



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

April 29, 1994

OFFICE OF THE ADMINISTRATOR  
SCIENCE ADVISORY BOARD

EPA-SAB-RSAC-LTR-94-008

Honorable Carol M. Browner  
Administrator  
U.S. Environmental Protection Agency  
401 M Street, S.W.  
Washington, DC 20460

Subject: Review of the FY 1995 Presidential Budget Request for the Office of Research and Development

Dear Ms. Browner:

The Budget Review Subcommittee of the Research Strategies Advisory Committee (RSAC) met on April 8, 1994 to review the FY 1995 Presidential Budget Request for the Office of Research and Development activities within the Environmental Protection Agency. This review was conducted to provide the Agency and Congress with insights on the adequacy of the budget to carry out a research program, responsive to the needs of the Agency and the Nation and of high scientific quality.

The Subcommittee's approach included a) a broad review of the total research and development program and related budget and b) a more detailed review of four specific activities: the Ecosystem Protection Initiative, the Environmental Technology Initiative, and the Human Health Risk Assessment Methods and Criteria Air Pollutant Issues.

The review was carried out using background materials provided by the Agency, as well as materials specifically requested by the Committee, supplemented by briefings from Agency senior managers.

#### Major Findings and Recommendations

1. The Agency's research and development budget for 1995 represents an increase of \$37.9M (\$570.6M compared to \$532.7M for 1994) and a reduction of 33 work years (1830 work years compared to 1865 work years in 1994). However, it is the Subcommittee's understanding that 265 Federal workyears will be allocated to research and development activities as a result of the conversion of contract dollars to Federal workyears proposed as part of the Agency's Contract Reform Initiative.

We are pleased to note the increased funding in 1995 for research and development activities.



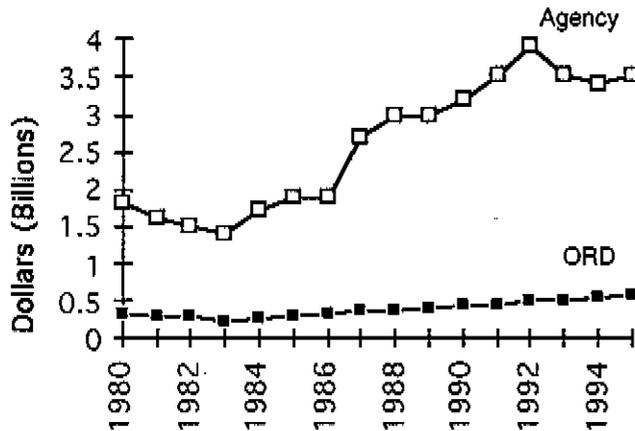
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However, the budget does not indicate this change nor the funds that might be altered to reflect the changing personnel structure. The nature of the Agency's budget submission makes it difficult to assess the adequacy of the research and development budget to meet the Agency needs.

The Subcommittee notes the long-term erosion that has occurred in the level of the Agency's research and development activities. This is apparent from a comparison of the Agency's Research and Development budget (presented in 1987 dollars) for 1980 - \$460M and the 1995 request - \$440M and the related workforce of 2300 FTEs in 1980 to 1800 FTEs in 1995. See figures 1 and 2. This change is even more striking when it is recognized that in 1980 the research and development personnel represented 17% (2300/13,200) of the total Agency personnel which has eroded to less than 10% (1830/19,400) in 1995. This is especially disturbing in view of the scope of new issues that need a research effort in order to provide an adequate science base for Agency decisions. Thus, the Agency does not appear to be heading in the direction of creating the stronger science base that is so desperately needed.

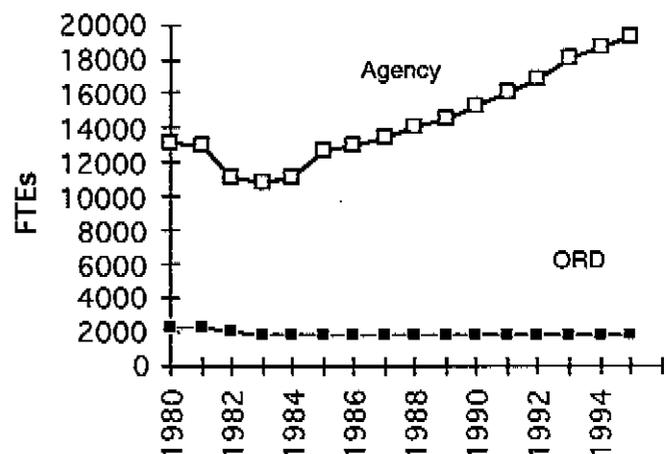
**Figure 1. Budget Trends (\$B)**



The Subcommittee strongly recommends that the Agency critically review the adequacy of the agency's total science program relative to its legislated regulatory responsibilities and explore the opportunities for re-engineering that would increase the agency's scientific staff and associated capabilities. The Subcommittee is aware that the Agency is currently generating a new strategic plan. The development of the strategic plan provides an ideal opportunity for considering a major shift in resource allocation to the research budget in order to complement shift from a command and control paradigm to alternative paradigms that require a stronger science base.

2. The Agency does not have in place a functioning integrated, program management system with provision for planning, budgeting, implementing, reporting, and oversight of its research and development activities. Meaningful budgeting cannot be done without a clear plan regarding what is to be addressed. The present "management system" appears to be a disjointed collection of elements of a management system functioning with variable degrees of effectiveness at different organizational levels within the agency. The absence of an integrated management system serves to impede communication among researchers, research managers, and "customers" of the research results.

**Figure 2. FTE Trends**





The absence of a well-developed program management system which includes provision for planning, budgeting, implementing, reporting, and oversight of its research and development activities makes it difficult to determine whether the budget and allocation of funds are appropriate to accomplish the research and development goals of the Agency. Year-to-year changes in the management system and uncertainties in the integration of the management process between headquarters-based activities and laboratory operations left the Subcommittee uncertain as to whether changes in research and development activities delineated in the budget documents represent actual changes in the scientific work being conducted in the laboratories or not.

The Agency is strongly encouraged to develop a management system that vertically is integrated from laboratory bench operations through the Office of the Assistant Administrator for Research and Development to the research programs of the total Agency. Further, it should have clearly identified linkages to the activities and needs of other segments of the Agency for which the research and development activities provide a significant part of the scientific basis for action. A reporting system capable of presenting the research program in different ways for different audiences is needed, e.g., by issues, by media, or by projects.

3. The Agency's 1995 budget implies new investments in ecosystem protection, criteria air pollutants (PM<sub>10</sub> and tropospheric ozone), human exposure, environmental technology initiative and the high performance computing. These investments resulted both from shifts in funding from low priority areas and an absolute increase in overall research and development funding. The Subcommittee encountered some difficulty in assessing these new investments/disinvestments because of changes that have been made in how the research activities are reported from 1994 to 1995.

In general, the Subcommittee was supportive of these new investments. They appear to be well-justified and timely. However, it should be recognized that the increases for research on the criteria pollutants (PM<sub>10</sub> and tropospheric ozone) are coming at a time when current revisions of the criteria documents for these pollutants are either in the late stages of planning and/or review. Therefore, this research will have little impact on pending decisions. There is a need for a strategic vision of how today's research will fit into tomorrow's decision. Obviously, this viewpoint must extend to the total research and development program, not just the criteria air pollutants.

4. The Subcommittee was favorably impressed with the specific research issue plans that were provided and reviewed. However, the current documents appear to be first iterations and in some cases are already in need of updating. We also gained the impression that some Agency personnel have not yet accepted research issue planning as a central element of the Agency's approach to management.

The Subcommittee strongly endorses the use of research issue plans as part of an integrated management system. We feel strongly that senior EPA management must provide strong endorsement of the process for developing and using the research issue plans as part of an integrated approach to managing the research and development program. Further, the Subcommittee urged that additional attention be given to the implementation phase of the research issue plans in order to provide a stronger and on-going linkage to the actual conduct of the research in both the internal (EPA) and external laboratories. It was noted that the research issue plans should be "living documents" which are updated on an annual basis.

5. The Subcommittee received an oral briefing on the process for converting from use of con-



tractor personnel to the performance of research by full-time Federal employees working in EPA laboratories.

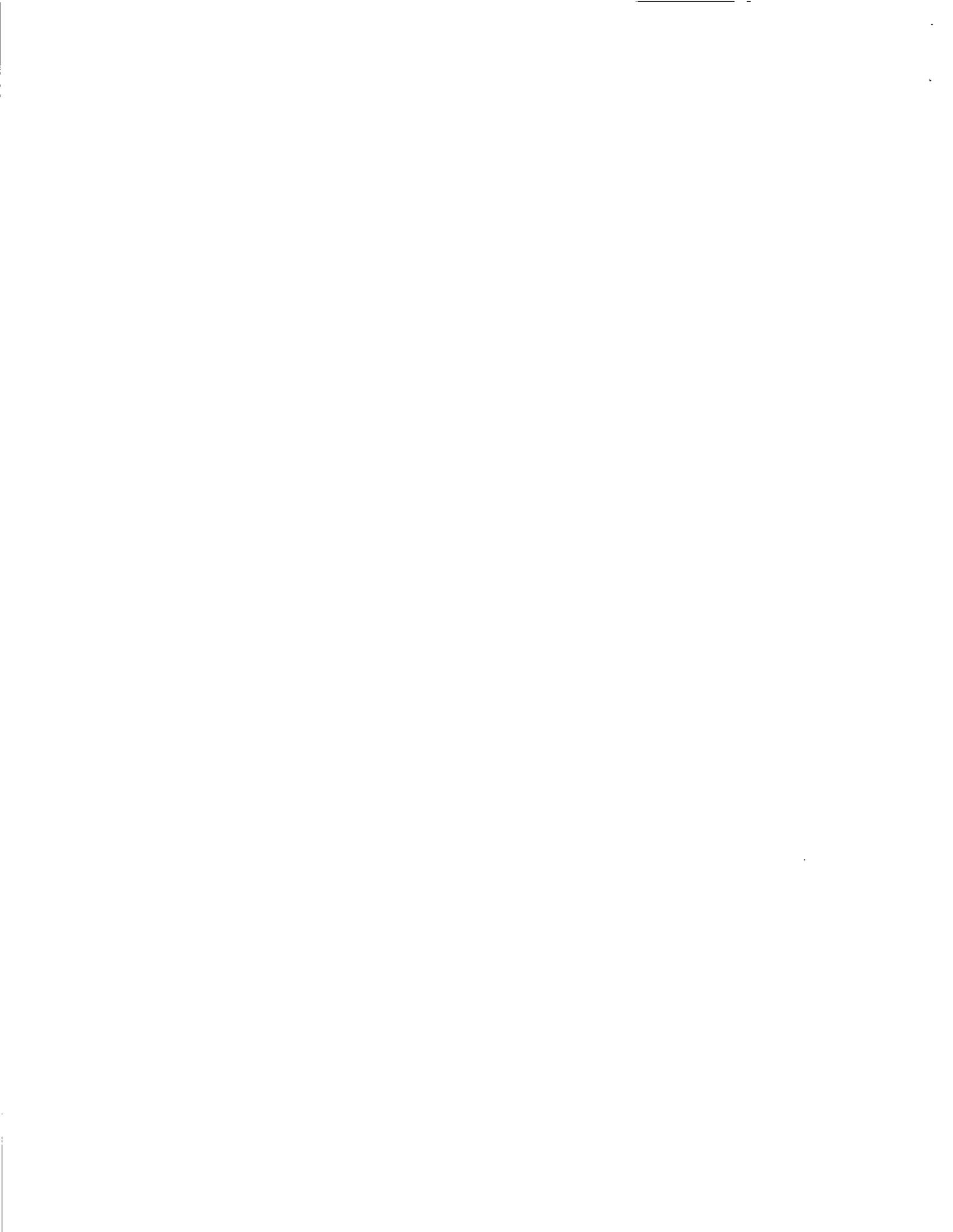
The Subcommittee is strongly supportive of the conversion process. The Subcommittee is of the opinion that the conversion of contractor personnel to full-time Federal employees can only improve the efficiency and effectiveness of the EPA research program. The Subcommittee urges the Agency to use a significant number of the conversion positions to hire new entry level Ph.D. personnel as one means of re-vitalizing the Agency's scientific staff.

6. The ORD budget justification and support information on its research programs provided to the Subcommittee initially was not adequate with regard to explaining the underlying rationale for new investments/disinvestments and reprogramming of the budget and the direction of its research program. In response to SAB requests, some additional information and analysis was provided at the review meeting, including step charts and long term trends. The Subcommittee was also provided a summary of the total Agency budget and a copy of the complete Agency budget submission to the Congress was provided after the April 8 meeting of the Subcommittee. Recommendations for information to support future SAB budget reviews are listed in Appendix B.

The inability of the Agency to provide the Subcommittee with the relevant information needed for evaluating the research and development budget and the rationale for changes probably relates to several factors: a) the lack of an integrated management system as noted in findings and recommendations #2 above; b) the difficulty of communicating research and development budget that is ultimately presented to the Congress in a cross-cutting format (i.e., by media - Air, Water, etc.); and c) a perception that some members of the Agency staff may not appreciate the value of the Science Advisory Board oversight review of the Agency's research and development budget.

The Subcommittee concerns in this area can be addressed if the Agency provides the Subcommittee a well-organized package of budget and related program information well in advance of its meeting in 1995 for review of the 1996 budget. Details as to the materials requested for an adequate review are listed in the appendix to this letter. If the Agency does not wish to comply with this request, then consideration should be given to discontinuing the SAB review of the ORD research program in the context of the President's Budget Request.

In summary, the Subcommittee is supportive of the Agency's 1995 research and development budget in the aggregate and in its major initiatives. However, the Subcommittee is concerned that the Agency does not have an integrated management system (for planning, budgeting, implementation, reporting, and oversight) which functions in an adequate manner to meet the Agency's legislated responsibilities. The Subcommittee is aware of current management initiatives such as the Administrator's strategic planning initiative, the laboratory organization study, and the on-going issues planning activity. And at the April 22nd Executive Committee meeting, we learned of yet another review related to risk issues. The Subcommittee is concerned that these activities, clearly well-intentioned, do not address a central need--an integrated system extending from the operational level in laboratories to the Office of the Administrator. If such a management system were in place, it would not only provide for more effective and efficient management of the research program, but it would inherently provide a structure that would permit ready examination of the research program as to its responsiveness to specific concerns such as environmental justice, pollution prevention, and risk assessment.

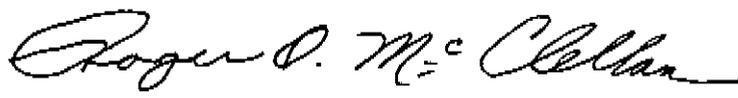


The Subcommittee would be pleased to expand on any of these findings and recommendations presented in this letter report, and we look forward to your response.

Sincerely,



Dr. Genevieve Matanoski, Chair  
Executive Committee  
Science Advisory Board



Dr. Roger O. McClellan, Chair  
Research Strategies Advisory  
Committee  
Science Advisory Board



Appendix A. Subcommittee Roster

Research Strategies Advisory Committee  
ORD Budget Subcommittee  
Roster

**CHAIR**

Dr. Roger O. McClellan, President, Chemical Industry Institute of Toxicology,  
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## Appendix B: Specific Findings and Recommendations

This appendix provides specific findings and recommendations to complement the letter report.

1. The Subcommittee noted that the budget is a snapshot of a part of the overall management process. The exercise of the budget focuses on classifying dollars and positions according to specific object codes, however, this is not particularly useful in managing the program. In order to evaluate the adequacy of the budget, it is essential to understand the overall management process being used to carry out research the Agency's research and development program. The Subcommittee believes that issue plans are an important part of the management process. The plans should clearly delineate the vision, mission (including EPA's role in the larger context of all research on the issue), objectives, and goals associated with an issue. The research issue plan provides the link to appropriately designated budget items. This information is essential for technical reviewers who want to understand the contribution of individual activities and funds to the overall objectives. As the Agency begins to apply the issue plans, they should serve as a guide for management and implementation of the research program.

2. Specific Committees of the SAB and the Research Strategies Advisory Committee will review specific research issue plans periodically, so there was no attempt to review these plans in detail here. However, the Subcommittee would like to offer a few comments:

a. The research issue plans should not be extremely detailed or prescriptive. They should emphasize vision and direction for the research. It is understood that the labs will develop detailed descriptions of specific tasks and subtasks.

b. The basic vision and structure of the research issue plans need only be updated annually, with the vision and the direction remaining more or less consistent from year to year and having a consistency with the overall vision and strategic plans of the Agency. They should also identify the responsibilities of other agencies as they interface with EPA's responsibilities.

c. Each research issue plan should contain a discussion of what the Agency is doing, what level of effort is actually needed to address the issue, and what is or can be done outside the Agency and within the Agency. For example it was disappointing that more coordination with DOE and DOD was not apparent with respect to Superfund research. It is important to explain the magnitude of the problem and an estimate of resources (dollars, people, and time).

d. Research issue plans should avoid being excessively detailed to reduce the administrative burden of preparing them. The plans would typically not detail activities of less than \$100K/year or 1 FTE. If this level of detail is needed, it can be handled at the laboratory level.

2. The ORD Budget Trends indicate that the relative proportion of ORD funding in the Agency's total budget, less construction grants, has declined from over 20% in 1980 to less than 7%



in 1995. The level of funding has remained nearly constant in 1987 dollars(\$460M in 1980 versus \$440M proposed for 1995) for ORD in spite of nearly two fold increase in the Agency's total budget, less construction grants.

a. Budgets may have actually declined further because, in the past, ORD received funds from program offices to conduct specific research programs. ORD was not able to supply any information on this source of funding during the review on the current level of funding from the program office.

b. The trends toward contractor support for the ORD laboratories has changed. In accord with previous recommendations from the Research Strategies Advisory Committee, this year the Agency will convert many positions currently filled by contractor personnel to positions filled by federal employees. The Subcommittee recommends that ORD use these positions wherever possible to hire entry level doctoral scientists to revitalize the scientific staff.

c. The trends in ORD's budget are disturbing given the desire of the past and current Administrators to achieve high stature of EPA as a science agency.

3. The Agency's mission appears to be increasing in breadth with every Congress. This mission must have a solid science base if it is to be achieved effectively and efficiently.. In the past, the SAB has recommended a series of steps that the Agency must undertake to assure that it attracts and retains high quality scientific staff and supports their work. (See for Example Reducing Risk (1990)). These recommendations need to be more fully implemented.

In addition, ORD needs to seek ways to expand its program of extramural funding for investigator initiated research conducted in Universities and other research institutions. The expertise of scientists external to the Agency can be better used than it has in the past to complement the in-house activities.

4. The Subcommittee was pleased to hear that ORD is making conscious efforts to improve its ecosystem science by consolidating its programs and increasing its use of partnerships. However, this consolidation appears to be a mere repackaging, without actual changes in program content and without a clear direction or vision. We recommend that ORD document this plan and take it to the Ecological Processes and Effects Committee for detailed review.

Also, the discussion of the Environmental Technology Initiative raises several questions which the Environmental Engineering Committee should address in a detailed review now being planned. For example, the ETI appears to overlook the role of pollution prevention in replacing or shaping environmental technologies, particularly for the small business industries in this country.

5. Currently, many Agency research and development scientists divide their time between carrying out research, consultation with program offices, and monitoring contractors research. The Subcommittee believes that in many cases, conducting laboratory research and contract monitoring are awkward responsibilities for a single scientist to perform. The contract management training and expertise and the mandatory documentation requires a specialist or at a minimum adequate specialist support. Therefore, we recommend that the Agency more clearly segregate these responsibilities among its research scientists and supporting staff. In addition, a critical review of the contracting process may help identify ways to streamline the process.



The Subcommittee is pleased by the lifting of the freeze on hiring non-supervisory positions above Grade 13. If this arbitrary "glass ceiling" were imposed, it would make it difficult for the Agency to recruit and retain skilled scientists.

6. The Subcommittee believes the Agency does not have a well-defined management approach for planning, budgeting, implementing, and reporting the research. The lack of a well-defined management approach, with clear objectives, long-term goals, and consistent measures of progress, means there is less than optimal communication with any of the clients of ORD. The following suggestions are offered:

a. As noted, the Subcommittee supports the research issue plan approach. However, there also needs to be an associated, integrated management information system that extends from the laboratory working level to the top level of the organization. EPA should commit to develop and use a system which can aggregate and display data by issue, media, or project. The issue planning process should be developed in a manner which is consistent and complementary to the current streamlining efforts. For example, responsibility and tracking of individual laboratory tasks should be delegated to specific laboratories and these tasks need to be clearly identified within the overall management system.

b. Issue planning needs the support of senior management in ORD and within the Agency's program offices. It represents a paradigm shift approach to strategic planning and implementation which will not be achieved without some difficulty. This issue planning approach has already demonstrated it can help the Agency to make significant changes in the direction of research. The Agency should make a long term commitment to implement this process.

7. The Subcommittee was concerned that the printed material and the presentations did not provide a clear sense of 5 to 10 year goals for any area of research. Although these goals are problematic in the political arena, they are needed to ensure that EPA has clear vision. As an example, funding the negotiated rule for regulation of disinfectants and disinfection by-products in drinking water was not apparent in the research and development budget, even though the Agency agreed to perform this important research in partnership with the water treatment industry.

8. The pending review of the EPA Laboratory Study is likely to add to the list of recommendations for research planning and coordination. Following that study, ORD should consider reorganization of its Headquarters structure and laboratory alignment to reflect the revised list of issue plans, the mission of ORD, and the Administrator's strategic vision for the Agency. The budget process is but one factor to consider in the organization of the laboratories. Ultimately, ORD should be concerned with how well the laboratories can perform their functions and support the mission of the Agency. The ORD labs must match people, facilities, and dollars with priority issues.

ORD and the program offices must also consider further changes in the structure of its headquarters staff and the mechanisms for streamlining consultations with program offices. Some individuals favor reducing ORD headquarters coordination activities, replacing them with more direct contact between scientists and those who use the science.

9. The "Multimedia" category appears to be a catchall; the more it becomes one, the less useful



it is as a category. It should be noted that almost any ecological or human health research has multimedia implications, but they should not be placed in that category. This large portion of the budget (\$272 million) may be very difficult to manage efficiently and identify its products, unless clear, well-defined implementation plans are developed. Instead, the Subcommittee recommends that the category Multimedia should only include research done specifically to understand multimedia phenomena or problems. Cross referencing between and among other programs which have possible multimedia attributes and with those strictly classified as "Multimedia would be useful.

10. The Subcommittee has determined that the background material sent to the it was not adequate communicating the ORD's research program. More thought on the Agency's part, working with the SAB's Designated Federal Official and the Subcommittee, would help in identifying useful background material. This would have allowed the Subcommittee time to consider ORD's own questions and concerns at the meeting. Several last minute supplements provided useful information, but they were not delivered early enough to be analyzed and discussed at the review. The following types of information, provided to the SAB four weeks in advance of the review meeting, would significantly improve the results of future budget reviews:

a. A concise summary of the ORD research program that relates the program objectives to the budget (including both FTEs and \$). This should be aggregated by both media and issues with some type of a cross walk.

b. Charts of the long term trends (15 years) in budgets (\$ and FTEs) for each media program and a comparison of the total ORD budget with total agency budget.

c. Step charts and narrative discussions of the changes between the proposed budget and the previous year budget. The narrative should include additions, deletions and areas of increase or decrease in funding.

d. A discussion of the overall planning, rationale for priorities, and the management process for developing and tracking the budget. This should include an example drawn from a high priority issue plan.

e. A copy of the materials provided to Congress and package of information released to the press and the public. This information should be provided as soon as it is available.

f. For comparisons, the total expenditures (with PRO identified by media and issue) assigned to specific tasks) should be delineated. The current reporting of PRO and R (research) and D (development) is very misleading when one tries to compare intramural allocations between programs.

12. Comments on specific programs in the Budget

a. Research on Criteria Air Pollutants-The Subcommittee supports the increases proposed for research on tropospheric ozone and PM 10 as they both represent major challenges for non-attainment of the ambient air quality standards.

b. Multimedia initiative-The Subcommittee supports the concept of a multimedia focus, however, it must be structured so that it meets the needs of its media-based clients, and also avoids serving as a "catchall" research issue plan.



c. Non-Point Source Pollution-This research has been consolidated into the Ecosystems Protection research issue plan. While this may be logical for research on some mechanisms and mitigation strategies, it is unclear where vital research on microbial sources contaminating drinking water supplies will be supported. The Subcommittee recommends that this research is more appropriately tied to human health research issues. The level of funding for non-point source research seems low considering the scope of the problem.

d. Socio-economic research-The SAB has advised the Agency several times (most recently EPA-SAB-RSAC-92-017) that socioeconomic research is needed to support development of risk reduction tools other than command and control, and that it must be integrated with other environmental research activities.

e. Toxic Substances-indoor air pollution involves a lot more than just asbestos. This program should be expanded and a more integrated program should be developed with clear vision and statements of objectives.

f. Superfund-Most of the increase is extramural (\$1.9M), but there is no explanation for the infrastructure increase (\$1.6 M) which is intended to support intramural activities.

g. Water Quality-The consolidation of many research activities into Ecosystems protection makes sense. It is not clear that the same amount of R and D monies were also transferred.

