



U.S. Environmental  
Protection Agency

Washington, D.C.  
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# Report of the Research And Development Budget Review Subcommittee

## Review of the Fiscal Year 1992 President's Budget for Research and Development





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

EPA-SAB-EC-91-005

OFFICE OF  
THE ADMINISTRATOR

March 8, 1991

Honorable James H. Scheuer  
Chairman  
Subcommittee on the Environment  
Committee on Science, Space, and  
Technology  
U.S. House of Representatives  
Washington, D.C. 20510

Dear Mr. Chairman:

The Science Advisory Board's (SAB) review of EPA's research and development budget began as a critique of the annual Office of Research and Development (ORD) Research Outlook. After performing this review for several years, the Board became frustrated that the elements of this document did not have priorities attached to them as is explicit when activities are associated with budgeted dollar amounts. Since the initiation of the annual review of the budget six years ago, the SAB has been able to examine not only the disciplinary areas addressed by ORD, but also the extent to which those areas are emphasized within the overall plan.

The annual budget review has been designed around the following charge:

- How does the proposal compare to the previous year in both absolute and constant dollars, and; how are resources distributed across the various media and disciplinary areas?
- What programmatic changes have been effected in the base program? Are new proposals relevant to Agency needs? Is there a critical funding mass for those initiatives and associated base efforts? Are infrastructure needs adequately addressed? Are the proposals consistent with the Core strategy and the Future Risk documents?

In order to obtain a detailed overview of the ORD program, the review focuses on: 1) areas of scientific uncertainty and 2) priorities assigned in pursuing both fundamental and applied research. The final, complementary factors taken into consideration are the staffing, equipment and facilities necessary to successfully undertake proposed research studies.

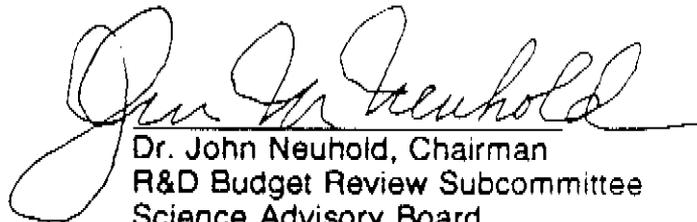
The Subcommittee uses materials that ORD's Research Committees have prepared for the budgeting process and also meets with the relevant ORD senior staff in an open interchange to gain further understanding of the proposals. Finally, the implications of the budget request are put into perspective by analyzing them with respect to previous reviews conducted by the board.

The Science Advisory Board applauds ORD's continuing efforts to implement certain recommendations in the "Future Risk" and "Reducing Risk" reports (SAB-EC-88-040 and SAB-EC-90-021). However, continuing budgetary disruptions consistently hinder its management's ability to stabilize its core program and expand high priority areas which are sorely underfunded. In light of these circumstances, the Board strongly recommends significant increases for ORD over the next 5 years. Several specific activities which should receive immediate attention include:

- inadequate base for replacement/upgrade of scientific equipment
- insufficient funding to cover salary and expense costs
- lack of training resources for scientific staff
- insufficient funding for competitive grants and centers

The following report contains the views and conclusions of the Budget Review Subcommittee of the SAB. However, due to the late release of the President's Budget and the need to provide review conclusions to the House Subcommittee on the Environment (Committee on Science, Space, and Technology) prior to their hearings, full Committee review was not possible. Consequently, the recommendations and conclusions herein are subject to some modification in the near future.

We are pleased to have had the opportunity to conduct this review and look forward to your response to the priority needs identified here and to your view of the prospects of improvements in the future.

  
Dr. John Neuhold, Chairman  
R&D Budget Review Subcommittee  
Science Advisory Board

## U.S. ENVIRONMENTAL PROTECTION AGENCY

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This report has been written as a part of the activities of the Science Advisory Board, a public advisory group providing extramural scientific information and advice to the Administrator and other officials of the Environmental Protection Agency. The Board is structured to provide balanced, expert assessment of scientific matters related to problems facing the Agency. This report has not been reviewed for approval by the Agency and, hence, its contents do not necessarily represent the views and policies of the Environmental Protection Agency, nor of other agencies within the Executive Branch of the Federal government, nor does mention of trade names or commercial products constitute a recommendation for use. This report has not been reviewed and approved by the full Board and therefore is subject to some revision.

## ABSTRACT

ORD has responded admirably to a myriad of environmental concerns facing our nation, and even the world. Still, it will continue to be incapable of providing an adequate response to environmental issues without a significant infusion of resources. Base programs (both core and non-core and including professional development) must be shored up to prevent further erosion of the in-house capabilities. Extramural resources (including those for competitive grants, centers, and professional fellowships) must be increased in order to foster innovative and timely research by other leading researchers in the environmental research fields. Finally, serious attention must be paid to the aging equipment and facilities (infrastructure) of the organization through increases each year which are earmarked for these areas.

Key words: core, extramural, infrastructure, budget, research

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## 1.0 EXECUTIVE SUMMARY

The Science Advisory Board (SAB) applauds The Office of Research and Development's (ORD's) continuing efforts to implement certain recommendations in the "Future Risk" and "Reducing Risk" reports (SAB-EC-88-040 and SAB-EC-90-021). However, continuing budgetary disruptions consistently hinder its management's ability to stabilize its core program and expand high priority areas which are sorely underfunded. Compounding these problems is an inadequate base for replacement/upgrade of scientific equipment, insufficient funding to cover salary and expense costs and lack of training resources for scientific staff. In light of these circumstances, the Board strongly recommends significant increases for ORD over the next 5 years. Specific findings and recommendations include:

1) The 1992 budget numbers are somewhat deceptive. Although the total request reflects an increase in nominal dollars, it provides considerably less buying power than was available in FY 1981. In addition, the R&D total is somewhat skewed by a shift of equipment dollars from the S&E appropriation from 1990 to 1991 (which was not fully funded in the final FY 1991 appropriation). Consequently, the ORD request does not reflect the full increases noted with respect to the 1990 program.

2) As mentioned earlier, ORD has responded admirably to certain recommendations in "Future Risk" and "Reducing Risk". However, several areas have been inadequately addressed. These issues include epidemiologic research, training for environmental scientists, research on valuing natural resources and economic analysis.

3) ORD is striving to improve its infrastructure by earmarking specific lump sums for capital equipment and operating expenses. However, the increases to the S&E and R&D appropriations fall very short of providing adequate funding for ORD laboratories to become state-of-the-art.

4) ORD should implement a professional development program for its scientists and funding should be provided to establish a fellowship program for training environmental scientists.

Specific recommendations for various media include the following:

- 1) The effects of chronic ozone exposure should receive higher priority (Air).
- 2) Exposure research should be more carefully planned and coordinated in order to maximize the use of resources and avoid overlap (Cross-cutting).
- 3) Research on exposure to and effects of radon and electromagnetic radiation should be expanded (Radiation).
- 4) Decreases in the wastewater treatment technology area should be restored (Water Quality).

- 5) Research efforts on disinfectant by-products should not be reduced (Drinking Water).
- 6) Efforts in ecological risk assessment and field validation in pesticides and toxics should be dramatically increased (Pesticides and Toxics).
- 7) Funding for academic research centers should be increased in order to provide funding for 9 centers as should funding for extramural grants (Multimedia).

## **2.0 INTRODUCTION**

### **2.1 Development of the SAB Budget Review**

Science Advisory Board (SAB) review of EPA's research and development budget began as a critique of the annual ORD Research Outlook. After performing this review for several years, the Board became frustrated that the elements of this document did not have priorities attached to them as is explicit when activities are associated with budgeted dollar amounts. Since the initiation of the annual ORD budget review, the SAB has been able to examine not only the disciplinary areas addressed by ORD, but also the extent to which those areas are emphasized.

In order to obtain a detailed overview of the ORD program, this review focuses on: 1) areas of scientific uncertainty and 2) priorities assigned in pursuing both fundamental and applied research. The final, complementary factors taken into consideration are the staffing, equipment and facilities necessary to successfully undertake proposed research studies.

The committee uses materials that ORD's research committees have prepared for the budgeting process and also meets with the relevant ORD senior staff in an open interchange to gain further understanding of the proposals. Finally, the implications of the budget request are put into perspective by analyzing them with respect to previous reviews conducted by the Board.

The following report contains the views and conclusions of the Budget Review Subcommittee of the SAB. However, due to the late release of the President's Budget and the need to provide review conclusions to the House Subcommittee on the Environment (Committee on Science, Space, and Technology) prior to its hearings, full SAB review was not possible. Consequently, the recommendations and conclusions herein are subject to some modification in the near future.

### **2.2 Basis for Review**

In the past four years, the SAB has produced two reports ["Future Risk: A Research Strategy for the 1990s" (SAB-EC-88-040, September 1988) and "Reducing Risk: Setting Priorities and Strategies for Environmental Protection" (SAB-EC-90-021, September 1990)] that highlighted perceptions of critical needs which must be

addressed in order to gain control over our environmental future. These reports have each provided ten recommendations used by the Budget Review Subcommittee as part of its interpretation of the proposed ORD budget. In this process, the Subcommittee compared the 1992 budget proposal to the 1991 operating year program in an effort to determine ORD's progress in implementing its overall research plan.

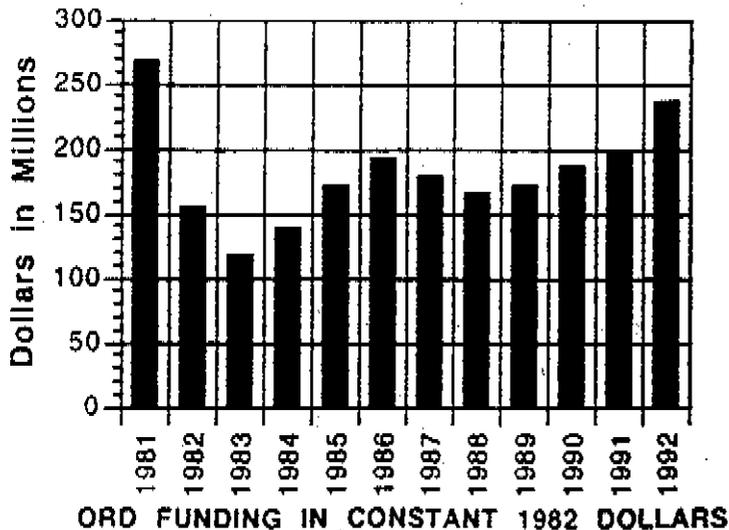
The recommendations in "Future Risk" and "Reducing Risk" address research needs in pollution prevention, long-term and exploratory efforts, risk reduction (for both humans and ecosystems), and technical training for environmental scientists. The Board feels that, given the emphasis afforded to these areas in both reports, the budget proposal should reflect strong support for each.

### 3.0 BUDGET OVERVIEW

#### 3.1 Funding

In "Future Risk," the SAB recommended that the research budget for 1988 be doubled to about \$700 million by 1993 (assuming no increase in the consumer price index). This translates into an average increase of \$70 million per year over a 5 year period to effectively address new tasks stemming from the increasing complexity of environmental issues. Since the release of the "Future Risk" report, ORD has fallen short of its goal. Although the current (1992) budget proposes an increase of \$57.8 million, its impact is somewhat deceiving. Due to mandatory reductions of \$24 million in the FY 1991 budget, an actual increase of \$34 million is requested after restoration of prior year cuts. Disregarding this budgetary anomaly, the Research and Development request reflects a 13% increase (from 254.9 million to 313 million); Salaries and Expenses increase from \$103 million to \$109 million (6%); Superfund declines from \$73.6 million to \$68.6 million (6.7%); and LUST remains static at \$0.8 million.

Figure 1



After accounting for restoration of 1991 reductions, the ORD budget request actually falls short of the 1981 level (using constant 1982 dollars - see Figure 1). At this rate, the goal of doubling ORD's buying power will be unachievable until well into the

21st century, if at all. With the mounting regional, national and global environmental

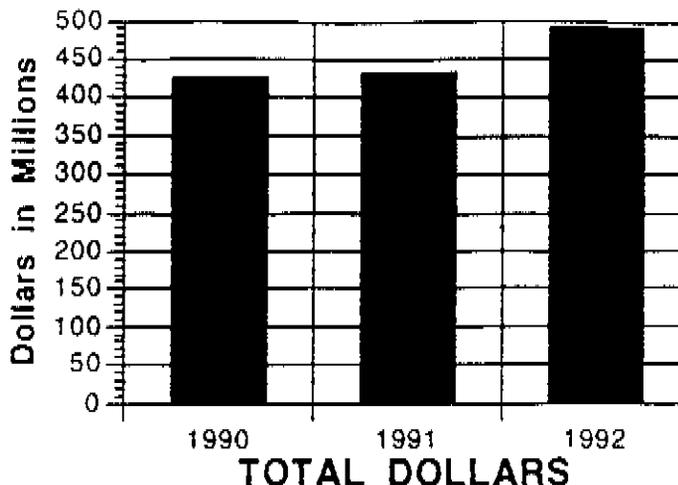
problems which are indicated as serious threats to human health, welfare and the

economy, EPA and the Congress would be ill-advised to allow such disparities to continue.

**3.2 Changes in Research Direction Figure 2**

The Subcommittee is pleased with the efforts ORD has made to implement certain recommendations in the "Future Risk" and "Reducing Risk" reports. ORD has, to varying extents, addressed the issues of pollution prevention, risk reduction, ecosystem effects, ecological monitoring and exposure. However, it has inadequately addressed the issues of epidemiologic research, training of

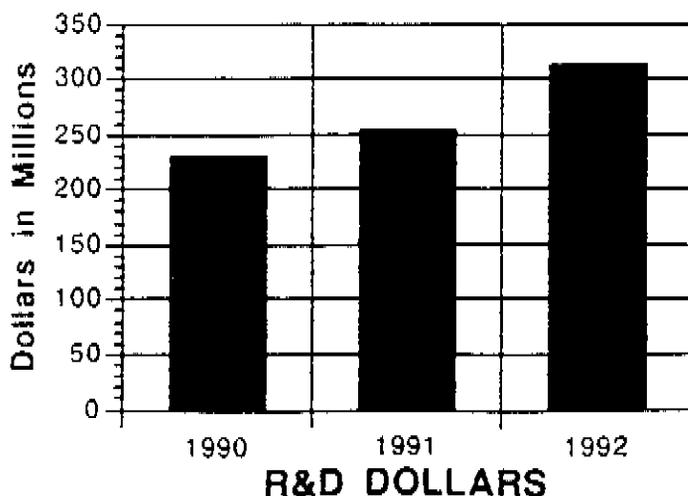
environmental scientists, research in valuing natural resources and economic analyses. Clearly, the ability to address all of these recommendations adequately is hampered by the availability of funds, even with the increases in the media programs mentioned below. (Figure 2).



**3.3 Infrastructure**

Though S&E funding increased by 6.6% (to total \$108.9 million), it was not adequate to cover capital personnel compensation and benefits for the additional FTEs requested. Congressional authorization to utilize R & D funds for equipment

Figure 3



allowed ORD to implement a scientific equipment modernization program (Figure 3) and the Subcommittee is pleased that its recommendations have contributed to this progress. Still, we feel concerned and disappointed at the rate of progress in this area and encourage additional funding.

The \$3.8 million increase requested for replacement of obsolete equipment raises total resources in this area from \$9.3

million to \$13.0 million. The schedule recommended by the Budget Review Subcommittee in the 1990-91 review was \$26 million per year over a five year period

assuming constant dollars. At this year's rate of expenditure (based on a 7 year turnover of equipment), the time necessary to achieve the goal of state-of-the-art equipment readiness would be tripled to approximately 15 years (assuming no change in the Consumer Price Index).

### 3.4 Staffing

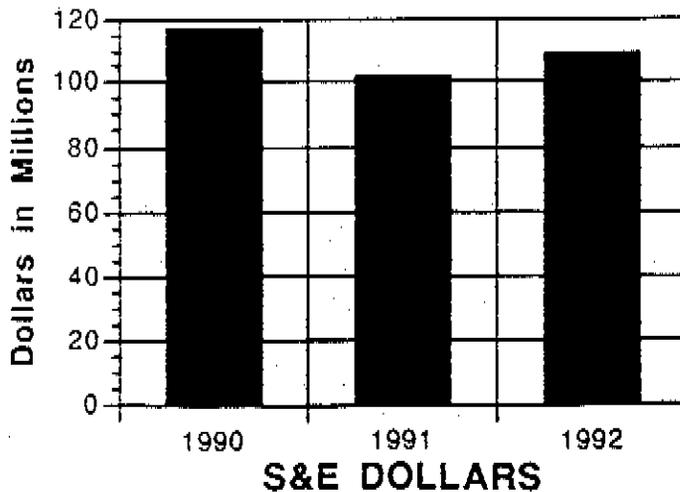
The Office of Research and Development continues its parallel advancement system for its scientists and administrators. Vacant Senior Executive Service (SES) positions and Senior Scientist positions continue to be filled, undoubtedly increasing ORD's scientific productivity. The Science Advisory Board encourages the Office of Research and Development to continue its progress in these efforts.

Figure 4



An increase of 43 full time equivalents (FTEs) from 1891.1 to 1934.1 (Figure 4) is requested in the 1992 ORD budget. This continues a slow upward trend which started in 1984. Unfortunately, the S & E budget falls \$5.2 million short in funding this increase. The Board is extremely concerned that this is becoming a trend which could force the Agency to lapse vitally needed FTEs due to insufficient S&E coverage (Figure 5).

Figure 5



As indicated in our review of the 1991 budget request, the workforce study conducted by ORD cited an ageing work force, the result of previous hiring freezes and reductions in force during the period 1980 to 1984 as contributing to difficulties in maintaining in-house capabilities. Unfortunately, there is little evidence that much has changed during the past year. The critical need to fill positions with young, dynamic scientists is exacerbated by an inadequate

source of graduating environmental scientists and engineers.

In 1992, ORD has budgeted \$1 million for the support of minority fellows as well as \$0.4 million for training in math and sciences. While this addresses the problem with minorities, it falls far short of training environmental scientists at institutions with strong environmental research programs. As last year, we strongly urge EPA and Congress to develop a program of support which will encourage students to enter graduate environmental science and engineering programs.

With regard to the existing workforce, we note once again with concern that EPA spends only \$240 per year per scientist for professional development. This remains far short of the \$1000 to \$2000 that private industry spends to maintain their workforces' scientific excellence. Since scientists must meet with their peers (in workshops or formal classroom sessions) to remain at the cutting edge of their science, we once again recommend that EPA implement a professional development program.

### 3.5 Research Planning

The Office of Research and Development has evolved a viable research planning system based on media-based research committees. Each committee, consisting of representatives from ORD and the relevant program offices within EPA, has the responsibility for recognizing the scientific questions involved with the variety of environmental issues facing the Agency and placing those questions in some order of priority contingent upon the funds available. Priorities among the research committees are, presumably, set by the Research Strategies Committee which includes the Deputy Assistant Administrators for all the program offices within the Agency. Final decisions on priority are made by the Assistant Administrator for R & D.

When cuts are mandated from either the Congress or the Executive Branch, the same Committees responsible for program planning are employed to distribute the cuts in such a way that minimizes program impairment in the judgement of those distributing the cuts. For example, the 1991 Appropriation subjected ORD to a mandated cut of some \$24 million which was distributed over some 38 funded programs. In implementing this cut, only one small \$300 thousand program was totally eliminated. However, with the deficit growing and other cuts to the annual appropriations likely, research planning becomes more and more difficult.

The Board understands the unique position held by legislators. All representatives have responsibilities to their constituents and often those constituencies' regional needs prompt the ear-marking of funds for special projects which might be vital to particular areas. However, in 1991, an \$18 million block of funds was diverted to tightly pinpointed studies with only \$5.8 million additional funding. Given the severe consequences of such actions, we strongly recommend that when funds are earmarked for special programs that additional monies be appropriated to accommodate them.

## 4.0 MEDIA PROGRAMS

We are generally pleased with the approach ORD has taken in supporting projects in the various program areas, and the recommendations of the of the Science

Advisory Board. Emphases have been rationally placed and disinvestments and reallocations have been appropriately applied. However, as with any complex program with limited funding, we have identified some areas in which the resource dispositions can and should be challenged. Each medium is addressed below.

#### 4.1 Air

The Air program receives a 39% increase in the proposed budget for a total of \$112.4 million.(Figure 6). The monies are primarily distributed to meet the requirements of the Clean Air Act, global climate change, indoor air, electromagnetic radiation and air health. With respect to specific pollutants, the Subcommittee agrees that ozone effects research is a high priority. However, ORD needs to reorient its efforts to

stress the effects of chronic exposure to a greater extent (this recommendation has been made in the "Reducing Risk" report and is reiterated here). It is also agreed that air toxics work is an important research area, but of the 189 air toxics mandated in the CAA, only a relatively small number have sufficient information with which to establish criteria documents. A relatively large number of those toxics pose a relatively small risk compared to pollutants such as ozone.. Consequently, ORD should reexamine the priorities for funding within the air program.

Figure 6

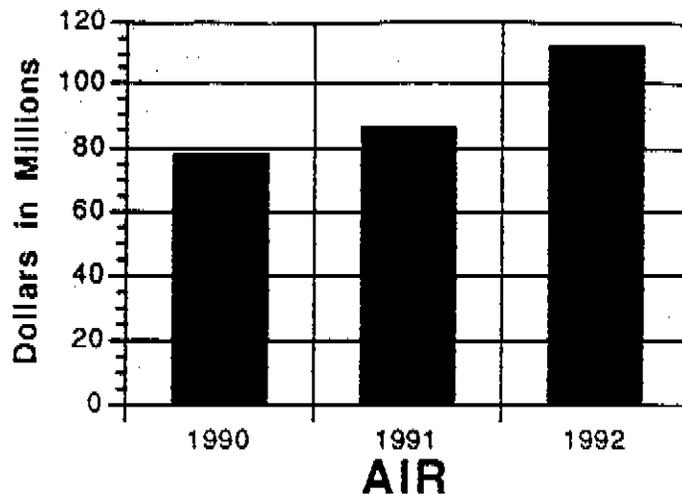
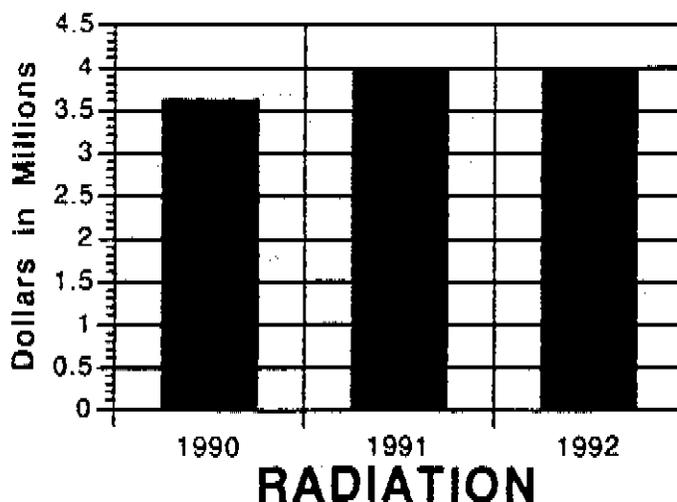


Figure 7



Exposure research is a cross-cutting issue which is relevant not only to the air program and humans but to all other media and ecosystems. Cross-cutting efforts such as these should be carefully planned and coordinated to preclude overlap and maximize the utility of resources.

#### 4.2 Radiation

The radiation program request totals \$4 million, (Figure 7) reflecting level funding with the 1991 budget.

The research component focuses on determining exposure to and effects of radon and electromagnetic radiation (EMR). EMR exposure is widely occurring in the U.S.

and could, potentially, put our population at risk. Consequently, the SAB's Radiation Advisory Committee (RAC) recommends increased funding for this and radon research.

### 4.3 Energy

Energy research funding remains static for 1992 (Figure 8) at a level of \$13.7 million. It addresses two major areas of research: acid precipitation [which is coordinated through an interagency task force of the National Acid Precipitation Assessment Program (NAPAP)] and the development and testing of the limestone injection multistage burner (LIMB) in cooperation with the Department of Energy.

Figure 8

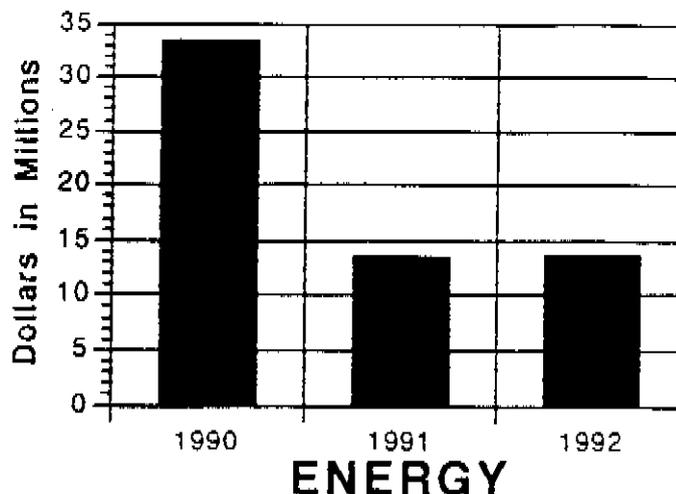
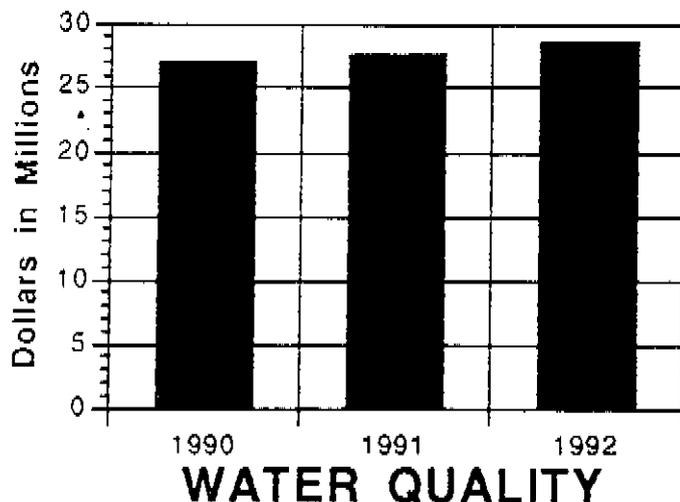


Figure 9



### 4.4 Water Quality

Water quality research support increases from \$27.7 to \$28.6 million (4%) in FY 1992 (Figure 9) with the funds going primarily to Great Lakes research, wetlands, wellhead protection and Midwest Agriculture Subsurface Transport Research (MASTER). The Great Lakes research is of long-standing national and international importance. This program is an excellent example of cooperation among EPA program offices, regions,

the states and foreign governments. It is an important component of the Environmental Monitoring Analysis Program (EMAP) and as such provides a strong retrospective data set upon which monitoring protocols can be developed. The lakes also provide an excellent outdoor laboratory for sediment toxicity work. The zebra mussel work conducted in this program is a congressional add-on that has become a high priority issue for the Great Lakes. As mentioned earlier, this program also contains an increase for MASTER, a program in which EPA cooperates closely with USDA and the USGS in researching the fate of agricultural chemicals in ground water as well as methods for their control and prevention.

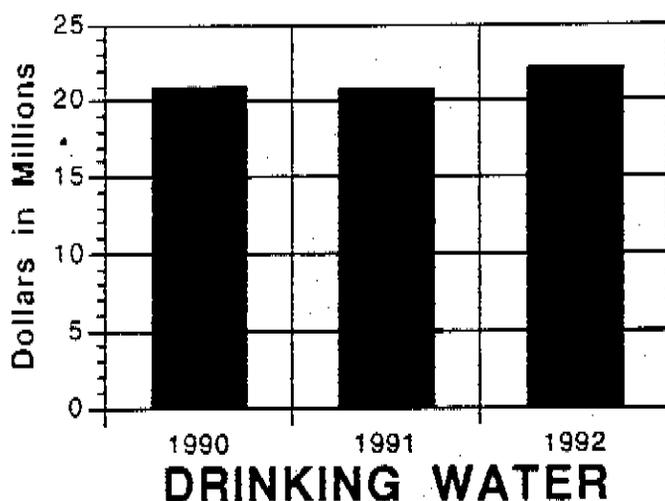
While the new activities are viewed favorably by the SAB, the concurrent

decrease in the waste water treatment technology area is of great concern. The waste water treatment technology research program was cut by nearly one half in 1991 due to the reductions in the 1991 appropriation. This \$2 million was not been restored in 1992, resulting in the loss of critical research on toxics treatability. The pollution prevention strategy, strongly endorsed by the administrator, is targeting selected toxicants that industry must remove by 50% within a specified time frame. Many of these toxicants find their way into waste water streams. Unlike conventional pollutants, the full impact of these toxic materials can only be determined by sophisticated bioassay procedures. Also, unlike the conventional pollutants which have been studied for some time, little is yet known about the effectiveness of common waste treatment processes in removing these toxicants. Without such work, the overall pollution prevention strategy will be weakened. And, although industry will seek to prevent the discharge of such toxicants, funds must be made available to ensure their identification.

#### 4.5 Drinking Water

The drinking water program receives a 7% increase (for a total of \$22.2 million) in the proposed budget (Figure 10), primarily for gathering health assessment information, evaluating analytical procedures to monitor drinking water and performing research on the protection of underground drinking water. Conversely, the SAB

Figure 10



Drinking Water Committee has expressed concerns about continuing reductions in research on disinfectant by-products at a time when water treatment facilities are laboring with mitigation problems concerning disinfection by-products and selection of alternative disinfectants to reduce undesirable by-products. The impending promulgation of the disinfectant by products rule will, thus, be weakened by lack of information regarding these by-products. The SAB strongly

recommends that this effort be supported at increased levels.

#### 4.6 Hazardous Waste and LUST

Hazardous waste is increased from \$39.2 million to \$43.4 million for an increase of 10% (See Figure 11). Research is directed toward bioremediation as a tool for hazardous waste disposal, health effects of incineration and municipal solid waste, oil spill cleanup (transferred from Superfund), and aquifer restoration (with emphasis on the effectiveness of chemical and biological processes for cleaning up beaches and shorelines). Considerable effort will also be expended on technology

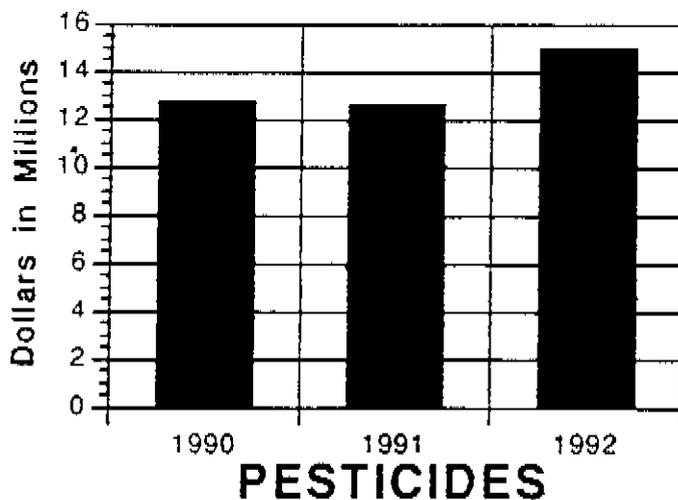
transfer activities. Pollution prevention activity is also receiving considerable attention as is risk assessment in both human and ecosystem health areas. The program is generally well-balanced and the Subcommittee supports the directions which it is taking.

The total for the LUST program remains constant from 1991 to 1992 at \$0.8 million.

#### 4.7 Pesticides

The Pesticides program request reflects an increase of \$2.3 million to \$14.9 million (an increase of 18%) in its budget (Figure 12). New emphases include research on neurotoxicology, reproductive toxicology, and exposure assessment.

Figure 12



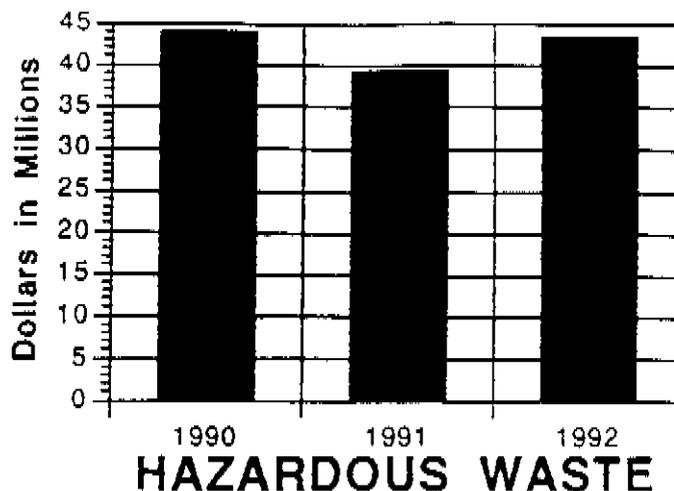
The Pesticides program and the Toxic Substances program are closely related in that much of the research conducted is similar (in fact, often conducted by the same scientists). The Subcommittee is disappointed to note that these two programs suffered a \$3.9 million cut in the 1991 budget with \$1.6 million reduction in the biotechnology area. The 1992 budget provides for an increase of only \$2.9 million for the two programs, which results in an overall reduction in support.

For example, ecological risk assessment in both programs is identified as an area slated for increase. However, both programs were subjected to reductions in the 1991 Appropriation by an equal amount. Consequently, the Subcommittee strongly recommends additional funding for these activities.

#### 4.8 Toxic Substances

The Toxic Substances program is increased 5% from \$25.5 million to \$26.3 million (See Figure 13). The increase is applied to initiating programs in neurotoxicology and exposure assessment. The work in this program is closely allied to that in Pesticides, and the Subcommittee again notes that the increases requested in both the pesticides and toxic substances programs do not restore the 1991 reductions. Thus, the net

Figure 11



effect in this program is an overall reduction, which would result in base program redirections to fund new starts.

#### 4.9 Multimedia

Multimedia research increases by \$27.9 million (23%) to \$151.1 million (Figure 14), with the increases going to a variety of activities including academic research centers, fellowships and traineeships, EMAP, scientific instrumentation, risk reduction, scientific outreach, arctic research and the extramural grants program.

Traineeship and fellowship programs are discussed in the overview section. The Subcommittee reiterates its support for the minority fellowship and the math and science education programs and again recommends that the Congress and EPA make an effort to initiate a graduate level environmental sciences and engineering traineeship/fellowship program patterned after the now defunct National Defense Education Act (NDEA) fellowship program.

Figure 13

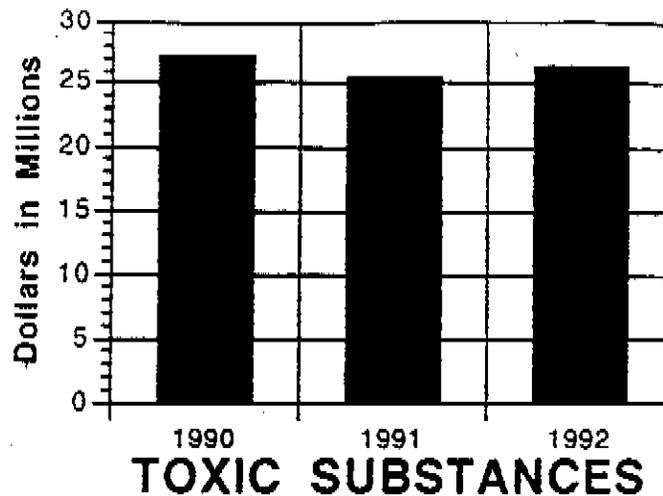
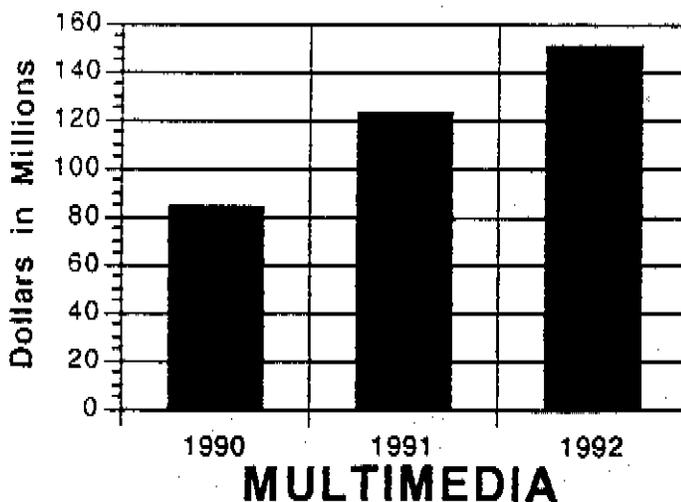


Figure 14



The Academic Research Centers program was initiated 8 years ago with 8 centers in scientific areas in which the Agency lacked sufficient expertise to conduct its own research. These centers were very successful and productive and provided considerable guidance which was relevant to the Agency's needs. However, over the years, funding for the centers was not increased to keep pace with rising costs, but actually diminished in the face of considerable cost of living increases. Previously, the SAB

had recommended that funding for each of the centers be increased from approximately \$400 K to \$2 million each so that they might operate more effectively. This year the centers program will terminate the support of the 8 existing centers, and will select 4 centers to be funded at about \$1 million each. The Subcommittee urges that centers be funded at this level and that this program suffer

no further cuts. We also urge the expansion of the Centers program to allow funding of 9 Centers at a minimum of \$2 million each.

The Subcommittee was pleased with the new flexibility of utilizing R&D funds for equipment shortages and modernization as well as for laboratory operating expenses. This spending authority can do much to make ORD laboratories premier facilities as well as foster better extramural programs.

Participation in the federal high performance computing program (HPC) is also commended. With the geographic information systems aspect of EMAP, Great Lakes and Arctic programs, as well as global climate change research, we can expect a great demand for the computing capabilities available with HPC. The Subcommittee urges the Congress to strongly support this activity.

The multimedia program is the focal point for the core research program in ORD. It serves to coordinate risk assessment, reduction and uncertainty work. An increase is requested in FY 1992 for core research in the exposure area. With proper coordination, this entity could serve as a useful research management device for exposure research throughout the Agency. Finally, the EMAP program is in the process of implementation and is proposed for a \$6.9 million increase.

The Subcommittee is distressed that the prior commitment to increase the extramural grants program by \$10 million dollars per year until it reached a level of \$50 million is not being implemented. This program has generated a high output of top quality research in areas vital to EPA, and provides a means of attracting highly skilled researchers to the environmental science and engineering area as well as creating research training opportunities for a new generation of scientists and engineers. Consequently, the Subcommittee strongly urges additional funding for the grants program in FY 1992 and beyond.

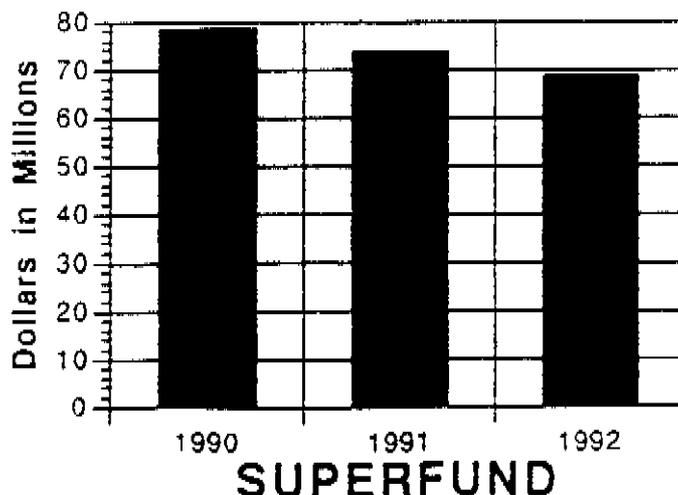
With the above exceptions, the committee is pleased with the directions and progress in the multimedia program. Its well designed components are important to the continued vitality of EPA's overall R&D efforts, and are strongly supported by the Board.

#### 4.10 Superfund

The Superfund research program request (\$68.6 million) reflects decreases of \$5.0 million in FY 1992. The

reduction (Figure 15) reflects 3 project terminations which were deemed appropriate

Figure 15



for funding from other sources. The decrease also reflects a minor one-time reduction to the engineering site/situation assessment area, which will be of minimal impact.

## **5.0 CONCLUSIONS AND RECOMMENDATIONS**

EPA's Research and Development program houses formidable scientific capabilities — many of which are unparalleled elsewhere. However, given the growing complexity of environmental concerns, the rate of inflation, and the nonexistence of adequate pools of scientific talent, the future of the program is uncertain. Our citizens are extremely concerned about the quality of the environment and demand a strong response to preserve its health. However, without an adequate knowledge base upon which to act, the Agency will be unable to respond.

To a great extent, ORD has responded admirably to a myriad of environmental concerns facing our nation, and even the world. Still, it will continue to be incapable of providing an adequate response to environmental issues without a significant infusion of resources. Base programs (both core and non-core) must be shored up to prevent further erosion of the in-house capabilities. Extramural resources (including those for competitive grants and centers) must be increased in order to foster innovative and timely research by other leading researchers in the environmental research fields. Finally, serious attention must be paid to the aging equipment and facilities of the organization through increases each year which are earmarked for these areas.

The concerns cited above provide a broad summary of our concerns about the R&D program. In addition to the essential support necessary in these general categories, we also wish to reiterate several recommendations mentioned earlier concerning specific items in the 1992 request:

- 1) Studies which stress the effects of chronic exposures to ozone should receive higher priority.
- 2) Exposure research should be more carefully planned and coordinated in order to maximize the use of resources and avoid overlap.
- 3) Research on exposure to and effects of radon and electromagnetic radiation should be expanded.
- 4) Decreases in the wastewater treatment technology area should be restored.
- 5) Research efforts on disinfectant by-products should not be reduced.
- 6) Efforts in ecological risk assessment and field validation in pesticides and toxics should be dramatically increased.
- 7) Funding for academic research centers should be increased to provide funding for 9 centers at \$2.0 million each.

