ENVIRONMENTAL RESEARCH, DEVELOPMENT, AND DEMONSTRATION AUTHORIZATION ACT OF 1993

Y 4. P 10: S. HRG. 103-756

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Environmental Research, Development... HE

SUBCOMMITTEE ON
TOXIC SUBSTANCES, RESEARCH AND
DEVELOPMENT
OF THE
COMMITTEE ON
ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE
ONE HUNDRED THIRD CONGRESS

SECOND SESSION

ON

S. 1545

A BILL TO AUTHORIZE APPROPRIATIONS FOR ENVIRONMENTAL RE-
SEARCH, DEVELOPMENT, AND DEMONSTRATION FOR FISCAL YEARS
1994 THROUGH 1996, AND FOR OTHER PURPOSES

JULY 21, 1994

Printed for the use of the Committee on Environment and Public Works

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ENVIRONMENTAL RESEARCH, DEVELOPMENT, AND DEMONSTRATION AUTHORIZATION ACT OF 1993

THURSDAY, JULY 21, 1994

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
SUBCOMMITTEE ON TOXIC SUBSTANCES, RESEARCH AND
DEVELOPMENT,
Washington, DC.

The committee met, pursuant to notice, at 9:38 a.m. in room 406, Dirksen Senate Office Building, Hon. Harry Reid, [chairman of the subcommittee] presiding.

Present: Senators Reid, Lieberman, and Baucus [ex officio].

OPENING STATEMENT OF HON. HARRY REID, U.S. SENATOR FROM THE STATE OF NEVADA

Senator REID. The committee will come to order.

Today, we take the next step toward authorizing appropriations for the EPA's Office of Research and Development. The EPA Office of Research and Development is charged with the duty of providing scientific support to implement our environmental statutes as well as providing basic research to address systematic, environmental, and human health hazards.

Recently, the Office of Research and Development, ORD, has been the subject of debate. A recent report by the Mitre Corporation was critical of ORD laboratories and has caused many to call for reform. The Science Advisory Board and others have criticized ORD's research and development strategy as being short-sighted in terms of national policy.

EPA itself, in response to the Mitre report and other criticism, is drafting its own lab reorganization proposal. Yet with all this debate and criticism, we have not had a law reauthorizing ORD since 1981.

I believe that congressional leadership is critically needed in this area at this time. Our statutes and regulations must be based on sound science if we are to ensure that our environmental spending is invested in the most effective manner possible. If we are to expect the American public to spend some \$115 billion a year in pollution abatement, we owe it to them to make sure that the laws are based on sound science.

S. 1545 has a number of provisions that would move EPA in this direction. It authorizes \$520 million for fiscal year 1995 for EPA's ORD. It requires EPA to upgrade its facilities and equipment and

meet generally accepted standards appropriate for conducting research.

The bill establishes an experimental program to stimulate competitive research to enhance competitive peer review. It directs EPA to direct and implement the national human exposure and assessment survey to study human exposure and the environmental monitoring and assessment program to study ecological systems.

The bill authorizes a number of other research programs, including research on international development programs, international environmental problems, and lead exposure in drinking water disinfection. And to enable EPA to develop clear research goals, the bill requires EPA to develop a list of at least 10 environmental hazards that present the greatest degree of risk and the greatest degree of scientific uncertainty.

The bill establishes a program to monitor and evaluate the potential for human exposure to pesticides in food, water, soil, and air. The public health and environmental implications of pesticide use are still poorly understood and this research will provide much needed information.

I wish to offer my sincere thanks and appreciation to the Senator from Connecticut, Senator Lieberman, for his contribution to this section of the bill.

This bill includes provisions which create the National Arid Climate Ground Water Research Center to promote and coordinate ground water management research in arid regions. Groundwater is a natural resource of immense importance, providing drinking water for half of the United States population and supplying much of the water needs of livestock and irrigation. Yet in many parts of this country, groundwater supplies are threatened or contaminated by environmental pollutants. The research conducted by the center will contribute not only to the arid western States, like Nevada, but to all States who wish to assure the quality of their groundwater.

At this point, I would like to mention two changes that I contemplate in S. 1545. The first involves language in section 9 establishing the National Arid Climate Groundwater Research Center. I will propose language be added to this section which will more accurately reflect the research center's true regional purpose. As I stated, research conducted at this center will not only benefit Nevada, but the entire western part of the United States, which is almost all arid.

The second change I will propose involves section 21 of S. 1545, which provides financial assistance for research on drinking water disinfection. Currently, the bill directs the Administrator to enter into an agreement with the American Water Works Association to conduct disinfection and disinfection byproducts research. So that this research will be conducted with an appropriate level of peer review, I will propose that this bill adopt House language in H.R. 1994. In so doing, EPA will be able to conduct this research on a more competitive basis.

In sum, this bill, with these changes, goes a long way toward responding to many of the issues raised in debate.

I look forward to hearing from our witnesses today and learning more about how we can achieve balance within ORD's dual re-

search functions, long-term, and program research and how EPA can create incentives to attract and nurture a sufficient number of highly qualified scientists.

The House, under the leadership of Chairman Brown and Congressman Valentine, have passed a bill substantially similar to S. 1545. It is my hope that we can move forward to reauthorize this legislation for the first time in 13 years.

Senator REID. I am going to call upon the other members of the committee, but first I want to welcome Chairman Brown and Congressman Valentine. We are sorry to see that you are going to leave, Tim. You and I came together. You have been a good friend, as has been Chairman Brown. We are very grateful for your leadership in this legislation.

Senator Baucus, do you have a statement?

OPENING STATEMENT OF HON. MAX BAUCUS, U.S. SENATOR FROM THE STATE OF MONTANA

Senator BAUCUS. Thank you, Mr. Chairman.

I appreciate your holding this hearing. It is an extremely important hearing.

I also want, at the outset, to commend our colleagues from the other body. Chairman Brown has always been a leader in scientific issues. I have always admired Chairman Brown's work for many, many years. I always take note of what he has to say because when it comes to science, he is on target. The same with Congressman Valentine. I haven't known him quite as long as I have known the chairman, but I do know that his work, too, has been very helpful. I appreciate both of them.

Mr. Chairman, I want to commend you, too. You have provided tremendous leadership on environmental research and development generally, and particularly with respect to issues before this committee and EPA. I think everyone in Nevada should be very proud of your efforts, as well as the others in the country.

The last time Congress passed this bill was in 1981. So this legislation is long overdue. Given the historic nature of this session, the passage of the bill would be a tall order, especially if it becomes bogged down with contentious amendments. But nevertheless, I think this bill is extremely important, and I will help to get it passed this year.

Senator REID. If the gentleman would yield, I am going to go vote so that we don't hold up the House members. Please take the Chair until I get back.

Senator BAUCUS [assuming the chair]. It focuses attention on many critical issues, including the national human exposure assessment survey, research on pesticides, environmental monitoring, health and ecological risk.

I cannot stress enough the importance of high quality research. It provides a sound, scientific basis on which to make effective environmental policy. Science issues are an important part of our debate.

The Senate, for example, considered the Safe Drinking Water Act earlier this year. Issues such as risk assessment, health effects, exposure were central issues of the debate. It helped us focus on the right contaminant. It is an extremely important issue. A good ex-

ample is radon. We all know that when it comes to radon 5 percent of the exposure is in drinking water and 95 percent in air. It is critical that we measure correctly to make sure that our remedies are well tailored to the problem. Science and good research helps us do that.

Environmental problems we face today are extremely complex. They can be subtle. They demand much of science and sometimes demand more than science can deliver. Science will never answer all our questions, but policymakers will always need good science in order to exercise good judgment.

Furthermore, our leadership in environmental science leads to new technologies, new technologies which can clean up pollution more efficiently and also create jobs. The last few days, Administrator Browner has proposed two forward-looking initiatives to better enable the EPA to address the complex environmental issues we face. Both the laboratory reorganization plan and the common sense initiative are designed to make EPA more effective in carrying out its mission to protect the human health and the environment. That is the kind of focus we need to have in order for our environmental goals to be reached, particularly if we are going to maintain a high level of public support.

In closing, let me again commend Senator Reid for calling this hearing, and also praise him for his leadership, as well as Senator Lieberman. Senator Lieberman has been a terrific addition to this committee. I know of no other Senator with more intelligence or dedication or focus than the Senator from Connecticut. I want everyone to know that his presence on the committee is well noted.

Senator LIEBERMAN. Thank you, Mr. Chairman. I particularly appreciate those kind words, particularly coming from you. It has been a pleasure to serve with you as chairman the last couple of years.

I have a statement that I would ask to be included in the record, then I am going to make three quick points so that we can yield to our friends from the House.

Senator BAUCUS. Without objection, your prepared statement will appear in the record.

OPENING STATEMENT OF HON. JOSEPH I. LIEBERMAN, U.S. SENATOR FROM THE STATE OF CONNECTICUT

Senator LIEBERMAN. As has already been indicated, this bill does get to the heart of the whole question of how to have fact-based environmental protection, which is so much in the air today. Not only has the research and development function at EPA come under some criticism lately, but almost every bill that we pass here is an occasion to raise questions about whether we are basing our actions on science or on our own reactions to public anxiety. It is a real challenge for us in a democracy to balance—particularly since most of us are laymen and not scientists—our natural desire to be cautious and therefore in some measure to over-protect against threats with the standard of fairness that we like to set for ourselves, which is to base our actions on fact as opposed to fear.

This division of EPA is at the heart of rational results to that dilemma.

Secondly, I really want to thank the chairman for the provisions in this bill in the area of pesticides which he and I have worked on together. Pesticides are applied so frequently to our crops, our lawns, and our buildings. But the more Senator Reid have gotten into this, the more we see that EPA possesses not so much information concerning the amount of pesticides applied, the frequency of their use, the path of their exposure, the extent of migration into the environment, the exposure levels of agriculture workers, lawn care chemical applicators, and the general population.

I think the sections in this bill—section 8, particularly, requiring EPA to conduct pesticide research—will really go a long way toward eliminating the data gaps that we have in that particular area. I appreciate very much its inclusion here.

Third and finally, I would like to join with my colleagues in welcoming our colleagues from the other body and thanking them for their extraordinary leadership in the House in areas of mutual interest. I want to particularly thank Chairman Brown for all that he has done in the area of environmental technologies in which Chairman Baucus and I have been actively involved and to wish him well as we move that bill forward in the House. I would like to thank Congressman Valentine as well for his leadership that has given us a remarkable example of Research Triangle Park which the rest of the country aspires to emulate in the realization of the potential for environmental technology.

Thank you, Mr. Chairman.

[Senator Lieberman's prepared statement follows:]

STATEMENT OF HON. JOSEPH I. LIEBERMAN, U.S. SENATOR FROM THE STATE OF CONNECTICUT

Thank you Mr. Chairman. I congratulate you on your leadership and commend you for holding today's hearing on S. 1545, the Environmental Research, Development, and Demonstration Authorization Act, of which we are both cosponsors.

The activities of the EPA Office of Research and Development have not been reauthorized since 1981. Unfortunately, today the Agency is faced with a "research management dysfunction" that is "approaching a crisis level", according to the Science Advisory Board. Clearly, these basic management problems must be resolved if the public can have full confidence in EPA's scientific research program—which provides the fundamental justifications for its regulations. As the Science Advisory Board stated: the ultimate success or failure of the Agency to carry out its mandate to protect human health and the environment is at stake. I know one of Administrator Browner's top priorities is ensuring that EPA's actions are based on sound science and research and I have confidence that she will act to address these problems.

In addition to the SAB, numerous other experts, such as the Carnegie Commission, have been critical of EPA's research program. These experts have urged that EPA's research program must go beyond meeting the regulatory needs of the various program offices to develop a long-term agenda for identifying, evaluating and alleviating the highest priority environmental risks.

The provisions in this bill are important because they authorize EPA to establish specific research programs that are designed to address long-term systemic environmental and human health hazards. This bill, by requiring EPA to establish fundamental research programs in areas such as risk assessment, human exposure, and lead abatement, will provide the data and methodologies that will enable the Agency to more effectively combat those environmental problems in the present and in the future.

In particular, I am pleased Mr. Chairman that you have included provisions for research in the area of pesticides. During the last several years at hearings with you Mr. Chairman, I have learned that although pesticides are applied frequently

and abundantly to our crops, our lawns, and our buildings, the EPA possess very little information concerning the amount of pesticides applied; their frequency of use; their routes of exposure; the extent of pesticide migration into the environment; the exposure levels in agricultural workers, lawn care chemical applicators, and the general population; and the extent to which pesticides are misused. In addition, past hearings on food safety have demonstrated that there are significant data gaps regarding the level of pesticides consumed by Americans, particularly sub-populations that represent a variety of eating habits, including those of children.

Section 8 of the bill requires EPA to conduct pesticide research that will eliminate those data gaps. It requires the EPA to establish monitoring methodologies for measuring pesticide levels in the environment, to assess the routes of human exposure to pesticides, to develop cost-effective methodologies for assessing pesticide residues in food, to determine the extent of pesticide contamination in different environmental media, to study the acute and chronic health effects of pesticide exposure, and to assess the long-term effects of pesticides on various ecosystems.

This research will enable the Agency to conduct state-of-the-art risk assessments regarding the health and environmental effects of pesticides, thereby, ensuring that the environment and the American public will be adequately protected from their potential adverse effects.

I want to thank Representative George Brown from California and Representative Tim Valentine from North Carolina for testifying before this subcommittee today. These two members of Congress have actively worked to promote the cause of environmental research in the House and are currently working to secure passage of the Environmental Technology bill. Representative Brown has been a leader in environmental matters for many years and was an original sponsor of the first bill that authorized appropriations for environmental research, development, and demonstration programs. Representative Valentine's district in North Carolina contains the area known as "Research Triangle Park," which is home to some of this country's finest public and private environmental research facilities. I commend both of these men for their dedication to the environmental research issue.

Mr. Chairman, thank you for convening this hearing. I am proud to be a cosponsor and a coauthor of this bill and I look forward to working with you and our colleagues in the Senate to help pass this legislation. Enactment of S. 1545 will help EPA develop and implement a scientific, integrated, research agenda that will ultimately result in identification of the best methods for reducing the greatest environmental risks that threaten our ecosystems and the American people.

Senator BAUCUS. Chairman Brown, you may begin.

STATEMENT OF HON. GEORGE E. BROWN, U.S. REPRESENTATIVE FROM THE STATE OF CALIFORNIA

Mr. BROWN. Thank you very much, Mr. Chairman, first for having this hearing today and secondly for the combined work you are doing and all the members of this committee in connection with environmental issues, including the issues of new environmental technology in which you have played a leadership role. We hope to match the efforts you have made shortly and pass some legislation in this area.

I also want to express my gratitude for the kind remarks you have made. As we approach the twilight of our careers—as we are rapidly approaching—we really have to value only the goodwill and respect of our colleagues. I hope that I have earned a little of that before I leave.

Senator BAUCUS. Most definitely.

Mr. BROWN. I do recall with some fondness—it was about 20 years ago that I persuaded the chairman of the House Committee on Science and Astronautics, as it was known at that time, to establish an environmental subcommittee. My motives were entirely

selfish. I was in line to become chairman of that subcommittee and I did. I have been working in that area for the last 20 years both in that committee and in the Agriculture Committee, which I also serve on. I wrestled with the FIFRA issue over much of that time.

As Senator Reid made reference to the fact that he is proposing to add to this bill a couple of other provisions, I hope that I can indicate to him personally but I will say for the record that I welcome this initiative. We have an old laboratory, about 60 years old, in California which is called a salinity laboratory. It deals with the problems of water. I think that a laboratory dealing with the problems of arid lands would be a complement to that. The ideal situation would be that they would both work together in a partnership arrangement to attack both sets of problems since they are closely interrelated.

I would ask that the full text of my statement appear in the record and I will abbreviate it as much as possible.

Senator BAUCUS. Without objection, your prepared statement will appear in the record.

Mr. BROWN. I am pleased to have this opportunity to testify on your legislation, S. 1545, to authorize the Office of Research and Development at the Environmental Protection Agency. This is a companion bill to H.R. 1994, which we have reported out of the Committee on Science, Space, and Technology. We passed that bill some months ago.

The changing nature of environmental problems requires a fundamental change in regulatory philosophy, and we all are becoming very well aware of that. Beyond command-and-control waste regulations are new paradigms emphasizing pollution prevention with consideration of consumer product life cycles to minimize waste and optimize energy material efficiency. On this point, I recognize and commend the hard work this committee has done on S. 978, the environmental technologies legislation, which I have referred to in passing. We hope to consider that initiative later this week.

I believe our objectives also should include the creation of a more innovative and cooperative atmosphere between public and private sectors to achieve the desired outcomes. The role of R&D to support sound environmental policy and regulatory decisionmaking is more urgent now than ever. I know of no substantial opposition to that concept. I have enjoyed working closely with the industrial community and the chemical manufacturers and others on these issues. I think they are in agreement on the need for some well-based research and development. We hope that we can continue to work together with them.

An essential element to the improvement of environmental decisionmaking is the scale and quality of the research that undergirds the policy. To improve the quality of that research, the science used must be relevant to an agency's mission and not driven by current political needs. At the same time, it is necessary for science to be an integral component of the agency's mission in order to maximize the effectiveness of the research in supporting that mission.

The bills that you have before you I believe are an important step. They would direct the Science Advisory Board to review the agency's program and submit an annual report outlining whether the budget submitted by the President adequately funds the pro-

gram. This will help the Congress to better evaluate the relevance of EPA's research program.

In addition, the bills establish a program to modernize the laboratories. We are doing that for most other agencies of the Federal Government and EPA should be included in that effort.

These companion legislative initiatives also direct the Administrator to establish a program to transfer these environmental technologies and information to outside groups. That is equally important.

We in the House commend your leadership in this area, Mr. Chairman, and pledge to work closely with you on this and other legislation to guarantee that all Americans can experience the level of environmental quality they expect and deserve.

Let me conclude by just thanking you for the great work you are doing and express our very strong desire to continue to cooperate with you.

Senator REID [resuming the chair]. Chairman Brown, I appreciate that very much.

While I was gone, I know that you talked about desalinization. Senator Simon and I have worked on that a great deal. We have legislation that is pending to put more money into the work that we are doing on desalinization, which is not very much. We should be doing a lot more.

With the problems we have in the world, I think it is the only answer. We need to be able to do something economically in order to turn salt water into potable water. There are two problems, as you are aware, the tremendous expense involved in the electricity power to generate to break it down and then what to do with the waste afterwards. Those are the two problems we need to try to solve.

Congressman Valentine?

STATEMENT OF HON. TIM VALENTINE, U.S. REPRESENTATIVE FROM THE STATE OF NORTH CAROLINA

Mr. VALENTINE. Mr. Chairman, I thank you for the opportunity to appear here, especially to sit at this table and bask in the reflected sunlight from our distinguished chairman of the Science Committee.

Senator REID. And that is not artificial light, either.

[Laughter.]

Mr. VALENTINE. No, it is not, sir. It comes directly from above. I wouldn't exactly call it a halo.

[Laughter.]

Mr. VALENTINE. The chairman is aware personally of Mr. Brown's accomplishments. Most of what we do on the Science Committee—I wouldn't say it is "warmed-over George Brown" but most of it has his fingerprints all over it as a result of his fertile imagination.

I want to say also, Mr. Chairman, that I take great pride in the fact that we came to this institution known as the United States Congress at the same time. You served on the Science Committee and I would like to think that what you learned there helped you to be catapulted into this august position where you have served with great distinction for the past several years.

Let me say also that I used to be a citizen of your State. I used to reside in your State. I worked for the Federal Government for awhile back between 1944 to 1946 and I resided for awhile and was gainfully employed at the Las Vegas Air Force Base. Had I stayed there, I would have been a strong Harry Reid supporter, I can assure you.

Mr. Chairman, I want to commend you for convening this hearing on the Office of Research and Development at the Environmental Protection Agency.

As you know, the House passed H.R. 1994 last year, which is very similar to S. 1545. As you may know, in the district that I represent in North Carolina, there are approximately 1,200 EPA Federal employees. The majority of these employees are scientists at the EPA research laboratories and offices located in the Research Triangle Park and surrounding area—the Air and Energy Engineering Research Laboratory, the Atmospheric Research and Exposure Assessment Laboratory, the Health Effects Research Laboratory, and the Environmental Criteria and Assessment Office.

The applied research mission of EPA is critical to the solution of America's environmental problems, as has been stated. The research conducted in and supported by the laboratories in North Carolina and Nevada, as well as those throughout the country, has provided the basis for many of the actions taken by environmental regulation agencies both in this country and around the world. The need for this environmental research will only increase in the coming years as we are faced with even more complex environmental crises.

It is imperative that EPA maintain a high-quality, credible research program. EPA cannot afford to establish regulations based on poor quality or insufficient scientific data. The regulatory decisions must be based on the very best scientific evidence available. We believe that H.R. 1994 and S. 1545 will help to accomplish this purpose.

I believe that one of EPA's biggest problems is a public relations problem. It is our belief that the way to cure this problem is to provide a means for the agency to make judgments which are based on the best that science and technology can offer and good judgment.

I have many other pearls of wisdom written out here, and I will ask unanimous consent to have placed in the record.

Senator REID. Without objection, your prepared statement will appear in the record.

Mr. VALENTINE. I thank you again for this opportunity to appear, Mr. Chairman.

Senator REID. In reference to your statement, Congressman Valentine, I did serve on the Science and Technology Committee. It was one of the high points of my congressional career—and I say that seriously. I enjoyed that very, very much. I served on a number of subcommittees. The one I remember the most is the one chaired by now Vice President Gore, Investigations and Oversight. We did some very interesting things there, things that I still use over here. It was that beneficial.

I miss the committee. It was not only educational but a lot of collegiality there. I enjoyed it a lot.

I look forward to doing my best to move this through the Senate this year so that we can have a conference as early as possible and work out the minor differences and move this bill on. I will do everything I can to accomplish that.

Thank you both very much for being here.

Senator REID. The next panel today will consist of Dr. Gary Foley, Acting Assistant Administrator for Research and Development with the United States Environmental Protection Agency; Dr. Mark Schaefer, Assistant Director for the Environment with the Office of Science and Technology Policy in Washington, D.C.; and we did have somebody lined up from the Science Advisory Board, but they were unable to be here.

We will first hear from Dr. Foley and then Dr. Schaefer. If you could, we would like for you to keep your remarks around 5 minutes so that we can ask some questions to which the committee needs answers.

Dr. Foley?

STATEMENT OF GARY FOLEY, ACTING ASSISTANT ADMINISTRATOR FOR RESEARCH AND DEVELOPMENT, ENVIRONMENTAL PROTECTION AGENCY

Dr. FOLEY. Thank you, Mr. Chairman.

I appreciate the opportunity to testify today on the proposed reauthorization of the Environmental Research, Development, and Demonstration Authorization Act, or ERDDA. I would also like to share with you some of the details of what we are doing within EPA and within the Administration to strengthen science and research and to possibly restructure the Office of Research and Development.

We are clearly at a time when we have the opportunity to strengthen science and research within EPA and the Federal Government. At EPA we will soon have new leadership in our research program. As you know, the White House has nominated Dr. Robert Huggett, who has been Chair of the Department of Environmental Sciences at the Virginia Institute of Marine Sciences at the College of William and Mary, as our new Assistant Administrator for Research and Development. We in the agency are looking forward to his confirmation and him taking the lead here.

Certainly, a part of strengthening environmental research within EPA is the reauthorization of ERDDA. EPA generally supports the goals of S. 1545 and we would like to continue working with the committee on this legislation. I will talk a little more later about the bill and its implications, but first I want to address things that are going on within EPA and the Administration.

As my testimony indicates, we have put a lot of effort within EPA to develop an agency-wide strategy for all of the activities that go on. As we are developing the strategy—and this is a living document—it is important to note that the Administrator has set some guiding principles for guiding the effort that is done by all parts of the agency. One thing that I want you to note in my testimony is that strong science and data is one of the guiding principles that all offices and regions within EPA are looking at as one of the major efforts.

Within the strategic plan, we in particular are putting a lot of effort into promoting science excellence to assure sound EPA decisions, assuring that environmental data are accessible and useful to policymakers, scientists, and the public. We want to measure environmental progress where we can, and we intend to create a national and international environmental research agenda. These efforts will be done in collaboration with other agencies through the National Science and Technology Council that the President has created, and particularly through the Committee on Environment and Natural Resources.

My testimony also points out that EPA has created a Science Policy Council, which we think is very significant. Our Deputy Administrator, Robert Sussman, who chairs the Science Policy Council, has provided an opportunity within the agency to bring science and policy together, thus ensuring that science underpins our policy decisions.

We are active participants in the Committee on Environment and Natural Resources, CENR, about which I am sure my colleague, Mark Schaefer will speak. We have made a commitment as an agency to fully participate in this. Our Deputy Administrator, Robert Sussman, is one of the vice chairs of this committee. The Assistant Administrator for Research and Development—the position I am acting in right now—chairs the Subcommittee on Toxic Substances, Solvents, and Hazardous Waste.

Many of the provisions of the ERDDA bill call for us to strengthen interagency collaboration and cooperation on activities. We are working these things through the Committee on Environment and Natural Resources.

We have also undertaken, as you are very well aware, a laboratory study. You mentioned in your opening remarks the Mitre report, the SAB report, and other things. We have delivered to the Administrator the final recommendations of the steering committee on the laboratory study and hope that the Administrator will soon come out with her decisions on this.

In particular, we want to emphasize that we are going to set our research agenda based on the risk assessment paradigm. We are going to be giving priority to research that has the greatest impact on reducing uncertainty in risk assessment and facilitates risk management. S. 1545 promotes similar ideas. So we think we are moving in a very consistent direction.

We also intend to put more priority into long-term research, moving to 50 percent of our research dollars. We intend to embark with a new organizational structure, as I mention in my testimony, that will have more partnerships with the scientific community, increase the number of EPA fellowships, and move along with a lot of management and administrative streamlining.

My testimony also goes through the fiscal year 1995 budget request. That I will leave to the committee to look at in the record.

We think that our research program provides the vital tools to understand and solve the environmental problems and to translate science into policy. Currently, we have our authorizations through a number of single media statutes, but we clearly recognize that S. 1545 clarifies the role. It allows us to embark on a number of cross-media programs for which the individual media strategies don't

provide. We also feel that the reauthorization of ERDDA would provide EPA with a less fragmented and more cohesive framework within which we can conduct environmental research.

We support the provisions that are provided in the bill. As I said, we look forward to working with the committee on this.

I am available to answer questions.

Senator REID. Thank you very much.

Dr. Schaefer?

STATEMENT OF MARK SCHAEFER, ASSISTANT DIRECTOR FOR THE ENVIRONMENT, OFFICE OF SCIENCE AND TECHNOLOGY POLICY, EXECUTIVE OFFICE OF THE PRESIDENT

Dr. SCHAEFER. Thank you, Mr. Chairman.

I will summarize my prepared remarks.

Senator REID. Without objection, your prepared statement will appear in the record.

Dr. SCHAEFER. I am the assistant director for environment in the Office of Science and Technology Policy and I appreciate the opportunity to meet with you this morning to discuss the Administration's efforts to enhance Federal environmental and natural resources R&D programs. The Administration is fully committed to working with Congress to improve these programs.

I would like to describe some of our interagency activities with respect to environmental R&D. Dr. Foley has taken the lead in discussing the specifics of the bill.

Given the increasing complexity, scope, and linking of local, regional, and global environmental issues facing our Nation and the globe, significant changes are needed in the Federal environmental and natural resources R&D system. The classical single agency/single scientific discipline approach to problem-solving needs to be transcended by a more coordinated multi-agency interdisciplinary approach.

As you know, several recent reports have criticized the way the Federal Government does its environmental R&D. They raise issues with respect to lack of leadership, inadequate links between agencies, no comprehensive national environmental research plan, and imbalance between our intramural and extramural programs. We feel that these criticisms are based in fact. We are taking them seriously and have put in place a number of initiatives to try to rectify them.

The Administration has demonstrated its leadership and commitment to a strong, integrated, and comprehensive Federal program for environmental R&D. In particular, the Committee on Environment and Natural Resources within the new National Science and Technology Council is leading an effort to coordinate these programs and to improve the links between the scientific and policy components of the Executive Branch.

A unique aspect of the new CENR is that the subcommittees are organized around key environmental policy areas. The subcommittee structure was created recognizing that coordinated, interdisciplinary, multi-agency R&D efforts are required to respond effectively to complicated environmental problems.

The Administration is committed to formulating an environment and natural resources R&D strategy through the CENR. The

charge to the subcommittees is to design a balanced environmental R&D program that is scientifically excellent, policy relevant and not policy-driven, well coordinated between Federal agency programs that meets the near and long term needs of the scientific and policy communities, broad enough to catch and respond to surprises, and is anticipatory and not just focused on the policy and management issues of today.

The Administration is also committed to strengthening the manner in which the Federal Government performs assessments. Particularly, integrated assessments would provide a bridge for two-way communication between policymakers and scientists.

CENR is currently developing a set of principles that should be used and mechanisms that can be used to conduct credible scientific and technical assessments. We are hopeful that these types of analyses will be useful to you as you develop environmental policy.

The Administration believes that the imbalance between extramural and intramural R&D programs is a significant weakness of our Federal system. The Administration is proposing that all Federal agencies take a careful look at the balance between intramural and extramural R&D activities within their agencies with the goal of increasing the involvement of the academic community by competitively awarding more R&D activities in a manner similar to the National Science Foundation and NASA.

In addition, there may be instances where the quality of the research endeavor may be strengthened by combining the intellectual talent residing in universities with the institutional capabilities of the Federal labs, thus improving the overall quality and cost-effectiveness of Federal research programs.

I would just like to add a personal note, Mr. Chairman, that I had an opportunity to testify before you several years ago about an OTA study on non-cancer health risks. I was very pleased to see that the committee is seriously committed to looking at non-cancer risks. I think the pesticide provisions in your bill are excellent and will take us a long way as we begin to look more seriously at the risks pesticides pose to the human health and the environment.

Thank you.

Senator REID. I appreciate that very much.

Dr. Schaefer, would you explain the role that ORD plays in relation to other research programs, like NIH, for example?

Dr. SCHAEFER. ORD is working to design its extramural grants program so that they are structured similarly to those at NIH. So they are using NIH programs as a model. I have heard people talk about doing this very recently. I worked for Doug Costle during the Carter Administration and this is something that we started doing then, but EPA has never had a very sizable extramural grant budget, so it hasn't made a lot of progress there.

In terms of interaction with NIH laboratories, they mainly work with the National Institute of Environmental Health Sciences, as you know, in Research Triangle Park. I think they have a good relationship with them. The programs complement each other pretty nicely at this point. As you know, a few years ago there was some question about overlap and coordination and so on.

Senator REID. S. 1545 requires EPA to coordinate its research efforts with other Federal and State agencies to avoid duplication of efforts.

Are there any programs in this legislation which have already been sufficiently addressed or could be better addressed by other agencies, that you are aware? In effect, is duplication of research effort a problem?

Dr. SCHAEFER. I think that traditionally duplication of research has been somewhat of a problem. It is one of the driving forces behind the new National Science and Technology Council's activities. Through the council, we are looking at all \$76 billion that the Federal Government devotes to R&D. In the past, we have only looked at bits and pieces of that. I think through the extensive subcommittee structure that we have now, we are able to make sure that our research efforts are targeted to the highest priorities and that each agency knows what the other agency is doing.

As Dr. Foley said, he is chairing one of the committees on toxics. I am chairing one of the subcommittees on risk. I think we both feel that these are very effective mechanisms for getting people from different agencies together to discuss the programs and to reach agreement on who is doing what and where these programs should be headed.

Senator REID. And do some coordination?

Dr. SCHAEFER. Absolutely.

Senator REID. Do you agree, Dr. Foley?

Dr. FOLEY. Yes, I do. I think that is one of the major benefits we will see from participation in the subcommittees.

Senator REID. Dr. Foley, it has been said that EPA is currently unable to attract and nurture a sufficient number of qualified scientists.

Do you know the current breakdown of those that are in-house and those that are contractors?

Dr. FOLEY. Working within our laboratories, we have more than 1,100 scientists across ORD. The on-site contractor work force in the same laboratories is a little more than 1,000. So there appears to be about a 50/50 ratio across the organization, roughly.

Senator REID. What do you think the breakdown should be?

Dr. FOLEY. Looking at the contractor conversion effort that was part of the President's budget, and looking at what we have and what we felt would be better done by Federal staff, the numbers should be more like 75 percent Federal scientists and 25 percent contractor scientists at our labs. That was our estimate. So with the contractor conversion coming in the fiscal year 1995 budget, we will be taking a step in that direction, but it is only a partial step.

Senator REID. I would agree with the direction. In this and other areas, we have to be careful with the downsizing of Government that we don't just play with numbers. It is easy to have less Federal employees if you contract all the work out. But you don't accomplish anything. In most areas, it is a negative factor. I just point this out.

Also, Dr. Foley, some say that EPA is currently too reliant on outside contractors. You have indicated that maybe that is the case with its R&D function.

Would you agree that this is particularly difficult when we in Government have an oversight function? It is difficult sometimes to have that oversight function done by outsiders. Do you follow what I mean?

Dr. FOLEY. Yes.

Senator REID. Would you agree that that is a problem?

Dr. FOLEY. Yes. We recognize that there are quite a number of inherently governmental functions and places where you want to have Federal expertise. We do base our recommendations on that.

We also recognize that we need to work more with academia than we have in the past.

Senator REID. For example, grant-writing—we shouldn't have outside people involved in that, should we?

Dr. FOLEY. Grant writing?

Senator REID. In some cases, I have been told that we have a situation where inherently Government functions, such as oversight and grant-writing, are being carried out by outside contractors.

Dr. FOLEY. We have been working very hard to make sure that that doesn't occur at all, but it does put an additional burden on the current Federal work force. We recognize that it is unacceptable to have that happening.

Senator REID. One of the concerns is that EPA's lab reorganization proposal provides for an increase in extramural competitive peer review research from approximately \$20 million this year to \$100 million after the lab reorganization. The concern is, from where will this extra money come?

Dr. FOLEY. We intend to make that shift within the base of our work, which would mean that there would be less money for contracting and more money for these extramural competitive grants within our base.

Senator REID. EPA has been working on a risk assessment of dioxin. As I understand, that report is still under review, but let me ask you a few questions anyway.

Why was dioxin, in particular, chosen for this review? Do you intend for this risk assessment to serve as a model for other substances?

Dr. FOLEY. I don't know that I can answer the first question.

Senator REID. Would you see if you could gather the information and submit it in writing, then?

Dr. FOLEY. Yes, I will do that.

[The information requested follows:]

Question. Why was dioxin chosen for this review? Do you intend for this risk assessment to serve as a model for other substances?

Answer: The EPA has been involved in the assessment of the health and ecological effects of dioxin and related compounds since the early 1980s. The latest reassessment, begun in May 1991, was in part stimulated by the recognition that dioxin and related compounds would continue to be important substances when considering regulatory actions, particularly in the air, water, and waste programs. In addition, two scientific advances caused us to reconsider reexamining our position. The first was an October 1990 meeting at the Banbury Center in Cold Spring Harbor, New York, at which some 30 prominent experts discussed the probable processes through which dioxin causes toxic effects in humans and animals. Included in this discussion, was new information on mechanisms of toxic action, toxicity equivalence of members of the chemical class, levels of the compounds in the general population and in more highly exposed special populations, and new data suggesting the poten-

tial for additional adverse effects in people and laboratory animals. It was agreed that these data would be critical for the development of a biologically-based understanding of the responses to exposure to dioxin and related compounds, as suggested by the EPA Science Advisory Board (SAB) in 1989, in its advice to the Agency regarding future evaluation of these compounds. The second was the January 1991 publication of a major National Institute for Occupational Safety and Health (NIOSH) study of cancer mortality in U.S. chemical workers exposed to dioxin.

Although the reassessment is not yet complete, it appears that the approach taken has resulted in a significant understanding of the issues under discussion by all involved, and has been well received. In this sense, the approach used in this reassessment of dioxin and related compounds can serve as a model for the assessment of other substances. The dioxin reassessment has been noteworthy in its openness and participatory nature. It has involved a large segment of the expert scientific community as authors and reviewers. From the outset, it has used public comment and participation from various stakeholders—industry, environmental groups, veterans, Native Americans, and others—to frame the issues and assure that all points of view were considered. It also fostered extensive collaboration in data development, writing and review across the Federal agencies with an interest in dioxin.

Senator REID. Do you know when the dioxin study will be released?

Dr. FOLEY. Yes. We expect to make a decision by the end of the week on the release date. Right now, we are looking at August 15th for the release date of an extramural review draft of the document. But we will be making that decision finally by the end of the week.

Senator REID. We have been looking at the reauthorization of TSCA. One area that a number of witnesses have discussed is pollution prevention and the need to bring that more directly to TSCA. I know the EPA Office of Prevention, Pesticides, and Toxic Substances has been working with the industry on several pollution prevention efforts.

I would like to know what work ORD is doing to enhance or improve pollution prevention.

Dr. FOLEY. I mentioned that we have a number of guiding principles the Administrator has set for all offices within the agency to adopt and build into everything we do. Pollution prevention is one of those guiding principles.

In our research that focuses on how to prevent risks—a risk reduction and risk management type of approach—pollution prevention is a very fundamental part of that. We are moving more and more to funding projects like that. In addition, the environmental technology initiative that we have undertaken as a presidential initiative is trying to promote pollution prevention wherever possible as the approach for dealing with activities.

So it is a major guiding theme for ORD, but also for the rest of the agency.

Senator REID. I appreciate that.

We see now coming into the room Dr. Genevieve Matanoski, who is the chairman of the Science Advisory Board.

Would you come forward, please? We have been waiting with bated breath for you. We appreciate your being here. On this panel has been Dr. Foley and Dr. Schaefer. We have basically completed the questions of them and we would ask you to give your opening statement and then we may have a question or two for you.

I appreciate your being here.

**STATEMENT OF GENEVIEVE MATANOSKI, CHAIRMAN,
SCIENCE ADVISORY BOARD**

Dr. MATANOSKI. I am Genevieve Matanoski, professor of Epidemiology of Johns Hopkins School of Public Health in Baltimore, Maryland and Chair of the Science Advisory Board.

Senator REID. Johns Hopkins had to be happy with U.S. News and World Report last week about being ranked number one in basic medical care in the country.

Dr. MATANOSKI. Yes, and the School of Public Health was also rated number one.

Senator REID. That is great.

How big is the hospital? How many beds? Do you know?

Dr. MATANOSKI. It is approximately 200. It is not a very big hospital.

Senator REID. Please, proceed.

Dr. MATANOSKI. I would like to indicate that I am testifying today as an individual. I have to because none of my testimony has actually been cleared by the Science Advisory Board.

Senator REID. The record will reflect that.

Dr. MATANOSKI. I would like to indicate that the Science Advisory Board has been established under the 1976 ERDDA and it is an independent body of scientists who are basically there to provide advice and review the scientific information which is the basis for EPA's activities. These reviews include an evaluation of how the agency conducts their scientific research as well as how the EPA uses the science in regulations. So we actually serve two functions, both a peer review function and a scientific evaluation and advice function.

I think the experiment has been quite successful. It has been growing in size and activities over time and now consists of over 100 members and about 10 committees, which is coordinated by the executive committee, and I Chair that committee. There are many additional scientists who serve as consultants for specific reviews because the extent of EPA's activities are so broad that even 100 scientists could not cover all the things in depth.

The committees hold about 60 public meetings a year and generate more than 30 reports annually. So we are an active body and we have a budget of about \$2 million, which sounds like a lot but for that much activity it is pretty cheap.

Over the years, the board has played an expanding role in review of many controversial scientific and technical issues. They have been asked recently, especially, to take on some additional activities both from the agency as well as from Congress, which is kind of a new direction for the board. The Science Advisory Board has reviewed the science basis for health risks from environmental tobacco smoke, from radon in drinking water, and from electromagnetic fields. We don't always come down on the same level of approval or disapproval in terms of what the agency has done, but I think we have done a relatively independent scientific review and it provides a public forum for debate on the science which has gone on within the agency.

We have in the last several months undertaken a reinvention review of the Science Advisory Board itself. When that is complete, I would be glad to share it with the Senate or any other Members

of Congress who would be interested in it. It is not quite complete at the present time. We felt that was important because we have been in existence for almost 2 decades and there have been very few reviews of what we actually have been doing and how we could do our job better. We think that we will come up with even a better Science Advisory Board when we are done.

In regard to the proposed legislation, I applaud the thrusts which have been indicated, especially as they relate to the Science Advisory Board, and they certainly fit with the mission and vision of the board. I am confident that the board stands ready to help you in any way that we can in terms of fulfilling your goals.

The bill, S. 1545, contains several areas in which the Science Advisory Board is explicitly designated as the agent for external peer review of certain agency reports to Congress. In so doing, Congress indicates the importance it attaches to the technical soundness of the reports which are under discussion. However, there are many technical reports which must be reviewed, both from the standpoint of EPA and for Congress, and some of those are not specified as to how they should be reviewed. You might want to take that under consideration.

At the same time, I am sensitive to the fact that the resources of the Science Advisory Board cannot possibly review everything we have on our plate. At the present time, we review about one-third of what is actually offered to us. But there are other mechanisms by which adequate peer review can take place and we would ask that the Congress be prepared to accept that if the Science Advisory Board felt that additional or different types of peer review were acceptable to the Congress as well as EPA that that would be something that would take place. In fact, at the present time, the EPA is expanding their actual activities within the area of peer review to look at how it might best be done.

Therefore, I would like to propose that we would at least have a right of refusal because we would be overburdened by undertaking too many activities for peer review and that we would designate appropriate people or groups of people to do that peer review, if necessary.

Other than that, I have no further comments.

Senator REID. Thank you very much.

This legislation requires EPA to conduct basic research in a number of specific program areas, including pesticide research, lead research, environmental monitoring and assessment program, and the national human exposure assessment survey.

With these particular programs, do you have a comment on the strengths and weaknesses of the direction?

Dr. MATANOSKI. We have reviewed the activities within the laboratory and just recently we have reviewed the Mitre report on the laboratories themselves. The Science Advisory Board, in general, has always been supportive of the laboratory activities in all areas in EPA. Obviously, there are no set of laboratories which can conduct all the scientific research that goes into the regulations, so some is done on the outside and some is done under contract to EPA.

But in general, that science which is done within the agency has been very well done. The only criticisms we frequently have is that

the laboratory is often given too many short-term kinds of goals and they don't have a long-term type of commitment for many of their activities, which is difficult for a scientist to carry out, but is part of the activities of the agency itself. But in general, there has never been any problems from that standpoint.

The management of the laboratory has been the primary problem that the Science Advisory Board has seen, not at the local level, but it is very heavily connected to the management at the administrative level in Washington. What we think might help better—and as the Administrator has indicated is probably the direction they will be going—is to provide more local types of administration and management of their own program.

Senator REID. In talking about this Mitre report, which was critical of EPA's research laboratories, SAB and EPA have either responded or are planning to respond.

What are the merits of the criticism, from your personal perspective, raised by the report? What can be done to respond to these issues?

Dr. MATANOSKI. We have heard recently at our recent meeting of the Science Advisory Board some of the plans for implementation for changes in the laboratory. The board was extremely enthusiastic about those plans. They include a restructuring to allow more local management of the actual programs themselves in a gradual way within the laboratories. That certainly is strong.

The laboratories need to build a scientific basis that has some input from the outside. That was proposed in terms of research agendas that would go, perhaps, to universities or other outside groups under the supervision of the laboratories. That, too, is a very strong program.

And the idea of building "young blood" to come into the laboratories and build the scientific research through fellowship programs and through visiting scientists kinds of programs is a very strong step forward.

So in general, we saw something that would definitely strengthen the laboratories in most of their endeavors.

Senator REID. Could I have the panel respond to this final question? Each of you can respond.

The environmental monitoring and assessment program requires EPA to collect data. Is this an appropriate function for its Office of Research and Development?

Dr. Foley?

Dr. FOLEY. The EMAP program, currently as we are operating it, is in its research phase. The research phase consists of doing research to identify appropriate indicators, to identify how to take those indicators to the field and do sampling, and ascertaining whether you can get the information using these indicators and, using a various grid approach and sampling frequency. We are in the research phase to really identify what needs to be done.

Where the work will be done once it becomes routine and operational has not yet been determined.

Senator REID. Dr. Schaefer, do you have a comment?

Dr. SCHAEFER. Yes. One of the biggest weaknesses we have had in environmental research is the quality of our data on the ecological environment. EMAP, together with the national biological sur-

vey at Interior I think can go a long way toward addressing that problem. One thing we are trying to do in the executive office is make sure that the programs are well integrated and complementary and not overlapping. That is the only issue we have been watching, but we think the EMAP program is very important and we would like to see it continue at EPA.

Dr. MATANOSKI. From the standpoint of an epidemiologist as well as the Chairman of the Science Advisory Board, this is one of the important activities of EPA. Should it be based in EPA? It has to be based in a group in which there is some interest in collecting this data for the long term. I think EPA appropriately collects the data as a regulatory agency as well as now a research arm to that activity.

If we didn't have that data, we would be in the same situation we are right now, which is that local areas tend to collect their own data for a single project. That is a very expensive proposition and does not allow us any opportunity to be able to see something that is not normally detected. We have to continue to keep up a surveillance to try to find out if there is anything going on that we're not looking for on a regular basis. That is a job which has to be done constantly by the agency, which most likely would be the agency which will be regulating in the future because they know the questions to be asked of that data.

Senator REID. Thank you very much. We appreciate each of your being here.

Dr. Matanoski, earlier today the chairman of the full committee, Senator Baucus, and Senator Lieberman were here. They are not here now because of the press of other matters; however, their staffs and the staffs of other members of this committee are here. Your testimony is very important to us in order to develop a bill that we can put on the Senate floor.

Thank you all very much for being here.

Senator REID. Our next panel will consist of Dr. Allan Ford, Director, Gulf Coast Hazardous Substance Research Center, Lamar University; Dr. William Glaze, Professor and Chairman, Department of Environmental Sciences and Engineering, University of North Carolina, Chapel Hill; and Mr. Ralph DeGennaro, Director of Appropriations Projects, Friends of the Earth.

Please, be seated.

We will first hear from Dr. Ford of Lamar University. As indicated earlier, if you could hold your testimony to around 5 minutes, we would appreciate it. We have a series of questions we would like to ask each of you.

Dr. Ford?

STATEMENT OF ALLAN FORD, DIRECTOR, GULF COAST HAZARDOUS SUBSTANCE RESEARCH CENTER, LAMAR UNIVERSITY

Dr. FORD. Thank you, Mr. Chairman. Thank you for inviting me here today.

While I am here as a private individual, it is important to note that I am a research professor at Lamar University and operate a research program of eight gulf coast universities particularly funded by EPA as well as the State of Texas and private industry. I

am retired as director of Monsanto Company's Environmental Sciences Center, a large industrial environmental R&D facility. I am also very active within the American Chemical Society. I Chair their Committee on Environmental Improvement, which sets most of their public policies in environmental areas.

I will borrow liberally from ACS policy statements, but again, I do not represent ACS and will depart from their official policy statements in substantial ways.

I tend to advocate a free market environmentalism. I hope that can become clear as we go along. I think that somehow or another we are going to have to bring the public into our environmental paradigm.

It is a particular concern to me that many long-term environmental impacts are not addressable with current technology. We are living in a world that is growing more people than it can support. With a current population of 5.5 billion people, current trends suggest that we may get to 10 billion people in 30 to 40 years.

Senator REID. Let me just interrupt. I don't like to do that, but I know that I have my friend here from Friends of Earth.

I have been concerned about population problems in the United States. We have about 1.5 million new people come here every year. This is in addition to the people who are born here every year. I think it is a serious problem not only with our illegal immigration but I think we have to take a look at the number of people we allow to immigrate here legally. There are 1.5 million new people every year in addition to the ordinary growth, and that is significant.

I wrote what I thought was a good letter of 3 pages laying out the problems I felt we were having in this country, not the world—we all know the problems of world population—to approximately 80 environmental groups around the country indicating that I thought this was something on which they should take a position. I got a letter back from one of the 80 letters we wrote. The rest of them must have thrown my letter in the garbage.

I was extremely disappointed. I would rather that someone had written back and said, "Your legislation is a piece of garbage," rather than simply being ignored. I agree with you that this population explosion around the world, of which we are getting our share, is the most significant problem we have facing our country and the world. Problems with infrastructure, sewers, water supplies, highways, bridges—maybe tomorrow, if not next week, we are going to take up on the Senate floor Interior appropriations. This deals with many things, but one of the things we deal with is our forests, our park system, fish and wildlife refuges. The problem with those is that we have too many people that have just overburdened these areas we have set aside. We just totally ignore the fact that the problem is too many people.

In Las Vegas, Lake Mead Recreation Area—we had 9 million people visit that last year.

I agree with you.

Dr. FORD. I know you have championed this issue. That is one of the reasons I highlighted it. I very much applaud your interest.

Senator REID. I wish someone else was interested. That is the problem.

Dr. FORD. All of us need to work on population issues.

There is, however, a concurrent trend that has significant environmental impact. The world is getting more democratic. More societies are coming to have some say in determining their quality of life. Movement to democracy in countries from Argentina to Russia has allowed more voters to impact their own quality of life. In addition, improvement in communications world-wide have allowed people in countries without elected government to view more progressive societies. This has caused non-elected governments to likewise exhibit an intent to improve the quality of life for their people.

When I talk about quality of life, I talk about things that are manufactured. I talk about foodstuffs. Certainly, the environment figures into that, too. But there are a multitude of things within the quality of life. In this kind of atmosphere, few governments are going to be able to accept a lower quality of life—or lower standard of living, however you want to put it—for their citizenry. But if we are to have a long-term future, we must be able to provide some quality of life that is acceptable to the public without unduly damaging the environment.

Certainly, a clean environment is a component, but just a component. There is little evidence of any general rule that the production of goods and services needs to entail high risk to the environment. I say that with emphasis. On the contrary, agricultural chemicals are less toxic and less persistent than they were a generation ago. But with this big increase in population, we need to go much further. Few manufacturing operations in the United States have not developed a technology for drastically reducing environmental risk from their operations. The lowering of environmental risk is truly a success story for both EPA and American industry. It is done through research and development—R&D—with regulatory incentives.

I want to say just a word about the utility of EPA's R&D facilities as an industrial R&D director. Technology developed at EPA laboratories are available to industry in a variety of ways—through publications, cooperative agreements, and various contracts. While I was the director of Monsanto Company's Environmental Sciences Center, I had a number of interactions with EPA's R&D facilities, which I would like to describe for you.

For example, I used to visit EPA's Las Vegas lab. Dr. Ronald Mitchum ran part of that facility at that time during the dioxin crisis of the middle 1980s. Much of the analytical work we did within Monsanto was done with interaction with the EPA's Las Vegas laboratory. It saved us tremendous amounts of money and hopefully it helped EPA out, too, since they better understood our problems.

When we were trying to develop better effluent guidelines internal to our company, I was able to have one of my staff, Dr. John Doy, do a sabbatical in EPA's Duluth laboratory. He came back understanding enough to give Monsanto Company a program.

At one time, we felt our waste site remediation program would benefit from an understanding of bioremediation. So I spent a lot of time at Dr. Robert Mentzer's Gulf Breeze, Florida laboratory trying to understand that. We did a lot of life cycle work with EPA's Cincinnati laboratory. Finally, several years ago I started work with a colleague in EPA, Dr. Joseph Breen, in putting together a

pollution prevention program for an American Chemical Society meeting. In Washington, D.C. next month we will have probably the largest pollution prevention designed for the environment type of scientific conference in the world.

It is not possible for a research director from Monsanto Company to go over and sit down in DuPont's laboratories. That just doesn't happen. When you go out and deal with academia, you are dealing with a fairly narrow expertise. This is very valuable, but it is a very narrow expertise. So from a research director's viewpoint, being able to go to an EPA laboratory, which is inherently multidisciplinary, and sit down and talk with a lot of different kinds of people is very, very valuable. Since this crosses a number of industrial firms, it is very valuable to us.

To summarize very quickly, I think that somehow or another we are going to have to come to a research-led Environmental Protection Agency which supports an industry which is both environmentally benign and can compete in the world marketplace. In a world marketplace, if we can invent technologies that do not pollute, I think there is enough interest among world societies to make our products more valuable than German products, Brazilian products, or whatever. The key to it is a good, healthy R&D operation.

With that, I will yield to my colleagues.

Senator REID. Dr. Glaze?

STATEMENT OF WILLIAM H. GLAZE, PROFESSOR, SCHOOL OF PUBLIC HEALTH, UNIVERSITY OF NORTH CAROLINA, CHAPEL HILL, AND CHAIRMAN, DEPARTMENT OF ENVIRONMENTAL SCIENCES AND ENGINEERING

Dr. GLAZE. Thank you, Mr. Chairman.

I appreciate the opportunity to be here today. As you said before, I am a professor at the School of Public Health at the University of North Carolina and Chair of the Department of Environmental Sciences and Engineering, which I might mention is soon to celebrate its 75th anniversary as one of the oldest and most comprehensive programs of its type in the country.

May I mention also that I am editor of Environmental Science and Technology, which is the premier publication in that field, sponsored by the American Chemical Society but an independent research publication. I am also a former member of the Science Advisory Board of EPA, the executive committee as well as the chair of the Drinking Water Committee.

Senator REID. What is your academic background?

Dr. GLAZE. I am a chemist. My degrees are from the University of Wisconsin.

I would like to say, Mr. Chairman, that in my opinion this country does not have the institutionalized environmental research apparatus that it needs to adequately protect public health, preserve the environment, and encourage sustainable economic development. As others have said before, the United States environmental R&D apparatus is fragmented, uncoordinated, and poorly structured to deal with complex, interdisciplinary research.

I and my colleagues are particularly concerned that there is so little support for exploratory or basic research in the environmental

area and so little support for students who will be the environmental professionals of the future. Basic research is particularly important in the environmental field because the systems that we work on are so complex and relatively unexplored. I am sure that the chairman realizes that until recently this country had no comprehensive research program that explored the complex relationship between human civilization and environmental quality. Until recently, we had very little systematically derived information on the occurrence of contaminants in water, air, and soil.

More importantly, we are just now learning about the mechanisms and processes that operate in the natural ecosystems that account for transport and transformation of natural and anthropogenic substances on the planet and that are responsible for the effect of these substances on living species. The more we delve into these process, the more appreciate how complex they are.

Our present environmental management structure, based on command and control strategy, quite naturally places a high degree of emphasis on action, even in the absence of complete understanding about the system to be managed. Indeed, there are many who seem to feel that complete knowledge of the system is not needed, that environmental action can be effected even in ignorance. While this is viewed by some as true, it is true only on a superficial level. This position cannot be maintained indefinitely. It is simply not profitable to manage this complex civilization and protect nature without further information on how the system works.

To use an analogy from the medical field, the history of environmental protection is replete with examples of how we tried to fix the patient without having a good understanding of the anatomy, prescribed drugs that were in fact toxins, and in the process ran up an extraordinary bill that the public had to pay.

Mr. Chairman, I have in my testimony made some specific suggestions with regard to EPA's role in the Nation's environmental R&D apparatus. I will not go through those in detail. They are there for your critical review. I would like to say, however, that the points I am making are, in brief, that EPA needs to separate its R&D establishment at least in part from its program offices. It needs to reward its scientists and engineers more.

And it needs to structure its R&D apparatus in such a way that it makes better utilization of the people who are in the external community, particularly in academia, but also in other places such as national laboratories, and to create a climate within EPA where the people who are in the laboratories—line scientists and engineers—are respected and given the appropriate kinds of rewards. It means respect and intellectual freedom to pursue research in the way it is done in the best places in the world. We do not find that in abundance in EPA laboratories at the present time.

Moreover, research administration at EPA needs to be revamped. It needs to be revamped in a way where there is better peer review, where the people who are administering it are actually scientists, engineers, and policy analysts in their own right, and who are not interested in staying in those positions indefinitely. In fact, the system should be set up for them to rotate back out into the external community, and in that way to make EPA's R&D establishment more robust.

Finally, we need a better apparatus within our R&D establishment to encourage the support of new environmental professionals, that is, students. I am pleased to see that there is in the bill under discussion some provision for graduate assistance. My feeling is that this program needs to be substantially expanded. There really are not appropriate and sufficient programs within the Federal establishment to support talented young people who want to go into the environmental field. Only approximately 60 percent of the students in our department are supported at the present time and many of them are supported inadequately. These are all graduate students who are pursuing their degrees. Of course, we are then in competition with other fields of science where more substantial support is available.

All I would say is that that means that in the long run we are not getting talented people into the field that we would get and that we desperately need.

Thank you very much for the opportunity to appear before you today.

Senator REID. Thank you very much for taking the time to be with us.

Mr. DeGennaro?

STATEMENT OF RALPH DeGENNARO, DIRECTOR, APPROPRIATIONS PROJECTS, FRIENDS OF THE EARTH

Mr. DeGENNARO. Thank you very much, Mr. Chairman, for the opportunity to testify here today.

Senator REID. You are our money expert today.

Mr. DeGENNARO. Yes. I will not pretend to be a scientist. I think I know a lot about the Federal budget. I have also testified twice on EPA R&D before the House Science, Space, and Technology Committee. So I have followed the debate over the years.

I am testifying today on behalf of the 15,000 members and supporters of Friends of the Earth.

Senator REID. I don't think they answered my letter either.

Mr. DeGENNARO. On immigration—it is a good question. I was yelled at 2 weeks ago by somebody because environmentalists have been advocating some of the positions you have mentioned here today. I intend to look into it because it is an interesting debate. I personally have not been involved, but it is a very interesting debate.

At Friends of the Earth, I have served as director of the appropriations project since 1990. It is a project which is unique in the environmental community in that it focuses solely on Federal budget issues. Our mission is to achieve adequate Federal funding for Federal environmental programs and to reduce environmentally harmful spending and subsidies.

In January of 1993, Friends of the Earth published the Earth Budget report, which I coauthored, a first-ever comprehensive survey of Federal spending on the environment in virtually every Federal agency, everything from Amtrak to Antarctica, Boston Harbor to the ozone layer.

Friends of the Earth supports most of the provisions of S. 1545 as introduced. We urge swift enactment of this legislation authorizing the basic and fundamental R&D programs of EPA.

Because the press of business is such in Congress that it is unlikely that this committee or the Congress can take the time to do annual authorization bills, we would strongly urge that you do a multi-year authorization bill, as provided in your bill as introduced, rather than a 1-year authorization bill, as the House has approved. I think a 1-year authorization sets itself up for a situation where, even if we get a bill through this year, we are going to spend another 5 or 10 years without another authorization. We need to have a multi-year authorization, keep it simple, and then allow the committee to have the time to do the right oversight and maybe to think in a bigger way about some of the points raised by Dr. Glaze, which are excellent.

Because I represent an organization which is known as "wet-eyed tree huggers", I would like to emphasize that EPA R&D should not be controversial. I would like to go back to 1984. In 1984, a letter was written to Congressman Edward Boland, who was then chairman of the House Appropriations Subcommittee on VA, HUD, and Independent Agencies, the subcommittee now chaired by Representative Louis Stokes. The letter strongly urged him to provide a substantial increase for EPA R&D in fiscal year 1985. The letter said:

The reason for presenting this recommendation to you is our deep concern that the scientific base on which the agency's regulatory decisions are founded has been seriously eroded in recent years by severe cuts in the R&D budget of EPA.

The letter observed that EPA needed additional resources to both meet existing statutory duties and address long-neglected problems, such as indoor air pollution, risk assessment methodology, health and environmental effects assessment, and support of scientific work in external research and academic centers. These are the same needs that we talk about today, 10 years later.

The letter said that the added dollars would buy benefits such as "improved health and environmental quality, better based regulations for industry, and increase the development of scientific expertise in technical and academic centers in the private sector".

The most important thing about this letter was not what it said, but who signed it. It was signed by the leaders of 10 major environmental groups, but also by the CEOs of five major chemical companies, including Exxon Chemical Corporation, Dow, American Cyanamid, Monsanto, and Union Carbide.

The point here is that more, better environmental R&D makes good, smart environmental policy that is good for everybody.

I would like to emphasize that more funding is needed for R&D. Funding for conduct of R&D at EPA was cut by 50 percent between fiscal year 1978 and fiscal year 1983. It has never really recovered. Recent incremental increases have been inadequate.

The Carnegie Commission report of 1992 said:

It is clear that organizational changes alone will not lead to improvements in the scientific capacity of EPA. Substantial funding increases will be required as well.

The National Commission on the Environment, in a respected report, *Choosing a Sustainable Future*, published in 1992 recommended that, "... the Federal Government should substantially increase funding for R&D."

The Science Advisory Board at EPA reviewed the President's budget request for fiscal year 1995 just months ago and expressed concern about the long-term erosion that has occurred in the level of the agency's R&D activities. According to SAB, "EPA's R&D budget has declined, measured in real dollars, from \$460 million in fiscal year 1980 to \$440 million in fiscal year 1995. That is a real decline of 4 percent since fiscal year 1980."

I would like to turn to the very back page of my testimony. I am used to seeing these numbers and these surprise even me.

In the same 1980-95 period, according to the American Association for the Advancement of Science, using the same constant dollars, defense R&D increased from \$21.8 billion to \$30.4 billion, a real increase of 39 percent. So defense R&D went up by 39 percent during the same period when EPA R&D went down by 4 percent. Surely our Nation can afford a little more money for important environmental research.

I will just hit a couple of quick highlights here.

To the extent that the Committee on Environment and Public Works can become involved in the appropriations process being an advocate for the program and research operations account in the EPA budget, the salaries and expenses account—we believe that this would have an enormous benefit in terms of improving management at EPA. The EPA deserves a lot of credit this year for proposing Administrator Browner's contractor conversion initiative. The reality, though, is that the Appropriations Committee has reduced the account in the bill approved last week and it remains to be seen what is going to come out of conference.

Something like salaries and expenses at EPA is one of these boring issues that no single Member of Congress is going to champion. It would be extremely helpful if the Committee on Environment and Public Works could perhaps adopt this as a pet cause. I think that would do an enormous amount for EPA's R&D management.

Finally, I would just like to call to your attention the macro budget issues. We are having a fundamental debate about the role of Government in this country. This year, we saw cuts in discretionary spending. We need to understand that no matter what this committee does with authorization levels on EPA R&D, that could be a lot less important than congressional actions on things like overall levels of discretionary spending, entitlement reform, deficit reduction, and health care cost containment. Unless we can get our fiscal house in order here, we are not going to have the money to invest in anything, be it defense R&D or EPA R&D.

I think everyone who receives money from the EPA for research, everyone who supports EPA research, needs to begin to admit that they like Government, that they believe in discretionary spending, that they want our Nation to invest in the future. We need to start fighting for that or this will all be gone in 10 or 15 years.

Senator REID. Let me just interrupt and say that you have given the same speech I give at town hall meetings, to high school students, college students—whoever will listen. I think you have said a lot.

I believe that what has happened in this country, in the last 15 years, to cause people to dislike their Government has come from a number of different sources and has been caused by us with all

the negative campaigning. Finally people have said, "I guess you are right. I guess you are all bad."

As a result of that, there is a general dissatisfaction with anything the Government is connected with. I think it is up to us and people like you to, in effect, reeducate the American public that they are stuck with Government anyway and they may as well join in and try to make it better rather than to constantly criticize.

Since 1980, domestic discretionary spending in America has gone from 25 percent of all the dollars we spend to less than 12 percent, and it is going down all the time. We have less and less money to spend as a percentage, but we are spending it on other things. As a result of that, NIH is having tremendous difficulty giving their research grants. Only a small percentage of the good grants are allowed to be funded. This is the same as Dr. Glaze indicated. We have graduate students who should be conducting research who are not because they can't support themselves.

We have this entitlement commission of which I am a member. We are supposed to report to the President by December 20th with ways that entitlements can be stabilized or that we can rearrange taxes or both. So I appreciate your talking about some of these things that are very boring to talk about. It is much easier to talk about a B-2 bomber than it is about somebody doing research at the University of North Carolina on butterflies, or something of that nature.

Mr. DEGENNARO. Mr. Chairman, the vision that would unite both the advocates of the B-2 bomber and of EPA R&D is the need to invest in the future. I am hoping that later this year various advocates of discretionary programs, which represent most of our investment budget, can come together and begin to talk about the need for that kind of investment, and also give some political support to those of you on the Entitlement Reform Commission and send a message that there are people out here who are concerned about the fact that entitlements could eat the lunch of everything else in the budget. We need to support you in your efforts to something about this. I know it is a lonely commission to be on.

Senator REID. What steps should ORD take to support and enhance pollution prevention efforts?

I would like to hear from all three panelists on this.

What steps should ORD take to support and enhance pollution prevention efforts? If you have already talked about it, let's talk about it again.

Dr. GLAZE. In my opinion, there are some initiatives that are on the board now that have not really been implemented that would be very beneficial, namely the collaboration between EPA, NSF, and NIST in ventures which will bring in industry, academic people, and Government people into teams which will carry out research which is directed toward that goal.

The real problem, as you know, Mr. Chairman, in carrying out such research is the proprietary issue. Pollution prevention very often involves getting into the nitty gritty of how to solve a particular problem at a particular site and there are definitely proprietary issues involved there.

But still it should be done and it can be done. There are long range issues, for example, catalyst development which would allow

us to get to new products or new processes which will replace the dirty ones that we have today. Fundamental research of that type is absolutely necessary, but very often could not be handled just by EPA because they don't have the contacts with the fundamental science community which is able to do that kind of work. So we need teamwork. We need teamwork at the Federal agency level and we need teamwork with industry and academia.

Senator REID. Dr. Ford?

Dr. FORD. It is a particularly interesting issue to me, coming from a big company. We have talked about this for years.

Certainly there are things that need to be done. There need to be new unit operations, new solvent systems, and things like this. I think we all know about those things. But there are some systematic things that need to be done, too.

If I were in a big company today, and I wanted to make my stockholders happy and make some money, I would go out and look for a commodity chemical market—maybe aspirin or something like that where you have a high end-of-pipe pollution control cost—in the commodity market, everybody has about the same process, everybody makes a thin dime and makes a few dollars, nobody upsets the apple cart. I would develop a whole new process that didn't have these end-of-pipe costs. Right away that market would be mine because there is no reason why a chemical process needs to pollute. There is nothing inherent in it. We have not discovered how to make these kind of process chemistries, and that is where we need to be. There ought to be some kinds of tax incentives, regulatory incentives, and so forth for moving in this direction. The opportunity is there.

Senator REID. Mr. DeGennaro?

Mr. DEGENNARO. I have nothing to add, Mr. Chairman.

Senator REID. Dr. Ford, during your career, you have worked both in industry and in the academic world. In your testimony you mentioned that you have worked with several EPA labs, including the one in Nevada.

How do you compare the EPA labs to academic and industry labs?

Dr. FORD. As I said earlier, they are multi-disciplinary, so they are very friendly to industrial people. The real weakness is that they haven't had the money over the years.

Mr. DeGennaro made some comments about the budget over time. It is my understanding that they have been flat budgeted since about 1980. Before that they had taken some hits. But of equal importance is the fact that the overall EPA budget has been going up. If I were trying to operate a company where R&D as a percentage of my budget were going down, I don't think anybody would buy my stock.

And that is what is happening here. It is becoming a less important function within EPA.

As Dr. Glaze said, there needs to be at each EPA laboratory a group of nationally known scientists. At one time I could go through each EPA laboratory and I could talk about people who had a national reputation. A lot of these people have retired and have not been replaced. A lot of people just haven't had the funding and have gone off some place else.

This needs to be changed and there needs to be a separate management track for scientific people. Within a big company, you have a managerial track for people to rise and you have a scientific track. It is very important for these people. When I was at Monsanto, I had one person working for me that outranked me, in a managerial sense.

Senator REID. Dr. Ford, what is your academic background?

Dr. FORD. I have a Ph.D. in chemistry, my undergraduate work at Iowa State and my Ph.D. at Kansas State.

Senator REID. Again using your background in industry, do you believe that private industry would be willing to share the cost of doing research that would ensure a sounder scientific basis for improving the end product, as you have talked about it?

Dr. FORD. Certainly. We funded things in a number of academic laboratories.

Right now, I think there is a system starting where industry and EPA are getting together and sharing costs on some very important remediation problems. It is an organization called RTDF that is starting to put together something called electroendosmosis, an electronic remediation technology. This kind of thing needs to be encouraged and needs to move on.

You always have antitrust problems when big companies get together. I think the collaborations with EPA offer the opportunity for getting around that.

Senator REID. The environmental monitoring and assessment program and the national human exposure assessment survey require the Office of Research and Development to collect data and develop methodologies and protocols.

Dr. Glaze, while I agree that developing methodologies and protocols is a good use of ORD's resources, I am not sure if the data collection component is a proper research and development function.

What are your thoughts?

Dr. GLAZE. It is a part of the research function. The problem is that EMAP and perhaps other programs of that type have focused perhaps too much on simple data collection, in which case it is largely an administrative matter, and less on what is going to be done with that data. That is the key to this. It can very well become an appropriate research function. Indeed, both of these efforts are needed, but the analysis of that data—particularly in EMAP—is going to be where the rubber hits the road. That is where EPA, so far, has not been forthcoming about how that process is going to take place.

In my opinion, EMAP is a needed program, but what has been described so far—as you have said—is not research in that it is not a full complement of research involving analysis and synthesis of data, rather it is simply collection.

Senator REID. Dr. Ford, as you have already said, it appears that EPA is not currently able to attract highly qualified scientists.

As a scientist, could you give any recommendations to the committee or any incentives that EPA could use to attract and nurture highly qualified scientists?

Dr. FORD. I think it would be interesting to look at this issue of separating tracks, establishing a separate system for encouraging

scientists to stay within the agency. It is not always salary. It is equipment, facilities, opportunity to publish, opportunity to interact with fellow scientists—and I will go as far as to say that if I had to hire a scientist who was only interested in salary, I would probably be making a poor choice.

Senator REID. Dr. Glaze, would you add anything?

Dr. GLAZE. Just to reinforce the things that Dr. Ford has said.

One of the real problems, in my opinion, with the EPA laboratories and the morale of the staff is—at least from the information I have gleaned from talking to them personally—that they are overwhelmed with paperwork. They are supervising contractors; they are supervising external people; they are filling out pieces of paper for transfer of this sample from one place to the other; they are dealing with a tax by the Inspector General; they are covering themselves in so many ways in the pursuit of what someone has defined as their job that they don't have time to do research.

This is demoralizing for people who went into the profession hoping that they would make accomplishments in the area of research.

Mr. DEGENNARO. Mr. Chairman, I would note that the EPA Science Advisory Board, in its review of this year's President's budget request made a similar point to what Dr. Glaze and Dr. Ford just made, that they were spending so much time supervising and administering contractors that they don't have time to do their own scientific work.

Senator REID. What should we do about this?

Mr. DEGENNARO. I think the separate track makes a lot of sense.

Senator REID. The Mitre Corporation recently published a report critical of EPA's research laboratories. We talked about that a little earlier in the hearing.

What are the merits of the criticisms raised by the report and what should be done by the agency to respond?

Dr. Glaze, do you have a comment?

Dr. GLAZE. I think the Mitre report—by the way, I have not read it in detail, I have only read about it—I think it goes in the appropriate direction, asking for efficiency. Some people are saying that the Mitre report may simply be shuffling parts and not really getting at the core issues, some of which I think have been raised here today.

The concept of megalabs which focus on national priorities of research is not a bad idea. I do think that one is concerned that this will be used only as a way to cut personnel. That is to say, Are we really trying to make the research establishment much more effective? Or are we simply looking for ways in which to effect cost cuts?

I think it is the former. I think there is a real effort on the part of EPA to reorganize to become more effective. But frankly I would like to see some structural changes, as we have discussed today, within the agency more than I would like to see the reshuffling.

Senator REID. Section 19 of this legislation requires the Administrator of EPA to identify at least 10 environmental research issues that present the greatest degree of risk and have significant scientific uncertainties concerning their environmental assessment risk assessment.

If you, Dr. Ford, could list two or three items under that, what would you list?

Dr. FORD. To begin with, I like the section because I feel that one thing we have missing in this country is a set of national environmental goals that research can support. You talk about worries over population. I was reading an article coming up on the plane about global cooling.

[Laughter.]

Dr. FORD. Regardless of the argument, the issue is a very important one, whether or not the world is heating up. We do not have a priority list that includes these things subject to some kind of national debate. Maybe this should come out of EPA. Maybe EPA should supervise it. Maybe it should be done here on the Hill. I don't know.

But it seems to me that your section 19 kind of points in this direction. We need to have some kind of priorities.

Certainly I would put air issues on there—global warming, ozone effects, and things like that. I would also worry a lot about bays and estuaries, an area that doesn't get looked into very much in this country. The effects here are going to be seen in third world countries, if not seen already.

Senator REID. Dr. Glaze, would you add anything to Dr. Ford's list?

Dr. GLAZE. I would say that one of the overriding concerns today, which is a vexing question, is, What really are the risks of chemicals not only to human beings but to the environment?

As you know, our decisionmaking in that area is built upon a dogma, a methodology involving animal bioassays, by and large. The fact of the matter is that there is a huge uncertainty associated with that whole area. It relates to the health of the environment, ecosystems, individual species, endangered species, and it relates to human beings.

I have strongly supported, for example, the initiative of the American Water Works Association Research Foundation to develop a better research agenda to address the issues associated with human health and drinking water. I strongly endorse the proposal to integrate health risk assessment as it is carried out by NIH and what goes on in EPA. I hate very much to see, for example, the decline of health-related research within EPA. I think it needs to be enhanced and integrated with ecological research.

After all, some of the same proteins are involved in the cell division of bacteria and our cell division. Some of the biochemistry is very similar. Some of the toxicology is very similar. We need to build a world-class capability in toxicology—eco-toxicology as well as human toxicology—and to integrate those two.

If you talk to the people in industry, you will find that that is one of the biggest problems we have: What are the real risks and how can we improve the methodology for assessing those risks?

Senator REID. The committee appreciates each of your being here today and taking time from your busy schedule to help us with this legislation. We look forward in the years to come to working with each of you.

The committee stands in recess.

[Whereupon, at 11:30 a.m., the committee was adjourned, to reconvene at the call of the Chair.]

[Statements submitted for the record, and the bill S. 1545, follow:]

STATEMENT OF HON. GEORGE E. BROWN, U.S. REPRESENTATIVE FROM THE STATE OF CALIFORNIA

I am pleased to have this opportunity to testify today on your legislation, S. 1545, a bill to authorize the Office of Research and Development at the Environmental Protection Agency. This bill is the companion bill to H.R. 1994, legislation that was reported out of the Science, Space, and Technology Committee, which I chair. The House of Representatives subsequently passed H.R. 1994 in November of last year.

We all know that the nation's environmental awareness in the 1970s, and the subsequent federally supported environmental research, was focused primarily on human health issues.

Over the last 20 years, we have come to a greater understanding and appreciation of the complementarity between human health and the integrity of our diverse ecological systems. A more sophisticated understanding of these interdependent relationships has led to a greater valuation of retaining the healthy state of ecosystem services. Thus, there is a commensurate need to develop similarly holistic environmental policies which protect the ability of the biosphere to provide on a sustainable basis the goods and services to support continuing human activity, not just for today but for future generations.

Current and emerging environmental problems portray, in scale and kind, potentially more cumulative, irreversible environmental effects. Localized environmental problems, naively viewed in isolation, are recognized now as having compounded regional and even global impacts.

The changing nature of environmental problems requires a fundamental change in regulatory philosophy and environmental policies. Beyond command-and-control waste regulations are new paradigms emphasizing pollution prevention with consideration of consumer product life-cycles to minimize waste and optimize energy material efficiency. On this point, I recognize and commend the hard work this Committee has done on S. 978, Environmental Technologies legislation. The House is scheduled to consider our Environmental Technologies initiative later this week.

I believe our objectives also should include the creation of a more innovative and cooperative atmosphere between public and private sectors to achieve the desired outcomes.

The role of R&D to support sound environmental policy and regulatory decision-making is more urgent now than ever before. The changing nature of the complex, cross-media issues we face today, and the promise of new management strategies to address them, require development of increasingly sophisticated models, databases and validations. Several critical areas of research include the development and validation of environmentally sound "green" technologies and of more precise human health and ecological risk assessments. Research can provide a predictive capacity for future environmental issues allowing us time to respond proactively.

An essential element to the improvement of environmental decision-making is the scale and quality of the research that undergirds the policy. To improve the quality of environmental research, the science used must be relevant to an agency's mission and not driven by current political needs. At the same time, it is necessary for science to be an integral component of the agency's mission in order to maximize the effectiveness of the research in supporting that mission.

These bills, I believe, are an important step toward strengthening the scientific base of the EPA. They would direct the Science Advisory Board to review the Agency's research program and submit an annual report outlining whether the budget submitted by the President adequately funds that program. This will help the Congress to better evaluate the relevance of EPA's research program to its overall mission.

In addition, the bills establish a program to modernize the laboratories to insure that credible science can be carried out.

These companion legislative initiatives also direct the Administrator to establish a program to transfer environmental technologies and information to outside groups.

Over many years, I have heard witnesses repeatedly stress the importance of sound science as the basis for sound policy and regulations. Passage of these bills will demonstrate that the Congress is serious in meeting its obligation to ensure that EPA conducts better science on which to promulgate sounder policy for the nation's long-term viability.

We, in the House of Representatives, commend your leadership in this area and pledge to work closely with you on this and other legislation to guarantee that all Americans can experience the level of environmental quality they expect and deserve.

I want to thank the Gentleman again for convening this hearing and for inviting me to appear today.

STATEMENT OF HON. TIM VALENTINE, U.S. REPRESENTATIVE FROM THE STATE OF NORTH CAROLINA

Mr. Chairman, I commend you for convening this hearing on the Office of Research and Development at the Environmental Protection Agency. As you know, the House of Representatives passed legislation, H.R. 1994, last year which is very similar to your bill, S. 1545.

As you may know, in the district that I represent in North Carolina, there are approximately 1,200 EPA Federal employees. The majority of those employees are scientists at the EPA research laboratories and offices located in the Research Triangle Park and surrounding area: The Air and Energy Engineering Research Laboratory, the Atmospheric Research and Exposure Assessment Laboratory, the Health Effects Research Laboratory, and the Environmental Criteria and Assessment Office.

The applied research mission of EPA is critical to the solution of America's environmental problems. The research conducted in and supported by the laboratories in North Carolina and Nevada, as well as those throughout the country, has provided the base for many of the actions taken by environmental regulatory agencies both in this country and around the world. The need for this environmental research will only increase in the coming years as we are faced with even more complex environmental crises.

It is imperative that EPA maintain a high quality, credible research program. EPA cannot afford to establish regulations based on poor quality or insufficient scientific data. The regulatory decisions must be based on the very best scientific evidence available. I believe H.R. 1994 and S. 1545 will help to accomplish this goal.

It is important to remember that EPA ranks behind NASA, the Department of Energy, the Department of Defense and the National Science Foundation in the amount of Federal money appropriated to conduct environmental research and development. This is an extremely important point that I wish to underscore, considering that the regulations that are promulgated by the EPA are estimated by some to cost industry over \$150 billion per year.

ORD's budget is well under 10 percent of the total EPA budget. How can we expect the EPA to write regulations that are free from unnecessary uncertainty when we do not provide the funds required to conduct the essential research that would answer regulators' questions?

I would like to take a few minutes to detail the provisions that are in my bill.

The fundamental research program section would, for the first time, emphasize the importance of an integrated long-term, basic research program at EPA. In addition, this section requires a report from EPA every 2 years detailing the fundamental research being conducted by the Agency.

The section on the Environmental Monitoring and Assessment Program would authorize the EPA to design a long-term monitoring program. This type of program is vital if we have any hope at being able to anticipate the future environmental problems.

The section on modernization lets the Agency know that we in Congress realize that sound science cannot be conducted on antiquated equipment and that a program to improve the laboratories is necessary now.

Section 7 of the bill clarifies the responsibilities of the Science Advisory Board. This entity was developed to help ensure that EPA's science programs met peer-review requirements similar to universities and to give Congress an independent review of the Agency's science program. The bill requires the SAB to review the President's budget submission annually and report to the Administrator and to Congress on the adequacy of the funding.

I believe that one of EPA's biggest problems is a public relations problem. The research accomplishments section provides a formal mechanism for informing Congress and the public of EPA's ongoing research and development programs and activities.

The Technology Transfer and Information Exchange section authorizes EPA to share whatever technology and information its research develops with outside groups. State and local governments are especially important targets for the transfer of technical information because of their key role in the national response to environmental problems.

Both the Senate and the House bills contain two sections on risk research. They would authorize the Agency to develop a program to gain a better understanding of the risks that exist and annually report on that program.

The section on lead research authorizes the Agency to work with other Federal agencies to develop the best ways to protect humans from lead poisoning. This research should help to find the safest ways to remove lead-based paints as well as find the most effective and efficient ways to dispose of, recycle or recover lead in contaminated mediums.

The bills would require EPA to report to Congress on any opportunities that exist for the transferring of technologies developed from defense-related research to environmental applications. This could develop into an excellent program to help companies affected by the downsizing of the defense industry.

And lastly, the bills would authorize the Administrator to enter into a matching fund arrangement with water research foundations to do research into disinfection and disinfection byproducts. With the limited resources that the Agency has, this may be the best way for the Federal government to leverage its funds.

I believe this is a time when Congress can show its support for a stronger science base at EPA. While I have consistently supported efforts to keep the budget in check, I believe this is an area where additional funding is needed.

This is a critical time for environmental policy. The bill that this Subcommittee is discussing today directs the EPA in areas where I believe the Agency needs guidance.

Chairman Reid, I look forward to working with you as Congress reauthorizes the Office of Research and Development at EPA for the first time in over 15 years.

STATEMENT OF GARY FOLEY, ACTING ASSISTANT ADMINISTRATOR, OFFICE OF
RESEARCH AND DEVELOPMENT, ENVIRONMENTAL PROTECTION AGENCY

Thank you, Mr. Chairman and members of the Subcommittee, for the opportunity to testify today on the proposed reauthorization of the Environmental Research, Development, and Demonstration Authorization Act (ERDDA), as well as to share with you some of the details of the President's budget request for EPA's environmental research program, and the proposed restructuring of EPA's research laboratories.

This is a time for strengthening science and research within EPA, as well as across the Federal government. At EPA, we will soon have new leadership in our research program—the White House has nominated Dr. Robert Huggett, Chair of the Department of Environmental Sciences, Virginia Institute of Marine Sciences at the College of William and Mary, as our new Assistant Administrator for Research and Development.

One part of strengthening environmental research within EPA is the reauthorization of ERDDA. EPA generally supports the goals of S. 1545, the Senate bill reauthorizing ERDDA, and would like to continue working with the Committee on this

legislation. I will provide more detail about the bill and implications for EPA's research program throughout this testimony. But first, I want to address EPA's science and research program in relation to the reauthorization of ERDDA. I also want to convey our priorities for environmental research over the next few years, and how our budget request reflects these priorities. Finally, I want to discuss the EPA Laboratory Study, which provides far-reaching recommendations for re-engineering environmental research at EPA.

Let me begin by discussing the context for research at EPA in terms of the overall strategic vision Carol Browner has established for the Agency, and the Agency's priority science and data issues.

EPA's Strategic Vision: Provides Focus for Research

I join with Administrator Browner in saying that I believe that science must play a vital role in guiding our nation's environmental protection policy—it must become the foundation for EPA's environmental protection decisions. Science must guide us as we confront the complex environmental challenges that face us in the future: How can we protect, and restore, the necessary functions of whole ecosystems? What harmful pollutants are people exposed to, are certain groups disproportionately exposed, and how can these exposures be reduced? What technologies and other tools can be used to prevent pollution before it happens?

To unravel these complex problems, we need a new generation of environmental protection. And to answer the multitude of questions that face us today—and the new questions that will arise tomorrow—we need a new generation of environmental science.

For EPA to develop and carry out effective and fair environmental policies, our research must be responsive to these questions. We must also answer broader questions concerning ecological management and global environmental problems. Many of the provisions of S. 1545 address this vision—for example, EMAP, NHEXAS, risk assessment, technology transfer. I want to discuss our research priorities in these areas in more detail later in this testimony, but first I want to mention EPA's goals and how our research program fits into these goals.

The EPA has set a new and challenging vision for itself and the environment over the next five years. To achieve these objectives, EPA must move beyond reacting to today's environmental problems to working with its partners anticipate and prevent pollution. It must transition from piecemeal solutions to a more holistic environmental response that utilizes the best available science. And in all its activities, EPA must ensure equal protection for all and effective stewardship of resources. EPA has identified the following principles—each with specific research implications—for guiding how it will achieve its goals:

1. *Ecosystem Protection.* EPA will encourage ecosystem management and economic development that promotes the health and productivity of natural systems. The long-term mutual dependence of human and ecosystem health, as well as economic prosperity, will be a major premise of EPA's commitment in this area.

2. *Environmental Justice.* EPA will work to assure that individuals and communities are treated equitably under environmental laws, policies and regulations, and that the benefits of environmental protection are shared by everyone in the society.

3. *Pollution Prevention.* EPA will prevent pollution by incorporating prevention into the Agency's mainstream environmental programs; strengthening partnerships with State and local governments, the private sector and other Federal agencies; providing information to the public; encouraging technological innovation and technology diffusion; and, where necessary, working to change existing environmental legislation. The Agency will anticipate and address future environmental issues before they become problems.

4. *Strong Science and Data.* EPA will employ the best possible science, invest strategically in research and development for the future, and foster a productive dialogue with the public about science and risk. To be credible and effective, EPA policies, programs and actions will be based on sound data and research from both the traditional sciences and the social sciences, such as economics.

5. *Partnerships.* EPA will work in partnership with its stakeholders Federal, State, and local agencies, tribes, private industry, public interest groups and citizens to develop the technology and capacity for carrying out environmental programs and policies using common sense, innovation and flexibility.

6. *Reinventing EPA Management.* EPA will strive to make itself known as the best managed agency in the Federal government. EPA will seek to manage for better results; streamline its programs; and use savings to strengthen existing programs and invest in emerging high risk issues. Employee development, empowerment, and diversity will be emphasized.

These guiding principles provide clear direction for EPA's science and research programs. Ecosystem-level management, understanding of risks to subpopulations to ensure equity in environmental decision-making, and prevention of pollution rather than only pollution control all require changes in research focus. Additionally, the research process itself must be re-engineered through increased use of research partnerships, expanded public education about environmental science and engineering, and streamlined research management.

I want to briefly discuss how we propose to strengthen science and data throughout the Agency and within ORD.

Strengthening Science at EPA: Better Links Between R&D and Environmental Policy

EPA's strategic plan, *New Directions in Environmental Protection*, identifies some important themes for EPA's science and data programs, including:

- Promoting scientific excellence to assure sound EPA decisions;
- Ensuring that environmental data are accessible and useful to policy-makers, scientists, and the public;
- Measuring environmental progress, and using results to improve environmental protection programs;
- Guiding creation of a national and international environmental research agenda;
- Expanding partnerships with the scientific community, other agencies, and the public;
- Creating opportunities for scientific and technical achievement at EPA.

Promoting scientific excellence to assure sound EPA decisions: EPA will ensure that high-quality science is provided to decision-makers in ways that are useful for the policy-making process. Three components are key to this plan:

- Revamping and expansion of the Agency's peer review process. Peer review is also a key component of EPA's Laboratory Study recommendations. I will provide more detail of our plans for peer review at the end of my testimony when I address the Laboratory Study recommendations.
- Improving health and ecological risk assessments and developing guidelines to promote consistency within EPA and among Federal agencies. This component is in line with the risk assessment provisions of S. 1545.
- Enhancing effects and exposure information

Additionally, EPA has reformed its rulemaking process to better incorporate science and data in important rulemakings, and established a Science Policy Council to address science policy issues that go beyond regional or program office boundaries.

Ensuring that environmental data are accessible and useful to policy-makers, scientists, and the public: EPA will spearhead efforts to improve sharing of data among Federal agencies and greatly broaden the availability of environmental information. We will pursue improvements to our own information infrastructure, so that staff and management, our partners, and the public will have access to timely, meaningful information for decisions.

Measuring environmental progress, and using results to improve environmental protection programs: Through the Committee on Environmental and Natural Resources (CENR), we are working with other Federal agencies to establish the databases that will allow us to measure improvements in environmental quality, and use the results to improve environmental decision-making.

EPA is developing two major assessment programs: the Environmental Monitoring and Assessment Program (EMAP) and the National Human Exposure Assessment Survey (NHEXAS). These programs are designed as research and monitoring demonstrations to develop approaches for assessing impacts of environmental changes on ecosystems and human health. A number of other Federal agencies are major participants in these programs. Extensive discussions are taking place with the National Biological Survey to ensure that all monitoring efforts complement—rather than duplicate—one another. These programs have been extensively peer-reviewed, and we continue to solicit, listen to, incorporate, and benefit from the recommendations of peer reviewers.

Authorization of EMAP and NHEXAS in the Senate ERDDA bill is an important next step in fulfilling the promise of these important programs.

Guiding creation of a national and international environmental research agenda: EPA alone cannot identify emerging issues and generate the knowledge needed to solve domestic and international environmental problems. To be effective, EPA must work collaboratively with other Federal agencies that have responsibilities for protecting and managing the environment. We must, together with these other Federal agencies, develop a coherent national research agenda on the environment, one that will organize activities and set priorities across the Federal government.

For these reasons, EPA is a very active participant in the Committee for Environmental and Natural Resources (CENR), established under the auspices of the President's National Science and Technology Council (NSTC) to coordinate all Federal environment and natural resources R&D activities and to improve the links between science and policy. EPA's Deputy Administrator, Robert Sussman, has been personally leading EPA's effort.

In the last several months, the Committee has been developing R&D strategies outlining an effective scientific approach and near-term priorities in coordination with representatives from the scientific community, the private sector, Congress, State and local governments and non-governmental organizations (NGOs). The Committee's research agenda targets ten issues: global climate change, biodiversity and ecosystem dynamics, resource use and management, air quality, toxic substances and hazardous and solid waste, water resources and coastal and marine environments, natural disasters, social sciences and economics, technology and engineering, and risk assessment. EPA is developing its Fiscal Year 1996 research budget in accordance with the goals and priorities developed through the NSTC.

Expanding partnerships with the scientific community, other agencies, and the public: EPA needs the involvement and commitment of all of our nation's scientific experts to solve our complex environmental problems. EPA's work on drinking water research is an excellent example of this partnership approach. ORD has been working cooperatively with the American Water Works Research Foundation (AWWRF), to conduct joint research in disinfection by-products. A major effort is now underway to significantly augment this collaboration—EPA and the water industry have together prepared a 5-year, \$50 million research program, for which we are now negotiating funding. Clearly, the water industry will contribute a substantial, if not major, share of this funding. S. 1545 directly supports this research plan. However, we fear that authority specifying which organization to work with may tie our hands in negotiating projects to carry out this ambitious research plan. We would like to have the flexibility to work with other organizations and to leverage our Federal dollars to the maximum extent possible.

Creating opportunities for scientific and technical achievement at EPA: The strength of EPA's science and data depends on the quality of our scientists. EPA will use several mechanisms to create these opportunities, including: (1) instituting internal research awards to EPA scientists through a competitive, peer-reviewed process; (2) establishing science career tracks throughout the Agency, building on the experience of ORD; and (3) maintaining and enhancing its infrastructure for science, and giving increased emphasis to training and professional development opportunities for scientific and technical staff.

An additional critical component of the Agency's science and data goals involves specific changes within EPA's research program, stemming from the EPA Laboratory Study and ORD's Streamlining Report.

EPA's Laboratory Study: Reengineering Research

To be effective, environmental research must continually evolve in response to changes in scientific understanding of the nature and complexity of environmental problems. In recent years, EPA has been reexamining the structure and focus of its research as part of an ongoing effort to improve the quality of its science and to expand the range, efficiency, and effectiveness of the approaches and tools available to mitigate and solve our nation's environmental problems.

As part of this effort, in early Spring ORD developed a Streamlining Report as a follow-up to Vice-President Gore's National Performance Review. This report contained numerous ideas that would result in a radical alteration of how EPA organizes and conducts research. In this plan, we evaluated streamlining options, but we also reexamined fundamental principles related to mission and organization. For example, the report recommended that we clearly identify separate program plans for: (1) research to directly support EPA's program offices; and (2) strategic research to advance environmental science and engineering—critical to support future Agency decisions. Other ideas focused on blending a multi-disciplinary research team approach with the current management system; aggressive action to recruit and retain women and minorities; and the targeting of new areas for EPA scientific expertise, such as regional and watershed-scale ecosystem management. These and other proposals were developed through a participatory process involving all parts and layers of ORD.

In parallel to this, the EPA Laboratory Study was initiated to examine the configuration, staffing, facilities, emerging roles and other management aspects of all of EPA's research and technical support laboratories. This study and its recommendations have been completed, and provided to Congress on July 20, 1994. It represents a key step in EPA's continuing process to reinvigorate its science programs. In conjunction with past studies of the science and laboratories at EPA, the National Performance Review, and ORD's streamlining findings, the EPA Laboratory Study points out the need to better define EPA's role in environmental research, and to change the way in which EPA carries out its research, science, and technology functions.

Specifically, the Laboratory Study proposes major new directions for EPA's science and research programs, including:

Research Focus and Leadership: EPA's research, development, and technical services should continue to promote risk assessment/risk management as the principle that drives priority setting. Consistent with the S. 1545 provisions on the use of risk to guide research priorities, EPA should give priority to research that will have the greatest impact on reducing the uncertainty in risk assessment, and that facilitates risk management.

EPA should change its research program so that 50 percent of EPA's research dollars go to support long-term research—so that we can better identify environmental problems, and get early warning of tomorrow's problems. The remaining 50 percent of the Agency's research dollars should be used to vigorously support the more applied research and implementation requirements of the regulatory programs and regions. EPA should establish a research, development, and technical services strategic plan that integrates the needs and capabilities of the program offices, regions, and ORD.

Organizational Structure: In 1993, the Carnegie Commission on Science, Technology, and Government published a report entitled "Environmental Research and Development—Strengthening the Federal Infrastructure" that included recommendations for restructuring the ORD field units into four national laboratories. EPA has bused these recommendations as a starting place in its reorganization proposals, but has refined this structure to better address the risk assessment/risk management paradigm that is fundamental to the Agency's mission. ORD should realign its national research laboratories into four laboratories.

These laboratories centralize and strengthen the Agency's ability to respond to the greatest threats to environmental quality and human health. The four laboratories are:

1. National Health and Environmental Effects Research Laboratory;

2. National Exposure Research Laboratory;
3. National Center for Environmental Assessment; and
4. National Risk Management Research Laboratory.

Partnership with the academic community: As discussed previously in this testimony, one of EPA's priorities is to expand interactions with the scientific community, other Federal agencies, and the public. The intent is to expand ORD's competitive, peer-reviewed, investigator-initiated grants program from \$20 million to \$100 million per year. These grants take advantage of the expertise and creativity of the academic and not-for-profit research community.

Peer Review: EPA will continue to improve the quality of its research through an enhanced peer review process. This process will focus on:

On-site reviews of research laboratories and programs following an approach similar to that used by the National Institute of Health (NIH);

Initiation of a new, competitive, peer-review process for the award of internal research grants to EPA scientists; and

An Agency-wide consistent level of peer review of scientific products and publications.

EPA Fellowships: EPA should expand the graduate fellowship program to increase the resource base from which the Agency and the environmental community draw technical and scientific talent.

Management and Administrative Streamlining: ORD should decentralize its research laboratory management and administration to the extent possible, and use streamlining as an opportunity to enhance and empower the science function in ORD. EPA will use this same opportunity to increase the accountability of all of its laboratories to the overall research, science, and technology mission of the Agency.

Regional and program laboratories: The Agency also recognizes the importance of maintaining program laboratories. With their clear missions and customer focus, they provide vital technical support to assist in regulatory development and enforcement programs. These laboratories are important to maintain, and EPA will explore ways to enhance and improve their functions. These laboratories will be fully engaged with ORD through the research, development, and technical services planning process to define Agency-wide research needs and capabilities.

These changes are far-reaching, integrated actions that will provide EPA and the nation with better science, better decisions, and better environmental protection.

We will work with EPA's scientists and managers, and representatives of employee organizations, as well as with scientists across the broad research community, to ensure that this plan is effectively and cooperatively implemented.

ORD's Fiscal Year 1995 Budget Request

The total ORD budget request for Fiscal Year 1995 is \$570.6 million, an increase of \$37.8 million over Fiscal Year 1994, or about 7 percent. This budget request reflects ORD's vision for improving the link between EPA science and environmental policy. Just as the overall EPA budget represents a commitment to a new generation of environmental protection, our research initiatives emphasize our commitment to the development of a new generation of environmental science to solve environmental problems.

ORD's research initiatives reflect the changes we are making in our research program. In the Fiscal Year 1995 budget, we are proposing:

Contractor Conversion Initiative: One of the most important developments in the Fiscal Year 1995 budget is our proposed Contractor Conversion Initiative. This initiative—now pending—is one of the Agency's four management improvement initiatives. It will convert 265 contractor workyears to Federal workyears in ORD. This workyear conversion is an extremely important step that will strengthen our in-house research capabilities, as well as address the vulnerabilities associated with the over-reliance on the use of contractors. This conversion does not increase EPA's budget, but rather is budget-neutral by shifting resources previously used for contracts to fund in-house workyears. ORD will still use contractors. This conversion affects only a certain percentage of the ORD-supported contractor workforce.

Research to improve our ability to do human health risk assessment, with special emphasis on human exposure. Enhanced risk assessment research is key to deter-

mining which environmental problems pose the greatest risks to human health, helping policy makers in the future better target policies and regulations to achieve the greatest risk reduction. But risk assessment is a new and rapidly developing science, and methods must evolve as our understanding grows.

EPA's proposed strengthening of its risk assessment research program will improve our ability to conduct human health risk assessments in two ways: (1) by focusing on one of the major weaknesses in risk assessments—human exposure—we will better understand what pollutants people are actually exposed to; and (2) by improving the methods we use to assess health risks in people. S. 1545 would specifically authorize this research.

Our Fiscal Year 1995 budget request for risk assessment and exposure assessment includes: an increase for the National Human Exposure Assessment Survey (NHEXAS); a "Pesticides in Children" initiative that has been developed in response to a National Academy of Sciences report on pesticides and children; and a U.S.-Mexico border research initiative that provides support for a coordinated effort among participating Federal, State and local agencies to address complex environmental health problems that exist along the U.S.-Mexico border.

These programs, in the long-term, will provide needed information about how different subpopulations are exposed to different chemicals, supporting EPA's concerns for environmental justice issues.

Building the scientific knowledge base needed for managing our nation's ecosystems. The Federal government, through the CENR, is undertaking a significant effort to restructure its strategy for protecting and restoring the nation's ecological resources. Rather than focusing solely on regulatory command and control policies based on individual legislative mandates, the new approach recognizes the need for a strategy that adequately accommodates the interactive nature of ecological systems.

Beginning in 1994, ORD is restructuring its ecological research, monitoring, and assessment research into a single, coordinated program, which will provide the improved science and tools necessary for effective ecosystem management. EMAP is clearly an integral part of this research. We have also identified areas of focus for our ecological research program: (1) integrated regional ecosystem management; (2) integrated watershed ecosystem management; and (3) national assessments and research.

Pollution prevention, rather than pollution control, and innovations in environmental technology. Pollution prevention has become the touchstone for the 1990s—we all know now that it is generally more cost-effective to prevent pollution at the source than to treat it or clean it up later. Like the ecosystems research program, ORD's pollution prevention and technology development programs are also moving in a new direction—to harness the expertise and the resources of organizations outside the Agency.

ORD is using the President's Environmental Technology Initiative (ETI) as a springboard to refocus its engineering and demonstration programs in areas where there are opportunities to build partnerships. Through this initiative, EPA will promote public/private partnerships to identify needs for and develop new technologies, and then help find markets for these technologies at home and abroad.

I also want to highlight several other important initiatives in ORD's Fiscal Year 1995 budget request:

High Performance Computing and Communications: ORD is requesting funding for a High Performance Computing and Communications (HPCC) program. The HPCC will purchase the first massively parallel computer for EPA; demonstrate how massively parallel computing will allow better scientific models to be applied to environmental problems—for example, a linked air pollution-sediment model; and transfer new computing techniques and models to States for routine use.

Air Quality Research: ORD is requesting additional funding to study widespread tropospheric ozone non-attainment problems and the impacts of particulate matter (PM₁₀) on human health.

Environmental Research, Development, and Demonstration Act

EPA's research program provides the vital tools to understand and solve our environmental problems, and to translate the science into policy. Our research is authorized through a number of single media statutes—the Clean Air Act, the Clean Water Act, and Superfund are examples. However, EPA's research program has been changing in recent years to emphasize multi-media, cross-disciplinary problems that require a more holistic research approach, with programs like NHEXAS, EMAP, risk assessment, and technology innovation. And within this new generation of environmental protection that I discussed earlier in this testimony, EPA's research continues to change, becoming even more complex and cross-disciplinary as we understand more about the depth and complexity of the environmental issues and problems facing us.

S. 1545 clarifies the role that these cross-media programs play in the environmental research arena. It allows us to clearly look at these issues outside of the framework of individual media statutes. The reauthorization of ERDDA would provide EPA with a less fragmented, more cohesive framework within which we can conduct environmental research.

ORD generally supports the goals of the pesticide research provisions of S. 1545, which require ORD to develop methodologies to determine pesticides exposure levels in various media, assess human health effects associated with exposures to pesticides, and assess the impacts of long-term pesticides use on various ecosystems. This research is integral to reducing the uncertainties about human and ecosystem exposure to the millions of pounds of pesticides used annually.

In the past 3 years, ORD has begun conducting pesticides research efforts similar to those proposed in the Senate bill. However, the Senate provisions mandate more pesticides research than ORD's current program. This provision would require funding above the proposed Fiscal Year 1995 budget.

EPA is also supportive of the authorization of NHEXAS and EMAP contained in the Senate bill. These are long-term, interagency research programs, designed to guide us in developing future environmental policies and give us crucial information about the effectiveness of our current environmental strategies. Because these programs represent a significant interagency investment, it is important to have a long-term commitment, something ERDDA legislation ensures.

welcome the opportunity to further discuss these and other provisions in Senate bill S. 1545 in more detail with the Committee.

Conclusion

I look forward to working together with you on this bill and in transforming EPA's science and research capabilities, and in exploring new ways to better protect our health and our natural resources. The transition we are attempting will not be easy—we will need your help to achieve our vision of an invigorated environmental research program at EPA. Reauthorization of ERDDA will go a long way toward achieving this vision.

Thank you.

STATEMENT OF MARK SCHAEFER, ASSISTANT DIRECTOR FOR THE ENVIRONMENT,
OFFICE OF SCIENCE AND TECHNOLOGY, EXECUTIVE OFFICE OF THE PRESIDENT

Mr. Chairman and Members of the Committee: My name is Mark Schaefer. I am the Assistant Director for Environment in the Office of Science and Technology Policy. I appreciate the opportunity to meet with you this morning to discuss the Administration's efforts to enhance Federal environmental and natural resources research and development (R&D) programs. The Administration is fully committed to working with Congress to improve Federal environment and natural resources R&D programs.

World population and industrial activities have increased dramatically during the last century, and human activities are affecting the environment at all geographical scales from local to regional to global. The range of environmental issues is diverse and encompasses such issues as pesticides and toxic substances, hazardous and

solid waste disposal, water quality and quantity, urban and rural air pollution, resource use and management, loss of wetlands, soil erosion, degradation of aquatic and terrestrial ecological systems, desertification, deforestation, marine pollution, natural disasters, loss of biological diversity, stratospheric ozone depletion, and climate change. These issues are interrelated and are no longer the sole concern of the scientific community and environmentalists. Their importance is now well recognized by the private sector and governments around the world. Sound national and international environmental policies must be based on a solid foundation of scientific, technical, and economic understanding of the relevant facts. This understanding will allow us to meet a number of key Administration and Congressional priorities:

- a cleaner environment, by providing the scientific and technical information needed to continue to refine environmental and economic policies;
- a healthier safer America, by improving our understanding of the human health implications of environmental changes and the societal vulnerabilities to natural hazards;
- a stronger economy, through the continued development of cost-effective pollution prevention technologies, and a reduction of market and government inefficiencies that prevent the diffusion of technologies and efficient use of legal, economic and environmental resources;
- national security, by providing the information needed to reduce destabilizing environmental degradation and resource depletion that leads to conflict, environmental refugees, and further ecological damage resulting from war; and
- an improved education and training of Americans through environmental education curriculum development and strengthening environmental continuing education initiatives, utilizing such mechanisms as government-private sector partnerships.

Given the increasing complexity, scope and linking of local, regional and global environmental issues facing our nation and globe, significant changes are needed in the Federal environment and natural resources R&D system. The classical single agency, single scientific discipline approach to problem solving needs to be transcended by a coordinated multi-agency interdisciplinary approach. The problems will only be understood by bringing together natural and social scientists, economists, engineers and policymakers.

Several recent reports have criticized the Federal environmental research and development system and its relationship to environmental policy formulation:

- the Carnegie Commission on Science, Technology, and Government, December 1992: Environmental Research and Development: Strengthening the Federal Infrastructure;
- the National Commission on the Environment, 1993: Choosing a Sustainable Future;
- the National Research Council, 1993: Research to Protect, Restore and Manage the Environment;
- the Committee for the National Institute for the Environment, 1993: A Proposal for a National Institute for the Environment: Need, Rationale, and Structure;
- the Office of Technology Assessment, October 1993: Preparing for an Uncertain Climate;
- the Environmental Protection Agency, 1992. Safeguarding the Future: Credible Science, Credible Decisions; and
- the National Research Council, 1993. A Biological Survey for the Nation.

The major issues raised by these reports include:

- no clear leadership;
- inadequate links between research and policy;
- no comprehensive national environmental research plan;
- no comprehensive think tank for assessing state of knowledge;
- no approach to research issues beyond near-term regulatory or management needs;

- an imbalance between intramural and extramural R&D;
- a lack of funding for ecological and social sciences, and for finding engineering solutions to environmental problems;
- insufficient attention to long-term monitoring, data collection and management, and interpretation.
- the need for improved education and training of people.

In general, the Administration believes that these criticisms are based in fact and must be addressed. Consequently, it has already enacted a number of major changes to rectify these apparent weaknesses in the environmental R&D structure and in the links between science and policy. At present the Administration believes that there is no compelling reason for a fundamental restructuring of the research agencies or to create any new entities given the changes it has already initiated. These changes need to be given an opportunity to work before taking further steps.

The Administration has taken a number of steps that respond to these criticisms:

- creating the Office of Environmental Policy (OEP);
- creating the National Biological Survey (NBS);
- signing the Convention on Biological Diversity;
- creating the Environment Division in Office of Science and Technology Policy (OSTP);
- elevating the Federal Coordinating Committee on Science, Engineering and Technology (FCCSET), to the National Science and Technology Council (NSTC);
- creating the Committee on Environment and Natural Resources (CENR) within the NSTC, which builds upon the earlier efforts of the FCCSET Committee of Earth and Environmental Sciences;
- creating the President's Committee of Advisors for Science and Technology (PCAST);
- proposing the elevation of the Environmental Protection Agency (EPA) to Cabinet status;
- strengthening the links between science and policy through the CENR;
- strengthening the assessment capabilities through the CENR;
- enhancing support for environmental R&D, despite limits on discretionary spending;
- developing an environmental R&D strategy through the CENR;
- expanding the scope of environmental R&D, through increased emphasis on the socio-economic dimensions, impacts assessment, adaptation and mitigation, and the development and utilization of science-policy tools in the Fiscal Year 1995 budget.

The following section briefly describes Administration actions to specifically address the major issues raised by the reports.

Creating Federal Leadership for Environment and Natural Resources R&D

Through all the steps listed above, the Administration has demonstrated its leadership and commitment to a strong, integrated and comprehensive Federal program of environmental R&D.

In particular, the Committee on Environment and Natural Resources is leading the effort to coordinate all Federal environment and natural resource research and development activities, and improve the links between the scientific and policy components of the executive branch. A unique aspect of the CENR is that subcommittees are organized by key environmental policy areas. This subcommittee structure was created recognizing that coordinated, interdisciplinary, multi-agency, R&D efforts are required to respond effectively to complicated environmental problems.

The strength of the CENR, and its subcommittees, is that it has active participation from all relevant agencies and offices of the White House, including OSTP and OMB during all phases of the budget process. The CENR is not a top-down decision-making entity of the White House; if it were, it would fail. The CENR will work because there is buy-in at all levels of the agencies from program managers and from agency heads. R&D priorities must, and will, explicitly take into account Administration priorities, environmental statutes, and international Conventions. Agency agendas that are consistent with the priorities of the interagency process are

likely to have highest priority in the budget process. The challenge is to increase the total amount of resources available to environmental and natural resources R&D and to identify areas of lower priority or where unnecessary redundancies exist. This identification is being done by agencies working with the CENR subcommittees.

The structure of the Committee on Environment and Natural Resources is shown in attached chart. The objectives of the committee include:

- maintaining, and improving, a strong science base for environmental and natural resource issues;
- developing a balanced, comprehensive environmental and natural resources R&D program that provides the scientific and technical basis for national and international policymaking;
- strengthening research on: the socioeconomic aspects of environmental changes; the impacts of environmental changes on human health, ecological and socioeconomic systems; adaptation to environmental changes; and the mitigation of environmental changes;
- creating an organization that improves the way that the Federal government plans and coordinates environmental and natural resource R&D activities;
- establishing a structure for developing environment and natural resources budget inventories;
- developing a strategy to strengthen extramural academic R&D programs;
- promoting the utilization of merit-review and peer evaluation and competitive selection in Federal R&D projects;
- developing the tools needed for policy formulation, e.g., integrated models and risk assessments;
- creating a body to link science and policy.

Environmental Issue Subcommittees

Global Change: The scope should be comparable to the existing USGCRP, i.e., includes climate change (broad definition) and stratospheric ozone, but with increased emphasis on socioeconomic dimensions, impacts, adaptation, mitigation, and integrated assessments.

Biological Diversity and Ecosystem Dynamics: Biodiversity (population/community; systematic biology/surveys; habitat analysis; and conservation biology); and ecological dynamics (physiology and biochemical ecology; genetic processes and responses; basic ecosystem processes; and population/community response to stress).

Resource Use and Depletion: Management, conservation and extraction of renewable (terrestrial and marine ecosystems, including grasslands, wetlands, fisheries, and forests), and non-renewable resources (oil, gas, minerals, and coal).

Toxic Substances and Hazardous and Solid Waste: Environmental toxicants (e.g., pesticides, hazardous waste, solid waste, and oil spills).

Air Quality: Ambient air pollutants (oxidants and their precursors, sulfur dioxide, nitrogen dioxide, carbon monoxide and particulates); acid deposition and its precursors, and indoor air.

Water Resources and Coastal and Marine Environments: Water quality and quantity, integrated watershed management, and coastal and marine systems

Natural Disasters: The scope encompasses weather related hazards (storms, hurricanes, typhoons, tornadoes, floods, droughts), geological hazards (volcanoes, earthquakes), and wildfires.

Program Content of Each Issue Subcommittee

Each subcommittee has established its own working group structure, and has developed a balanced, comprehensive R&D program that covers the following aspects of the issue: structure and function of the system, socioeconomic driving forces of environmental change, impacts of environmental change, adaptation to environmental change, mitigation of environmental change, and assessment.

Strengthening Links Between Research and Policy

The Administration recognizes that for the past decade or more the link between the scientific and policy formulation agencies has been too weak. Consequently, the

Administration has taken some initial steps to improve significantly the integration of environmental research with policymaking and resource use management decisions:

- a senior-level interagency committee, co-chaired by members from the Office of Science and Technology Policy, the Council of Economic Advisors, and the Office of Environmental Policy, has been formed to provide an effective science-technology-economics-policy link across all sub-committees of the CENR, through close interaction with both technical and policy offices within the White House and the agencies;
- each subcommittee of the CENR has a senior level policy vice chair, ensuring that the policy agencies will play a vital role in setting environmental R&D priorities;
- each environmental issue subcommittee, with membership from both the science and policy branches of agencies, will have an assessment function, to include all stakeholders in the evaluation of the current state of knowledge for addressing these environmental problems;
- a data and information working group has been formed within the CENR, reporting directly to the executive committee, that will, with stakeholder participation (including, academia, industry, environmental organizations, Congress, State and local government), work to develop a distributed system that ensures rapid access by all users to scientific, technical, and economic environmental information.

The risk assessment subcommittee will examine a range of scientific and technical issues in the risk assessment and risk management area. Its work will complement the broader policy oriented efforts of the interagency working group on risk, which is examining issues related to the interface of risk analysis and cost-benefit analysis and the appropriate use of these tools in setting regulatory priorities. The subcommittee will examine such issues as comparability across agencies in undertaking risk assessments, ways to better integrate socioeconomic considerations into risk analyses, approaches to advancing the assessment of ecological and non cancer risks, and possible mechanisms to undertake comparative risk analyses.

Developing a Comprehensive National Environmental Research Plan

The Administration is committed to formulating an environment and natural resources R&D strategy through the CENR. The charge to the CENR is to design a balanced environmental R&D program that is:

- scientifically excellent;
- policy relevant, not policy driven;
- well coordinated between Federal agency programs and private sector programs;
- meets the near- and long-term needs of the scientific and policy communities;
- broad enough to catch, and respond, to surprises;
- anticipatory, and not just focused on the policy and management issues of today.

The CENR has been structured with respect to both scope and membership so that it can develop and implement, in concert with non-federal partners, a comprehensive environment and natural resources R&D strategy. The CENR has already taken a number of steps toward developing this strategy.

The environmental issue and crosscutting subcommittees of the CENR developed a set of draft strategy documents that presented initial views on: an environmental vision; near- and long-term policy questions; the scientific information needed to answer the policy questions; the scientific goal of each CENR subcommittee; the current state of scientific knowledge; the highest priority scientific needs; and a strategy to develop the required scientific knowledge.

The draft strategies were presented to more than 200 non-federal scientists from academia, industry, environmental organizations, Congress, and State and local government, at a White House sponsored scientific forum that was hosted at the National Academy of Sciences from March 28–30. The specific goal of the forum was to

develop an initial set of priorities for a Federal environment and natural resources R&D program based on the perspectives of a wide range of interests. Senior members of the Administration, including Vice President Gore, Bruce Babbitt, John Gibbons, Carol Browner, Jim Baker, and Katie McGinty, addressed the forum participants.

The experts reviewed the material presented and identified important near-term priorities for funding. The major conclusions of the forum are being used to guide the Agencies as they develop their Fiscal Year 1996 budgets, are summarized below. The key conclusion was that there needs to be more attention paid to scientific basis for integrated ecosystem management; socio-economic dimensions of environmental change; the development of science-policy tools such as integrated assessments and risk analysis; observations, and data and information systems; and environmental technologies.

The next step is to further refine these "environmental issue" strategy papers. Additional sections will be included, such as a description of the roles of the different agencies, a plan for implementing the strategy, and a list of performance milestones to assess relevance, progress, and cost effectiveness. These issue strategies will then be integrated into an initial Federal environment and natural resource R&D strategy by Fall 1994.

New Approach for Assessing State of Knowledge

The Administration is committed to strengthening the manner in which the Federal government performs assessments, particularly integrated assessments, which provide a bridge for a two-way dialogue between policymakers and scientists. The policymakers need to articulate the challenges they face in pursuing a particular environmental objective, while the scientists must convey to the policymaker a sense of the degree of understanding of the environmental problem; the physical, biological, and socioeconomic issues that underlie it; and alternative approaches to responding, mitigating, or adapting to it.

The CENR is currently developing a set of principles that should be used, and mechanisms that could be used, to conduct credible scientific and technical assessments. The principles that should be applied, independent of the mechanism employed, will likely include the involvement of all stakeholders, as appropriate and an independent peer-review process. The mechanism chosen would depend upon a number of factors, including the scope and audience of the assessment, and the deadline for completion of the assessment. The CENR will develop a credible flexible approach for conducting environmental assessments.

In addition to legislatively mandated environmental assessments conducted by individual agencies, assessments could, and should, be conducted by: (a) subcommittees of the CENR; (b) the White House science-policy assessment group, co-chaired by OSTP, CEA, and OEP; and (c) the National Academy of Sciences/National Academy of Engineering and Institute of Medicine, depending upon the scope of the assessment under consideration. The Administration has begun work on (a) and (b), and has started a dialogue with the NASINAE/IOM with respect to option (c).

We believe the combination of these three new mechanisms for performing assessments across a wide variety of environmental issues will fully utilize the strengths of the academic community and the Federal agencies, together with other key stakeholders, while being responsive to policymakers needs without requiring the creation of any new agencies or institutions.

Research Strategy that Goes Beyond Near-Term Regulatory and Management Needs

While many of the environmental research programs may be too near-term and policy driven, some of the largest Federal R&D programs have a long-term perspective, and some have actually been criticized for being too long-term and not adequately near-term and policy relevant.

One example of a Federal research program that has combined excellence in scientific content, coordination with private sector research, and has balanced near- and long-term policy requirements is the Federal stratospheric ozone program. The Federal research program, which was primarily housed in NASA, NOAA and NSF, provided most of the scientific information that formed the basis for both national and

international policy formulation. However, even this program was not adequately balanced to meet the complete needs of the decision makers. While NASA, NOAA and NSF developed a robust program to understand quantitatively the impact of human activities on the abundance and distribution of ozone, agencies responsible for impacts research did not aggressively pursue a program to understand the implications of ozone depletion on human health, ecological and economic systems.

As the CENR subcommittees develop their research strategies and implementation plans, they will explicitly consider both near- and long-term priorities.

Approach To Redress the Imbalance Between Intramural and Extramural R&D by Utilizing Merit Review, Peer Evaluation and Competitive Selection in Federal R&D Projects

The Administration plans increase the involvement of the academic community through merit review, peer-evaluation and the competitive selection of Federal R&D projects. In addition, we plan to improve the evaluation procedures and quality of Federal R&D efforts. The style of external peer-review may, in some instances, need to be tailored according to agency mission.

The Administration believes that the imbalance between extramural and intramural R&D programs is a significant weakness of our Federal environmental R&D system. "Intramural" refers to those R&D programs conducted within a department or agency and its laboratories. Extramural programs are activities supported by the Federal government through grants, contracts, cooperative research and development agreements, or other mechanisms. Some agencies have relatively large extramural programs. NASA's Mission to Planet Earth program, for example, is almost entirely intramural. EPA's extramural program includes university-based research (i.e., through grants and cooperative research agreements) and contract research, but the agency has limited funding for competitive grants. This deprives the agency of a mechanism to reach many of the best academic scientists and engineers in the nation. The Administration proposes that all Federal agencies take a careful look at the balance between intramural and extramural environmental R&D activities within their agencies with the goal of increasing the involvement of the academic community by competitively awarding most R&D activities, in a manner similar to NSF and NASA. In addition, there may be instances where the quality of the research endeavor may be strengthened by combining the intellectual talent residing in the universities with the institutional capabilities of the Federal laboratories, thus improving the overall quality and cost-effectiveness of the Federal research program.

Following procedures put in place by the Committee on Earth and Environmental Sciences for the U.S. Global Change Research Program, we plan to develop performance standards and foster a process of measuring progress, identifying gaps, and assessing the effectiveness of agency activities. In this management arrangement, meaningful performance measures for major elements of the CENR strategy will be developed and tracked, providing periodic evaluations of both individual projects and the strategy as a whole.

Increased Funding for Ecological and Social Sciences, and for Funding Engineering Solutions to Environmental Problems

The Administration recognizes that there has been insufficient attention to the ecological sciences, the socioeconomic dimensions of environmental problems, and for engineering solutions to environmental problems.

Biological sciences: The ecological sciences are clearly underfunded in comparison to the physical sciences in the study of some environmental issues, e.g., climate change and ozone depletion. In 1993 the FCCSET Subcommittee for Environmental Biology performed an analysis of the Federal environmental biology budget and reported an annual expenditure of over \$900 million, a level comparable to that spent on the study of the physical and chemical aspects of global change. However, the NRC Corson report noted that 50 percent of all ecological experiments are performed on plots of less than one meter squared, and only 7 percent last longer than 7 years. This suggests that more long-term, large scale ecological studies need to

be performed. Additionally, it is clear that there needs to be an increased emphasis on understanding the interactions among biodiversity, ecosystem dynamics and management, and environmental degradation. The President's Fiscal Year 1995 budget for the USGCRP, the DOI National Biological Survey, and EPA, through its integrated ecological research program, shows that steps are being taken to enhance comprehensive ecological research.

Social sciences: While it is well recognized that environmental change has both anthropogenic and natural components, our understanding of the human dimensions of environmental change will not improve until more resources are committed to studies of this kind. The President's Fiscal Year 1995 USGCRP budget, within the NSF, reflects an increased emphasis for this type of research.

Engineering: The Administration has already moved aggressively to increase the level of funding for research and development for environmental technologies in several agencies: EPA, DOE, Commerce (NIST). In addition, DoD has been charged with increasing its efforts on dual-use technologies. The President's Fiscal Year 1995 budget for energy efficiency and renewable energies reflect an increased emphasis on these areas of research, with the total Federal budget for environmental technologies exceeding \$4 billion.

Increased Attention to Long-Term Monitoring, Data Collection and Management, and Interpretation.

The Administration agrees that inadequate attention has been paid to monitoring and assessing environmental trends and consequences. Vast quantities of data on environmental quality are generated, but historically there has been insufficient attention to the collection, quality assurance, management and interpretation of data. Thus, data is not readily accessible to investigators within and outside the Federal government. In some areas we have instituted major programs to organize data; in other areas, data management is severely lacking. For example, through the EOSDIS program, NASA, working closely with NOAA and other agencies, is organizing remote sensing data.

There is a recognized need for coordinating the monitoring, evaluation, and reporting on these trends. The Federal system should improve the tracking and regular reporting on major environmental trends, from climate change, to water quality, to the exposure of individuals to pollutants and the health consequences of exposure. In some areas there is already a significant, but not fully adequate, amount of effort.

The Administration believes that we can significantly improve our collection and dissemination of data and information by developing an evolutionary and cooperative international environmental monitoring and information system, using civilian and dual-use technologies. This system will support the identification of trends, advancement of scientific understanding, and the development of prediction systems, but will require the successful implementation of an international policy for securing open and stable exchange of environmental data and information. A multi-step strategy is proposed, including inventorying, collecting and assessing existing data sets for a range of environment and natural resources issues; increased use of existing "operational" monitoring systems, by making minor modifications, thus enhancing the value of ongoing observations; improve existing monitoring systems and data bases to develop enhanced observational capabilities; improved data collection, data sharing, data base management, and information systems building upon the evolutionary concepts of initiatives such as EOSDIS and the NII, and consistent with the terms and conditions of the executive order on a National Spatial Data Infrastructure (NSDI) coordinated through the Federal Geographic Data Committee (FGDC).

The Administration has already embarked on a number of activities that will improve our ability to determine environmental trends: the reorganization of DOI to create the National Biological Survey; the implementation of the EPA Environmental Monitoring and Assessment Program to assess the status and trends of ecological resources and stressors; the development of a single converged meteorological and environmental monitoring polar orbiting satellite system; and the design of the U.S. component of an integrated international ground- and space-based system for

long-term systematic observations, including the data management system, of the environment and natural resources.

Improved Education and Training of People

The Administration acknowledges the need for improved environmental education and training. One of the high priorities for the NSTC Committee for Education and Training will be to assess how to improve education and training on environmental issues at all levels. Summary

The Administration has made significant progress toward dealing with the issues that this Committee and others have legitimately raised. The Administration has mounted a substantial and well orchestrated effort to conduct environment and natural resources R&D, which is both scientifically sound and policy-relevant. In establishing the CENR, the Administration has created a mechanism to better develop an R&D strategy and coordinate agency efforts. Under the NSTC, the CENR elevates the level of guidance to that of agency leaders, while maintaining and enhancing the quality of agency R&D manager participation.

We have already taken a number of significant actions, and will be moving rapidly in the coming months to implement the objectives of the CENR that have been outlined in our testimony today and are summarized below:

- provide a higher proportion of Federal R&D funds to support competitive, peer-reviewed, extramural research;
- devote more funds to areas such as the social and ecological sciences, and environmental technologies;
- ensure the development of the science-policy tools required for policy formulation, e.g., integrated assessment models;
- improve data and information activities;
- enable credible comprehensive national or international assessments to be performed involving all stakeholders (government, industry, and environmental scientists and decision makers);
- improve education and training on environmental issues at all levels.

We would like to express our gratitude to this Committee for holding this hearing and we value your participation in helping to make our coordinated environment and natural resources R&D efforts more effective.

Structure

STATEMENT OF GENEVIEVE MATANOSKI, CHAIR, SCIENCE ADVISORY BOARD,
ENVIRONMENTAL PROTECTION AGENCY

I am Genevieve Matanoski, Professor of Epidemiology of Johns Hopkins School of Public Health and Chair of the Science Advisory Board (SAB) of the Environmental Protection Agency (EPA). I am testifying today as an individual and not in my capacity as Chair of the SAB as these remarks have not been reviewed by the Executive Committee of the SAB for approval.

The SAB was established under the 1976 ERDDA as an independent body of scientists to provide advice and review of the scientific information which form a basis for EPA's activities. These reviews include an evaluation of how the Agency conducts their scientific research as well as how EPA uses the science in regulations.

The experiment has been quite successful. The SAB has grown in size and in activities over the past decades. It now consists of 100 members divided among 10 committees coordinated by an Executive Committee. Additional scientists serve as consultants for specific reviews. The committees hold about 60 public meetings a year and generate more than 30 reports annually with a budget under \$2 million.

Over the years, the Board has played an expanding role in review of many controversial scientific and technical issues. They have been asked to take on many activities both from offices within the Agency as well as by Congress itself. SAB has reviewed the scientific basis for whether there are health risks from environmental tobacco smoke, from radon in drinking water and from electromagnetic fields. They have reviewed whether there is a scientific basis by which environmental risks can be compared quantitatively for their impact on the public. They currently have undertaken a project to postulate from their scientific knowledge what might be the environmental risks of the future. Thus, the Board has provided a public forum in which major scientific and technical issues can be addressed independently of final policy decisions.

With the growing demands on the SAB for scientific advice and peer review and with the current changes within the Agency, the SAB has undertaken a self-examination of what might be its optimum role for the future. We have evolved over almost two decades under many administrators. We now are in the process of completing this activity. We believe the SAB has a new vision and mission from that seen at the time of its inception. The new vision will result in some changes in the goals and functions of the body. We will be sharing these proposed perspectives with the Administrator in the near future for her input. We would be happy to review these views with Congress as well. We think that they will help focus our activities for the coming years.

In regard to ERDDA-94, I applaud many of the thrusts particularly as they relate to the SAB. They fit with the mission and vision of the Board. I am confident that the Board stands ready to lend assistance in helping EPA and Congress attain the general goals of the legislation.

S. 1545 contains several areas in which the SAB is explicitly designated as the agent for external peer review of certain Agency reports to Congress. In so doing, the Congress is indicating the importance that it attaches to the technical soundness of the reports under discussion. However, there are a number of other important technical reports to Congress for which the SAB (or other external peer review agent) is not mentioned; e.g., the NHEXAS and EMAP programs (Sections 6 and 10 respectively).

At the same time, I am sensitive to the fact that the resources of the SAB are not sufficient to allow for the Board's review of all of the Agency's scientific and technical documents. In fact, in a typical year, the SAB can address only about a third of the issues that the Agency has asked that the Board address. Even among the more limited subset of technical reports prepared for Congress, not all of these would rank "high" for SAB review, based upon the selection criteria mentioned above.

Therefore, it would be most helpful if the Congress were to:

- a. Indicate its concern about technical merit of any specific Agency report to Congress by explicitly indicating the need for external peer review and

b. Indicate its confidence in the judgement of the SAB by providing the Board with the option of reviewing the draft report to Congress or attesting to an alternative external peer review mechanism, when confronted with competing demands on the Board's schedule. Given the Agency's recently announced Peer Review Policy and its rapid movement toward implementation, I am confident that the Agency is developing a series of alternatives and credible mechanisms for gaining quality peer review.

Such a "right of first refusal" would seem to meet the desire of Congress for independent, quality reviews of technical Agency reports to Congress and the Board's desire to target strategically its efforts across the broad range of Agency activities.¹

STATEMENT OF ALLAN M. FORD

While I am here as a private individual, it is important to note that I am a Research Professor at Lamar University and operate a research program of eight Gulf Coast universities partially funded by EPA as well as the State of Texas and private industry. I am retired as Director of Monsanto Company's Environmental Sciences Center, a large industrial environmental research laboratory, and I serve in various elected and appointed capacities within the American Chemical Society (ACS). In addition, I am co-editor of the journal *Waste Management*. I represent none of these but, again, I am here as a private individual.

Since I am an elected member of the board of the nearly 6,000 member environmental division of ACS and the ACS's policy recommending committee on Environmental Improvement as well as its task force on Environmental Research funding, I will borrow liberally from Society policy statements but, again, do not represent the ACS and will depart from their official policy statements in substantial ways.

It is of particular concern to me that many of the long-term environmental impacts are not addressable with current technology. We are living in a world that is growing more people than its resources can support. With a current population of five and one half billion people, current trends suggest that we could reach as many as 10 billion people in 30 to 40 years. Most major environmental issues have worldwide impact well beyond the United States.

There is, however, a concurrent trend that has significant environmental impact. The world is getting more democratic. More societies are coming to have some say in determining their quality of life. Movement to democracy in countries from Argentina to Russia have allowed more voters to impact their own quality of life. In addition, improvement in communications world-wide have allowed people in countries without elected government to view more progressive societies. This has caused non-elected governments to likewise exhibit an intent to improve the quality of life of the average citizen. This will indeed be difficult since environmental effects are often not noticeable to the average person until extensive damage is done.

In this kind of atmosphere, few governments are going to be able to accept a lower quality of life for their citizenry. But if we are to have a long-term future, we must be able to provide a quality of life that meets the expectations of a demanding public without unduly damaging the environment. Included in quality of life are many goods and services including such basics as food stuffs and normal human activity that have environmental impact.

There is little evidence of any general rule that the production of goods and services needs to entail high risk to the environment. On the contrary, agricultural chemicals, for example, are less toxic and less persistent than they were a generation ago. With the current interest in integrating various chemical and non-chemical technologies for managing pests, the risk to the environment from producing agricultural products is diminishing. The understanding of the role of the various as-

¹ It is important to recognize that the Board's endeavors go well beyond simply reviewing documents. They include such important activities as conducting special projects which provide a scientific overview (like Reducing Risk), advising on research plans, and evaluating professional publications by Agency scientists.

pects of pest management has been a long-term interest of the Environmental Protection Agency's R&D program.

In addition, the lessening of environmental impact, of the production of most products, at least on a unit basis, has been an EPA success story. An additional example is the tremendous reduction in Toxic Release Inventory (TRI) chemicals by many of the major chemical companies. Programs at EPA's Risk Reduction Engineering laboratory in Cincinnati have provided significant support to industry's efforts to reduce environmental risk.

If it is true that we ought to be able to provide the goods and services that society needs and wants without undue environmental risk, then Research and Development must have a central role to play because we do not know how to do this now.

You may ask why this shouldn't be done by private industry. The answer is that product development is the realm of industry, and should remain so, but the environment is the realm of EPA and likewise should remain with EPA. Yet in the production of new products, many steps are generic enough as to be non-proprietary. Research in these areas often has industry-wide impact and may not be supported by a single company as single company impact may be small. EPA's research function should complement industry's product development function by assuring that the technical understanding of environmental risk does not lag behind the development of new product technologies.

It is important to note that EPA's regulatory authority is largely limited to the United States, but the environmental impact of EPA's research and development activity is global, limited only by our ability to transfer technology.

While EPA's research function has a broader mission, there are several areas that I view as fundamental to the future: the generation of technology for understanding of risk, the prevention of pollution, and the development of cost-effective "end-of-pipe" technologies for waste disposal and cheap remediation technology.

The EPA has made an outstanding effort to incorporate risk-based decision making into its management of environmental problems. Unfortunately, the accuracy and precision of estimates of human and ecological risk are unduly influenced by a limited knowledge of baseline data and/or of the pertinent environmental parameters. EPA's research and development efforts are thus fundamental to the reduction of risk to human health and the environment. In the absence of needed risk information, EPA must too often regulate to ensure adequate protection. Thus, advances in understanding of risk and risk relationships may diminish the need for some regulations costly to industry. Indeed, large scale comparison of risk across many programs may give EPA a priority setting capability not available today.

EPA's Pollution Prevention Programs are rightly receiving high priority under the new Administration. "End-of-pipe" technologies added to manufacturing processes increase manufacturing costs and may make products non-competitive in a world market place. It is particularly distressing that an unprofitable process may shut down in the U.S. and foreign capacity may increase causing a net increase in pollution world-wide. Yet, if a manufacturing process can be developed that does not need end-of-pipe technology, there is no reason that it cannot compete in whatever market it chooses to enter. Please keep in mind that there is no inherent quality in the production of goods and services that requires pollution of the environment. Much of the technology used in production today was invented before environmental pollution became an issue. In addition, programs in life cycle analysis and recycling actually bring the environmentally conscious consumer into the manufacturing paradigm.

The third area fundamental to the future is the development of low cost technologies for end-of-pipe control of pollution and low cost remediation technologies. End-of-pipe control of pollution will be with us for some time to come. Since these technologies are not as important to the manufacturer of the product, they often are not used in countries that are less environmentally conscious than the U.S. If end-of-pipe control costs are high, a product can quickly become noncompetitive in the world market place. As the U.S. company becomes non-competitive and goes out of business, the ex-U.S. manufacturer of the product often causes a net increase in pollution world wide. The cost of waste site clean-up in the U.S. is enormous, particularly with more governmental waste sites being located. Many hazardous waste

sites are too costly to clean up with current technology. EPA's research and development program has become a bridge between EPA, academic, and industrial laboratories. Much of the technology being developed in this area is exportable and may recover some cost as well as reduce pollution worldwide.

It is important to emphasize that in each of the three areas just described all have an international character to them. While the regulatory process normally stops at our border, our technology has worldwide utility. Whether we choose to sell environmental technology outside of the U.S. or give it away, the environment, world-wide, will only benefit by its generation. EPA's environmental research and development operations have, in the past, and will continue to be significant generators of new scientific information geared to assuring our society of a high standard of living and an ever lessening of environmental impact.

It is important to note that environmental research funding within EPA has not tracked overall funding for the agency. Note from the attached figure that research funding within the agency has kept fairly constant in 1987 dollars but that agency funding has increased substantially. The agency has grown but R&D has not. The United States has preeminence in environmental R&D to a major extent through EPA's R&D branch and through the collaborations it has generated even though there are a number of public and private entities supporting environmental R&D.

I do not want to detract from other Federal departments doing environmental R&D. Certainly, programs within the Department of Energy, the Department of Defense and even NASA's space station have environmental importance, but leadership in science should come from the Environmental Protection Agency.

STATEMENT OF WILLIAM GLAZE, UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL

Chairman Reid, Distinguished Committee Members: My name is William Glaze. I am currently a Professor in the School of Public Health at the University of North Carolina in Chapel Hill and Chair of the Department of Environmental Sciences and Engineering soon to celebrate its 75th anniversary as one of the largest and most comprehensive departments of its type in the nation. I am also editor of *Environmental Science and Technology (ES&T)*, the environmental journal of the American Chemical Society, a former member of the executive committee of the EPA Science Advisory Board and Chair of the SAB Drinking Water Committee. My other credentials are listed in an attachment to the transcript of my testimony.

Some of the points that I wish to make to the Committee are summarized in two editorials I wrote for the May and July issues of *ES&T*, copies of which are attached to the transcript of my testimony. I am sure the Committee is aware that my testimony is my own and does not reflect the views of either the University of North Carolina or the American Chemical Society.

Mr. Chairman, in my opinion this country does not have the institutionalized environmental research apparatus that it needs to adequately protect public health, preserve the environment, and encourage sustainable economic development. As others have said before, the U.S. environmental R&D apparatus is fragmented, uncoordinated, and "poorly structured to deal with complex interdisciplinary research".¹ I and my colleagues are particularly concerned that there is so little support for exploratory environmental research and so little support for students who will be the environmental professionals for the future. We are aware that basic research is under attack on several fronts in our society, as indicated by the recent controversy over DOD basic research funding in the House of Representatives, but we believe that the crisis is particularly serious in environmental research.

Basic research is particularly important in environmental research because the systems we work with are so complex and relatively unexplored. I am sure that the Committee recognizes that until about three decades ago, this country had no comprehensive research program that explored the complex relationship between human civilization and environmental quality. Until recently, we had very little systematically derived information on the occurrence of contaminants in water, air and

¹ Report of the Committee on Environmental Research, National Research Council, National Academy of Science Press, July, 1994.

soil. More importantly, we are just now learning about the mechanisms of processes that operate in natural ecosystems, that account for transport and transformation of natural and anthropogenic substances on the planet, and that are responsible for the effects of these substances on living species. And, the more we delve into these processes, the more we appreciate their complexity.

Our present environmental management structure, based on command and control strategy, quite naturally places a high degree of emphasis on action even in the absence of complete understanding about the system to be managed. Indeed, there are many who feel that complete knowledge of the system is not possible and not needed; that environmental action can be effective even in ignorance.

While true at a superficial level, this position cannot be continued indefinitely. It is simply not possible to manage this complex civilization and protect nature without further information on how the system works. To use an analogy from the medical field: the history of environmental protection is replete with examples of how we tried to fix the patient without having a good understanding of its anatomy, prescribed drugs that were in fact toxins, and in the process ran up an exorbitant bill that the public ended up paying.

So, my principal message to the Committee is that environmental research is needed, that the Federal apparatus for support of environmental research should be improved, and that basic research is particularly needed.

In the following comments, I would like to elaborate on these and some other issues more specifically related to S. 1545.

EPA's role in the nation's environmental research system is critical and should be enhanced.

Much is being said today about the rapid growth in expenditures for environmental protection, including Federal environmental R&D, and the need to coordinate this "piecemeal" enterprise.² I and many of my colleagues agree with the call for coordination, but with one caveat: we are concerned that fixes that are not institutionalized will mean that environmental research continues to play the role of stepchild in the Federal R&D establishment. We understand that this coordination, and by inference the role of EPA and other specific agencies, will be carried out primarily through committees operating out of the White House. While we applaud this effort, and we recognize that many Federal agencies must continue to play an active role in environmental R&D, we are concerned that temporary arrangements may be modified in the next Administration (and beyond), with the net result that environmental science will still not receive the degree of permanent support that it deserves. I and many others feel that we must have a flagship agency to lead environmental R&D and that agency must be the best in the world.

I am aware that many do not wish for EPA to be the flagship because they feel that the Agency has neither the expertise nor the will to do the job well. I agree that this may be the case today, but in the long term, I believe that our country must have an enlightened, research oriented agency responsible for the protection of environmental quality. Therefore, I am hopeful that the Congress will approve full cabinet status for EPA, and with the assistance of the Administrative Branch, reinvent EPA. Environmental protection (and research) deserves a institutionalized place in the Federal research establishment and as long as it is split between twenty agencies, believe it will not have that place.

² May 4, 1994 hearing of House Committee on Science, Space and Technology as reported in ACS Washington Alert, American Chemical Society, Washington, D.C. The specific dollar figures quoted for environmental R&D are: for 1975 \$1.4 billion; for 1995, \$6 billion (est.). This represents an average annual increase of 7.5 percent compounded. Given the fact that in 1975 there was little knowledge or appreciation about the depletion of the ozone layer, the degree of contamination of our groundwater, the number of abandoned hazardous waste sites, the hazards of chlorinated byproducts in drinking water, the potential effects of increasing carbon dioxide in the atmosphere, the worldwide loss of biological diversity, and countless other environmental hazards, this increase in R&D spending seems minuscule. The increase in the cost of compliance with environmental regulations (from \$30 billion in 1986 to \$160 billion (est) in the year 2000 is more serious, an increase of 13 percent per year, but one could argue that if effective environmental R&D had been initiated in 1975, this cost would be substantially lower.

To become the leading environmental research agency, EPA should have a better balance of short and long-range research. In its Summary of the 1995 Budget, EPA lists two purposes of its research and development program:

1. "to support the Agency's statutory and regulatory responsibilities of protecting human health and the environment, and
2. to advance the level of knowledge in environmental sciences to better understand current and emerging environmental issues to be able to address them."

I believe that EPA is doing an outstanding job in pursuing the first purpose. Based on my knowledge of similar agencies in other countries, EPA scientists appear to have established themselves among the leading experts in several applied research fields, including environmental analytical chemistry, drinking water quality, risk assessment, air pollution research, and others.

On the other hand, it is equally apparent that EPA has given much less priority to "advancing knowledge" per se. Congress recognized this in its Fiscal Year 1993 and Fiscal Year 1994 Appropriations. The Fiscal Year 1993 Conference Committee report stated that "EPA has failed to sufficiently address the issue of basic research" and required the Agency to submit a report outlining expenditures according to research classifications. EPA replied to this directive with the required report in February 1993³ and an update on expected expenses in Fiscal Year 1994.⁴

While it is encouraging to examine EPA's Report to Congress Fiscal Year 1994: Fundamental and Applied Research at the Environmental Protection Agency because it reveals an apparent appreciation of "fundamental" research, the report falls short of convincing a critical reader that the Agency really has a coordinated basic research plan. Those close to the Agency know that fundamental research is still not a significant effort within EPA and in many areas (e.g., some aspects of human health research) the budget for staff and extramural research has actually been cut over the past year or two. The entire budget for extramural fundamental research is only \$113 million and there are only 489 people in the Agency carrying out this function. Funds for exploratory research are only \$51 million. Compared with the total budget of the Agency and the total environmental R&D effort of the country (approximately \$5 billion) these are paltry sums indeed.

EPA needs to separate its R&D establishment, at least in part, from its program offices and from politics. One of the most commonly heard criticisms from outside the Agency is that EPA's R&D program is controlled by its program offices. It is my understanding that this is less true today than in the past, but most of EPA's research is still highly directed, and exploratory research accounts for only 14 percent of the extramural R&D budget (\$51 million).

The problem with this preponderance of directed research is that it fails to be anticipatory. OSTP and OMB have reportedly issued new guidelines on how Federal science agencies should carry out research and one of these is to invest in anticipatory research.⁵ EPA Administration needs to implement this recommendation most enthusiastically by expanding undirected exploratory research in the broad domain of its research mission. Practically, this means that Congress must appropriate funds for fundamental research within the agency that are not controlled by the program offices of EPA. The amount of funds for this purpose has to be substantial and protected from transfers into other operations of the agency. In other words, EPA needs to establish a viable, independent research establishment within the agency closely coordinated with, but largely autonomous from the program offices.

EPA needs to reward its research scientists and engineers more, not just in salaries but in other ways such as more intellectual freedom, more time to pursue fundamental research, and with other intangible perks such as respect. My colleagues within EPA tell me that they are harassed by loads of paperwork, spend a huge amount of time covering their tails because of the recent actions of the Inspector General, and have little time for real work because they are supervising external

³ Report to Congress Fiscal Year 1993, EPA/600/R-93/038.

⁴ Report to Congress Fiscal Year 1994, Fundamental and Applied Research at the Environmental Protection Agency, DRAFTS Feb. 1994.

⁵ "Memo Backs Basic Research With Words, Not Cash", *Science*, Vol. 264, 3 June, 1994, p. 1395.

or internal contractors. EPA needs to push hard toward a system which will reward the many dedicated researchers at EPA, cull out the laggards, and recruit, nurture and reward talented young scientists and engineers.

Creating this climate in the EPA R&D establishment is essential and it must come from the top. In my opinion, EPA ORD needs to be reorganized to give more autonomy to its fundamental research mission. A new R&D division emphasizing anticipatory, fundamental research needs to be created, managed by highly respected scientists and engineers who are given a freer hand to make EPA a first class research organization. A new model is needed which taps the external research community for leadership, more in the style of the National Science Foundation and the National Institutes of Health. In this model, EPA OR&D staff would be in closer touch with the external research community and would, in most cases, return to research positions in academia or industry after their term with EPA. This will lead to a more robust R&D administration and to more imaginative and innovative research.

EPA needs to completely revamp the way it is using the external community for research. EPA must also draw more on the academic community for assistance in its research program, both fundamental and applied. All who know about the external grants and cooperative agreement program know that it is a shambles. From the exploratory research office, proposals are called for, slowly reviewed and then sit upon desks for years awaiting funding. The review committees are constituted by curious rules involving external contractors and it is highly likely that committee members will be reviewing proposals out of their area of expertise, led by EPA staffers who are not involved in research nor have been for many years. The result of this ineptness has caused me and many of my colleagues to avoid the exploratory research program of EPA as a source of support for our students and research. It is just not worth the hassle.

Congress should assist EPA in the effective use of cooperative agreements. The academic community is now very confused about the rules for awarding and administering cooperative agreements. There appear to be new rules that prohibit effective collaboration of academia and EPA toward common research goals, and the paperwork obstacles are very formidable. There also appear to be major differences between how the various EPA research laboratories operate in their relations with the academic communities, so the rules for cooperative agreements are not clear. In short, many serious investigators in this country simply don't want to fool with EPA and we all lose. Congress needs to look into the process by which EPA works with academia, streamline it, and make it more productive.

A new mechanism is needed to encourage more highly qualified individuals to enter and remain in environmental protection careers. The fields of environmental science, engineering and management are exciting and challenging careers, but at the present time there are an inadequate number of opportunities for qualified students to pursue graduate degrees. There are two reasons for this, in my opinion. First, there is the uncertain situation for the funding of exploratory research. Secondly, graduate traineeships programs for graduate students in the environmental sciences are very rare. I am very pleased to see in S. 1545 provisions for graduate traineeships (Sec. 5 (c)) but it appears to be only a modest beginning. Graduate traineeships are needed in environmental engineering, science and management, particularly for minorities and women, and should not be limited to a few States.

Finally, may I say that we need to develop programs to attract high quality scientists and engineers in the basic sciences to work on environmental problems. We need programs that will link environmental science and engineering programs such as mine with departments of chemistry, physics, geology and biology. This will encourage scientists in those departments to consider working on environmental systems and in the process, bring new techniques and talents to environmental R&D. This type of expertise will be increasingly valuable in the future as we shift our R&D effort from the remediation of old sins to pollution prevention. Pollution prevention will require more R&D on fundamental science to effect process modifications and create new manufactured products so as to minimize or eliminate wastes. I am hopeful that NSF and other agencies that support basic science will see the

value of such programs, and will develop incentives for faculty and students in the basic sciences to extend their works into the environmental field.

This can be accomplished most effectively, in my view, if these faculty and students from the basic sciences are linked with their counterparts in the applied sciences and engineering in program projects or centers. We in academia need to make some changes in the way we do business in order to make such crosscutting, interdisciplinary efforts really work, but it can and should be done.

Mr. Chairman, thank you for the opportunity to address you today. I would be pleased to try to answer any of your questions.

STATEMENT OF RALPH DE GENNARO, DIRECTOR, APPROPRIATIONS PROJECT, FRIENDS OF THE EARTH

Mr. Chairman, thank you for the chance to appear before this Committee. My testimony may be summarized as follows:

1) Friends of the Earth supports the thrust and most provisions of S. 1545 as introduced and urges swift enactment of legislation authorizing the basic R&D programs of EPA's Office of R&D. We urge that the final bill emphasize simplicity by providing for a multi-year authorization of 3 to 5 years, setting a higher overall funding level, and eliminating subcategories in the funding authorization.

2) This bill should not be controversial. Parties on all sides of environmental debates agree that better R&D makes for smarter environmental policies and a stronger U.S. green technology industry. Similarly, virtually all parties agree that EPA needs more and better R&D. The main disagreements about environmental R&D do not bear on the question of whether Congress enacts S. 1545 this year.

3) More funding is needed and affordable. Numerous authorities have cited the need for more funding for EPA's R&D programs, which could be paid for by cutting unnecessary defense R&D. In the 15-year period between Fiscal Year 1980 and Fiscal Year 1995, defense R&D increased by 39 percent in constant dollars while EPA R&D declined by 4 percent.

4) Championing salaries and expenses funding would speed management reform. The Environment and Public Works Committee could greatly improve EPA R&D by championing more salaries and expenses funding before the Appropriations Committee and OMB.

5) Remember that macro actions affecting the overall Federal budget—such as protecting discretionary spending, cutting defense and capping entitlements—will have an indirect but crucial impact on the EPA R&D budget over the next 5 years.

6) Beware of easy answers to EPA's R&D budget needs. Weakening environmental laws will not remove the need to understand emerging environmental problems. Similarly, reprioritizing EPA's currently inadequate budget according to risk will not in itself free enough money to meet current funding needs.

About Friends of the Earth and Its Appropriations Project

My name is Ralph De Gennaro, and I testify today on behalf of the 15,000 members and supporters of Friends of the Earth. We are a national environmental advocacy organization founded in 1970 and headquartered here in Washington, D.C. We have affiliates in over 50 countries.

At Friends of the Earth, I have served as Director of the Appropriations Project since 1990. The project's mission is to advocate a fundamental change in Federal budget priorities to achieve adequate funding for Federal environmental programs while cutting environmentally harmful spending and subsidies. In January 1993, Friends of the Earth published *Earth Budget: Making Our Tax Dollars Work for the Environment*, which I coauthored with Gawain Kripke of our staff. This 200-page report presented a first-ever comprehensive survey and analysis of Federal environmental spending in virtually all Federal agencies. The report has received significant media attention, and has been used by key policymakers at the Office of Management and Budget, Office on Environmental Policy, Environmental Protection Agency, Department of State and other Administration offices. Chapter 15 of the *Earth Budget* report, entitled "Research and Development," presents an overview of environmental R&D issues.

My expertise is in matters of the budget and government, rather than in science or technology. My testimony today focuses on S. 1545, and presents some general observations to put this bill in context

Swiftly Enact S. 1545 with Minor Changes

Friends of the Earth supports the thrust and most provisions of S. 1545 as introduced. We urge swift enactment of legislation authorizing the basic and fundamental R&D programs under the jurisdiction of EPA's Office of Research and Development (ORD). It is worth noting that no new authorization has been enacted for these programs since the 3-year authorization enacted in 1978. Given the press of business in Congress, it is unlikely that this Committee will have time in the future to reauthorize these programs every year. Indeed, it would seem unrealistic and unnecessary to attempt annual authorizations. For this reason, Friends of the Earth strongly urges that Congress provide for a multi-year authorization of 3 to 5 years. For a similar reason, we urge the Committee to set an overall funding level that is high enough to allow flexibility over the years should the President wish to request more funding. Again, for a similar reason, we recommend that the Committee eliminate the subcategories in the funding authorization section. Because many funding decisions will ultimately be made in the appropriations bills, we urge that the Committee keep the funding authorization sections simple and durable.

EPA R&D Should Not Be Controversial

There is no disagreement over the importance of R&D at EPA. There is and has been a very broad consensus that EPA's R&D efforts are important and underfunded. The best evidence of this consensus is a letter written in 1984 to Congressman Edward Boland, then Chairman of the House Appropriations Subcommittee with jurisdiction over EPA, which is now chaired by Congressman Louis Stokes. The letter to then Chairman Boland "strongly urged" him to provide a "substantial increase" for EPA R&D in Fiscal Year 1985. The letter said, "The reason for presenting this recommendation to you is our deep concern that the scientific base on which the Agency's regulatory decisions are founded has been seriously eroded in recent years by severe cuts in the research and development budget of the EPA."

The letter observed that EPA needed additional resources to both meet existing statutory duties and "address long-neglected problems" such as indoor air pollution, risk assessment methodology, health and environmental effects assessment, and "support of scientific work in external research and academic centers." These are the same needs that exist today. The letter said that the added dollars would buy benefits such as "improved health and environmental quality, better based regulations for industry, and increased development of scientific expertise in technical and academic center in the private sector."

The most impressive aspect of this letter was who signed it—the leaders of ten major environmental groups and the CEO's of five major chemical companies, including Exxon Chemical Corporation, Dow, American Cyanamid, Monsanto and Union Carbide.

So there has been broad agreement on the importance of supporting EPA R&D.

More Funding Is Vital

Whatever form the final authorization takes, more funding is absolutely needed if EPA R&D is to succeed. Funding for conduct of R&D at EPA was cut by 50 percent between Fiscal Year 1978 and Fiscal Year 1983, and it has never fully recovered. Presidents Bush and Clinton have proposed modest increases for EPA R&D in recent years. But these incremental increases are inadequate to make up for previous cuts or fix material weaknesses identified by EPA. EPA lacks sufficient money to carry out existing laws and mandates, much less address neglected or emerging requirements. This funding shortfall is old news. I personally have testified about it in 1992 and 1993 to the House Science Committee. Parades of experts raise the issue in hearings every year, and recommend solutions which include greater funding. Yet, the situation does not seem to have improved significantly.

The Carnegie Commission report of December 1992 said "it is clear that organizational changes alone will not lead to improvements in the scientific capacity of EPA. Substantial funding increases will be required as well." Another prestigious report

made a similar point The National Commission on the Environment, in its Choosing a Sustainable Future report in December 1992, recommended that "the Federal government should substantially increase funding for research and development."

The EPA Science Advisory Board's Research Strategies Advisory Council reviewed the President's Fiscal Year 1995 budget request for EPA's ORD earlier this year, and sent its results to EPA Administrator Browner on April 29, 1994. The SAB expressed concern about the "long-term erosion that has occurred in the level of the Agency's research and development activities." According to the SAB, the Agency's R&D budget has declined (measured in constant 1987 dollars) from \$460 million in Fiscal Year 1980 to \$440 million in Fiscal Year 1995. The SAB further noted the "even more striking" drop in agency R&D personnel, from 2,300 workyears in Fiscal Year 1980 to 1,800 workyears in Fiscal Year 1995. The SAB noted that, "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."

Increased EPA R&D Is Affordable

By cutting unnecessary military R&D spending, the U.S. can afford to boost environmental R&D without increasing the deficit Between Fiscal Year 1980 and Fiscal Year 1995, defense R&D exploded in a 39 percent increase while EPA R&D declined by 4 percent These figures, measured in constant dollars, were published in 1994 by the EPA Science Advisory Board and the American Association for the Advancement of Science.

Presidential science adviser John Gibbons has endorsed a funding priority shift from defense to non-defense programs, but it is not happening this year. The AAAS reported earlier this year that defense R&D consumed \$385 billion in Fiscal Year 1994—54 percent of all Federal R&D spending. AAAS further noted that President Clinton's request for Fiscal Year 1995 would keep defense R&D at 54 percent of total R&D, and that this is still well above the 47 percent share defense R&D had 15 years ago in Fiscal Year 1980. (AAAS Report XIX, "Research and Development Fiscal Year 1995," p. 20, 54).

Championing Salaries and Expenses Could Help EPA R&D

The Environment and Public Works Committee could speed management reform of EPA R&D by championing salaries and expenses funding for EPA. This is the kind of cause that is taken up by no particular member of Congress. This leaves the authorizing committee of jurisdiction as the sole advocate with the Appropriations Committee and the President's Office of Management and Budget

The salaries and expenses account, now called Program Research and Operations (PRO), funds the EPA research workforce. Due to funding shortfalls in salaries and expense, the agency's R&D workforce has declined from 2,300 FTEs in Fiscal Year 1980 to 1,800 FTEs in Fiscal Year 1995, according to the SAB's Fiscal Year 1995 budget review. This hurts EPA's ability to attract high-quality new scientists, and it also invites disaster because there are not enough EPA staff to manage the agency's many contractors. In fact, one material weakness that has been identified by the EPA is inadequate management of extramural resources. In its Fiscal Year 1994 budget review last year, SAB pointed out that this has resulted in an over reliance on a "shadow workforce." SAB said "inadequate funding has resulted in a reliance on on-site contractors which transcends mere support services and now seriously threatens the scientific excellence of the organizations. . . . In effect, a 'shadow bureaucracy' is created." A "disproportionate" share—almost 50 percent—of the workforce at laboratories is on-site contractors, as opposed to agency personnel. Those EPA scientists who remain must spend more of their time and energy attempting to manage this excessive number of contractors, instead of doing their own scientific work.

President Clinton and Administrator Browner deserve credit for proposing a contractor reform initiative in their Fiscal Year 1995 budget request, including \$45 million in the PRO account to convert 620 contractor FTEs to in-house employees. However, it should be noted that the Senate Appropriations Committee recently cut

Clinton's Fiscal Year 1995 PRO request from \$963 million to \$922 million, which means that EPA will not be able to fully fund the contractor reform initiative in Fiscal Year 1995. This issue deserves continuing attention from the Environment and Public Works Committee.

Friends of the Earth is proud to have organized a letter Sent in February 1992 from eight environmental leaders to Appropriations Committee leaders in favor of full funding for EPA's salaries and expenses budget. The letter stated, "we believe it is important to distinguish the Salaries and Expenses account as an issue of vital importance for EPA's efforts in every program and medium."

Other material weaknesses identified by the EPA are the antiquated and obsolete inventory of scientific equipment, and aging laboratory facilities. These are the physical infrastructure of the agency, and it is essential that they receive increased funding, as recommend by the SAB.

Macro Budget Issues Will Have Big Impact on EPA R&D

It is important to remember that the EPA R&D program may be less affected by authorization levels stipulated by this Committee than by "macro" actions affecting the entire Federal budget. EPA R&D and virtually all other environmental programs are part of the discretionary spending category of the Federal budget. In order to protect environmental spending programs, Friends of the Earth recommends the following measures:

- protect discretionary spending from further cuts when the Senate considers the Fiscal Year 1996 budget resolution next year;
- cut defense in order to boost non-defense investments;
- achieve tough health care cost containment and enact fair and responsible entitlement spending reform to prevent unchecked growth in this category of the budget that threatens to crowd out all discretionary spending in the future;
- reduce the deficit by taxing pollution and the use of natural resources, and by obtaining fair return for taxpayer assets.

Unless Congress is able to act on these items, funding for EPA R&D will never be adequate to provide the information this nation needs to deal with threats to human health and the environment.

No Easy Answers

Finally, I would like caution those who would seize two easy answers to the current funding shortfalls. First, risk reduction budgeting is not going to solve this problem. It may help around the margins, but no list of priorities can make up for the fact that we are failing to fund essential work. Second, forgoing new environmental laws or weakening current laws will not solve funding shortfalls. Many environmental research needs today are driven by increasingly complex scientific issues, rather than enactment of new laws. It is vital that EPA perform the necessary research to reduce uncertainty and allow formulation of solid policies, regardless of congressional action on new environmental laws.

Other Issues in Bill

There are numerous minor provisions in S. 1545, and Friends of the Earth does not have the expertise or time to comment on all of them. However, Friends of the Earth believes that section 8 of the bill regarding long-term pesticide research is a useful initiative that would help fill data gaps on an environmental health issue of great significance. We urge the Committee to retain this section of the bill as introduced. Dr. Richard Fenske has previously testified to this Committee that existing pesticide research efforts are inadequate, and that "The health and environmental issues posed by modern pesticide use can only be addressed through development of a national strategy, and by establishment of a long-range planning and stable funding for pesticide research and development."

Defense R&D vs. EPA R&D

(All figures are constant FY 1987 Dollars in millions)

	Actual FY 1980	Requested FY 1995	Percent Change, FY 1980-FY 1995
Defense	\$ 21,800	\$ 30,400	+ 39
EPA	\$ 460	\$ 440	- 4

Sources: EPA figures from EPA Science Advisory Board, "Review of Fiscal Year 1995 President's Budget request for the Office of Research and Development," April 29, 1994.

Defense figures (including DOE nuclear weapons activities) from AAAS, Report XIX: "Research and Development Fiscal Year 1995," (March 1994) p. 54.

STATEMENT OF RICHARD FENSKE, SCHOOL OF PUBLIC HEALTH AND COMMUNITY
MEDICINE, UNIVERSITY OF WASHINGTON

PESTICIDE RESEARCH AND DEVELOPMENT

Pesticide use in the United States has seen enormous growth over the past several decades.

Not only have the number and volume of pesticides increased, but new use patterns have emerged in such areas as lawn care management and residential treatments. Understanding the consequences of changes in pesticide use requires substantial new knowledge in the areas of exposure assessment, toxicology and alternative techniques for pest control.

Pesticides are inherently a mixed blessing, impacting our lives for better and for worse. For the better, they provide a means of reducing infectious disease transmission through vector management, and they allow substantial increases in agricultural production. For the worse, however, their use inevitably results in human exposure through air, water and soil, and deleterious effects on other species.

Given the dual nature of these powerful pest management tools, it is fair to ask whether we squander much of their value, for we use pesticides as much for convenience as by necessity. When pesticides are employed in agriculture as ripening agents or for cosmetic purposes, what price are we paying in terms of environmental contamination and exposure to chemical residues on food? If we employ pesticides to maintain aesthetically pleasing lawns and gardens, or treat our homes with chemicals in lieu of more preventative measures, what health costs will our children incur?

Such questions can only be answered through development of a national strategy to manage pesticide use, and by establishment of long-range planning and stable funding for pesticide research and development.

Need for a Pesticide Research and Development Program within U.S. EPA

Research and development activities addressing the health and environmental impact of pesticide use have not been well focused. Historically, a large proportion of these activities have been conducted by manufacturers at the behest of the U.S. Environmental Protection Agency. Yet the data and insights derived from such studies normally remain proprietary, and therefore inaccessible to the scientific community and the public.

Research and development sponsored by the U.S. Department of Agriculture has been directed primarily towards production, with health and environmental aspects of pesticide use receiving a relatively low priority. In the area of occupational exposures, the National Institute for Occupational Safety and Health has generally deferred to EPA. As a result, the health concerns of such worker populations as farmers and agricultural fieldworkers have received far less attention than they merit.

The regulatory responsibilities assigned to the U.S. EPA are complex, and have grown dramatically in recent years without commensurate funding. Many of the provisions of the proposed legislation under consideration today will require new and expanded activities on the Agency's part, and should be funded accordingly.

Perhaps as a consequence of growing regulatory demands, the Agency has had little opportunity to create a systematic strategy in the area of pesticide research and development. Yet the Agency has made substantial and pioneering contributions to this field, notably on the issues of developmental and neurotoxic effects of pesticides, pesticide contamination of groundwater, protective clothing for pesticide workers, and residential pesticide exposure.

The potential for a comprehensive pesticide research program exists within the Agency, and this legislation can provide the impetus for its development. Such a program must increase both in-house capabilities as well as stimulate and sustain basic and applied extra-mural research.

Need for Research in Pesticide Exposure Assessment

Federal regulatory policy has become increasingly dependent on risk assessment as a basis for prioritization and decision-making. Risk assessments require the answers to two fundamental questions: How and to what extent are particular populations exposed? What are the health consequences of such exposures? In case after case the conduct of sound risk assessments are stymied by lack of adequate exposure assessments.

Farmers and agricultural fieldworkers are exposed to a wide variety of pesticides over an entire growing season, yet exposure assessment studies of these populations are at a rudimentary stage, providing at best an estimate of exposure over a few days for selected compounds. Critical issues such as the magnitude of dermal exposure and absorption or the adequacy of protective clothing are to a great extent undocumented.

Lawns, gardens and the insides of homes are treated routinely with pesticides, yet virtually no data are available to estimate exposures of residents. Children, in particular, may be a sensitive subpopulation. Little information exists to predict the long-term health effects of exposures during infancy or early childhood. We have learned from studies of lead exposure that a primary source for children's exposure is soil and house dust, and that hand-to-mouth activity is an important component of the exposure pathway. The Agency's Office of Research and Development has demonstrated recently that household soils and dust contain a wide range pesticides. What hazards do these residues pose to children? How do other pathways (air, food, water) contribute to the multimedia exposures that are the realities of everyday life? How can we minimize exposure in these circumstances?

The science of exposure assessment is rapidly evolving to take its place as one of the primary environmental health sciences. There is a critical need for basic research regarding human exposure pathways and for training young scientists in this field. This legislation clearly recognizes these needs and will help the focus the Agency's attention on these issues.

Need for Research in Pesticide Toxicology

Major uncertainties exist regarding both the acute and chronic health effects of pesticides. Basic toxicological research is required in two areas: development of standard methods for testing health effects, and elucidation of mechanisms of toxicity.

The neurotoxicity of pesticides has been the subject of growing concern, and the Agency recently published guidelines for neurotoxicity testing. The absence of such guidelines until this time has been due primarily to a lack of standardized tests. Substantial research is required to create and validate testing methods, yet such research has received only limited funding. In the case of immunotoxicity, no standard tests are yet available. Thus, pesticides are currently registered with no knowledge of effects on the immune system. Only a substantial investment of time and resources can improve our ability to detect subtle and complex responses to such toxins.

Much of the toxicological research on pesticides has focused on single compounds. In many cases the health effects of single compounds can be documented without knowledge of the underlying toxicological mechanism. However, when faced with chemical mixtures this approach is inadequate. Testing the many possible combinations of pesticides is not feasible. An understanding of mechanisms is essential to developing a theoretical framework which allows prediction of effects. This approach has been followed successfully in pharmaceutical research, where drug interactions have been well documented.

Need for Research in Alternative Pest Control Techniques

The primary strategy of public health is prevention. Prevention of exposure to hazardous chemicals is most surely achieved by elimination at the source; i.e., discontinuation of use. In regard to pesticides, prevention can be achieved by substituting safer compounds for more hazardous ones, more strict control of sources, or adoption of nonchemical methods of pest control.

This legislation appears to break new ground by proposing that U.S. EPA develop expertise in the area of agricultural production. Yet EPA has been conducting cost-benefit analyses of the consequences of pesticide regulation for many years. The provisions in this bill would allow EPA to develop a pro-active approach to such regulation by evaluating the performance of integrated pest management (IPM) programs and other pest control strategies.

Need for a Grant Program for Training and Research

A successful pesticide research and development program will require substantial support for both in-house and extra-mural research. Although EPA has a grant program in place for health effects research, this program has not been funded at a consistent level in the past. A grant program which offered awards of 3-5 years duration would attract high caliber researchers and provide sufficient stability in funding to allow significant progress.

There are at present an inadequate number of newly trained researchers in the environmental health sciences. In particular, graduates of programs in environmental toxicology, industrial hygiene and exposure assessment are in high demand. A grant program focused on M.S. and Ph.D. level training in pesticide research would lead to an infusion of capable young scientists into this field in a relatively short time. The building of such a scientific infrastructure is critical to meeting the long-range objectives of this legislation.

STATEMENT OF NEIL L. DOBBS, LEGISLATIVE DIRECTOR, COMMITTEE FOR THE NATIONAL INSTITUTE FOR THE ENVIRONMENT

Mr. Chairman and members of the Committee: Thank you for the opportunity to provide written testimony about the Environmental Protection Agency's Office of Research and Development. My name is Neil Dobbs; I am the Legislative Director of the Committee for the National Institute for the Environment (CNIE). The CNIE is a national grass roots network of more than 8,000 scientists, business leaders, environmentalists and other concerned citizens calling for the creation of the National Institute for the Environment (NIE) to improve the scientific basis for decision-making on environmental issues. Legislation to establish the NIB (S. 2242) was introduced in the Senate by Tom Daschle and 9 bipartisan cosponsors. Companion legislation (H.R. 2918) was introduced by George Brown (D-CA) and currently has 78 bipartisan cosponsors.

The NIE will perform four critical integrated functions:

- Assess environmental knowledge, and identify issues of critical importance where more information is needed.
- Fund peer-reviewed, problem-focused research in the natural and social sciences, engineering, economics, and other fields as necessary;
- Communicate information through a universally accessible electronic National Library for the Environment;

- Support education and training to prepare future generations for the environmental challenges ahead.

Office of Research and Development's Mission

Since the EPA was founded over 20 years ago, the EPA's Office of Research and Development (ORD) has played a valuable role in its capacity as the in-house division responsible for scientific research and technical support programs for the agency. During the 1970s, when the EPA was expanding, there was inadequate information available to the agency to provide an adequate scientific basis for many of its regulations and standards. To EPA's credit, under constant legislative directives and strict statutory deadlines, it achieved the majority of its regulatory objectives.

In this context, the ORD played a crucial role in providing the technical assistance and scientific advice needed to carry out its regulatory mission. EPA's ORD and the program offices made a valiant effort to address what the Congress and the public demanded—the cleanup of our air, water, and soil and the protection of human health and the environment.

In September 1988, at the request of EPA Administrator Lee Thomas, the EPA Science Advisory Board (SAB) undertook a comprehensive study on the state of the agency's environmental research. Their overall conclusion was that while the ORD had functioned well in its capacity to meet the short-term needs of EPA's regulatory programs, it fell far short of its long-term research and development goals.

As we move into the 1990s. . . our strategy for reducing environmental and health risks must evolve in response to changing circumstances. . . Just as EPA has emphasized command-and-control approaches because of statutory requirements, its R&D program has emphasized short-term, program-related research that supports regulatory development. . . EPA's R&D program has to be expanded and reoriented *to include much more basic, long-term research* not necessarily tied to the immediate regulatory needs of the EPA's program offices. ("Reducing Risks: Research Strategies for the 1990s", U.S. EPA, Sept. 1988; emphasis added.)

This initial report was followed 2 years later by a report requested by Mr. William Reilly, the Administrator of the EPA during the Bush Administration. The SAB appointed committee was called the Relative Risk Reduction Strategies Committee. While the report's conclusion agreed with most of the earlier criticism of the agency's lack of commitment to long-term strategic planning on critical environment issues, it went further by pointing out specific areas of neglect:

[O]ver the past 20 years and especially over the past decade, *EPA has paid too little attention to natural ecosystems*. The Agency has considered the protection of public health to be its primary mission, and it has been less concerned about risks posed to ecosystems. . . *EPA's response to human health risks as compared to ecological risks is inappropriate*, because, in the real world, there is little distinction between the two. ("Reducing Risks: Setting Priorities and Strategies for Environmental Protection", U.S. EPA, Sept. 1990; emphasis added).

In March 1992, a distinguished four-member "Expert Panel on the Role of Science at EPA", presented their report to EPA Administrator Reilly. Their overall findings do not paint a very encouraging picture of the scientific mission and direction at the EPA, and strongly criticized the quality of science and budgetary planning process at the agency. Among their many conclusions were:

- "EPA does not have a coherent science agenda and operational plan to guide scientific efforts throughout the Agency and support its focus on relatively high-risk environmental problems."
- "In many cases, appropriate science advice and information is not considered early or often enough in the decisionmaking process."
- "EPA has not consistently enlisted the nation's best scientists to provide the research and technical information needed for decisionmaking." ("Safeguarding the Future: Credible Science, Credible Decisions", U.S. EPA, March, 1992).

More recently, SAB Chair Genevieve Matanoski and SAB Research Strategies Advisory Committee Chair Roger McClellan emphasized the importance of research to the agency in a letter to current EPA Administrator Carol Browner dated April 29, 1994. The SAB concluded that EPA "does not appear to be heading in the direction of creating the stronger science base that is so desperately needed."

Approximately 85 percent of ORD's resources goes to conduct short-term, regulatory research and development, with only 15 percent going to the long-term strategic, non-regulatory research. Short term research has dominated ORD's activities because of EPA's mission to promulgate regulations and meet Congressional mandates. In light of the criticisms cited in these reports, it is critical to address the need for long-term, strategic research. With EPA research currently favoring its programs, it is important to ensure that an increase in long-term research at the agency is not at the detriment of its regulatory programs and related research.

Funding for Environmental R&D

EPA's R&D programs are only a small part of a larger patchwork of environmental research programs carried out by other Federal agencies. In Fiscal Year 1992, at least six Federal agencies had annual environmental R&D funding in excess of EPA's total research budget. They were the National Aeronautics and Space Administration (\$826 million), Department of Energy (\$799 million), Department of Defense (\$577 million), Department of Interior (\$554 million), the National Science Foundation (\$541 million), and the Department of Agriculture (\$403 million). (All Fiscal Year 1992 budget figures above were derived from Federal Funding for Environmental R&D, Gramp et al, AAAS, 1992).

ORD's total budget figures for Fiscal Year 1994 are estimated at \$500 million. Approximately \$38 million is designated for exploratory research in areas where previous reports concluded the agency was lacking. The exploratory portion (long-term, interdisciplinary research) of the budget generally receives less attention due to the amount of ORD resources necessary to provide program offices with information to help them meet their short term, regulatory mandates. With the importance of research to the agency's mission, it is discouraging that since 1980 EPA research and development declined by 8 percent in constant dollars. It is also discouraging to note that research is less than 8 percent of EPA's total budget.

According to a December 1990 EPA report to Congress, in 1994 the United States will likely spend between \$135 billion and \$158 billion on cleaning up past environmental mistakes. These numbers are expected to increase to between \$165 billion and \$194 billion by the year 2000. It is troubling that more resources are not placed in environmental research so that we may anticipate and avoid costly environmental crises.

Federal Environmental R&D

A more disappointing situation awaits us when we view the Federal environmental R&D effort as a whole. In December 1992, the Carnegie Commission on Science, Technology, and Government released an in-depth report on the state of environmental research and development in the United States among all Federal agencies. They noted:

Unfortunately, the existing Federal environmental R&D infrastructure was built for another time and a set of issues that no longer correspond to today's problems. . . Largely because of its origins as a series of individual programs initiated in response to specific problems, *much of our current R&D system is diffuse, reactive, and focused on short-range, end-of-pipe solutions.*

Today the Federal environmental R&D system is a loose collection of laboratories and programs, most of which were established to respond to the problems and priorities of the past. While many of these problems remain today, we also face a new set of challenges, and responding to them *requires a more dynamic, interrelated organizational structure and more effective assessment and policy-making process.* ("Environmental Research and Development: Strengthening the Federal Infrastructure", Carnegie Commission, Dec. 1992; emphasis added).

Decision-makers in the public and private sectors lack sound scientific information on critical environmental problems today because there is no coherent or inte-

grated system for assessing, interpreting, educating, and effectively communicating environmental knowledge to those who need it. The Federal environmental R&D effort is spread over more than 20 agencies, each with its own institutional mission and legislative mandate.

Fragmentation of national environmental R&D prevents broad analysis and understanding of critical environmental problems that frequently transcend scientific disciplines and cut across agency boundaries. The absence of a commitment to long-term environmental research and education, strategic planning, and lack of integration by the agencies, makes it difficult for decision makers to anticipate problems before they become costly environmental crises.

The Committee on Environment and Natural Resources

The Clinton Administration has recognized the need for stronger coordination of existing programs. The Committee on Environment and Natural Resources (CENR) of the National Science and Technology Council represents an attempt to address inadequacies in Federal environmental R&D. The CNIE supports this initiative to provide leadership and to rationalize and coordinate the more than 20 agency programs. It is our hope that the proposed CENR can prove effective in its initial efforts to set priorities, coordinate agencies, and change the direction of Federal environmental research. At the same time, we must be realistic about the inherent limitations of any attempt to correct the significant shortcomings of the existing R&D structure by relying totally on that structure itself.

- Coordination will inevitably clash with the research priorities of the agencies as they conduct their usual business, which is statutorily based on near-term regulatory and management duties.
- CENR, a White House managed research planning effort cannot achieve a true partnership with the various environmental stakeholders because it does not include those most affected by environmental problems in its priority setting process.
- It is unclear whether the CENR can improve the credibility of Federal environmental research, as the infrastructure continues to be largely intramural, focused on near-term regulatory mandates, and often not subject to peer review.
- Because the CENR remains dependent on the commitment of the White House, it is uncertain how this mechanism could, over the long-term, withstand political pressures and changes in Administrations.

Adaptations to the existing Federal infrastructure, such as CENR or the proposed changes in the EPA's organization, will accomplish much, but will not be sufficient to successfully address the environmental challenges of the future. Since 1989, a diverse coalition of scientists, environmentalists, business leaders, State and local government officials, and community activists have recognized the need for a new, comprehensive national approach to provide credible environmental information.

The National Institute for the Environment

The proposed NIE will focus on long-term, policy relevant research on large scale environmental problems, and target voids in the environmental knowledge base that do not fit neatly within the narrow mission of one agency. The NIE will complement the existing Federal structure and meet the critical need recognized by the previously cited reports. It will not replace or duplicate the existing Federal programs, which are needed to fulfill missions and achieve regulatory deadlines, but would research environmental issues that the present system is unable to address well. The NIE should not be considered as an alternative to the current Federal system, but as a necessary and essential complement.

The NIE would be an independent, non-regulatory institution with the mission to improve the scientific basis for decision-making on environmental issues. It would achieve this mission

by integrating four critical areas of (1) knowledge assessment, (2) research, (3) information services (through a state-of-the-art electronic National Library for the Environment), and (4) education and training. By being integrated for the first time within one agency, each of these activity areas would benefit from, and reinforce, the others in a way that cannot occur in the decentralized Federal system.

NIE research will be cost-effective because it would competitively award peer-reviewed extramural grants. Thus, there would be no expense of building and administering government laboratories. Through extramural grants, the NIE will be able to tap into the scientific expertise of academia, private industry, nongovernmental organizations, research institutes, and Federal laboratories. By assuming a responsibility for interdisciplinary research and sponsoring higher education, the NIE would help to educate the public and the next generation of environmental scientists for the challenges ahead.

The NIE's inclusive process would involve the nongovernmental sector in a way that no program administered by the White House can. The NIE will be governed by a diverse board comprised of representatives of the scientific community, universities, environmental organizations, private industry, State, tribal, and local governments, environmental justice organizations, and other citizens' groups. At the same time, the NIE would work with the other Federal environmental agencies through the guidance of an interagency advisory council that would prevent duplication and address the information needs of existing agencies.

"Most importantly, the NIE's independent status and the inclusion of stakeholding constituencies in its governance would provide, more than any restructuring of the existing Federal system, a greater long-term assurance of credible research by the nation's best scientists, as well as greater insulation from the political winds that constantly buffet environmental issues." (Letter to President William J. Clinton from former EPA Administrators William Reilly, Russell Train, and William Ruckelshaus endorsing the NIE, May 3, 1994.)

The U.S. Conference of Mayors, the National Council of Negro Women, the Environmental Defense Fund, and more than 150 universities, scientific societies, professional organizations, State and local governments, and environmental groups endorse the NIE.

The CNIE shares with this Committee, and with the Administration, the common objective to achieve the high quality science this nation needs to address the critical environmental challenges of the future. We look forward to working together in attaining this goal. We urge this Congress to establish a National Institute for the Environment.

103D CONGRESS
1ST SESSION

S. 1545

To authorize appropriations for environmental research, development, and demonstration for fiscal years 1994 through 1996, and for other purposes.

IN THE SENATE OF THE UNITED STATES

OCTOBER 14 (legislative day, OCTOBER 13), 1993

Mr. REID (for himself and Mr. LIEBERMAN) introduced the following bill; which was read twice and referred to the Committee on Environment and Public Works

A BILL

To authorize appropriations for environmental research, development, and demonstration for fiscal years 1994 through 1996, and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 **SECTION 1. SHORT TITLE; TABLE OF CONTENTS.**

4 (a) **SHORT TITLE.**—This Act may be cited as the
5 “Environmental Research, Development, and Demonstra-
6 tion Authorization Act of 1993”.

7 (b) **TABLE OF CONTENTS.**—The table of contents of
8 this Act is as follows:

Sec. 1. Short title; table of contents.

Sec. 2. Definitions.

- Sec. 3. General authorization.
- Sec. 4. Fundamental research programs.
- Sec. 5. Experimental program to stimulate competitive research.
- Sec. 6. Environmental Research and Demonstration Act language for NHEXAS.
- Sec. 7. Research on international environmental problems.
- Sec. 8. Pesticide research.
- Sec. 9. National Arid Climate Ground Water Research Center.
- Sec. 10. Environmental monitoring and assessment program.
- Sec. 11. Modernization program.
- Sec. 12. Repeal of 5-year research report requirement.
- Sec. 13. Science Advisory Board.
- Sec. 14. Miscellaneous authorization for cooperative agreements.
- Sec. 15. Research accomplishments report.
- Sec. 16. Technology transfer and information exchange.
- Sec. 17. Research to support the evaluation of health and ecological risk.
- Sec. 18. Lead research program.
- Sec. 19. Risk assessment research priorities.
- Sec. 20. Report on opportunities for defense technology transfer in development of environmentally sensitive products.
- Sec. 21. Financial assistance for research on drinking water disinfection.
- Sec. 22. Purchase of American-made equipment and products.

1 SEC. 2. DEFINITIONS.

2 As used in this Act:

3 (1) ADMINISTRATOR.—The term “Adminis-
4 trator” means the Administrator of the Environ-
5 mental Protection Agency.

6 (2) AGENCY.—The term “Agency” means the
7 Environmental Protection Agency.

8 (3) SCIENCE ADVISORY BOARD.—The term
9 “Science Advisory Board” means the Science Advi-
10 sory Board established under section 8 of the Envi-
11 ronmental Research, Development, Demonstration
12 Authorization Act of 1976 (42 U.S.C. 4361).

13 SEC. 3. GENERAL AUTHORIZATION.

14 (a) ENVIRONMENTAL RESEARCH, DEVELOPMENT,
15 AND DEMONSTRATION.—

1 (1) IN GENERAL.—There are authorized to be
2 appropriated for—

3 (A) environmental research, development,
4 and demonstration activities; and

5 (B) program management and support of
6 the Office of Research and Development,
7 to the Agency \$475,400,000 for fiscal year 1994,
8 \$520,000,000 for fiscal year 1995, and
9 \$575,000,000 for fiscal year 1996.

10 (2) AUTHORIZATIONS OF PROGRAMS AND AC-
11 TIVITIES.—Of the amounts specified in paragraph
12 (1), amounts not to exceed the following amounts
13 shall be used by the Administrator for the following
14 purposes:

15 (A) For air-related research—

16 (i) \$126,000,000 for fiscal year 1994;

17 (ii) \$119,000,000 for fiscal year 1995;

18 and

19 (iii) \$125,000,000 for fiscal year
20 1996.

21 (B) For water-related research—

22 (i) \$49,000,000 for fiscal year 1994;

23 (ii) \$45,300,000 for fiscal year 1995;

24 and

25 (iii) \$48,000,000 for fiscal year 1996.

1 (C) For toxic chemical-related research—

2 (i) \$76,000,000 for fiscal year 1994;

3 (ii) \$74,900,000 for fiscal year 1995;

4 and

5 (iii) \$75,000,000 for fiscal year 1996.

6 (D) For laboratory and field expenses—

7 (i) \$49,000,000 for fiscal year 1994;

8 (ii) \$47,400,000 for fiscal year 1995;

9 and

10 (iii) \$54,400,000 for fiscal year 1996.

11 (E) For headquarters expenses—

12 (i) \$5,400,000 for fiscal year 1994;

13 (ii) \$5,400,000 for fiscal year 1995;

14 and

15 (iii) \$5,500,000 for fiscal year 1996.

16 (F) For multimedia-related research
17 expenses—

18 (i) \$163,000,000, for fiscal year 1994;

19 (ii) \$225,000,000 for fiscal year 1995;

20 and

21 (iii) \$260,000,000 for fiscal year
22 1996.

23 (G) For program management expenses—

24 (i) \$7,000,000 for fiscal year 1994;

1 (ii) \$7,000,000 for fiscal year 1995;

2 and

3 (iii) \$7,100,000 for fiscal year 1996.

4 (3) EFFECT ON OTHER AUTHORIZATION.—

5 Nothing in this Act is intended to affect amounts
6 authorized for each of fiscal years 1994 through
7 1996 for Superfund research activities as authorized
8 by the Superfund Amendments and Reauthorization
9 Act of 1986 (Public Law 99-499; 100 Stat. 1613 et
10 seq.) and the amendments made by such Act.

11 (b) LIMITATION ON CLOSING OFFICES AND REDUC-
12 TIONS-IN-FORCE.—The Administrator shall not—

13 (1)(A) close any field station, regional office,
14 laboratory, or other research center; or

15 (B) permit any reduction-in-force; and

16 (2) finalize any closing or reduction,
17 unless at least 30 days prior to the issuing of a general
18 notice of the closing or reduction, the Administrator pro-
19 vides to the appropriate legislative and appropriations
20 committees of Congress written notice of the reasons for
21 the closing or reduction, the impact of the closing or re-
22 duction on the ability of the Administrator to carry out
23 this Act, the details of the reduction or closing, and other
24 information that the Administrator determines pertinent.

1 (c) AVAILABILITY.—Funds made available by appro-
2 priations pursuant to the authority provided by this Act
3 shall remain available for obligation or expenditure for
4 such periods as may be specified by Congress in making
5 the appropriations.

6 (d) LIMITATION ON APPROPRIATIONS.—Notwith-
7 standing any other provision of this Act, except as pro-
8 vided in section 21, no funds are authorized to be appro-
9 priated for any fiscal year after fiscal year 1996 for carry-
10 ing out the programs and activities for which funds are
11 authorized by this Act, or the amendments made by this
12 Act.

13 **SEC. 4. FUNDAMENTAL RESEARCH PROGRAMS.**

14 (a) ESTABLISHMENT.—

15 (1) IN GENERAL.—In addition to providing re-
16 search support for the regulatory needs of the pro-
17 gram offices of the Agency, the Administrator shall
18 establish separately identified research programs
19 consisting of fundamental ecological, health, and risk
20 reduction research.

21 (2) PURPOSE OF RESEARCH.—The research re-
22 ferred to in paragraph (1) shall be undertaken for
23 the purpose of generating fundamental knowledge
24 necessary to support efforts to identify, assess, and
25 mitigate serious environmental risks.

1 (b) AUTHORITY.—

2 (1) IN GENERAL.—In carrying out the fun-
3 damental research programs established under sub-
4 section (a), the Administrator may support research
5 concerning—

6 (A) environmental processes and trends;

7 (B) the identification and assessment of
8 potential risks to human health and the envi-
9 ronment; and

10 (C) approaches to prevent and reduce the
11 risks.

12 (2) ACTIVITIES OF THE ADMINISTRATOR.—The
13 Administrator is authorized to establish, acquire,
14 and maintain resources, expertise, and facilities nec-
15 essary for the advancement of the fundamental re-
16 search programs established pursuant to subsection
17 (a).

18 (c) REPORT OF THE ADMINISTRATOR.—Not later
19 than 2 years after the date of enactment of this Act, and
20 every 2 years thereafter, the Administrator shall prepare
21 and submit to Congress and the Science Advisory Board
22 a report that includes an assessment of the fundamental
23 research programs established pursuant to subsection (a).

24 (d) SCIENCE ADVISORY BOARD.—

(1) IN GENERAL.—The Science Advisory Board, or a designated subcommittee of the Science Advisory Board, shall—

(A) review the activities carried out by the Administrator under the fundamental research programs established under subsection (a);

(B)(i) make recommendations on the appropriate balance between the fundamental research and the programmatic research carried out by the Administrator; and

(ii) not later than 2 years after making the recommendations, and every 2 years thereafter, update the recommendations; and

(C) make such other recommendations to the Administrator with respect to the programs established under subsection (a) as the Science Advisory Board considers appropriate.

(2) REPORTS.—Not later than March 31, 1995, and every 2 years thereafter, the Science Advisory Board shall prepare and submit to the Administrator and to Congress a report that includes—

(A) an assessment of the most recent report of the Administrator prepared pursuant to subsection (c);

1 (B) the results of a review undertaken pur-
2 suant to paragraph (1); and

3 (C) the recommendations (including any
4 updated recommendations) made by the Science
5 Advisory Board pursuant to paragraphs (2) and
6 (3).

7 (e) CONFORMING AMENDMENT.—Section 2 of the
8 Environmental Research, Development, and Demonstra-
9 tion Authorization Act of 1981 is amended by striking
10 subsection (f).

11 **SEC. 5. EXPERIMENTAL PROGRAM TO STIMULATE COM-**
12 **PETITIVE RESEARCH.**

13 (a) DEFINITIONS.—As used in this section:

14 (1) ELIGIBLE STATE.—The term “eligible
15 State” means a State that received a planning grant
16 from the Administrator to conduct an experimental
17 program to stimulate competitive research for fiscal
18 year 1991 or 1992.

19 (2) EXPERIMENTAL PROGRAM.—The term “Ex-
20 perimental Program” means the Experimental Pro-
21 gram to Stimulate Competitive Research established
22 under subsection (b).

23 (b) EXPERIMENTAL PROGRAM.—

24 (1) IN GENERAL.—The Administrator, acting
25 through the Director, shall carry out an Experi-

1 mental Program to Stimulate Competitive Research
2 as part of the research and development programs of
3 the Agency.

4 (2) PURPOSES.—The purposes of the Experi-
5 mental Program shall be—

6 (A) to enhance the competitiveness within
7 the peer-review system of investigators from
8 academic institutions in eligible States; and

9 (B) to increase the probability of long-term
10 growth of competitive funding to investigators
11 at institutions from eligible States.

12 (3) PROGRAM ACTIVITIES.—In order to carry
13 out the purposes declared in paragraph (2), the Di-
14 rector shall provide for program activities. The pro-
15 gram activities may include competitive research
16 awards, scientific infrastructure development, and
17 graduate traineeships.

18 (4) ASSISTANCE.—In carrying out the Experi-
19 mental Program, the Director shall provide assist-
20 ance to each eligible State that—

21 (A) historically has received a relatively
22 small amount of Federal research and develop-
23 ment funding; and

24 (B) has demonstrated a commitment to de-
25 velop the research base of the State and im-

1 prove science and engineering research and edu-
2 cation programs at the institutions of higher
3 education of the State.

4 (c) GRADUATE TRAINEESHIPS.—Not more than 10
5 percent of the funds made available by appropriation to
6 carry out the Experimental Program for any fiscal year
7 may be used for graduate traineeships.

8 (d) FUNDING LEVELS.—For each of fiscal years
9 1994 through 1996, from the amounts authorized to be
10 appropriated under section 3(a)(1), the following amounts
11 may be used by the Administrator to carry out the re-
12 search programs authorized under this section:

13 (1) \$5,000,000 for fiscal year 1995.

14 (2) \$10,000,000 for fiscal year 1996.

15 (3) \$15,000,000 for fiscal year 1997.

16 **SEC. 6. ENVIRONMENTAL RESEARCH AND DEMONSTRATION ACT LANGUAGE FOR NHEXAS.**
17

18 (a) SURVEY DEFINED.—As used in this section, the
19 term “Survey” means the National Human Exposure As-
20 sessment Survey conducted by the Administrator pursuant
21 to this section.

22 (b) IN GENERAL.—

23 (1) NATIONAL HUMAN EXPOSURE ASSESSMENT
24 SURVEY.—The Administrator shall, in cooperation
25 with the heads of other Federal agencies, establish

1 a National Human Exposure Assessment Survey to
2 monitor and assess the extent and characteristics of
3 human exposure to harmful chemical substances.

4 (2) ACTIVITIES OF THE ADMINISTRATOR.—In
5 carrying out the program described in paragraph
6 (1), the Administrator is authorized to—

7 (A) conduct research, monitoring, assess-
8 ment, and demonstrations activities;

9 (B) cooperate with the appropriate officials
10 of other Federal agencies, State governments,
11 other governments and nonprofit organizations,
12 and other persons;

13 (C) collect such samples from humans and
14 environmental sources as are necessary to carry
15 out this section in accordance with accepted
16 and prudent scientific practices;

17 (D) develop and apply such monitoring,
18 collection, and storage techniques as are nec-
19 essary to accomplish the purposes of this sec-
20 tion;

21 (E) provide such facilities, staff, and
22 equipment as are necessary to carry out this
23 section;

24 (F) use Federal laboratories and centers;

1 (G) enter into a contract or cooperative
2 agreement with the appropriate official of a
3 Federal agency or department or agency of a
4 State or political subdivision of a State, or
5 other person; and

6 (H) provide the results of efforts under
7 this program to the persons referred to in sub-
8 paragraph (G).

9 (e) ISSUES.—At a minimum, in carrying out the Sur-
10 vey, the Administrator shall conduct or assist with re-
11 search, investigations, studies, surveys, or demonstrations
12 with respect to the following issues:

13 (1) The magnitude, duration, frequency, and
14 distribution of exposure to harmful chemical sub-
15 stances of the general population, identified geo-
16 graphic subunits, and groups that receive a high
17 level of exposure over time.

18 (2) Pathways of human exposure to harmful
19 chemical substances and a determination of which of
20 the pathways are most important.

21 (3) Exposure to harmful chemical substances
22 experienced by groups that are more biologically sus-
23 ceptible to harmful chemical substances than are
24 other groups in the general population.

(4) Emission sources, activity patterns, lifestyles characteristics, and other appropriate exposure factors and the relative degree of contribution of the factors to human exposure to harmful chemical substances.

(5) Changes in exposure to harmful chemical substances over time.

(6) The quantity of people exposed on a local, regional, and national basis to harmful chemical substances.

(7) With respect to harmful chemical substances, the relationship between exposure and dose to target tissues including uptake, metabolism, storage, and elimination of substances of concern.

(8) The link between exposures to harmful chemical substances and manifestation of health effects.

(9) The effectiveness in achieving reductions in exposure to harmful chemicals of control strategies before the date of the survey.

(10) The development of quality assurance methods and techniques to ensure the reliability and accuracy of exposure monitoring and evaluation.

(11) The development of such data management and storage facilities as are necessary to—

1 (A) ensure a long-term record of monitor-
2 ing data; and

3 (B) provide access to the data by appro-
4 priate Federal agencies, State governments,
5 other governments, nonprofit organizations, and
6 other persons.

7 **SEC. 7. RESEARCH ON INTERNATIONAL ENVIRONMENTAL**
8 **PROBLEMS.**

9 The Administrator is authorized to—

10 (1) conduct research on the nature and impacts
11 of international environmental problems and ways to
12 respond to the problems; and

13 (2) provide technical and other assistance to
14 foreign countries and international entities to im-
15 prove the quality of the environment.

16 **SEC. 8. PESTICIDE RESEARCH.**

17 (a) DEFINITIONS.—As used in this section:

18 (1) FOOD.— The term “food” has the meaning
19 provided the term under section 201(f) of the Fed-
20 eral Food, Drug, and Cosmetic Act (21 U.S.C.
21 321(f)).

22 (2) PESTICIDE.—The term “pesticide” has the
23 meaning provided the term under section 2(u) of the
24 Federal Insecticide, Fungicide, and Rodenticide Act
25 (7 U.S.C. 136(u)).

1 (b) PESTICIDE EXPOSURE MONITORING

2 PROJECTS.—

3 (1) IN GENERAL.—

4 (A) MONITORING METHODOLOGIES.—The
5 Administrator shall develop and implement ef-
6 fective monitoring methodologies for measuring
7 the level of pesticides in—

8 (i) ambient air;

9 (ii) ground water;

10 (iii) soil;

11 (iv) food;

12 (v) indoor air (in residential dwellings
13 and workplaces); and

14 (vi) surface water.

15 (B) PROTOCOLS.—In developing the meth-
16 odologies described in subparagraph (A), the
17 Administrator shall specify appropriate proto-
18 cols for the effective implementation of the
19 methodologies.

20 (C) REPRESENTATIVE PESTICIDES.—

21 (i) IN GENERAL.—The Administrator
22 shall give priority to representative
23 pesticides—

24 (I) from a broad variety of chem-
25 ical classifications; and

1 (II) that are representative of
2 particular uses.

3 (ii) SELECTION OF SAMPLES.—In se-
4 lecting a sample of representative pes-
5 ticides under this subsection, the Adminis-
6 trator shall give priority to any pesticide
7 that is considered to pose a high level of
8 risk to human health.

9 (2) ROUTES OF EXPOSURE.—

10 (A) ASSESSMENT.—The Administrator
11 shall assess routes of human exposure to pes-
12 ticides.

13 (B) ROUTES OF EXPOSURE.—The Admin-
14 istrator shall address each route of exposure to
15 pesticides that the Administrator determines to
16 be a potential route of exposure through 1 or
17 more environmental media (as defined by the
18 Administrator).

19 (C) KNOWN PESTICIDES, USES, AND EXPO-
20 SURES.—In carrying out this paragraph, the
21 Administrator shall, to the extent practicable,
22 include research relating to all known pesticide
23 uses, and all individuals known to be exposed to
24 pesticides through exposure—

25 (i) in the workplace;

1 (ii) in and around residential dwell-
2 ings;

3 (iii) associated with recreational and
4 sports activities (including golf); and

5 (iv) from food consumption.

6 (D) PRIORITY FOR STUDY.—In carrying
7 out this paragraph, the Administrator shall give
8 priority to the study of routes of exposure relat-
9 ed to any pesticide with a chemical classifica-
10 tion or use that is considered to pose a high
11 level of risk to human health.

12 (E) HEALTHY MONITORING OF DOMESTIC
13 ANIMAL SPECIES.—In carrying out this para-
14 graph, the Administrator may use health mon-
15 itoring of domestic animal species that are in
16 close association with humans in the evaluation
17 of levels of exposure and risk to human health.

18 (3) AGRICULTURAL WORKERS.—

19 (A) IN GENERAL.—The Administrator
20 shall develop and carry out monitoring meth-
21 odologies to measure and assess the extent of,
22 and effects of, exposure to pesticides by agricul-
23 tural workers.

1 (B) DEVELOPMENT OF METHODOLOG-
2 GIES.—In developing the methodologies, the
3 Administrator shall—

4 (i) specify appropriate protocols for
5 the effective implementation of the meth-
6 odologies; and

7 (ii) give priority to chemicals, that, in
8 the judgment of the Administrator, are
9 considered to be associated with a high
10 level of risk to human health.

11 (4) LAWN AND GARDEN PESTICIDES.—

12 (A) IN GENERAL.—

13 (i) MONITORING METHODOLOGIES.—
14 The Administrator shall develop and imple-
15 ment effective monitoring methodologies to
16 determine the level of human exposure to
17 lawn and garden pesticides. The Adminis-
18 trator shall—

19 (I) identify populations that are
20 most likely to be exposed to the pes-
21 ticides; and

22 (II) assess the extent and effect
23 of the exposure.

24 (ii) HEALTH SURVEILLANCE OF DO-
25 MESTIC ANIMALS.—Health surveillance of

1 domestic animals in close association with
2 humans may be used in the monitoring
3 methods referred to in clause (i) to assess
4 levels of human exposure to lawn and gar-
5 den pesticides.

6 (B) DETERMINATIONS BY THE ADMINIS-
7 TRATOR.—The Administrator shall determine
8 the following:

9 (i) The range of the distance over
10 which residues of the pesticides travel from
11 the site of initial application.

12 (ii) The extent to which each of the
13 pesticides is capable of penetrating homes
14 and other buildings.

15 (iii) A range with respect to the pe-
16 riod of time that each of the pesticides per-
17 sists on lawns and gardens and on other
18 recreational areas, including athletic play-
19 ing fields and golf courses (calculated for
20 variable climatic conditions and uses of the
21 pesticide).

22 (iv) Other related information con-
23 cerning potential routes of exposure that
24 the Administrator determines to be appro-
25 priate.

1 (v) The average quantity of the pes-
2 ticides used during a calendar year (cal-
3 culated on the basis of application on a
4 standardized area) on the following:

5 (I) Lawns.

6 (II) Gardens.

7 (III) Recreational and sporting
8 areas.

9 (vi) An estimate of the total quantity
10 of the pesticides used during a calendar
11 year in the United States on each of the
12 items listed in subclauses (I) through (III)
13 of clause (v).

14 (vii) An estimate of the percentage of
15 the quantity described in clause (vi) that
16 is—

17 (I) used for preventive purposes,
18 in the absence of evidence of pest in-
19 festation;

20 (II) used unnecessarily;

21 (III) misused; and

22 (IV) likely to increase the resist-
23 ance to the pesticide of the targeted
24 pests.

1 (5) REPORT.—Not later than 2 years after the
 2 date of enactment of this Act, the Administrator
 3 shall submit to the appropriate committees of Con-
 4 gress a copy of a written report that summarizes the
 5 progress of the projects conducted under this sub-
 6 section.

7 (c) PESTICIDE RESIDUE DEMONSTRATION
 8 PROJECT.—The Administrator shall conduct research to
 9 develop and implement cost-effective methodologies for
 10 measuring and assessing pesticide residues in food. In car-
 11 rying out the research under this subsection, the Adminis-
 12 trator shall assess the feasibility of establishing a program
 13 in the Agency for the routine monitoring of pesticide resi-
 14 dues in food that is ready for marketing.

15 (d) PESTICIDE DISTRIBUTION STUDY.—

16 (1) IN GENERAL.—The Administrator shall de-
 17 termine the extent and effects of pesticide contami-
 18 nation in air, ground water, and surface water. In
 19 carrying out the research project, the Administrator
 20 shall, with respect to each pesticide studied—

21 (A) determine the range of the distance
 22 over which residues of the pesticide travel from
 23 a site of initial application (calculated for vari-
 24 able climatic conditions);

1 (B) if used in agriculture, with respect to
2 specific uses and methods of application of the
3 pesticide, the quantity (expressed as a percent-
4 age) of pesticide that does not remain on the
5 crop;

6 (C) the rate of fall out (as defined by the
7 Administrator) with respect to a specific type of
8 application of the pesticide;

9 (D) the rate of absorption and adsorption
10 of the pesticide (if any) into soil; and

11 (E) the quantity of the pesticide that
12 causes a threshold level of ground water or sur-
13 face water contamination (as determined by the
14 Administrator).

15 (2) REPORT.—Not later than 3 years after the
16 date of enactment of this Act, the Administrator
17 shall submit to the appropriate committees of Con-
18 gress a written report that summarizes the progress
19 of the research conducted under this subsection and
20 subsection (c).

21 (e) HEALTH RISK ASSESSMENT.—

22 (1) IN GENERAL.—

23 (A) EXPOSURE TO PESTICIDES.—The Ad-
24 ministrator shall study the acute and chronic

1 health effects of exposure to pesticides (includ-
2 ing any effects on development).

3 (B) EXPOSURE TO CHOLINESTERASE IN-
4 HIBITORS.—The Administrator shall study the
5 acute and chronic health effects resulting from
6 exposure to cholinesterase inhibitors,
7 including—

8 (i) the neurotoxic effects of the inhibi-
9 tors; and

10 (ii) other toxic effects of the inhibi-
11 tors, including any adverse effects on de-
12 velopment and reproduction, and any other
13 adverse systemic effects.

14 (C) HEALTH EFFECTS ON AGRICULTURAL
15 WORKERS.—The Administrator shall develop
16 and implement methodologies for measuring
17 and assessing the potential health effects on ag-
18 ricultural workers and consumers of agricul-
19 tural products from exposure to chemical pes-
20 ticides (as defined in section 201(q) of the Fed-
21 eral Food, Drug, and Cosmetic Act (21 U.S.C.
22 321(q)).

23 (D) HEALTH EFFECTS ON DOMESTIC ANI-
24 MAL SPECIES.—The Administrator may include
25 the study of acute and chronic health effects in

1 domestic animals species due to pesticide expo-
2 sure as part of an assessment of human expo-
3 sure levels.

4 (2) STUDY PRIORITY.—In carrying out this
5 subsection, the Administrator shall initially study
6 any pesticide (or active ingredient) described in this
7 subsection with a chemical classification or use that
8 is considered to pose a high level of risk to human
9 health.

10 (f) EFFECTS OF LONG-TERM PESTICIDE USE.—

11 (1) IN GENERAL.—

12 (A) FIELD STUDIES.—The Administrator
13 shall conduct field studies to assess the effects
14 of exposure to pesticides introduced in the envi-
15 ronment through long-term use. The Adminis-
16 trator shall study and assess the effects of pes-
17 ticide exposure on organisms other than hu-
18 mans and organisms that are not target orga-
19 nisms (with respect to the intended uses of the
20 pesticides) in the following types of ecosystems:

- 21 (i) Terrestrial ecosystems.
- 22 (ii) Marine and estuarine ecosystems.
- 23 (iii) Freshwater ecosystems.
- 24 (iv) Urban ecosystems.

(B) INITIAL STUDY.—In carrying out this paragraph, the Administrator shall initially study routes of exposure related to any pesticide with a chemical classification or use that is considered to pose a high level of risk to the organisms described in this subsection.

(2) BIOLOGICAL PESTICIDES.—The Administrator shall assess and monitor the impact of biological pesticides (as defined by the Administrator) on the environment.

(3) AIR QUALITY.—The Administrator shall assess and monitor the impact of pesticides on air quality.

(4) REPORT.—Not later than 2 years after the date of enactment of this Act, the Administrator shall submit to the appropriate committees of Congress a written report that summarizes the progress of the research conducted under this subsection and subsection (e).

SEC. 9. NATIONAL ARID CLIMATE GROUND WATER RESEARCH CENTER.

(a) SHORT TITLE.—This section may be cited as the “National Arid Climate Ground Water Research Center Act.”.

(b) DEFINITIONS.—As used in this section:

1 (1) BOARD.—The term “Board” means the
2 Board of Directors established under subsection (f).

3 (2) CENTER.—The term “Center” means the
4 National Arid Climate Ground Water Research Cen-
5 ter established under subsection (e).

6 (c) FINDINGS.—Congress finds that—

7 (1) growing demands for ground water in arid
8 regions require further research to protect and mon-
9 itor aquifers in existence as of the date of enactment
10 of this Act and to locate future aquifers;

11 (2) the protection of ground water from con-
12 tamination requires further research in monitoring
13 and regulating the movement of potential contami-
14 nants;

15 (3) a variety of Federal, State, and private enti-
16 ties are conducting research concerning ground
17 water at various research centers throughout the
18 United States;

19 (4) Nevada is the most arid State in the United
20 States and, along with other western States, has ex-
21 perienced 5 years of drought;

22 (5) Nevada is the fastest growing State in the
23 United States, according to the census conducted by
24 the Bureau of the Census in 1990;

(6) extensive ground water research capabilities exist within Nevada; and

(7) the utilization and enhancement of ground water research at institutions of higher education can be—

(A) economical and lead to high-quality research; and

(B) further the training of additional scientists and professionals to address critical ground water issues.

(d) PURPOSE.—The purposes of this section are to—

(1) establish a National Arid Climate Ground Water Research Center within the State of Nevada to promote and coordinate research concerning the availability, usage, management, and monitoring of ground water;

(2) increase research in monitoring and regulating the movement and concentration of contaminants in ground water; and

(3) coordinate the ground water research of the Center with the research of other Federal agencies, departments and agencies of States, and private agencies, institutions, and entities.

(e) ESTABLISHMENT OF CENTER.—

1 (1) IN GENERAL.—Not later than 60 days after
2 the date of enactment of this Act, the Administrator,
3 in consultation with the Governor of the State of
4 Nevada, is authorized to take such action as may be
5 necessary to establish, in the State of Nevada, the
6 National Arid Climate Ground Water Research Cen-
7 ter.

8 (2) ROLE OF BOARD.—The Board shall advise
9 the Administrator concerning the operation of the
10 Center.

11 (3) LOCATION OF CENTER.—The Center shall
12 be located at one or more locations within the State
13 of Nevada that the Administrator, after consultation
14 with the Governor and the Board, shall designate.

15 (4) ASSISTANCE FROM ADMINISTRATOR OF
16 GENERAL SERVICES.—The Administrator of General
17 Services is authorized, subject to the availability of
18 funds, to assist the Administrator in providing nec-
19 essary facilities for the purposes of this section. In
20 providing the facilities, the Administrator of General
21 Services shall consult with the Governor of the State
22 of Nevada and the Board.

23 (5) AGREEMENTS.—The Administrator is au-
24 thorized to enter into such agreements or other ar-
25 rangements with appropriate officials of the State of

1 Nevada and other public and private agencies, insti-
2 tutions, or entities, as may be necessary to enable
3 the Administrator to carry out this section.

4 (f) BOARD OF DIRECTORS.—

5 (1) ESTABLISHMENT.—As soon as practicable
6 after the establishment of the Center, the Adminis-
7 trator shall establish a National Arid Climate
8 Ground Water Research Center Board of Directors.

9 (2) MEMBERSHIP.—The Board shall be com-
10 posed of 8 members who shall be appointed by the
11 Administrator. In selecting the members, the Admin-
12 istrator shall select—

13 (A) 1 member nominated by the Governor
14 of the State of Nevada;

15 (B) 1 member nominated by the Director
16 of the United States Geological Survey;

17 (C) 1 member nominated by the Director
18 of the Bureau of Reclamation;

19 (D) 1 member nominated by the head of
20 the University of Nevada-Las Vegas;

21 (E) 1 member nominated by the head of
22 the University of Nevada-Reno;

23 (F) 1 member nominated by the Secretary
24 of Energy;

1 (G) 1 member nominated by the head of
2 Desert Research Institute; and

3 (H) an additional member selected by the
4 Administrator.

5 (3) CHAIRPERSON.—The member nominated by
6 the Governor of the State of Nevada shall be Chair-
7 person of the Board.

8 (4) TERM.—Each member of the Board shall
9 be appointed for a term of 4 years.

10 (5) QUORUM.—Four members of the Board
11 shall constitute a quorum, but a lesser number may
12 conduct meetings.

13 (6) FIRST MEETING.—The first meeting of the
14 Board shall be called by the Administrator and shall
15 be held not later than 60 days after the date of the
16 establishment of the Board.

17 (7) VACANCIES.—A vacancy on the Board re-
18 sulting from death or resignation by a member
19 shall—

20 (A) not affect the powers of the Board;
21 and

22 (B) be filled in the same manner in which
23 the original appointment was made.

24 (g) FUNCTIONS OF THE CENTER.—The functions of
25 the Center shall be to—

1 (1) study and evaluate the availability, usage,
2 and management of ground water in arid regions;

3 (2) study and evaluate means of monitoring
4 and regulating the movement and concentration of
5 contaminants in ground water;

6 (3) coordinate ground water research in the
7 manner specified in subsection (d)(3);

8 (4) encourage graduate and undergraduate edu-
9 cation in hydrology and other professions and dis-
10 ciplines related to ground water;

11 (5)(A) provide a forum for consideration of is-
12 sues involving the use and management of ground
13 water and the protection of ground water from po-
14 tential contaminants; and

15 (B) as appropriate, utilize citizens and special
16 advisory councils;

17 (6) make the work of the Center accessible to
18 the public by holding public meetings, disseminating
19 research results and other relevant information, es-
20 tablishing technology transfer programs, and other
21 appropriate means; and

22 (7) fund ground water research projects con-
23 ducted in arid lands.

24 (h) COMPENSATION.—

1 (1) IN GENERAL.—Each member of the Board
2 who is not otherwise employed by the Federal Gov-
3 ernment shall receive compensation at a rate equal
4 to the daily rate prescribed for GS-15 under the
5 General Schedule contained in section 5332 of title
6 5, United States Code, including travel time, for
7 each day the member is engaged in the actual per-
8 formance of duties as a member of the Board.

9 (2) OFFICERS AND EMPLOYEES OF THE FED-
10 ERAL GOVERNMENT.—A member of the Board who
11 is an officer or employee of the Federal Government
12 shall serve without additional compensation as a re-
13 sult of performance of duties as a member of the
14 Board. Each member of the Board shall be reim-
15 bursed for travel, subsistence, and other necessary
16 expenses incurred by the member in the performance
17 of duties as a member.

18 (i) POWERS AND ADMINISTRATIVE PROVISIONS.—

19 (1) SERVICES OF EXPERTS.—The Chairperson
20 of the Board, with the approval of the Board, is au-
21 thorized to obtain the services of experts and con-
22 sultants in accordance with section 3109 of title 5,
23 United States Code.

24 (2) ADMINISTRATIVE SERVICES.—The Chair-
25 person of the Board, with the approval of the Board,

1 is authorized to enter into agreements with the Ad-
2 ministrator of General Services for the procurement
3 of necessary financial and administrative services,
4 for which payment shall be made by reimbursement
5 from funds of the Board in such amounts as may be
6 agreed upon by the Chairperson and the Adminis-
7 trator of General Services.

8 (3) PROCUREMENT; SERVICES.—To carry out
9 the duties of the Board, the Chairperson of the
10 Board, with the approval of the Board, is authorized
11 to procure supplies, services, and property, and
12 make contracts for any fiscal year, only to the extent
13 that funds are made available by appropriations to
14 carry out this paragraph.

15 (4) CONTRACTS AND AGREEMENTS.—To the ex-
16 tent allowable by law, the Chairperson of the Board,
17 with the approval of the Board, is authorized to
18 enter into contracts or agreements with appropriate
19 officials of Federal agencies, departments, and agen-
20 cies of States, private firms, institutions, and agen-
21 cies for the conduct of research or surveys, the prep-
22 aration of reports, and other activities necessary for
23 the discharge of the duties of the Board.

24 (5) HEARINGS.—The Board, or (on the author-
25 ization of the Board) a member of the Board, may,

1 for the purpose of carrying out this section, hold
2 such hearings, and sit and act at such times and
3 places, as the Board or the member considers advis-
4 able.

5 (6) PRINTING AND BINDING.—The Chairperson
6 of the Board, with the approval of the Board, or (on
7 the authorization of the Board) any member of the
8 Board, may, for the purpose of carrying out this sec-
9 tion, enter into contracts and other arrangements,
10 and make expenditures that the Chairperson or
11 member of the Board considers appropriate, to the
12 extent that funds are made available by appropria-
13 tions to carry out the action.

14 (7) ACQUISITION OF INFORMATION.—The
15 Board may acquire directly from any executive de-
16 partment, bureau, agency, board, commission, office,
17 independent establishment, or instrumentality infor-
18 mation, estimates, and statistics for the purpose of
19 carrying out this section. Each such department, bu-
20 reau, agency, board, commission, office, establish-
21 ment, or instrumentality is authorized and directed
22 to furnish, to the extent permitted by law, the infor-
23 mation, estimates, and statistics directly to the
24 Board, upon request by the Chairperson.

25 (8) ADMINISTRATIVE AUTHORITY.—

1 (A) IN GENERAL.—The Chairperson of the
2 Board is authorized, without regard to the pro-
3 visions of title 5, United States Code, governing
4 appointments in the competitive service, and re-
5 gard to the provisions of chapter 51 and sub-
6 chapter III of chapter 53 of such title, relating
7 to classification and General Schedule pay
8 rates, appoint, terminate, and fix the compensa-
9 tion of an Executive Director and such addi-
10 tional personnel as the Chairperson determines
11 are necessary to enable the Board to carry out
12 the duties of the Board.

13 (B) COMPENSATION.—

14 (i) EXECUTIVE DIRECTOR.—The an-
15 nual rate of compensation of the Executive
16 Director may not exceed a rate equal to
17 the rate provided for level V of the Execu-
18 tive Schedule under section 5316 of such
19 title.

20 (ii) OTHER PERSONNEL.—The annual
21 rate of compensation of all other personnel
22 may not exceed a rate equal to the maxi-
23 mum rate for GS-15 of the General Sched-
24 ule established under section 5332 of such
25 title.

1 (9) FACILITIES AND SERVICES.—On request of
2 the Board, the head of any Federal agency is au-
3 thorized to make any of the facilities and services of
4 the agency available to the Board or to detail any
5 of the personnel of the agency to the Board, on a
6 reimbursable basis, to assist the Board in carrying
7 out the duties of the Board under this section.

8 (10) MAIL.—The Board may use the United
9 States mails in the same manner and under the
10 same conditions as other departments and agencies
11 of the United States.

12 (11) PRINTING AND BINDING.—The Board may
13 expend funds for printing and binding to carry out
14 this section, notwithstanding any other provision of
15 law, to the extent that funds are made available by
16 appropriations.

17 (12) DONATIONS.—The Board may accept a
18 donation of non-Federal funds or in-kind services for
19 use in assisting the Administrator in carrying out
20 the functions of the Center referred to in subsection
21 (g).

22 (j) REPORTS.—Not later than 1 year after the date
23 of enactment of this Act, and thereafter on the request
24 of Congress, the Board shall prepare and transmit to the
25 Administrator, who shall transmit to Congress, the Presi-

1 dent, and the Governor of the State of Nevada, a report
2 that describes the activities of the Center, and the findings
3 and recommendations of the Board, together with any rec-
4 ommendations of the Administrator and the Board con-
5 cerning specific actions necessary to be taken to enable
6 the Center to carry out the functions of the Center re-
7 ferred to in subsection (g).

8 (k) AUTHORIZATION.—For each of fiscal years 1994
9 through 1996, from the sums authorized to be appro-
10 priated under section 3(a)(7), a total amount not to exceed
11 \$1,000,000 may be used by the Administrator and the
12 Board to carry out the functions of the Center.

13 **SEC. 10. ENVIRONMENTAL MONITORING AND ASSESSMENT**
14 **PROGRAM.**

15 (a) PROGRAM DEFINED.—As used in this section, the
16 term “Program” means the Environmental Monitoring
17 and Assessment Program established under subsection
18 (b).

19 (b) ESTABLISHMENT.—The Administrator shall es-
20 tablish an Environmental Monitoring and Assessment
21 Program to conduct comprehensive, long-term environ-
22 mental monitoring, data collection, and data analysis as
23 a means of assessing and responding to the then current
24 and long-term status and trends of the ecological re-
25 sources of the United States.

1 (c) COORDINATION.—The Administrator shall consult
2 with the heads of other Federal agencies to coordinate the
3 Program activities with related activities of programs of
4 the Federal agencies in order to identify, integrate, and
5 fully utilize results of related efforts undertaken by other
6 agencies and minimize duplication of efforts.

7 (d) ANNUAL REPORT.—The Administrator shall pub-
8 lish an annual report that identifies and assesses—

9 (1) the performance of the activities carried out
10 under the Program;

11 (2) the effectiveness of interagency coordination
12 with respect to Program activities; and

13 (3) the contributions of multiagency research to
14 the advancement of research goals of the Program.

15 (e) PUBLIC DATA.—The Administrator shall periodi-
16 cally submit to Congress, and make publicly available, a
17 compilation of any statistical data summaries and inter-
18 pretive reports on ecological status and trends developed
19 as a result of the Program.

20 **SEC. 11. MODERNIZATION PROGRAM.**

21 (a) DEFINITIONS.—As used in this section:

22 (1) PROGRAM.—The term “Program” means
23 the Modernization Program established under this
24 section.

1 (2) SCIENTIFIC COMMUNITY.—The term “sci-
2 entific community” shall have the meaning given the
3 term by the Administrator.

4 (b) MODERNIZATION PROGRAM.—The Administrator
5 shall establish a Modernization Program designed to iden-
6 tify, acquire, and maintain modern buildings, facilities,
7 supplies, and equipment needed to conduct high quality
8 research. In carrying out the Program, the Administrator
9 shall ensure that the buildings, facilities, supplies, and
10 equipment referred to in the preceding sentence shall, at
11 a minimum, meet the standards generally accepted by the
12 scientific community as appropriate for conducting re-
13 search, including replacement standards for instrumenta-
14 tion for research.

15 (c) STUDIES.—In carrying out the Program, the Ad-
16 ministrator shall conduct studies to—

17 (1)(A) evaluate and determine the adequacy of
18 then current buildings, facilities, supplies, and equip-
19 ment; and

20 (B) identify then future building, facility, sup-
21 plies, equipment and research instrumentation
22 needs; and

23 (2)(A) identify and assess then future research
24 personnel needs; and

1 (B) make recommendations for attracting and
2 retaining qualified scientists, engineers, and other
3 personnel to meet the needs referred to in subpara-
4 graph (A).

5 (d) DEADLINE FOR SUBMISSION.—Not later than 1
6 year after the date of enactment of this Act, the Adminis-
7 trator shall submit a copy of the findings of the studies
8 required by this section to the Committee on Environment
9 and Public Works of the Senate and the Committee on
10 Science, Space, and Technology of the House of Rep-
11 resentatives.

12 **SEC. 12. REPEAL OF 5-YEAR RESEARCH REPORT REQUIRE-**
13 **MENT.**

14 (a) IN GENERAL.—Section 5 of the Environmental
15 Research, Development, and Demonstration Authorization
16 Act of 1976 (42 U.S.C. 4361) is repealed.

17 (b) CONFORMING AMENDMENTS.—(1) Section 4 of
18 the Environmental Research, Development, and Dem-
19 onstration Authorization Act of 1978 (42 U.S.C. 4361a)
20 is repealed.

21 (2) Section 7(a) of such Act (42 U.S.C. 4364(a)) is
22 amended by striking “, including those defined in the five-
23 year research plan”.

24 (3) Section 8 of such Act (42 U.S.C. 4365) is amend-
25 ed by striking subsection (c).

1 (4) Section 9(a) of such Act (42 U.S.C. 4366(a)) is
2 amended by striking the second sentence.

3 **SEC. 13. SCIENCE ADVISORY BOARD.**

4 (a) ANNUAL REPORT.—

5 (1) IN GENERAL.—The Science Advisory Board
6 shall submit to Congress and to the Administrator
7 an annual report that contains the views of the
8 Science Advisory Board concerning proposed re-
9 search programs as described in the annual budget
10 submitted by the President to Congress pursuant to
11 section 1108 of title 31, United States Code. The re-
12 port shall be submitted to Congress as soon as prac-
13 ticable after the submission of the annual budget of
14 the President to Congress.

15 (2) COOPERATION WITH SCIENCE ADVISORY
16 BOARD.—To assist the Science Advisory Board in
17 carrying out the duties of the Board under this sec-
18 tion, the Administrator shall cooperate with the Di-
19 rector of the Science Advisory Board, with respect to
20 the timely provision of budget information to the
21 Science Advisory Board.

22 (b) EVALUATION.—

23 (1) IN GENERAL.—The Science Advisory Board
24 shall conduct periodic evaluations of selected areas
25 of the then current and planned research, develop-

ment, and demonstration activities of the Agency. The areas of evaluation shall be selected by the Science Advisory Board in consultation with the Administrator, the Deputy Assistant Administrator for Research and Development of the Agency, the heads of other programs of the Agency, the Committee on Environment and Public Works of the Senate, and the Committee on Science, Space, and Technology of the House of Representatives.

(2) REPORTS.—The Science Advisory Board shall transmit to the Administrator and the committees referred to in paragraph (1) a report that includes the evaluations of the Board conducted pursuant to this section and recommendations that the Board considers appropriate.

(3) RESPONSE BY ADMINISTRATOR.—Not later than 60 days after the Science Advisory Board submits a report to the Administrator pursuant to paragraph (2), the Administrator shall provide to the committees referred to in such paragraph a written response to the evaluation and recommendations of the Science Advisory Board.

(c) REVIEW OF CERTAIN RESEARCH ACTIVITIES.—Not later than 1 year after the date of enactment of this Act, and annually thereafter, the Science Advisory Board

1 shall review the research activities of the Agency con-
2 ducted under section 19(b)(2) and shall include the results
3 of the review in the annual report required under sub-
4 section (a).

5 (d) CONCURRENT SUBMISSION TO CONGRESS.—The
6 Science Advisory Board shall concurrently submit to the
7 Administrator each report required to be submitted by the
8 Board to the Administrator to the Committee on Environ-
9 ment and Public Works of the Senate and the Committee
10 on Science, Space, and Technology of the House of Rep-
11 resentatives.

12 **SEC. 14. MISCELLANEOUS AUTHORIZATION FOR COOPERA-**
13 **TIVE AGREEMENTS.**

14 (a) IN GENERAL.—The Administrator may enter into
15 a cooperative agreement with an appropriate person or en-
16 tity to conduct appropriate scientific and professional re-
17 views of applications or proposals submitted to the Admin-
18 istrator for a grant, contract, or cooperative agreement.

19 (b) PAYMENT.—The Administrator may use funds
20 made available for research pursuant to this Act to pay
21 for the reviews conducted pursuant to a cooperative agree-
22 ment referred to in subsection (a).

23 **SEC. 15. RESEARCH ACCOMPLISHMENTS REPORT.**

24 The Administrator shall submit an annual report to
25 the Committee on Environment and Public Works of the

1 Senate and the Committee on Science, Space, and Tech-
2 nology of the House of Representatives that describes the
3 accomplishments of the research, development, and dem-
4 onstration programs with respect to funds that are made
5 available pursuant to this Act and the significance of the
6 accomplishments to the mission of the Agency.

7 **SEC. 16. TECHNOLOGY TRANSFER AND INFORMATION**
8 **EXCHANGE.**

9 The Administrator shall carry out a program of envi-
10 ronmental technology transfer and exchange of scientific
11 and technical information designed to make full and effec-
12 tive use of the research, development, and demonstration
13 efforts of the Agency. The Administrator may establish,
14 acquire, and maintain resources necessary to advance the
15 technology transfer and information exchange program.

16 **SEC. 17. RESEARCH TO SUPPORT THE EVALUATION OF**
17 **HEALTH AND ECOLOGICAL RISK.**

18 (a) **ESTABLISHMENT.**—The Administrator shall es-
19 tablish a separately identified research program designed
20 to improve the capability of the Agency to identify, assess,
21 and compare risks to public health and natural ecosystems
22 resulting from contamination of the environment.

23 (b) **OBJECTIVES.**—In carrying out the program es-
24 tablished under subsection (a), the Administrator may
25 conduct research to—

1 (1) develop and improve methodologies for the
2 comparison of risks to public health and natural
3 ecosystems, including risks resulting from contami-
4 nation of different environmental media;

5 (2) facilitate the monitoring of pollutants and
6 contaminants discharged to the environment;

7 (3) identify and develop methodologies for as-
8 sessing and reducing risks to natural ecosystems;

9 (4) develop and improve methodologies for the
10 assessment of noneancer risks to public health and
11 the integrated assessment of cancer and noneancer
12 health risks;

13 (5) support any other activities of the Agency
14 relating to the identification, assessment, or com-
15 parison of risks to public health and natural
16 ecosystems resulting from contamination of the envi-
17 ronment; and

18 (6) develop improved methodologies for evaluat-
19 ing (both quantitatively and qualitatively) the bene-
20 fits, of ecological protection activities, including im-
21 proved methods to value natural resources and to ac-
22 count for long-term environmental effects in the eco-
23 nomic analysis of the Agency.

1 **SEC. 18. LEAD RESEARCH PROGRAM.**

2 (a) ESTABLISHMENT OF PROGRAM.—The Adminis-
3 trator shall establish a program to conduct research, in-
4 cluding laboratory research in a controlled setting, on lead.
5 The research shall include the following:

6 (1) Research concerning state-of-the-art tech-
7 nologies for detecting lead in paint films and dust.

8 (2) Research concerning short-term and long-
9 term cost-effective technologies for the removal of
10 lead-based paint and in-place management tech-
11 niques. The research required under this paragraph
12 shall address the relative risk of, and the environ-
13 mental protection afforded by, various options to re-
14 move or ameliorate the toxic effects of lead-based
15 paint.

16 (3) A long-term research study concerning envi-
17 ronmentally compatible methods for the permanent
18 disposal, recycling, or recovery of lead in lead con-
19 tamination.

20 (4) A long-term research study to improve tech-
21 niques to measure lead levels, including levels of lead
22 in soil and dust. The study shall examine then cur-
23 rent and proposed methods and technologies to
24 measure lead exposure hazards.

25 (5) A long-term research study to examine the
26 results of lead abatement activities. The study shall

1 evaluate the effectiveness of the activities and shall
2 include the long-term monitoring of post-abatement
3 lead exposure of children and adults.

4 (b) CONSULTATION WITH THE HEADS OF OTHER
5 FEDERAL AGENCIES.—The Administrator shall consult
6 with the heads of other appropriate Federal agencies with
7 respect to the conduct of the research referred to in sub-
8 section (a).

9 (c) AUTHORIZATION OF APPROPRIATIONS.—For each
10 of fiscal years 1994 through 1996 from the amounts au-
11 thorized to be appropriated under section 3(a), the Admin-
12 istrator may use an amount not to exceed \$2,400,000 to
13 carry out this section.

14 **SEC. 19. RISK ASSESSMENT RESEARCH PRIORITIES.**

15 (a) IDENTIFICATION OF PRIORITY RISK ASSESSMENT
16 RESEARCH ISSUES.—

17 (1) REPORT.—Not later than 180 days after
18 the date of enactment of this Act, the Administrator
19 shall submit to Congress a report that identifies at
20 least 10 environmental research issues—

21 (A) correlating to the environmental haz-
22 ards that the Administrator estimates to
23 present the greatest degree of risk;

24 (B) with respect to which the Adminis-
25 trator determines there are significant scientific

1 uncertainties concerning the assessment of the
2 environmental risks; and

3 (C) with respect to which the uncertainties
4 could be significantly reduced through research.

5 (2) CONTENTS OF REPORT.—In addition to the
6 identification of the issues required under paragraph
7 (1), the report required under paragraph (1) shall
8 include—

9 (A) an assessment of any research that has
10 been, or is being, conducted by the Adminis-
11 trator with respect to each research issue iden-
12 tified under such paragraph;

13 (B) with respect to each of the research is-
14 sues referred to in subparagraph (A), an identi-
15 fication of the significant scientific uncertainties
16 associated with the assessment of the environ-
17 mental risks posed by the issue;

18 (C) an identification of the research that
19 needs to be conducted by the Administrator to
20 reduce significantly the scientific uncertainties
21 referred to in subparagraph (B); and

22 (D) a list that identifies the issues referred
23 to in subparagraph (C) in order of the priority
24 in which the research should be conducted.

25 (b) RESEARCH PROGRAM.—

1 (1) IN GENERAL.—The Administrator shall
2 carry out a research program to reduce the scientific
3 uncertainties with respect to the assessment of the
4 environmental risks posed by the issues identified
5 under subsection (a). The research shall be con-
6 ducted in accordance with the priority list referred
7 to in subsection (a)(2)(D).

8 (2) ECONOMIC IMPACT ASSESSMENT.—As part
9 of the research program conducted under paragraph
10 (1), the Administrator shall conduct research to im-
11 prove the methodologies used to assess the economic
12 impact of technologies developed as a result of the
13 research program.

14 (c) BUDGET COORDINATION.—In the first budget
15 submitted by the President to Congress pursuant to sec-
16 tion 1108 of title 31, United States Code, following the
17 submission required by subsection (a), and in the 4 suc-
18 ceeding budgets submitted by the President pursuant to
19 such section, the Administrator shall include a report that
20 identifies the research conducted by the Administrator in
21 accordance with the priority list referred to in subsection
22 (a)(2)(D).

1 **SEC. 20. REPORT ON OPPORTUNITIES FOR DEFENSE TECH-**
2 **NOLOGY TRANSFER IN DEVELOPMENT OF EN-**
3 **VIRONMENTALLY SENSITIVE PRODUCTS.**

4 (a) DEFINITION.—As used in this section, the term
5 “defense-related research for environmental applications”
6 means research funded by the Secretary of Defense to
7 mitigate the environmental impact of activities carried out
8 for military purposes.

9 (b) REPORT.—

10 (1) IN GENERAL.—Not later than 180 days
11 after the date of enactment of this Act, the Adminis-
12 trator shall submit to Congress a report that identi-
13 fies opportunities for the technology transfer of de-
14 fense-related research for environmental applica-
15 tions.

16 (2) CONTENTS OF REPORT.—The report shall
17 include information on the development of environ-
18 mentally sensitive products and processes that have
19 dual-use or commercial application, such as—

20 (A) the reduced use of toxic, hazardous,
21 and environmentally damaging substances;

22 (B) the development and employment of
23 substitutes for the substances; and

24 (C) the reduction of emissions and waste
25 generation in product design, manufacture, and
26 maintenance in relevant areas of technology.

1 (c) CONSULTATION.—In preparing the report pursu-
 2 ant to subsection (b), the Administrator shall consult with
 3 the heads of appropriate Federal agencies to identify pro-
 4 duction and design capabilities that are applicable to the
 5 development of products and processes described in sub-
 6 section (b).

7 **SEC. 21. FINANCIAL ASSISTANCE FOR RESEARCH ON**
 8 **DRINKING WATER DISINFECTION.**

9 (a) IN GENERAL.—

10 (1) DISINFECTION AND DISINFECTION BYPROD-
 11 UCTS RESEARCH.—The Administrator shall conduct
 12 research on disinfection and disinfection byproducts
 13 as part of the negotiated rulemaking procedures for
 14 National Primary Drinking Water Regulations for
 15 phase VIA contaminants (disinfection byproducts)
 16 issued pursuant to title XIV of the Public Health
 17 Service Act (commonly known as the “Safe Drinking
 18 Water Act”) (42 U.S.C. 300f et seq.).

19 (2) AUTHORIZATION OF APPROPRIATIONS.—
 20 There are authorized to be appropriated to the
 21 Agency, to carry out this subsection, \$4,000,000 for
 22 each of fiscal years 1994 through 1998.

23 (b) COOPERATIVE AGREEMENT.—

24 (1) IN GENERAL.—The Administrator shall
 25 offer to enter into an agreement with the appro-

1 priate official of the American Water Works Associa-
2 tion Research Foundation (or if the Foundation does
3 not enter into the agreement, an appropriate equiva-
4 lent entity) to conduct disinfection and disinfection
5 byproducts research for each of fiscal years 1994
6 through 1998.

7 (2) FUNDING.—

8 (A) IN GENERAL.—For each fiscal year,
9 the Administrator shall make available pursu-
10 ant to an agreement entered into under para-
11 graph (1), from amounts made available to the
12 Administrator pursuant to this section,
13 \$2,000,000.

14 (B) MATCHING REQUIREMENT.—As a con-
15 dition of the agreement, the Foundation (or
16 other appropriate entity) shall be required to
17 provide a non-Federal share in an amount that
18 is not less than the amount made available pur-
19 suant to this section.

20 (c) REPORTS.—

21 (1) REPORT TO THE ADMINISTRATOR.—Not
22 later than 1 year after the date the Administrator
23 enters into an agreement with a private entity under
24 subsection (a), the private entity shall submit to the

1 Administrator the study prepared pursuant to such
2 subsection.

3 (2) REPORT TO CONGRESS.—Not later than 2
4 weeks after the Administrator receives the study re-
5 quired to be submitted under paragraph (1), the Ad-
6 ministrator shall submit the study to Congress, to-
7 gether with any comments of the Administrator with
8 respect to the report.

9 (d) FUNDING.—Of amounts authorized to be appro-
10 priated under section 2(a), the Administrator may use not
11 more than \$500,000 to carry out this section.

12 **SEC. 22. PURCHASE OF AMERICAN-MADE EQUIPMENT AND**
13 **PRODUCTS.**

14 (a) SENSE OF CONGRESS.—It is the sense of Con-
15 gress that any recipient of a grant under this Act or any
16 amendment made by this Act, should, when available and
17 cost-effective, purchase equipment and products manufac-
18 tured in the United States.

19 (b) NOTICE TO RECIPIENTS OF ASSISTANCE.—In al-
20 locating grants under this Act, or under any amendment
21 made by this Act, the Administrator shall provide to each
22 grant recipient a notice describing the sense of Congress
23 under subsection (a).

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