Other Federal Programs 6

Several other federal agencies and departments conduct or support R&D pertinent to environmental technology. Some of the more significant programs are briefly highlighted below.

DEPARTMENT OF COMMERCE

Two Department of Commerce (DOC) agencies conduct and support R&D pertinent to environmental technology: the National Oceanic and Atmospheric Administration (NOAA) and the National Institute of Standards and Technology (NIST). In addition, DOC is involved in several interagency activities related to environmental technologies. It plays a major role in promoting environmental technology exports under the Environmental Technologies Exports Strategic Framework[1], an interagency document developed by the Department of Commerce, the Department of Energy (DOE), and Environmental Protection Agency (EPA). The export strategy calls for streamlining U.S. environmental technologies export promotion efforts, and improving export financing mechanisms. The Office of Environmental Technology Exports has been set up in the DOC's International Trade Administration.

DOC's role in the Rapid Commercialization Initiative is discussed in chapter 2. In addition, Department of Commerce officials chair or play prominent roles in the two NSTC Committees with environmental technology responsibilities, the Committee

[1] Department of Commerce, *Environmental Technologies Exports: Strategic Framework for U.S. Leadership* (Washington, DC: Interagency Environmental Technologies Export Working Group, November 1993).

on Environment and Natural Resources (CENR) and the Committee on Civilian Industrial Technologies. The activities of these civilian committees are also discussed in chapter 1.

As this report went to press, Congress was still considering FY 1996 appropriations for DOC. The House Committee on Appropriations had just reported a measure, H.R. 2076, proposing significant reductions in the department's FY 1996 funding compared to FY 1995. The bill would reduce funding for many, but not all, of DOC's science and technology activities, including some related to environmental technology.

DOC Sustainable Development Policy

DOC released a draft policy document, entitled *To Ensure the Nation's Future,*[2] for public comment in December 1994. The document discusses current actions and future opportunities for DOC to contribute to environmentally sustainable development, such as:

- creating opportunities and incentives for businesses, communities and individuals to prosper economically through environmentally sound growth;
- improving environmental monitoring, prediction, and assessment;
- encouraging the development and diffusion of eco-efficient technologies;
- building partnerships between business, government, and communities.

DOC also proposed to promote environmentally sound growth in key industrial and commercial sectors by focusing programs and coordinating policies related to: 1) environmental technologies, 2) marine fisheries management, 3) coastal zone management, and 4) ecotourism.

The policy emphasizes laboratory-based support for the development and testing of environmental technologies. It also seeks to support enabling technologies and industry R&D and diffusion through the Advanced Technology Program (ATP), the Manufacturing Extension Partnership (MEP), the National Information Infrastructure Program, various NOAA programs, and cooperative research and development (CRADAs) with industry. DOC would also seek to support commercialization of what it calls "eco-efficient technologies" by reducing regulatory barriers; developing science-, incentive-, and performance-based regulatory standards; and testing, evaluation, and certification.

The National Oceanic and Atmospheric Administration

NOAA's mission includes environmental components such as promoting global environmental stewardship in order to conserve and wisely manage the Nation's marine and coastal resources, and describing, monitoring, and predicting changes in the Earth's environment in order to ensure and enhance sustainable economic opportunities.

Estimates of NOAA's environmental technology RD&D expenditures vary. According to estimates provided by NOAA to the interagency Committee on Environment and Natural Resources (CENR), NOAA spent a total of about $34 million in FY 1994, and about $35 million in FY 1995 on focused environmental technology R&D, demonstrations, and commercialization. The lion's share was for R&D. The CENR data also identifies sizable NOAA expenditures for R&D in which environmental technology was a contributing objective. Because pro rating was not done, those numbers are not included here.

NOAA both develops and uses environmental monitoring technology. Its central weather forecasting function relies on both space based and in situ measurements of atmospheric water content, soil moisture, winds, clouds and precipitation. NOAA's weather forecasting research has grown in scope to include technologies to measure, model, and assess changes in the global environment. NOAA is working toward a goal of establishing

[2] Department of Commerce, *To Ensure the Nation's Future: Sustainable Development and the U.S. Department of Commerce,* A Draft Policy for Public Comment, Washington, DC, undated.

environmental observation, assessment, and prediction networks worldwide. This could require significant R&D investment and commercializing new environmental sensors to assess environmental conditions.

NOAA supports R&D on monitoring and remediation technologies to address marine and coastal area environmental degradation, reflecting its coastal zone management and fisheries habitat missions. It also supports fisheries research and management to develop technologies to reduce environmental degradation, such as fishing gear that is less harmful to the physical environment and that reduces wasteful bycatch and harm to protected species such as dolphins and various turtles.

NOAA classifies some R&D activities related to marine biotechnology as support for crosscutting initiatives on environmental technology. The R&D supports, among other things, development of molecular technologies for using marine organisms in applications such as aquaculture and bioremediation. About $14 million is expected to be spent on this and similar R&D in FY 1995.

National Institute of Standards and Technology

NIST missions include fundamental research and national standards measurement. In 1988, Congress explicitly authorized NIST to aid industry in "developing technology to improve product quality; to modernize manufacturing processes; to ensure product reliability; and to facilitate rapid commercialization of products based on new scientific discoveries."

NIST programs contribute to the development and application of technology, measurements, and standards across broad areas. Under NIST's environmental initiative, several R&D areas are targeted, including waste assessment and avoidance, advanced measurement and characterizing technologies for atmospheric pollutants and nonionizing radiation, and development of technologies needed for hazardous and radiation contaminated wastes.[3]

NIST estimates that its environmental technology R&D amounted to $ 8.5 million in focused activities in FY 1994, and may amount to $ 15.5 million in FY 1995. Additional amounts were also spent on R&D for which environmental technology was a contributing factor.

NIST Laboratories: NIST has eight laboratories with broad capabilities in the following areas:

- chemical science and technology,
- physics,
- electronics and electrical engineering,
- materials science and engineering,
- manufacturing engineering,
- computer systems,
- computers and applied mathematics, and
- building and fire research.

Most of the laboratories conduct R&D pertinent to environmental technologies. For example, the Chemical Science and Technology Laboratory has programs pertinent to pollution prevention and waste reduction technologies: chemical reactor engineering, separations using membranes, destruction of organic compounds in fluidized-bed reactors, and reactions in supercritical fluids. NIST's work is often supported in part by other federal agencies or industry. For example, in FY 1992, these projects were funded through a $315,000 appropriation to NIST and $170,000 in support from other federal agencies, mostly from the Air Force and the Department of Energy.

NIST's Green Buildings Program includes laboratory research, demonstrations, and funding for development of concepts and prototypes by industry. Improving energy efficiency is an important objective.

The NIST laboratories also have evaluated data and provided technology, measurement methods, sensors, and Standard Reference Materials (SRMs) used for industrial process design and

[3] For discussion of NIST activities, see National Institute of Science and Technology, "Environmental Technology at NIST," mimeo, April 1995.

control, waste minimization and processing, and environmental monitoring.

NIST has developed over 100 SRMs (which help assure accuracy of measuring systems and equipment) that are certified for concentrations of environmental contaminants. Laboratories use the SRMs in calibrating instruments to monitor atmospheric pollutants, gas mixtures, soils, and rainwater.

Advanced Technology Program: Begun in 1990, ATP provides R&D grants on a cost-shared basis with U.S. firms on high-risk, precommercial, generic technologies with commercial potential. Small, medium, and large companies, and joint ventures led by two or more companies, can compete for direct funding. Universities, federal laboratories, and nonprofit institutions often participate as subcontractors or members of joint ventures (although nonprofit institutions may administer joint ventures). ATP's mission—support for civilian technologies deemed to be in the nation's competitive interest—has become the subject of considerable controversy in Congress among those who think the federal government should not fund commercially oriented R&D.

ATP conducts both general and focused R&D competitions. Some of the awards in the general competition support research that could have energy efficiency or environmental benefits. For example, one grant recipient seeks to explore several options for improving the properties of biodegradable plastics while maintaining their biodegradability. Another recipient seeks to develop a biocatalytic process to remove sulfur from crude oil at an early stage—an approach that might reduce industry costs for environmental compliance.

Two focused competitions now under consideration also could have significant environmental implications: one is for vapor compression refrigeration technology; the other is for catalysis and biocatalysis technologies.

Manufacturing Extension Partnership: Although not a R&D program, MEP is working to foster a network of locally based organizations that help small manufacturing firms upgrade equipment, improve processes, and strengthen their business performance. These organizations, either Manufacturing Technology Centers (MTCs) or smaller Manufacturing Extension Centers (MECs), are nonprofit organizations. Most of the centers include environmentally conscious manufacturing as a component of their services. One center, the Pollution Prevention Center in Santa Monica, California, is particularly focused on this area.

NIST and EPA are jointly funding a MEP environmental partnership, announced in January 1995, to support development of methods to integrate environmental services with other MEP services as well as pilot centers focusing on specific industry sectors. Some MEP centers are funded by NIST. Other MEP centers are funded through the Department of Defense's Technology Reinvestment Project.

H.R. 2076, as reported by the House Committee on Appropriations in the 104th Congress, proposes a significant reduction in NIST's science and technology activities compared with FY 1995. Most of the reductions would occur in the ATP program and MEP. A slight reduction compared with FY 1995 is proposed for NIST's "core program" laboratories.

DEPARTMENT OF AGRICULTURE (USDA)[4]

USDA reports environmental technology RD&D budgets of $237 million for FY 1993 and nearly $250 million for 1994.[5] (See table 6-1). This esti

[4] A discussion of agroenvironmental R&D can be found in U.S. Congress, Office of Technology Assessment, *Agriculture, Trade, and Environment: Achieving Complementary Policies*, OTA-ENV-617 (Washington, DC: U.S. Government Printing Office, May 1995). For an in-depth examination of new agricultural technologies, including environmental aspects, see U.S. Congress, Office of Technology Assessment, *A New Technological Era for American Agriculture*, OTA-F-474 (Washington, DC: U.S. Government Printing Office, August 1992).

[5] U.S. Department of Agriculture, unpublished data, June 26, 1995.

TABLE 6-1: Estimated USDA Support for Environmental Technology RD&D ($ millions)

Category	FY 1993	FY 1994	FY 1995
Pollution avoidance	66.8	69.5	73.4
Pollution control	29,1	30.4	30.8
Monitoring and assessment	43.4	46.8	48.5
Remediation and restoration	89.0	93.0	91.9
Scaleup and commercialization (all categories)	8.4	8.7	11.0
Total	**236.7**	**246.4**	**255.6**

SOURCE: U.S. Department of Agriculture, unpublished data, June 26, 1995.

mate seems large relative to USDA's total R&D budgets of about $1.5 billion and when compared to another USDA estimate that 11.8 percent ($351 million) of *total federal and state* agricultural research expenditures of $2.97 billion was dedicated to environment and natural resources in 1993.[6] This latter estimate includes basic scientific as well as technological research. Furthermore, natural resources R&D is not necessarily aimed at improving environmental performance. However, it is possible that some environmentally favorable technological R&D might have been categorized under other headings such as crops, animals, forestry, and resources and technology.

Despite categorization of R&D as pollution avoidance, control, monitoring and assessment, or remediation and restoration. it is unclear what portion of the $250 million USDA reports as environmental technology R&D is tightly linked to technologies to prevent, control. and repair environmental damage. It may be that technologies and methods for studying water. soil. range, and forest resources that indirectly contribute to prevention, control, and remediation technologies are also included. Also complicating attempts to identify environmental technology R&D per se is the fact that a number of technologies for increasing animal and plant productivity may have environmentally favorable attributes (e.g., pest resistant plants require less pesticide application).

The Agricultural Research Service (ARS); Cooperative State Research, Education, and Extension Service (CSREES); and U.S. Forest Service (USFS) are the major supporters of environmental technology R&D within the department. (See Table 6-2). ARS and CSREES support RD&D pertinent to environmental problems associated with pest control, fertilizers, soil erosion and sediments, water and energy use, and animal and food processing wastes. Examples of relevant technologies include pest resistant vari-

TABLE 6-2: Estimated USDA Support for Environmental Technology RD&D by Agency[a] ($ millions)

Agency	FY 1993	FY 1994
Agricultural Research Service	109.0	113.7
Cooperative State Research Service[b]	49.1	55.4
Forest Service	68.4	69.0
Economic Research Service	1.4	1.4
Soil Conservation Service[c]	1.5	1.5
Alternative Agricultural Research and Commercialization Center[d]	**7.3**	**7.4**
Total	**236.7**	**248.8**

[a] Includes support for commercialization and scaleup activities
[b] Now part of the Cooperate State Research, Education, and Extension Service
[c] Now part of the Natural Resources Conservation Service
[d] Now part of the Rural Business and Cooperative Development Service

SOURCE: U.S. Department of Agriculture, unpublished table, June 26, 1995

[6] Office of Management and Budget, *Budget of the United States Government: Fiscal Year)996* (Washington, DC: U.S. Government Printing Office, 1995), T. 7-1, p. 94; and U.S. Department of Agriculture, Cooperative State Research Service, Inventory of Agricultural Research, Fiscal Year 1993, Washington, DC, 1993, in U.S. Congress, Office of Technology Assessment, *Agriculture, Trade, and Environment: Achieving Complementary Policies*, OTA-ENV-617 (Washington, DC: U.S. Government Printing Office May 1995), figure 2-9, p. 43.

eties, integrated pest management and biological pest controls, wastewater treatment, waste management and recycling, precision application of inputs, improved food and fiber processing, and cultural techniques to reduce erosion and chemical inputs.

USDA agencies also support RD&D for alternative crops and uses for agricultural commodities that in some cases may have environmental benefits. For instance, CSREES has worked on crop based alternatives for transmission fluid and diesel fuel, plant based anti-barnacle and anti-termite agents, and kenaf as an alternative fiber source for paper production, among others.[7] Biomass energy RD&D is also supported by the Department. The Alternative Agricultural Research and Commercialization Center (AARC, part of the Rural Business and Cooperative Development Service) spent $7.4 million in FY 1994 to help commercialize alternative uses that USDA claims are environmentally preferable.

The USFS reportedly spent $69 million in FY 1994 for environmental technology RD&D. However, a much smaller program (about $13 million) was identified when OTA asked the agency about RD&D programs directly linked to technologies for environmental damage prevention, control, and remediation.[8] The agency noted two major components: 1) biologically based pest control and bioremediation research (about $5 million annually during FY 1993 and 1994), and 2) technologies for effective use of wood (about $8 million annually). The wood use component includes "light on the land" harvesting and vegetation management, bio-based wood processing, improving wood and wood product recycling, and new applications of wood and processing wastes as adhesives, chemicals, and other materials.

The Natural Resources Conservation Service, which incorporates the former Soil Conservation Service, does pertinent work on soils; grazing practices and erosion control; stabilization and conservation of land, streams, and wetlands; and animal waste management and runoff pollution.

Other agencies such as the Animal and Plant Health Inspection Service and the Food Safety and Inspection Service (FSIS) do modest amounts of environmental technology R&D linked to their regulatory missions. For instance, FSIS spent between $150,000 to $200,000 in 1993 for hazardous waste reduction RD&D for laboratory operations.[9] The Economic Research Service performs economic and policy research on environmental aspects of agriculture.

In short, USDA reports itself as one of the largest federal supporters of environmental technology RD&D. However, the Department may construe environmental technology quite broadly to encompass production technologies, management practices, resource studies, and other activities that may be indirectly or secondarily linked to prevention, control, and reversal of pollution and environmental degradation. On the other hand, as in other areas, some of the most important environmental improvements in agricultural and forestry are likely to come from environmentally preferable attributes integrated into production systems, including management practices and techniques, rather than being embodied in discrete environmental protection hardware.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA) AND FEDERAL AVIATION ADMINISTRATION (FAA)

NASA, according to Clinton Administration estimates, has the second largest environmental technology RD&D budget among federal agen-

[7] D. Kugler, Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture, Washington, DC, personal communication, May 8, 1995.

[8] J. Sesco, Forest Service, U.S. Department of Agriculture, Washington, DC, letter, May 5, 1995.

[9] Ball & Associates, "Programs That Support Development and Diffusion of Innovative Environmental Technologies," contractor report prepared for Office of Technology Assessment, U.S. Congress, Washington, DC, December 1994, p. I-26.

cies—$791.1 million in FY 1994.[10] However, the overwhelming majority of the funding—$638.4 million in FY 1994 and $810.8 million in FY 1995—is for monitoring and assessment activities associated with Mission to Planet Earth and the Earth Observing Data Information System. Such activities—including satellite, aircraft, and balloon borne monitoring, and modeling and data management—focus on improving the understanding of Earth's major biological, chemical, and physical systems including atmospheric and ocean processes (e.g., ozone layer depletion and global climate change). OTA has not included these activities in its identification of federal agency environmental technology expenditures.

NASA supports substantial R&D for prevention and control of pollution. According to estimates of the NSTC's Joint Subcommittee on Environmental Technology (JSET), NASA spent $152.7 million on pollution avoidance and control in FY 1994.[11] For FY 1995, $180.5 million were budgeted for those categories.

The agency provided OTA with budget data on direct R&D for aircraft emissions reduction and noise reduction.[12] (See table 6-3). This R&D is performed by NASA's Office of Aeronautics under the High-Speed Civil Transport and Advanced Subsonic Technology programs.[13] JSET's estimate of NASA's pollution avoidance and control R&D budget are higher than that presented in the table because of inclusion of energy efficiency research and, perhaps, studies on atmospheric chemistry and air transport scenarios pertinent to emissions and noise reduction but not directly involving engine development.

TABLE 6-3: NASA Funding for Aircraft Emissions and Noise Reduction ($ millions)

Category	FY 1994	FY 1995	FY 1996 request
Emissions reduction	41	49	33
Noise reduction	58	54	42
Total	**99**	**103**	**74**

SOURCE: National Aeronautics and Space Administration, May 5,

The FAA also funds relevant research. That agency's environmental technology R&D budget included $1.3 million for noise reduction in FY 1994, rising to $1.4 million each for FY 1995 and FY 1996 request. Emissions reduction R&D had no funds in FY 1994 but is $200,000 for FY 1995 with the same amount requested for FY 1996.[14] FAA R&D funding is closely coordinated with NASA's through interagency agreement.

NATIONAL SCIENCE FOUNDATION

The National Science Foundation supports basic and applied research performed by individual investigators and groups of researchers, primarily at universities, through a peer-review system of selection based on merit. A portion of NSF support is directed at environmental technology R&D in cooperation with other federal research agencies, state agencies, nonprofit organizations, and universities through several programs. Four of these programs are:

[10] National Science and Technology Council, Joint Subcommittee on Environmental Technologies of the Committee on Environment and Natural Resources and Committee on Civilian Industrial Technologies, Washington, DC, unpublished data, Apr. 6, 1994.

[11] National Science and Technology Council, Joint Subcommittee on Environmental Technologies of the Committee on Environment and Natural Resources and Committee on Civilian Industrial Technologies, Washington, DC, unpublished data, Apr. 6, 1994.

[12] M. Fritz, Office of Resources and Management Systems, National Aeronautics and Space Administration, Washington, DC, letter and fax, May 5, 1995.

[13] For further discussion of aviation R&D including environmental issues see, U.S. Congress, Office of Technology Assessment, *Federal Research and Technology for* Aviation, OTA-ETI-610 (Washington, DC: U.S. Government Printing Office, September 1994).

[14] T. Connor, Office of Energy and Environment, Federal Aviation Administration, Washington, DC, personal communication, May 1, 1995.

- Environmentally Benign Chemical Synthesis and Processing Program;
- Environmentally Conscious Manufacturing Program;
- Technology For a Sustainable Environment Program; and
- NSF Industry-University Cooperative Research Centers (IUCRCs), and Engineering Research Centers (ERCs).

In 1992, NSF established the Environmentally Benign Chemical Synthesis and Processing Program in partnership with the chemical industry's Council for Chemical Research, in order to stimulate pollution prevention R&D at universities.[15] Industrial participation in the research is required, although the universities retain intellectual property rights consistent with the Bayh-Dole Act of 1980 (Public Law 96-512). In FY 1994, NSF supported this program with approximately $2.8 million of research grants to 29 separate grantees.[16]

Through the Environmentally Conscious Manufacturing Program, NSF supports research on cleaner raw material processing, use, and disposal. In FY 1995, this program received $8 million, which includes matching funds from the NSF Opportunity Fund, to investigate cleaner manufacturing technologies at universities, with a pollution prevention emphasis. Approximately 10 percent of this $8 million budget supports research that does not qualify as environmental technology R&D per se.[17] This program also builds on NSF experience in the Environmentally Benign Chemical Synthesis and Processing Program.

As noted in chapter 5, NSF cooperates with EPA to support the Partnership for Environmental Research. This partnership is part of the Administration's Environmental Technology Initiative (ETI), and includes the Technology For a Sustainable Environment Program. The goal of the Technology For a Sustainable Environment Program is to advance the development and use of technologies that avoid environmental damage. This Program is slated to award up to $6.5 million in FY 1995 for pollution prevention related R&D.[18] The focus of the Program's R&D includes support for small businesses, manufacturing operations in a variety of industries, clean chemical processing, and green materials manufacturing.

In addition, NSF supports IUCRCs and ERCs at universities, some of which perform environmental technology related R&D. The IUCRCs and ERCs were established to promote crossdisciplinary research, with the broad participation of industry, state government agencies, and universities. Funding for the centers ranges from approximately $1 million to $3.2 million annually.[19] Some IUCRCS and ERCs conduct environmental technology R&D, while others perform a portion of their research on environmentally related topics. For example, the Advanced Combustion

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[15] I. Amato, "The Slow Birth of Green Chemistry," *Science* 259:1538-1541, 1993.

[16] Information provided by the Division of Chemistry and Chemical & Transport Systems, U. S. National Science Foundation, Washington, DC, May 1995.

[17] Information provided by the Division of Design, Manufacture, and Industrial Innovation, U.S. National Science Foundation, Washington, DC, May 1995.

[18] National Science Foundation and Environmental Protection Agency, "Interagency Announcement of Opportunity: NSF-EPA Partnership for Environmental Research," Feb. 24, 1995, mimeo.

[19] Ball & Associates, "Programs That Support Development and Diffusion of Innovative Environmental Technologies," contractor report prepared for the Office of Technology Assessment, U.S. Congress, Washington, DC, December 1994.

ERC, jointly operated at Brigham Young University and the University of Utah, performs R&D directly relevant to environmental technology.[20], [21]

Department of the Interior

The Department of the Interior supports many research programs relating to the environment. Environmental research is an objective of several programs operated by the U.S. Geological Survey, the National Biological Service, the Bureau of Land Management, the Fish and Wildlife Service, and the National Parks Service. Most of these programs focus on assessment and monitoring of environmental conditions, ecosystems, and wildlife. While some observers might classify these programs as supporting environmental technology R&D, such a broad classification is not employed here. This chapter includes a brief description for those Department of Interior programs that explicitly focus on environmental technology R&D.

Bureau of Mines

The Bureau of Mines (BOM) is a research and fact finding agency responsible for helping to ensure an adequate supply of nonfuel minerals to meet U.S. needs. For example, the BOM supports research to provide technology to more safely extract, process, use, and recycle nonfuel minerals at a reasonable cost and with less environmental damage. OTA calculates that, in FY 1994, the BOM supported at least $40 million in focused environmental technology R&D through the Environmental Technology; Health, Safety, and Mining Technology; and the Minerals and Materials Science Programs.[22]

BOM supports environmental technology R&D and remediation through four budget line-item programs. These items and corresponding fiscal year 1994 funds are listed in the budget as environmental remediation ($26.8 million), pollution prevention and control ($27.3 million), health and safety ($48.2 million), and materials research partnerships ($8.2 million).[23] However, these budget items include moneys allocated for remediations at test sites, operations, administration, and other functions not directly related to R&D. Most BOM environmental technology R&D is conducted at nine BOM field research centers, and is administered within the Division of Environmental Technology. The Division oversees research in metallurgical waste, subsidence and solid waste, hazardous waste, biotechnology, hydrology, blasting, acid mine drainage, and water treatment systems. [24] The Division of Health, Safety and Mining Technology also administers some environmental technology R&D.

Some in Congress favor elimination of the Bureau of Mines. The House Appropriations Committee, for example, has recommended that the bureau be terminated in FY 1996, with funds available only for close out and environmental cleanup.[25]

Bureau of Reclamation

The Bureau of Reclamation, another agency in the Department of Interior, performs some environ-

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[20] Ibid.

[21] U.S. Congress, Office of Technology Assessment, *Industry, Technology, and the Environment: Competitive Challenges and Business Opportunities*, OTA-ISC-586 (Washington, DC: U.S. Government Printing Office, January 1994).

[22] National Science and Technology Council, Joint Subcommittee on Environmental Technologies of the Committee on Environment and Natural Resources and Committee on Civilian Industrial Technologies, Washington, DC, unpublished data, Apr. 6, 1994.

[23] Office of Management and Budget, *Budget of the United States Government: Fiscal Year 1996* (Washington, DC: U.S. Government Printing Office, 1995).

[24] Ball & Associates, "Programs That Support Development and Diffusion of Innovative Environmental Technologies," contractor report prepared for the Office of Technology Assessment, U.S. Congress, Washington, DC, December 1994.

[25] Committee on Appropriations, House of Representatives, U.S. Congress, *Department of Interior and Related Agencies Appropriations Bill, 1996*, House Report 104-173, June 30, 1995, p. 48.

mental technology R&D related to water pollution, through several programs performed both in the Bureau, by contractors, and at universities. The programs and their corresponding funding levels for FY 1994 are:

- Water Technology and Environmental Research Program (WATER) received approximately $2 million for environmental technology R&D;
- Water Treatment Technology Program (WTT) received $925,000 for environmental technology R&D; and
- Watershed Modeling Systems Initiative (WMSI) received $500,000 for environmental technology R&D.[26]

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institute of Environmental Health Sciences

The Public Health Service of the Department of Health and Human Services supports some environmental technology R&D at the National Institute of Environmental Health Sciences (NIEHS), which is part of the National Institutes of Health. Through the Superfund Basic Research Program, NIEHS currently supports R&D at 29 universities and other extramural grantee institutions.[27] It supports basic and applied R&D on technologies to reduce and monitor exposure to toxic substances through, for example, bioremediation, combustion, supercritical wet oxidation, and steam injection to remove solvents from soils. The NIEHS Superfund Basic Research Program budget for FY 1994 was approximately $33 million.[28] Of this FY 1994 budget, the Clinton Administration estimates that $10.9 million supported directly relevant environmental technology R&D.[29] One important aspect of the Program is its interdisciplinary nature. The R&D bridges biotechnology, engineering, hydrogeology, and ecological sciences in a way that emphasizes long-term integrated basic research of the remediation of hazardous wastes.

Established by the Superfund Amendments and Re-Authorization Act of 1986 (Public Law 99-499), the Superfund Basic Research Program at NIEHS was intended to complement existing activities within EPA and the Agency for Toxic Substances and Disease Registry.[30] One of the key characteristics of the Program is the fundamental nature of the research it supports. According to NIEHS sources, many projects funded through the Program lead to further R&D performed by other agencies, such as the Department of Energy, on a much larger scale.[31] In some cases involving other federal research laboratories, the R&D conducted under the Superfund Basic Research Program has lead to cooperative research and development agreements (CRADAs) with nonfederal research partners.[32]

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[26] Ibid.

[27] Ball & Associates, "Programs That Support Development and Diffusion of Innovative Environmental Technologies," contractor report prepared for the Office of Technology Assessment, U.S. Congress, Washington, DC, December 1994.

[28] B. Anderson, Superfund Basic Research Program, National Institute of Environmental Health Sciences, Department of Health and Human Services, Research Triangle Park, NC, personal communication, May 1995.

[29] National Science and Technology Council, Joint Subcommittee on Environmental Technologies of the Committee on Environment and Natural Resources and Committee on Civilian Industrial Technologies, Washington, DC, unpublished data, Apr. 6, 1994.

[30] Ball & Associates, "Programs That Support Development and Diffusion of Innovative Environmental Technologies," contractor report prepared for the Office of Technology Assessment, U.S. Congress, Washington, DC, December 1994.

[31] B. Anderson, Superfund Basic Research Program, National Institute of Environmental Health Sciences, Department of Health and Human Services, Research Triangle Park, NC, personal communication, May 1995.

[32] Ibid. A fuller treatment of CRADAs is explored in the context of the DOE National Laboratories as part of chapter 3.