaboration with the Office of Research and Development (ORD). The report presents our observations regarding our primary evaluation objective – to determine whether the designs of the Goal 8 and, more specifically, Objective 8.4 programs were consistent with the intent of the Government Performance and Results Act, i.e., conducive to achieving outcome-related results.

As agreed to by both parties at the outset, the pilot was to determine whether program evaluation techniques are appropriate for measuring progress in accomplishing Government Performance and Results Act goals, and to document and evaluate the program designs for Goal 8 and Objective 8.4.

We held several meetings with ORD managers to discuss the pilot, from an initial meeting in July 2000 through the preparation of this report. We provided results in briefings and a draft report to ORD managers. We have incorporated the response to the draft report in the main body of this report, as appropriate. ORD's comments are attached as Exhibit 3.

We wish to express our appreciation for the cooperation extended by ORD during the pilot. The ORD managers, scientists, and engineers responsible for research in pollution prevention and new technologies were uniformly cooperative and pleased to discuss their research. Their cooperation contributed significantly to the success of this pilot evaluation.

If you or your staff have any questions regarding this report, please contact me at (202) 260-2347.

Executive Summary

Purpose of Pilot Evaluation

The Environmental Protection Agency's (EPA's) Office of Inspector General, in collaboration with EPA's Office of Research and Development (ORD), conducted this pilot evaluation. As agreed to by both parties, this pilot sought to determine whether program evaluation techniques are appropriate for measuring the progress in accomplishing Government Performance and Results Act goals. This pilot specifically sought to document and evaluate the program designs for Goal 8, with a focus on Objective 8.4 (Pollution Prevention and New Technologies) research.

We concluded that the evaluation process was appropriate. The approach provided a better understanding of the programs, answered key questions, and provided a partnership approach that was beneficial in developing meaningful observations about the designs for Goal 8 and Objective 8.4. We provided results in briefings and a draft report to ORD managers.

Results of Evaluation

This report represents our observations on whether the designs for Objective 8.4 and the research portions of Goal 8 were consistent with the intent of the Government Performance and Results Act, i.e., conducive to achieving outcome-related results. As part of this evaluation, we also evaluated whether the program design was clear and how the performance goals were being achieved.

The 1997 *EPA Strategic Plan* recognizes that Goal 8 research is important, and ORD is developing multi-year plans for some research areas. Each multi-year plan for research details Annual Performance Goals and Measures designed to lead to achievement of long-term goals. We found that ORD's Goal 8 research priorities are consistent with National Research Council recommendations for core research, but identified opportunities for improvement that may facilitate EPA's accomplishing its mission of improving the environment and protecting human health. Specifically:

- **Focus Can Be Placed on Outcomes.** ORD has developed a multi-year plan for Objective 8.4 that links the research strategy to major milestones and goals. The Annual Performance Goals and Measures focus primarily on outputs (such as developing new methods, models, and tools) rather than on achieving outcomes (the effects resulting from the acceptance and use of these new tools and technologies). Placing greater focus on potential outcomes could result in more valuable benefits being realized.

- **Technology Transfer Can Be Expanded.** Success for Objective 8.4 and, ultimately, Goal 8 depends on effective transfer of technology so that customers can understand and use research results to accomplish desired environmental and health benefits. Technology transfer currently generally consists of publication in journals and presentation of papers at scientific conferences. While these types of activities are customary and necessary, further actions should be taken to more effectively transfer research products to customers so that successful application of products occurs.
- **Program Design Can Be More Consistent.** ORD created several documents between 1997 and 2001 that describe strategies and plans for accomplishing the Pollution Prevention and New Technologies research goal. A comparison of these documents and the implemented program showed program design inconsistencies that can limit successful implementation. Resolving these inconsistencies may enhance ORD's ability to achieve its objectives.
- **Planning System Can Be Enhanced.** ORD has developed a research planning system to establish priorities that links the "resources" for research with ORD "activities." There is opportunity to enhance the planning system by linking each research area to outcomes; providing more detailed documentation for multi-year research; and collecting and providing actual performance data in a time frame so it can be used for diagnosing and remedying problems with implementation.
- **Two-Tiered Strategy for Goal 8 Can Be Made Clearer.** The 1997 EPA Strategic Plan provides a two-tiered strategy for Goal 8: develop and apply the best available science, as well as new approaches for improving environmental protection. While both aspects are important, the Goal 8 description does not provide an approach for integrating the two-tiered strategy toward one goal. Opportunity exists to provide a clearer explanation of how the two-tiered strategy is intended to work in order to accomplish EPA's environmental outcomes.
- **Externalities Can Be Better Addressed.** Agency managers need to recognize externalities (factors beyond a Program's control that can help or hinder its success) and their potential impact on program outcomes. Planning documents do not take into sufficient account the role played by externalities for Goal 8 or Objective 8.4 research. EPA and ORD can benefit by anticipating externalities such as budget decisions, as well as by coordinating with other organizations doing environmental research so that efficiencies can be leveraged.

ORD has already taken several actions based on our evaluation to improve Goal 8 and Objective 8.4 programs.

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Introduction

Purpose of Program Evaluation Review

A new strategic direction for the Environmental Protection Agency's (EPA's) Office of Inspector General is performing program evaluations to provide Congress and EPA with best practices, analyses, and recommendations to address serious management challenges, accomplish environmental objectives, and achieve Government Performance and Results Act (GPRA) goals.

OIG began pilot-scale program evaluations in Fiscal Year 2000. EPA's Office of Research and Development (ORD) volunteered for this pilot. Our objective was to document and evaluate the design of ORD's portion of EPA Strategic Plan's Goal 8 program, with special emphasis on Objective 8.4, to determine whether program evaluation techniques are appropriate for measuring the progress in accomplishing GPRA goals.

GPRA and Inspectors General

"The nation's Inspectors General have the capability individually and collectively to review and analyze what the Federal government now does and ask such questions as: How can we improve the organization and management of the Federal government in order to maximize productivity, effectiveness, and accountability for performance results I'm encouraged that many Inspectors General are taking the lead to ensure that the Results Act is fully implemented throughout the Federal government."

S Senator Fred Thompson, Chairman,
Senate Committee on Government Affairs,
Journal of Public Inquiry, Fall/Winter 2000

Background

GPRA, enacted in 1993, challenges Federal agencies and managers to restructure their programs around answers to several basic questions: *What is our mission? What are our goals and how will we achieve them? How can we measure our performance?* In essence, the Act seeks to shift Federal planning, management, and decision making away from a traditional focus on resources and activities to a focus on results and the *outcomes* of those results on the lives of citizens. To make the government more outcome oriented, the Act requires agencies to: specify the outcomes they are trying to achieve, identify specific goals and measures, and evaluate performance against those goals and measures.

A centerpiece of the Act's outcome-oriented focus is that Agencies prepare strategic plans that reach at least 5 years into the future and describe the critical linkages between current activities and long-term goals. In essence, an agency's strategic plan is its road map for achieving long-term outcomes.

The 1997 *EPA Strategic Plan* describes the agency's strategy for the 5-year period of Fiscal Years 1997-2001 and includes 10 GPRA goals. Goal 8 is as follows:

Goal 8 - Sound Science and Innovative Approaches

EPA will develop and apply the best available science for addressing current and future environmental hazards, as well as new approaches toward improving environmental protection.

EPA's strategy for Goal 8 identifies three performance measures: quality, relevance, and impact on environmental decision making. Goal 8 includes 10 objectives. ORD implements core research in Objectives 8.1 through 8.4 and is responsible for a significant part of EPA's Goal 8 resources. ORD is also responsible for conducting research under Goals 1 through 7. We focused our review on Objective 8.4:

Objective 8.4 - Pollution Prevention and New Technologies

By 2006, develop and verify improved tools, methodologies, and technologies for modeling, measuring, characterizing, preventing, controlling, and cleaning up contaminants associated with high priority human health and environmental problems.

The Pollution Prevention Act of 1990 established certain requirements for pollution prevention and a national policy that pollution should be prevented or reduced at its source. Within EPA, the Office of Prevention, Pesticides, and Toxic Substances leads the Agency's response to requirements of the Act. Within its GPRA structure, EPA established research for pollution prevention as Objective 8.4 under Goal 8. ORD is responsible for developing, implementing, and managing pollution prevention research. Objective 8.4 research is accomplished through a combination of in-house and extramural mechanisms.

Scope and Methodology

We documented and evaluated the overall design of GPRA Goal 8, and evaluated in more detail the design of Objective 8.4 and its program components. Objective 8.4 was selected based on ORD input that indicated it was a well-documented program and would be a good choice for program design evaluation.

To help determine whether EPA's designs for Objective 8.4 research are consistent with Congressional intent, we developed questions from the U.S.

General Accounting Office recommendations to Congress about how GPRA strategic plans can be improved to better support Congressional and agency decision making. Those questions are shown in the box at right. This report presents only the most significant observations related to the questions.

To interpret information, we relied extensively on program design and evaluation theory, literature, and techniques.

We reviewed EPA's Goal 8 strategy, and focused on research in Objective 8.4 funded through EPA's Science and Technology appropriation and managed by ORD. To develop answers to the questions raised, we gathered and interpreted information from the following:

Questions for Evaluating the Design of EPA's Goal 8 Research

- Is the GPRA structure (i.e., the objective statement and performance measures) for Objective 8.4 focused on outcomes?
- Are the program designs for Goal 8 and Objective 8.4 clear? Are the elements of the design, and the links between these elements, clear?
- How are the performance goals to be achieved? Are the strategies logically linked to the goals and the day-to-day activities of the managers and staff? Do the managers monitor and assess external factors that can help or hinder achieving outcomes?

- **Interviews and Workshops:** We met with various program managers, particularly those involved with Objective 8.4 research. We conducted several workshops with ORD managers to address various aspects of the Objective 8.4 research program.
- **Documents:** We examined a large number of documents that describe EPA's mission as well as GPRA planning, goals, intended results, and program logic. We used the 1997 *EPA Strategic Plan* as a primary source of information through which EPA communicated to Congress and the public about GPRA strategies, goals, and management within EPA for Fiscal Years 1997-2001. We reviewed various EPA planning and budget documents, ORD strategic plans, and reports from external agencies such as the U.S. General Accounting Office and the National Research Council.

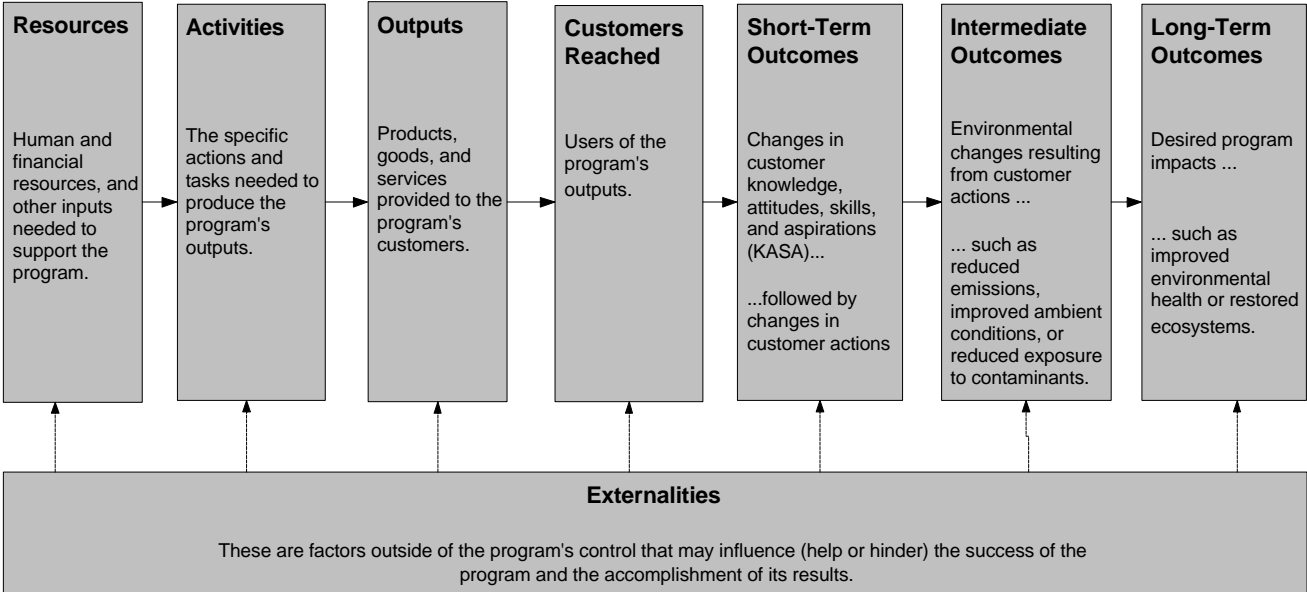
We did not consider other customers or stakeholders beyond ORD who may fund, support, or participate in programs designed to achieve similar outcomes or goals.

We used logic models¹ to identify and illustrate Goal 8 and Objective 8.4 research program designs, and to discuss the designs with ORD managers. Figure 1 that follows illustrates a generic logic model for an environmental program. The figure depicts the elements of program design, and the arrows between these elements

¹ "Logic Models: A Tool for Telling Your Program's Performance Story," McLaughlin, J.A.; and *Evaluation and Program Planning* 22 (1999) 65-72, Jordan, G.B.

represent critical links in the program’s design and functioning. In this figure, the program design theory is presented in the narrative text within the rectangles. When used this way, logic models can facilitate communication about the elements of a program’s design, the links between these elements, explicit and implicit assumptions about program operation, and expectations about results and accountability. Exhibit 1 contains logic models we developed for the Goal 8 and Objective 8.4 programs.

Figure 1: A General Logic Model for an Environmental Program



Although this review is a program evaluation and not an audit, we followed applicable *Government Auditing Standards* to the extent practical – particularly in regard to qualifications, due professional care, quality control, planning, supervision, evidence, and reporting. Because of significant and complex issues on the extent to which environmental research can be managed under GPRA, the Office of Inspector General determined that, for this pilot program evaluation, a deviation from the *Government Auditing Standards* about organizational independence was necessary. The team conducting this pilot included professionals from ORD as well as the Office of Inspector General. The pilot team leader was detailed to the Office of Inspector General from ORD for the duration of the pilot. Before this detail, the team leader did not have organizational or research responsibilities associated with ORD research in Objective 8.4.

Summary of Observations

The 1997 *EPA Strategic Plan* recognizes that Goal 8 research has an important role in EPA's achieving the long-term outcomes of protecting human and environmental health (see box). ORD is conducting a pilot program to develop multi-year plans for some of its most important research areas. Each Multi-Year Plan for research details Annual Performance Goals and Measures designed to lead to achievement of long-term goals.

Based on our evaluation, we observed that ORD has made significant progress in its GPRA efforts but can place more focus on outcomes. We also noted various ways in which ORD can make its Objective 8.4 program

design clearer by expanding on ways it transfers technology, being more consistent with its design, and making planning system improvements. Furthermore, performance goals for Goal 8 can be better achieved by making the two-tiered strategy clearer and taking steps to anticipate externalities that can impact on outcomes.

Value of Research

EPA's research program will measurably increase our understanding of environmental processes and our capability to respond to and solve environmental problems . . . Research will lead to greater certainty in assessing and comparing environmental risks.

– 1997 *EPA Strategic Plan*, page 53



Potential Area
for Improvement

Focus Can Be Placed on Outcomes

Analysis of the Annual Performance Goals and Measures indicated that ORD focuses primarily on outputs, such as developing new methods, models, tools, and technologies. Placing greater focus on potential outcomes rather than the steps taken to achieve outcomes could result in more valuable benefits being realized.

For example, one Objective 8.4 Annual Performance Measure is described as “update the Coating Alternatives Guide (CAGE) to show the chemical constituents of paint formulation and identify the most significant amounts of VOCs (volatile organic compounds) and HAPs (hazardous air pollutants) in commercially marketed paint formulations.” Focusing this measure more on outcomes being sought would enable managers to better assess how successfully the actions accomplish the desired results.

Research outputs may result in short-term outcomes, such as reduced scientific uncertainty and improved environmental decision making, if those outputs are

transferred effectively to customers. These customers (which include EPA, states, and industry) and the desired short-term outcomes are represented by the three shaded boxes in the middle of the logic model in Exhibit 1. Further, customer application of the outputs may result in intermediate outcomes, such as reduced emissions or improved environmental quality, which will enable EPA to achieve its long-term outcomes of improved environmental and human health. By improving the Objective 8.4 program design to include performance measures related to short-term outcomes, ORD can measure and know the extent to which customers use their research products and, consequently, determine the research's impact on intermediate- and long-term environmental outcomes.

Objective 8.4 program managers agreed research program designs generally do not focus on measuring the application of research products by customers to achieve outcomes. Program managers acknowledged that using logic model concepts to perform a matrix analysis similar to that found in Exhibit 1 would be helpful in understanding the critical linkages in managing for results.



Potential Area
for Improvement

Technology Transfer Can Be Expanded

The success of Objective 8.4 and, ultimately, Goal 8, depends on effective transfer of technology and the communication of research in proper formats that are accessible to and usable by a variety of audiences (see box). Both internal and external customers use ORD's research products. Internal customers include decision makers and regulators in EPA Program Offices and Regions. External customers and stakeholders include state and local government regulators, industries, other researchers, and the general public.

Review of the research area descriptions for Objectives 8.1 through 8.4, as well as interviews with ORD managers, indicated that EPA technology transfer activities consist primarily of:

- Publication of methodologies, technologies, and models in technical and trade journals and on internet web sites.
- Presentation of papers at scientific conferences.

These types of technology transfer are customary and necessary practices for research organizations and should be continued. However, further actions should be taken to more effectively transfer research products to internal and external

Impact on Decision Making

The performance goal is for EPA's research organization to transfer information, findings, and results effectively to users, partners, and the public.

– 1997 EPA Strategic Plan, page 56

customers so that successful application of products occurs. This conclusion was also reached in a National Academy of Sciences study, *Strengthening Science at EPA*, which states that EPA needs to “substantially increase its efforts to disseminate actively ORD’s research products and . . . assist others inside and outside the agency in applying them.”

The *1997 EPA Strategic Plan*, as well as ORD’s research planning documents, do not identify a systematic approach for transferring research products to customers, but such an approach is needed. Effective outreach by ORD to customers and stakeholders is a critical element in the designs for Goal 8 and Objective 8.4 programs, as shown in Exhibit 1. Program documentation should specifically describe the resources, activities, outputs, and performance measures related to technology transfer and effective customer outreach.

Furthermore, organizational responsibility for technology transfer should be clearly outlined. Objective 8.4 program managers said that although there is a Technology Transfer and Support Division within ORD funded by Objective 8.4, managers involved with Objective 8.4 are not clear on the level of support this division can provide for the transfer of their research products. Program managers said this Division provides technology transfer support to all of ORD and estimated there is approximately one full-time equivalent of technology transfer support for Objective 8.4. Also, ORD’s general workforce consists of highly trained scientists, engineers, and researchers, whereas the function of customer outreach may benefit from the use of disciplines in addition to scientific research.

Outreach and technology transfer activities are key to ensuring that customers understand ORD’s research products and are able to apply them. These activities represent a critical link between the “outputs” and “customers” elements in the logic model. If this link does not function properly, the desired changes in customer knowledge and behavior (i.e., short-term outcomes) leading to improvement in environmental conditions (i.e., intermediate and long-term outcomes) may not occur or occur to the level desired.



Potential Area
for Improvement

Program Design Can Be More Consistent

The long-term goal of Objective 8.4 is to develop and verify new tools, methodologies, and technologies for modeling, measuring, characterizing, preventing, controlling, and cleaning up contaminants with high priority human health and environmental problems by 2006. ORD created several documents between 1997 and 2001 that describe strategies and plans for accomplishing this Pollution Prevention and New Technologies research goal. We compared the program design as described in the ORD documents and the program as it is

actually implemented, and noted that resolving certain inconsistencies may result in improvements. Examples of inconsistencies include:

- The *Pollution Prevention Research Strategy* and the Fiscal Year 2002 Sub-Objective Summary identify an “active” risk assessment research area, with allotted resources, but this research area has not been implemented.
- One research area described in the Objective 8.4 Sub-Objective Summary – the Persistent Bio-accumulative Toxics Initiative – was not mentioned in the *Pollution Prevention Research Strategy* or the multi-year plan. Further, the Initiative’s research objectives were not consistent with the strategic goals identified in the *Pollution Prevention Research Strategy*.
- Although 30 to 40 staff responsible for technology transfer activities were supported by the Objective 8.4 budget, their activities and outputs were not described in any Objective 8.4 strategies or plans. Furthermore, program managers estimated that only one full-time equivalent was devoted to providing support to research managers in Objective 8.4.

Collectively, such inconsistencies can limit the ability of ORD managers to understand and implement the elements of the Objective 8.4 program. Resolution of these inconsistencies may enhance ORD’s ability to achieve its objectives.



Potential Area
for Improvement

Planning System Can Be Enhanced

The multi-media and multi-disciplinary nature of EPA’s Objective 8.4 research requires ORD to design, manage, and integrate many individual research projects over multiple years. A major challenge for EPA’s core research program is determining which research issues are important enough to support, as noted by the National Research Council (see box). ORD has developed a research planning system to establish priorities to help meet this challenge. This system represents a critical link in the Objective 8.4 program design because the priorities it identifies are used in making resource decisions. ORD’s research planning system links

EPA’s Environmental Research Challenge

Clearly, EPA cannot conduct or sponsor research on every issue of concern to the public, the Congress, or even its own program offices Because EPA’s task of protecting the environment and human health is so vast and difficult, and because resources to undertake the necessary research are very limited, choices will have to be made among many worthwhile projects.

- National Research Council
*Building a Foundation for Sound
Environmental Decisions*, pages 10, 60.

the “resources” for research with the “activities” of EPA’s research organization, as illustrated by the arrow in Exhibit 1 (Figure 2).

ORD program managers indicated that ORD requests input from agency-wide customers and stakeholders in identifying potential research priorities. Further, ORD involves senior agency scientists from program and regional offices on Research Coordination Teams, which recommend research priorities and establish new priority rankings each year. It may take several years to complete the individual research projects in a research area, and from 5 to 10 years to complete all the research areas needed to achieve an objective. With this in mind, we concluded that EPA’s planning system could better address how research should contribute to achieving environmental outcomes. Specifically:

- ▶ ORD’s research planning system focuses on the resources, activities, and outputs associated with each research area without also addressing how the research relates to achieving environmental outcomes. When annual priorities are established by the Research Coordination Teams for each research area, important GPRA information associated with that year’s research – such as performance goals, measures, and progress to achieve outcomes – is not available because performance data are collected after the annual research priority setting is completed. Consequently, ORD managers responsible for implementing Objective 8.4 research programs and projects may not have information essential for diagnosing and remedying problems with implementation that may be needed to achieve GPRA results.
- ▶ Currently, ORD is conducting a pilot program to develop multi-year plans for some of its most important research areas. According to ORD planning guidance, the multi-year plans are draft documents that “link the research strategy and research plans to show how ORD conducts research in an integrated fashion to reach major milestones and end points.” Review of the Draft Multi-Year Plan for Objective 8.4 disclosed that it includes activities, outputs, and annual performance measures and goals, but does not sufficiently consider outcomes. While the draft multi-year plan demonstrates how ORD has taken an important step toward linking research strategies to research plans, opportunities exist to improve the multi-year planning system by orienting the multi-year plan toward outcomes.
- ▶ It is difficult to measure the annual accomplishments of scientific research, since research typically takes several years to complete. However, it is important that plans for multi-year research projects include milestones that can be used to periodically measure and report on progress. The Agency has developed a reporting mechanism that rolls up the accomplishments for all Strategic Goals, but there are restrictions on how much information can be included for research projects still in progress. ORD managers stated it is difficult to communicate on a year-to-year basis the progress ORD is making toward achieving outcomes.

There is opportunity to enhance the planning system by linking each research area to environmental outcomes; providing more detailed documentation (including milestones) for multi-year research; and collecting and providing actual performance data in a time frame so it can be used by the managers in diagnosing and correcting problems in the next annual planning cycle.



Potential Area
for Improvement

Two-Tiered Strategy for Goal 8 Can Be Made Clearer

The 1997 *EPA Strategic Plan* indicates that the strategy for Goal 8 is two-tiered, as discussed in the following box:

Two-Tiered Strategy


It is clear that, in the future, environmental problems will be dealt with in a different manner than they are today. In moving towards this future, EPA has adopted a two-tiered strategy. On one level, EPA is working to strengthen those features of the current system that have been proven to be effective. At the second level, EPA is designing and testing fundamentally new tools and approaches that take advantage of new scientific knowledge and technological advancements, a growing ethic of environmental stewardship, the need to cut waste, and increase efficiency and similar opportunities as they arise in society.

- 1997 *EPA Strategic Plan*, page 53

The description of the two-tiered strategy for Goal 8 includes the development and application of:

- ✓ Best available science.
- ✓ New approaches for improving environmental protection.

According to the *FY 2001 Annual Performance Plan and Congressional Justification*, Objectives 8.1 through 8.4 address research related to best available science while Objectives 8.6 through 8.10 address new approaches (Objective 8.5 is reserved for future use). Specifically:

	Objective	Objective Title
Best Available Science	8.1	Ecosystem assessment and restoration
	8.2	Human health risk assessment
	8.3	Detecting emerging risk issues
	8.4	Pollution prevention and new technologies
	8.5	<i>(Reserved for future use)</i>
New Approaches	8.6	Increase integrated holistic partnership approaches
	8.7	Increase sector based approaches
	8.8	Regional enhancement of ability to quantify envir. outcomes
	8.9	Science Advisory Board peer reviews
	8.10	Incorporate innovative approaches to envir. management

Responsibility for the scientific research-related Objectives 8.1 through 8.4 rests with ORD, while responsibility for Objectives 8.6 through 8.10 rests with the Office of the EPA Administrator.

In addition, our analysis indicated that Goal 8 activities are funded through different Congressional appropriations:

- ✓ Objectives 8.1 through 8.4 are funded primarily through EPA’s Science and Technology appropriation.
- ✓ Objectives 8.6 through 8.10 are funded primarily through EPA’s Environmental Program and Management appropriation.

Goal 8 resources identified for Fiscal Year 2001 totaled \$328.8 million, of which about \$250.7 million (76 percent) was identified for Goal 8 research in Objectives 8.1 through 8.4. This budget information indicates that ORD, with its Objectives related to scientific research, has significant responsibility for achieving Goal 8 results.

Additional information could be added to the Goal 8 description to enable customers or stakeholders to better understand how this two-tiered strategy should be combined to accomplish the long-term environmental outcomes of the goal. The multiple levels of responsibility and sources of funding adds to the complexity.

ORD managers noted that, as currently designed, it will be difficult to determine whether EPA is achieving the intended Goal 8 outcomes when Objectives 8.1 through 8.4 are managed and funded by ORD while Objectives 8.6 through 8.10 are managed and funded by other EPA offices. Opportunity exists to provide a clearer explanation of how the two-tiered strategy is intended to work in order to accomplish EPA’s environmental outcomes



Externalities Can Be Better Addressed

The 1997 *EPA Strategic Plan* does not sufficiently consider the impact of externalities that can affect the success of Goal 8 research. Externalities are factors beyond a program's control that can help or hinder its success. In advising Congress about GPRA strategies, the U.S. General Accounting Office emphasizes in its report, *Agencies' Strategic Plans Under GPRA: Key Questions to Facilitate Congressional Review*, that it is important for program managers to recognize externalities and their potential impact on program outcomes.

We identified a number of externalities that may limit ORD's ability to accomplish Objective 8.4 research outcomes and results. These include:

- ▶ Budget decisions.
- ▶ Economic conditions.
- ▶ Other research organizations.
- ▶ Other federal agencies involved in environmental research.
- ▶ Planning guidance.

Although ORD may not be able to control externalities, such as budget reductions and economic downturns, ORD can benefit by recognizing such potential areas in advance and taking preparatory actions accordingly. Furthermore, by working together with other research organizations and federal agencies conducting environmental research, efficiencies can be leveraged by coordinating the various efforts so that duplication is avoided and more positive results are achieved.

Exhibit 1:

Logic Models for Goal 8 and Objective 8.4

Figure 2: Logic Model Depicting the Goal 8 Research Program Design

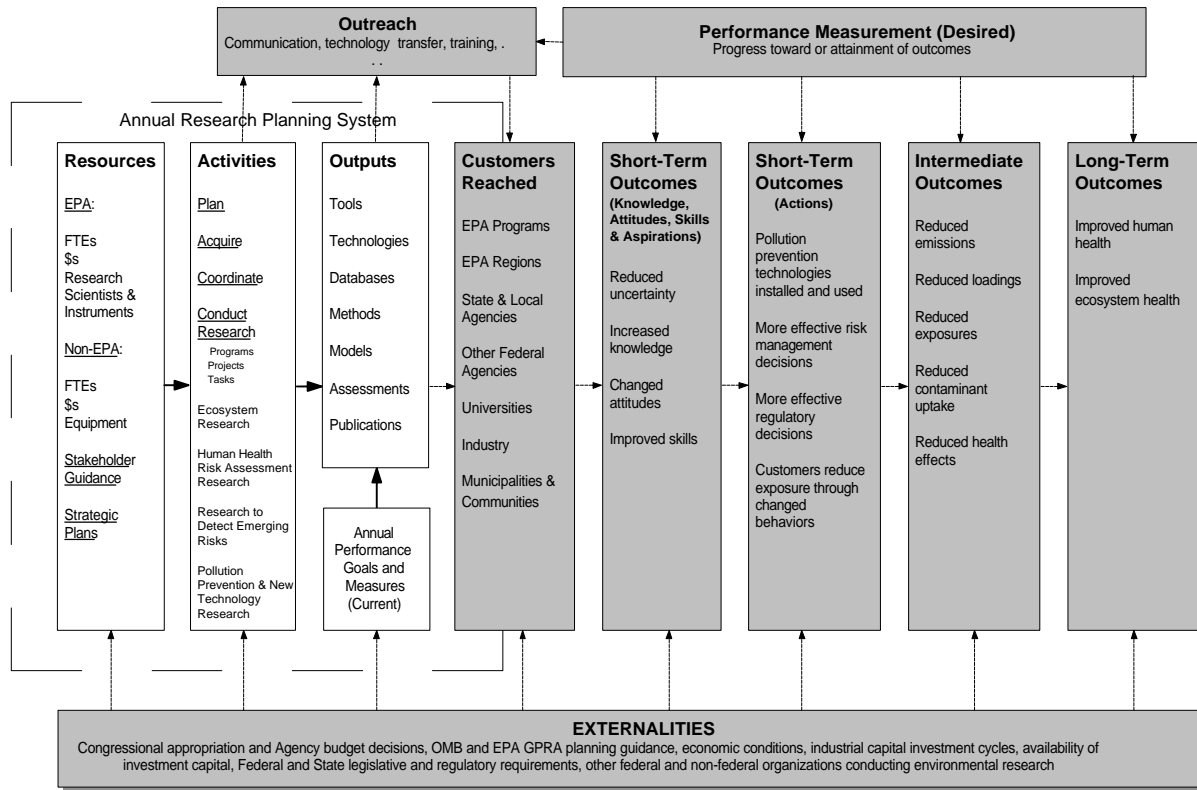


Figure 2 above presents a logic model that illustrates the general design of EPA’s Goal 8 core research program. The items identified in each rectangular “element” of the logic model present relevant information about Goal 8 core research. The white rectangles and solid arrows represent actual program design. The shaded rectangles and dotted arrows identify those elements in Goal 8 plans that are not currently part of the actual program design. The program design depicted in this model is based on: information presented in EPA’s description of its Goal 8 strategy; ORD’s research strategy and plans; interviews with Goal 8 program managers in ORD and the Office of the Chief Financial Officer; and workshop discussions with ORD managers.

Figure 3 on the next page presents a logic model that illustrates the general design of EPA’s Pollution Prevention and New Technologies research program in Objective 8.4. The information is based on: EPA’s description of its Goal 8 strategy, as well as the *Pollution Prevention and New Technology Strategic Plan*, ORD’s draft multi-year plan, interviews with ORD Goal 8 and Objective 8.4 program managers, and interviews and workshop discussions with ORD managers. The design of Figure 3 is similar to Figure 2, and differs mainly in the details.

Figure 3: Logic Model Depicting the Objective 8.4 Research Program Design

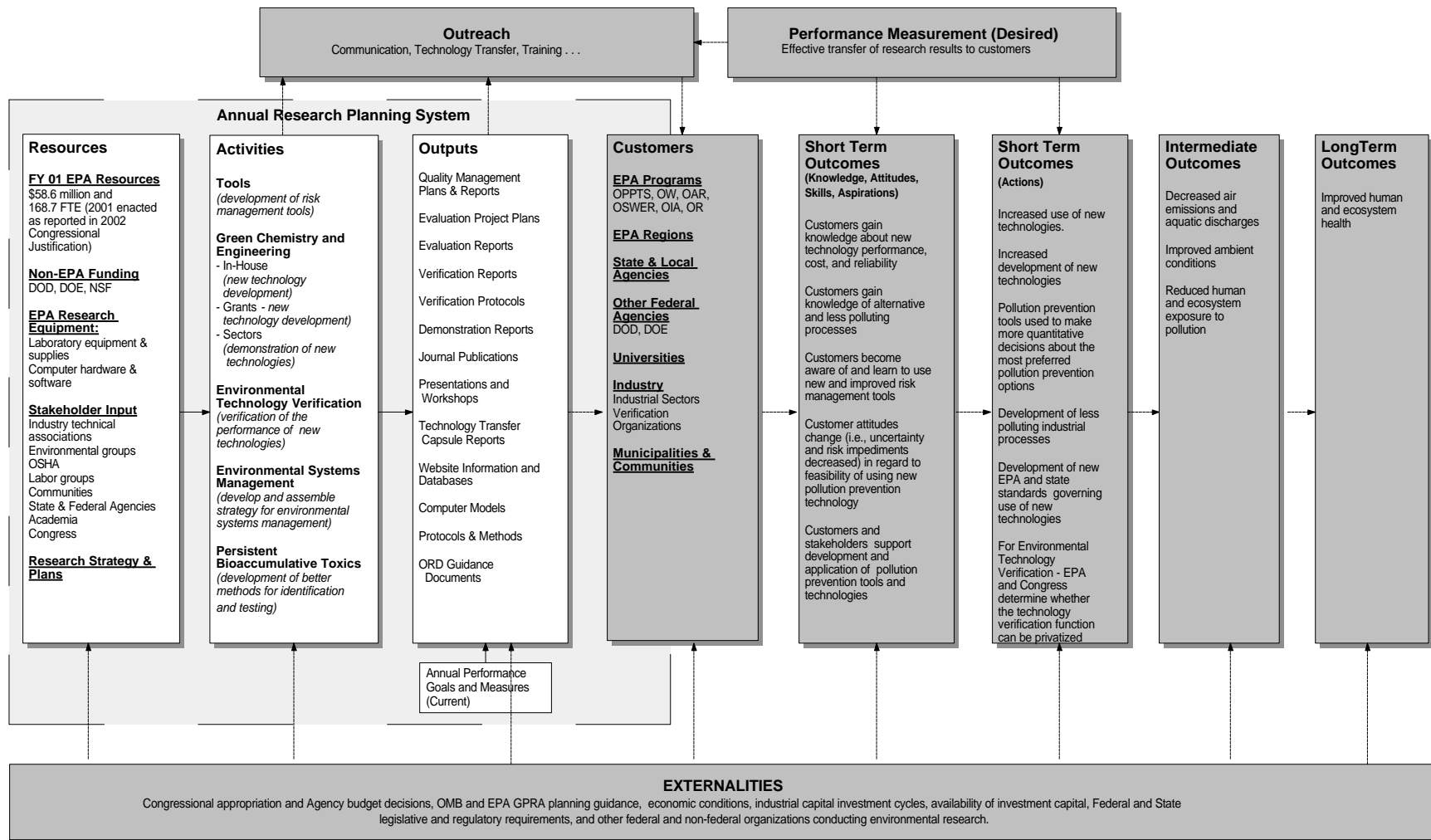


Exhibit 2:

Office of Research and Development Actions Taken in Response to Evaluation

ORD managers, scientists, and engineers responsible for research in pollution prevention and new technologies were cooperative and pleased to discuss their research. Their cooperation contributed to the success of this pilot evaluation. In addition, ORD has undertaken several actions that respond to our February 2001 briefing. These actions include:

- A mid-year fiscal 2001 review that involves ORD executive managers and considers how application of the logic model tool can improve the designs and outcome orientation of ORD's research programs.
- Guidance for ORD executives and managers to improve the outcome orientation of annual performance goals and measures as EPA prepares its initial Fiscal Year 2003 budget and strategic plan.
- Consideration of revisions to the annual research planning system that focus discussions and decisions on performance information, including outcomes. These revisions will allow ORD and its internal customers to understand how annual funding decisions affect ORD's ability to achieve the short-term outcomes referenced in Exhibit 1, and how they affect the customers' ability to achieve intermediate and long-term outcomes.
- A consultation between Objective 8.4 managers and OIG experts to identify applications of program design and evaluation theory that may enable ORD managers to strengthen their existing multi-year research plan for pollution prevention and new technologies.

The first three actions identified extend to ORD's research programs across *all* EPA GPRA Goals.

Exhibit 3:

Office of Research and Development Response to the Draft Report



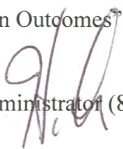
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

NOV 19 2001

OFFICE OF
RESEARCH AND DEVELOPMENT

MEMORANDUM

SUBJECT: ORD Comments on Draft OIG Program Evaluation Report,
"Design for Objective 8.4 Could Be Improved by
Reorienting Focus on Outcomes"

FROM: Henry L. Longest II 
Acting Assistant Administrator (8101R)

TO: Kwai-Cheung Chan
Assistant Inspector General
Office of Program Evaluation (2410)

Thank you for the opportunity to review the draft program evaluation report, *Design for Objective 8.4 Could Be Improved by Reorienting Focus on Outcomes*. This pilot effort demonstrated the value of program design and evaluation techniques in designing and managing our strategic goals and programs, and I commend your office for the objective and collaborative approach that the Office of Inspector General (OIG) managers and evaluators used throughout the process. The collaboration between OIG and the Office of Research and Development (ORD) ensured evaluation validity in the face of significant and complex questions about the extent to which environmental research can be managed under the Government Performance and Results Act (GPRA). ORD learned a great deal about program evaluation, and we have incorporated these lessons into various facets of our business processes.

EPA has made great progress in implementing GPRA, but many challenges remain. As OIG stated in its June 2001 report titled *EPA's Progress in Using the Government Performance and Results Act to Manage for Results*, "EPA has taken many actions to comply with GPRA's strategic planning requirements, although it faces significant challenges in developing results-oriented strategies that clearly link annual plans and budgets to accomplishments of long term outcomes." Developing such linkages for environmental research is an even more challenging task, but one that ORD takes very seriously. ORD has used its experience with the OIG pilot program evaluation to further advance its efforts in this area, and we continue to make significant progress in identifying the impacts and outcomes of our research programs. As an example of our commitment in this area, during the FY 2001 mid-year reviews of ORD National Laboratories and Centers, I asked each organization director to discuss outreach efforts and outcome measurement in the context of the program design/evaluation logic model. In addition, ORD used the model in its FY 2003 budget presentation to OMB.

The attachment to this memorandum lists a number of comments on the draft report for your consideration. Please do not hesitate to contact me or have your staff contact Howard Cantor (202-564-5236) with any questions regarding our comments.

Attachment

cc: William Farland
Ann Akland
Tim Oppelt

ORD Comments on Draft OIG Report

Design for Objective 8.4 Could Be Improved by Reorienting Focus on Outcomes

1. On page i of the Executive Summary, the report states that OIG’s objective was to “document and evaluate the program designs for the EPA Strategic Plan’s Goal 8 and Objective 8.4.” A similar statement appears on page 1 of the Introduction. ORD understood the focus of the pilot to be Objective 8.4. While it is clear that some study of Goal 8 overall was necessary for context, we did not believe that Goal 8 was the focus of the evaluation. Further, the vast majority of ORD’s discussions with the OIG team pertained to Objective 8.4 only.
2. On page 5 of the report, the first paragraph under Summary of Observations seems to focus on ORD’s multi-year plans. This language (second, third, and fourth sentences) appears out of place. In addition, language almost identical to these sentences appears on page 9 under the Planning System Can Be Enhanced section. It is more appropriate there, and we therefore suggest removing it from page 5.
3. There is a typographical error on page 12. In the last paragraph, “...ORD can benefit be recognizing...” should be changed to “...ORD can benefit by recognizing...”
4. On page 13, the report states that Figure 3 is based on information gathered from a number of documents, but does not reference the multi-year plan. Is this an intentional omission, or an oversight?