II. General Appraisal of the Plan

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ISSUES LIST

II General Appraisal of the Plan

INTRODUCTION

The development of a comprehensive 5-year planning process in environmental research is a difficult and complex undertaking, and may require substantial dedication of ORD planning skills over the next few years. A number of issues addressing ORD's planning, budgeting, and organization as well as issues addressing the role of ORD and its research are presented in this chapter.

Planning, Budgeting, and Organization

The ORD 5-Year Research Plan fails to inform Congress of the thrust, relevance, adequacy, and utility of the proposed research program. Clear statements relating program goals and priorities cannot easily be found nor are they evident from numerous research activities projected over the 5-year period. (Issue 1)

The deficiencies of the Plan stem from an incomplete planning process. The Plan, for example, does not fully examine alternative research approaches or resource allocations. The planning process is not discussed nor is the process to modify the Plan over a period of time suggested. (Issue 2)

A strategic thrust to identify, develop, and demonstrate industrial control technology appears to dominate ORD's 5-year budget. With the exception of a temporary rise in funding in the Industrial Processes Program needed to meet 1985 water-quality goals, the ORD 5-year budget projection indicates little change in long-term relative priorities of established research programs. (Issue 3)

The ORD 5-Year Plan was designed to support an organizational structure which was first established in 1970. In mid-1975, however, ORD was reorganized to improve staff morale and to achieve greater efficiency. The Plan, which was developed shortly after the reorganization, does not reflect the benefits of the new organizational structure. Additionally, it is difficult to relate budgeted responsibilities and the processes of planning, managing, and implementing the research activities with the new organization. Furthermore, the role and function of the 15 laboratories in the implementation of the planned research are inadequately described. (Issue 4)

The Plan does not indicate how, or whether, the public was involved in the development of the Plan. Such input could aid ORD as it attempts to develop priorities and define problems of public concern. (Issue 5)

The Role of ORD and Its Research

With the exception of plans for energy-environmental research, the ORD Plan fails to recognize the function of EPA in coordinating Federal environmental programs. At present, there appears to be no coherent integration of Federal environmental research programs. Since EPA has the line responsiblity for setting and enforcing standards, ORD should provide the required leadership in determining the environmental research goals and priorities among governmental agencies conducting environmental research. (Issue 6)

For the work performed by ORD to have high quality and proper content, ORD's program plans should not be unduly biased by short-term regulatory needs. To avoid misuse or misinterpretation of scientific data in regulatory actions, ORD should be responsible for the scientific credibility of new regulations. (Issue 7)

Environmental crises requiring immediate action by EPA appear to be occurring with increasing frequency. While one cannot predict the nature and time of environmental crises, an exploratory research program that attempts to anticipate problems would add a worthwhile dimension to ORD's program. (issue 8)

II. General Appraisal of the Plan

ISSUES

THE PLAN

Issue 1

The first ORD 5-Year Plan is inadequate as a planning document.

Summary

Although the Plan identifies issues and attempts to assign priorities to research elements, it generally fails to inform Congress of the thrust, relevance, adequacy, and utility of the proposed research program, and of the interrelationships between the proposed ORD research program and non-EPA environmental research activities.

While ORD's research Plan lists numerous research projects for the 5-year period, it does not clearly delineate program priorities; nor does it relate these priorities to overall program goals. It is impossible to determine what would be lost if some program components were dropped, or what would be gained if new program components and funding were added.

Questions

1. What are the major research priorities for 1977? For 1980? How have they changed since 1975?

2. How is the Plan to be used as a working document in EPA? Outside EPA?

Background

The EPA's first 5-Year Research Plan does not provide the data necessary to conduct a review in a reasonably expeditious fashion. As a plan, the document is not sufficiertt,

A plan develops strategies to achieve stated objectives with known priorities. Alternative strategies which achieve objectives within internal and external constraints are evaluated. A plan analyzes the allocation of human, capital, and financial resources in the pursuit of objectives. It also relates resources with the size and content of the endeavor. A research plan sets forth an organization and schedule for interrelated sequences of parallel and serial tasks. Statements such as, "Plans in the future call for . . . ," followed by a list of projects without priority or apparent interrelationship, are not amenable to analysis. Such statements do not inform; they lead to supposition about the intents of the program. Thus, there is no apparent rationale for determining whether the Plan presents a balanced research program with respect to:

- hardware versus management control options,
- exploratory research into innovative concepts versus demonstration of available technologies,
- regulatory-supporting research versus problem-solving research,
- development of control and abatement technology versus establishing dose/response characteristics.

While the Plan describes research programs as ''mission-oriented, with emphasis on timely outputs, neither of these attributes appears to be developed in the Plan,

In a sound plan there is internal consistency, within each major program and, further, goals and plans in major program areas are interrelated within the framework of clearly articulated national environmental goals.

A plan must provide information which allows Congress to monitor and assess the progress and accomplishments of ORD and to compare planned versus achieved results over time.

Because of the complexity of environmental research, the fragmentation of this work among various governmental agencies, and the competition for limited resources, a comprehensive ORD research plan is essential.

THE PLANNING PROCESS

Issue 2

The deficiencies of the ORD 5-Year Plan stem from an undeveloped planning process.

Summary

The Plan does not reflect a sufficient attempt to assess priorities, to examine the merit and costs of alternate research approaches, to quantify trade-offs or to allocate limited resources according to systematically devised research strategies. The planning process is not discussed nor is the process to modify the Plan over a period of time suggested.

Questions

1. How was the development of a 5-Year ORD Research Plan affected by:

(a) the public perception of immediate environmental hazards?

(b) legislative mandates?

(c) challenges to Agency regulations by industry or environmental groups?

(d) existing ORD facilities and staff skills?

2. How were priorities and funding levels determined?

3, What trade-off studies were conducted?

4. To what extent were others involved in the planning process, e.g.:

(a) EPA divisions?

(b) Federal agencies?

(c) State and local governments?

(d) Peer scientists?

(e) Industry?

(f) Private institutions? and

(g) The public?

5. Describe the process to update the 1977 5-Year Plan?

6. How were previous research results incorporated into the Plan?

Background

The following discussion summarizes the panels' understanding of the steps taken in developing the first Plan; it is offered to raise questions that may assist in improving the ORD planning process.

The planning procedure followed by ORD has been characterized by one observer as a "middle up-middle down" approach. This process involved soliciting candidate research topics from various headquarters and field offices within EPA; aggregating these tasks into programs within the four ORD project offices; developing a draft 5-year plan around these programs; soliciting comments on this draft throughout the Agency; assigning dollar and staff resources to the various programs; and publishing the final plan.

There are certain factors which influenced how this planning process proceeded and how decisions were made:

- Each of the individual pollution control program offices (air, water, etc.) is so completely absorbed with the day-to-day urgency of their tasks as to preclude significant guidance on long-term research programs which need to be carried out to improve pollution control.

- There were apparently no attempts to fit overall Agency strategy into the ORD Plan. Top management review was given to the budget implications of the 5-Year Plan, but substantive review to assure the consistency of the research plan (the programs, priorities, and distribution of funding) from an Agencywide perspective does not appear to have been considered.

- There were no explicit guidelines or criteria used for assigning research priorities evident in the planning process.
- There appears to be general acceptance within the ORD senior management staff that (a) the primary ORD mission is to provide the scientific and technical base needed to support the regulatory, standard-setting function of the Agency, and, (b) R&D activities should consist almost exclusively of directed research, i.e., research designed to accomplish some specific regulatory goal with no apparent role for basic science activities.
- No attempt was made to develop alternative, broad research programs around different R&D strategies. There were no systematic analyses that explored different approaches for accomplishing the ORD mission or that defined alternate program options in terms of research accomplishments.
- The planning process did not lead to development of a set of discrete alternate program research packages, i.e., alternate research programs containing identified levels of effort, priorities, and budgets for different mixes of basic research work, control technology, technical support work, socioeconomic work, health effects, etc.
- There was no external peer review of the 5-Year Plan.
- Ultimate decisions about the structure of the 5-year research program, the research projects included in the Plan, and the priorities and resources assigned to these activities were essentially made on the basis of subjective judgments by ORD personnel. Clearly, both external and internal pressures played important roles in these subjective judgments. External pressures included legislative mandates, perceived areas of public concern, outside challenges to Agency regulations and standard-setting procedures. Internal pressures included lack of flexibility caused by the organization of existing facilities, a staff trained in selected disciplines, established patterns of laboratory interests, and ongoing projects.

BUDGET IMPLICATIONS

Issue 3

A strategy to identify, develop, and demonstrate industrial control technology appears to dominate ORD's 5-year budget.

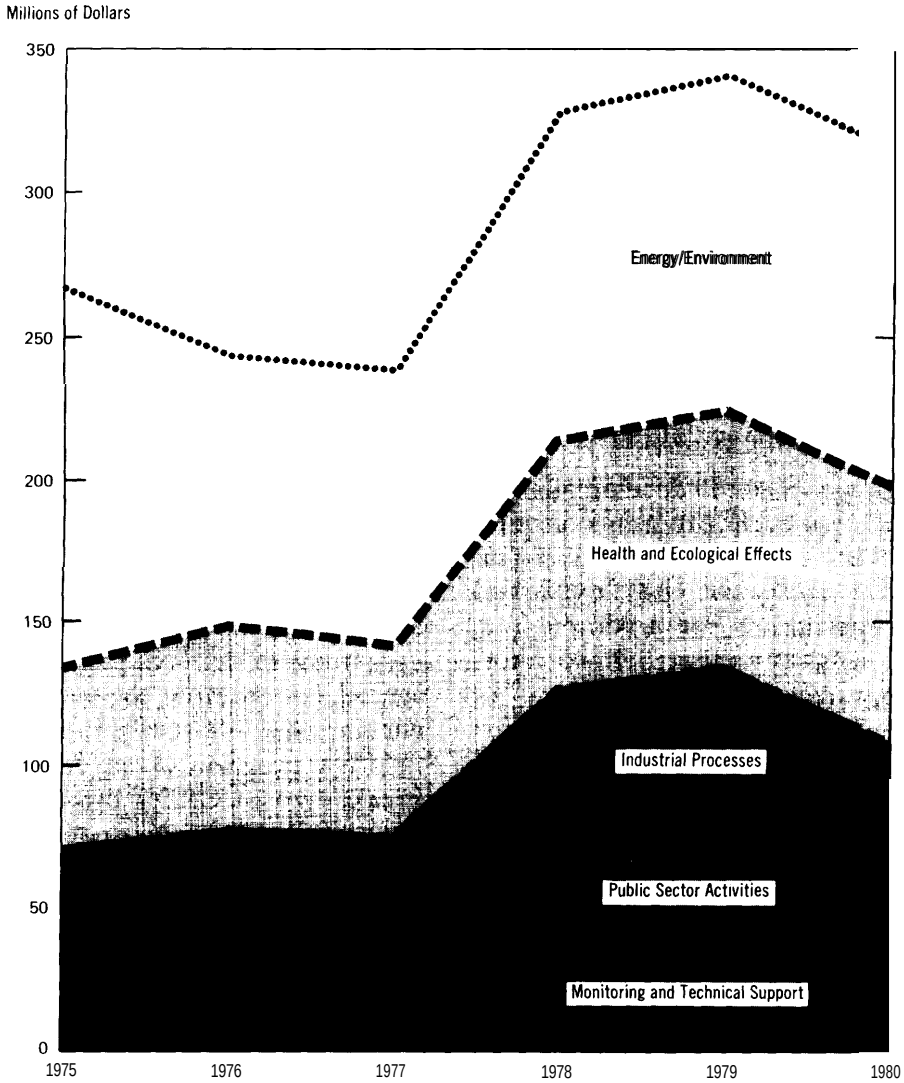
Summary

Figure 2 depicts ORD's projected allocation of resources for each program area. Although the Plan discusses each program area, it is difficult to discern research directions or budget emphases from those program aggregations of research projects which are presented. For example, the large energy program encompasses efforts similar to those pursued in other program areas. A possible alternate breakdown of ORD's projected allocation of resources is presented in figure 3. Subprograms were rearranged to form three new research categories replacing three of the ORD programs. Two ORD programs were unchanged. The new research categories are a first attempt at combining similar research from different programs. Table 2 compares the aggregation of the subprograms for the two ways of breaking down ORD's projected resource needs.

Figure 3[1] suggests the dominance of ORD's activity in industrial control technology. While it is true that this alternate breakdown may be disputed with added data on the distribution of funds within subprograms and added information on subprogram content, it is not an unreasonable interpretation of the 5-Year Plan.

[1] A table entitled "Planned ORD Funding by Subprogram Area" which appeared in a draft copy of the 5-Year Plan, dated Nov. 14, 1975, was used to construct the plots of figure 3 (the 1977 figures had to be adjusted).

Figure 2. Projected ORD Resource Needs ORD Breakdown Total ORD Budget



With the exception of the temporary rise in funding in the Industrial Processes Program needed to meet 1985 water-quality goals, the ORD 5-year budget projection indicates little change in the long-term priorities of established research programs.

Questions

1. Approximately what percentage of ORD's budget will be spent on identifying, developing, and demonstrating control technology over the 5-year period?

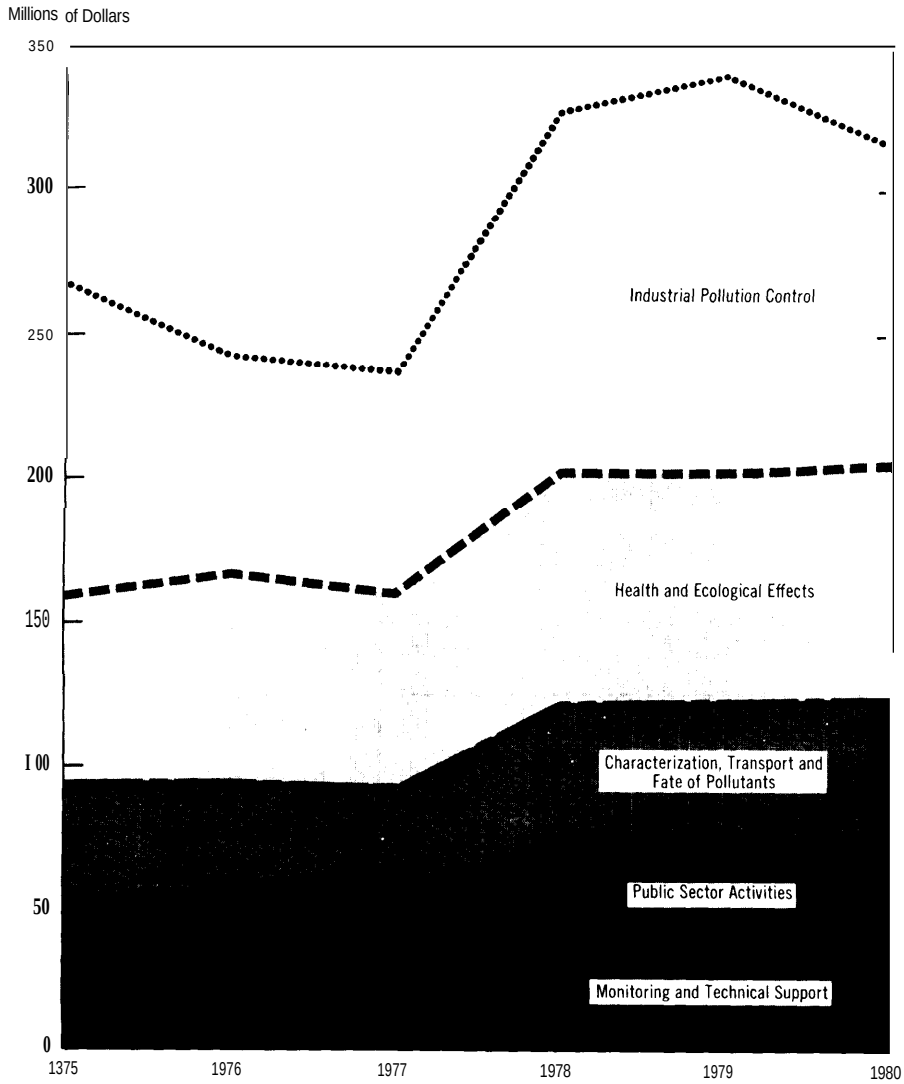
2. It appears that EPA must aggressively pursue the control technology area. What considerations led to this strategy?

Background

Figure 2 shows that the funds for all programs decrease slightly from 1976 to 1977. Ignoring the passthrough of energy funds, this is the first time that EPA's research budget is decreasing. When inflation is included, the decrease in 1976 dollars in the nonenergy base R&D is approximately $16 million.

ORD is projecting a temporary increase in the Industrial Processes Program to encourage development of appropriate control technology to meet 1985 water-quality goals. The Plan also offers two options for allocations of

Figure 3. Projected ORD Resource Needs Alternate Breakdown
Total ORD Budget



funds to the program areas under the constraint that the annual budget for the years 1977 to 1980 will remain at the 1977 level. One option is an attempt to achieve the 1985 water-quality goals at the expense of other programs, while the other essentially maintains the 1977 distribution of funds.

THE REORGANIZATION OF ORD

Issue 4

The first ORD 5-Year Plan does not adequately reflect how the mid-1975 reorganization improves management and planning.

Summary

Although the 5-Year Plan assigns planning and implementation responsibilities for the subprograms among the four offices of ORD, it is difficult to relate the new organizational structure to the processes of planning, managing, and implementing the research activities and budgeted responsibilities. In addition, the role and function of the 15 laboratories in the implementation of the planned research are inadequately described.

Table 1. ORD and Alternate Subprogram Aggregation

ORD Subprogram Aggregation	Alternate Subprogram Aggregation
Health and Ecological Effects Program • Health Effects • Ecological Processes and Effects • Transport and Fate of Pollutants	**Health and Ecological Effects Category** • Health Effects • Ecological Processes and Effects • Health and Ecological Effects/Energy (1/3 of total)
Industrial Processes Program • Mineral, Processing and Manufacturing • Renewable Resources	**Characterization, Transport and Fate of Pollutants Category** • Transport and Fate of Pollutants • Health and Ecological Effects/Energy (2/3 of total)
Energy/Environment Program • Extraction and Processing Technology/Energy • Health and Ecological Effects/Energy • Conservation-Utilization Technology Assessments/Energy	**Industrial Pollution Control Category** • Minerals, Processing and Manufacturing • Extraction and Processing Technology/Energy • Renewable Resources Ž Conservation-Utilization Technology Assessments/Energy
Public Sector Activities program • Waste Management • Water Supply • Environmental Management	**Public Sector Activities Program** • Waste Management • Water Supply • Environmental Management
Monitoring and Technical Support Program • Monitoring Techniques and Equipment Development • Quality Assurance • Technical Support	**Monitoring and Technical Support Program** • Monitoring Techniques and Equipment Development • Quality Assurance • Technical Support

Questions

1. Assuming that the mid-1975 reorganization had little effect on ongoing research, at the time, what impact has the current four-office structure of ORD had on changing the direction of research programs?

2. Since very few of the scientific personnel in the Environmental Research Laboratories have been assigned to different laboratories, to what extent can it be shown that the research programs of the laboratories have been consolidated ?

3. How did the laboratories contribute to the planning process? How will they contribute in the future?

Background

When EPA was established in 1970, the Office of Research and Monitoring (now ORD) inherited 40 separate field installations. These field installations were reduced in number and three large units (National Environmental Research Centers) were established: In Cincinnati, Ohio; Research Triangle Park, N. C.; and Corvallis, Oreg. Later, a fourth was established in Las Vegas, Nev.

Several independent studies of the ORD management structure in 1974 concluded that no clear lines of responsibilities existed between the laboratories and headquarters, that the excessively complicated management

structure at headquarters, greatly increased unnecessary and duplicative paperwork. Morale among the researchers was low, in part because of the absence of a long-term program to achieve specific goals to guide the research effort.

In response to these critiques, the management structure of ORD was reorganized in mid- 1975. The reorganization established four offices with in ORD reporting directly to the Assistant Administrator. The National Environmental Research Laboratories were reorganized so that each laboratory had four or fewer programs with a director of the program reporting to the corresponding office in ORD. A small number of employees at headquarters were reassigned to the laboratories and others who had management or administrative duties vis-a-vis the laboratories have now apparently been given responsibilities for performing reviews, analyses, and studies to fulfill headquarters' needs. The Washington Environmental Research Center, primarily engaged in socioeconomic analysis, was disbanded and its researchers were scattered among the programs within ORD.

PUBLIC PARTICIPATION

Issue 5

The Plan does not indicate how or whether the public and industry were consulted in formulating the 5-Year Research Plan.

Summary

Numerous local and regional environmental public interest groups and private industrial research programs offer a largely untapped potential for new insights into research approaches. Their contributions could help achieve a balance among research priorities, focus appropriate attention on regional problems, and bring to light developing industrial expertise.

Questions

1. What provisions exist for the public and industry to review and comment on EPA/ORD research plans?

Background

Consultations with the interested public and industry could enrich the research planning process and make research goals and priorities more enduring and responsive. Local public interest organizations and industrial plant personnel may have highly developed expertise or insights into environmental problems of national concern. Unless these organizations have forceful national forums, their valuable contributions may go unrecognized and unheeded.

EPA'S LEADERSHIP AND INTERAGENCY COOPERATION

Issue 6

At present, there appears to be no coherent integration of Federal environmental research and development programs except in the energy area. In their 5-Year Plan, EPA/ORD has not provided any proposed method of achieving such coordination.

Summary

The ORD Plan fails to recognize and delineate the actual function of EPA in coordinating Federal environmental programs, including programs related to research and development. Though mention is made that such a role exists, the Plan proposes no method to achieve it. The Executive initiative which created EPA and the numerous subsequent legislative acts mandating environmental programs seem clearly to place this responsibility with EPA.

Because there are numerous Government agencies conducting environmental research, leadership in determining the environmental research goals and priorities among these agencies is essential; ORD is the logical center for such leadership.

Questions

1. What should the EPA/ORD role be in the planning, implementation, and evaluation of Federal environmental R&D programs?

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2. How will ORD coordinate their environmental R&D programs and demonstration projects with other Federal agencies?

3. How does ORD obtain knowledge about the progress of the various environmental R&D programs and projects carried out by other Federal agencies?

4. To what extent does the ORD evaluate the effectiveness of environmental programs under the direction of other Federal agencies.

5. What potential conflicts and misunderstandings with other agencies would be anticipated if EPA expanded its lead-agency role in environmental research?

6. Is there a need for more explicit congressional authority to EPA/ORD to coordinate, monitor, and evaluate all Federal environmental R&D programs? Why?

7. Currently, ORD monitors and evaluates those environmental R&D programs in which EPA has the lead responsibility of transferring funds to other Federal agencies. How can this procedure be improved to provide more effective coordination?

8. To what extent should a portion of ORD's role within EPA be insulated from the Agency's short-term program needs in order to free ORD to better integrate Federal environmental R&D programs?

9. Is there a national clearinghouse that disseminates information about ongoing Federal environmental R&D projects? To what extent should ORD be involved in providing such a service?

Background

The creation of EPA as a major Federal line agency (based on Reorganization Plan No. 3, Dec. 4, 1970) was an attempt by the executive branch to consolidate environmentally related programs of the Federal Government into a single administrative unit. EPA inherited 15 separate programs from several Federal agencies: Federal Water Quality Administration (Interior), National Air Pollution Control Administration (HEW), Bureau of Water Hygiene (HEW), Bureau of Solid Waste Management (HEW), Bureau of Radiological Health (HEW), Pesticide Standards and Research (Interior, HEW), Pesticides Registration (Agriculture), Federal Radiation Council (AEC), and Studies of Ecological Systems (CEQ), Executive Office of the President.

At the same time, a number of Federal environmental R&D programs were retained or expanded in existing Federal agencies. According to the 5-Year ORD Plan, EPA research interacts with the following Federal agencies:

Department of Commerce-(National Oceanic and Atmospheric Administration, National Bureau of Standards)

National Aeronautics and *Space* Administration

Department of the Interior-- (Fish and Wildlife Service, Geological Survey, Bureau of Land Management)

U.S. Department of Agriculture

Energy Research and Development Administration

Nuclear Regulatory Commission

Department of Defense-- (Army Corps of Engineers)

National Science Foundation-(Research Applied to National Needs, National Center for Atmospheric Research)

Department of Health, Education, and Welfare —(National Cancer Institute, National Institute of Environmental Health Services, National Institute of Occupational Safety and Health, Food and Drug Administration)

Department of Transportation

Department of Housing and Urban Development

Council on Environmental Quality

Tennessee Valley Authority

As mentioned in the 5-Year Plan, EPA is directly responsible for administering a 5-year energy R&D program with 18 other Federal agencies.

It is apparent that there are areas of cooperation and formal interaction between

EPA and other Federal agencies. However, it is not clear from the 5-Year Plan how EPA/ORD plans to implement their administrative charge, nor how they plan to coordinate and evaluate the many R&D programs and individual projects. The Plan mentions the program areas without indicating how the specific projects under each program will be planned, carried out and monitored for performance. There is no discussion of whether duplication or undesired overlap of R&D functions exists and whether or not redundancy in R&D projects is planned so as to reinforce and complement a research objective.

Thus, the Plan seems to assume that Federal environmental R&D programs will proceed as funds become available, without real need for overall comprehensive planning.

MAINTAINING QUALITY RESEARCH IN EPA

Issue 7

ORD's involvement in short-term urgencies arising out of EPA's regulatory responsibilities or in the handling of emergencies diverts resources needed for establishing a strong scientific basis for EPA's regulatory function.

Summary

ORD serves as a primary source of scientific information used by EPA in developing and assessing environmental regulations. For the work performed by ORD to have high scientific quality, ORD's program plans should not be unduly biased by short-term regulatory needs. To avoid misuse or misinterpretation of scientific data in regulatory actions, ORD should review the scientific credibility of new regulations prior to their issuance. The Plan does not address the issue of how ORD insures the research program's integrity. It does, however, provide some evidence of potential overemphasis in support of EPA's regulatory function, particularly in the development of control systems.

Questions

1. How are the needs of regulatory programs considered in the ORD Plan? What program elements are not stimulated by regulatory needs?

2. How are the goals of research programs in control technology determined?

3. How does EPA identify and conduct research programs intended to look beyond existing or pending regulatory requirements?

4. At what point in control system development do research program personnel transfer responsibility to the regulatory branches?

5. How are ORD research staff assigned to "firefighting" activities?

6. How are inputs from the ORD to the EPA regulation review process made?

Background

When a regulatory agency conducts its own research to evaluate and support regulations that it must enforce, there is a danger that a strong regulatory orientation will permeate the research program. If this occurs, the efficiency, content, and quality of the research being performed may be seriously degraded. It is a matter of special concern when the research program is not only supposed to establish regulatory support data but also promote the development of basic science in the affected areas.

Scientific research staff are an important base of expertise for any operating regulatory program. The accessibility of research personnel, however, must be carefully managed to prevent their overinvolvement in the legal, procedural, and political activities of regulatory operations.

Such problems appear to be occurring in two kinds of situations faced by EPA:

- The handling of unanticipated environmental emergencies,
- The broader problem of regulatory program responsibility spillover, when operational responsibilities of the agency regulatory arms are carried out by ORD.

The first problem often characterized as the "pollutant-of-the-month syndrome" has been and will continue to be an unavoidable and important role for ORD experts as long as the problem persists. They must be accessible to quickly and accurately evaluate a situation and give regulatory responses to emergency environmental problems. The Agency, however, should provide assurances that these kinds of activities do not degrade R&D efforts.

The second problem typically involves the case of new legislative mandates requiring standard -setting activities under stringent time constraints. Under these conditions, regulatory program offices are likely to become overloaded and tend to shift some of the regulatory activities into the R&D program offices. Specifying control requirements and developing Control Regulations Support Documents cannot be added tasks of research personnel without jeopardizing research programs.

Although ORD personnel should be protected from excessive work in regulation development or formulation, their participation in scientific regulation review should be maintained and formalized. When a regulation is promulgated, the Administrator and the public must have an understanding of the scientific basis for the regulations, of the data base's adequacy, and of the extent to which scientific knowledge has been simplified in developing a manageable regulatory procedure.

At present, EPA uses a steering committee and a working-group mechanism to develop interagency review of al 1 regulations. Under this procedure, the Assistant Administrator of ORD has the opportunity to concur or not to concur. This procedure, in cases of significant scientific impact, may be inadequate. The multitude of regulations can easily turn this procedure into a rubberstamp exercise. At best, an official scientific reading of the issue from ORD cannot always be assured. ORD should be accountable to the Administrator and the public for the scientific quality of regulations.

PLANNING FOR THE UNEXPECTED

Issue 8.

It appears that ORD frequently cannot respond effectively to crises because the need for R&D was not forseen or funds to support anticipatory R&D were not available.

Summary

Environmental crises demanding immediate action by EPA appear to be occurring with increasing frequency. These events require some planning for a prompt and adequate response that anticipates problems. Development of such a capability requires appropriate exploratory research

Questions

1. How does EPA/ORD anticipate future environmental issues to provide timely data for the regulatory or legislative processes?

2. What methodology does EPA/ORD use to establish R&D priorities and programs in the exploratory area?

3. What constrains ORD from pursuing exploratory research to anticipate environmental problems?

Background

Inevitably, significant social, technological, and resource changes will affect the environment. While one cannot predict the nature and time of environmental crises, an exploratory research program that attempts to anticipate problems would add a worthwhile dimension to ORD's program.