

**EPA'S FISCAL YEAR 2007 SCIENCE
AND TECHNOLOGY BUDGET PROPOSAL**

HEARING

BEFORE THE

SUBCOMMITTEE ON ENVIRONMENT, TECHNOLOGY,
AND STANDARDS

COMMITTEE ON SCIENCE

HOUSE OF REPRESENTATIVES

ONE HUNDRED NINTH CONGRESS

SECOND SESSION

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**EPA'S FISCAL YEAR 2007 SCIENCE AND
TECHNOLOGY BUDGET PROPOSAL**

THURSDAY, MARCH 16, 2006

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENVIRONMENT, TECHNOLOGY, AND
STANDARDS,
COMMITTEE ON SCIENCE,
Washington, DC.

The Subcommittee met, pursuant to call, at 10:00 a.m., in Room 2318 of the Rayburn House Office Building, Hon. Vernon J. Ehlers [Chairman of the Subcommittee] presiding.

**SUBCOMMITTEE ON ENVIRONMENT, TECHNOLOGY
AND STANDARDS
COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES**

EPA's Fiscal Year 2007 Science and Technology Budget Proposal

Thursday, March 16, 2006

10:00 AM – 12:00 PM

2318 Rayburn House Office Building (WEBCAST)

Witness List

Dr. George M. Gray

Assistant Administrator for Research and Development and EPA Science Advisor
United States Environmental Protection Agency

Dr. M. Granger Morgan

Chairman, Science Advisory Board
United States Environmental Protection Agency

Dr. Donald Langenberg

Vice Chairman
National Council for Science and the Environment

Mr. Jeffrey Ruch

Executive Director
Public Employees for Environmental Responsibility

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HEARING CHARTER

**SUBCOMMITTEE ON ENVIRONMENT, TECHNOLOGY, AND
STANDARDS****COMMITTEE ON SCIENCE****U.S. HOUSE OF REPRESENTATIVES****EPA's Fiscal Year 2007 Science
and Technology Budget Proposal**

THURSDAY, MARCH 16, 2006

10:00 A.M.—12:00 P.M.

2318 RAYBURN HOUSE OFFICE BUILDING

1. Purpose

On Thursday, March 16, 2006 at 10:00 a.m. the House Science Committee's Subcommittee on Environment, Technology, and Standards will hold a hearing to examine the Environmental Protection Agency's (EPA) fiscal year 2007 (FY07) budget request for Science and Technology (S&T).

2. Witnesses

Dr. George Gray, Assistant Administrator for the Office of Research and Development and Science Advisor, U.S. Environmental Protection Agency.

Dr. M. Granger Morgan, Chair, EPA's Science Advisory Board (SAB); Lord Chair Professor in Engineering and Professor and Department Head, Department of Engineering and Public Policy, Carnegie Mellon University.

Dr. Don Langenberg, Vice-Chair, the National Council for Science and the Environment; Chancellor Emeritus of the University System of Maryland; Professor of Physics and Electrical Engineering, University of Maryland; former President, American Association for the Advancement of Science.

Mr. Jeff Ruch, Executive Director, Public Employees for Environmental Responsibility.

3. Overarching Questions

1. Is the overall level of Science and Technology (S&T) funding appropriate and are the priorities balanced among core research, mission-driven research, emerging issues, and homeland security?
2. In particular, what are the consequences of the past and proposed reductions to ecological research, sustainability research, climate change research, graduate fellowships, and technology verification programs?

4. Background

EPA's overall FY07 budget request is \$7.3 billion. The S&T portion of the budget request is \$788 million or a bit more than 10 percent of the total. The remainder of the budget is divided into several accounts. One account funds the agency's air, water, waste, toxics and pesticides programs, one supports clean up of hazardous waste sites under the Superfund program, and another provides grants to states to support EPA's Clean Water Act programs.

Nearly \$528 million (72 percent) of S&T funding is for EPA's Office of Research and Development (ORD), which is the primary research arm of the agency. ORD also receives a small amount of funding from the agency's Superfund program for research on hazardous waste remediation. Typically, most of the remaining S&T funds go to the Office of Air and Radiation, and a smaller amount to the Office of Water. The agency's FY07 budget request proposes a larger share of S&T funds than in past years for the Office of Water's homeland security activities.

ORD conducts and sponsors both fundamental research in environmental science and more targeted research that informs EPA's regulatory programs. For example, ORD develops the scientific risk information for the agency's Integrated Risk Information System (IRIS), a database about human health effects from chemicals in the environment. It is used by EPA programs and states to help determine hazardous

waste site clean up levels and drinking water standards. In air quality, ORD develops the scientific underpinning for EPA's air quality standards in areas such as particulate matter and ozone. And ORD also investigates newer environmental questions such as the environmental implications and applications of nanotechnology.

To carry out these responsibilities, ORD both conducts intramural research at EPA's laboratories and supports fellowships and research at colleges and universities through the Science to Achieve Results (STAR) grant program.

5. Budget Highlights

- The FY07 budget requests \$788 million for S&T at EPA, a \$58 million (eight percent) increase from the FY06 enacted level of \$730 million. However, that figure includes an accounting change, which transfers \$62 million from the Environment Programs and Management account to the S&T account. The accounting change is intended to more accurately allocate facility rents to the appropriate account and does not allow for any increased spending on programs. Excluding the accounting change, the S&T budget request is \$726 million, slightly less than a one percent decrease from FY06 enacted level, and \$71 million (12 percent) below the peak funding in FY04.
- The FY07 request would decrease the budget to \$557 million; \$38 million (six percent) less than the FY06 enacted level. About \$20 million of that reduction is the result of the Administration removing Congressional earmarks from the FY06 base.
- If enacted, the FY07 request for ORD would be its lowest funding level since FY00 and \$90 million (14 percent) less than its peak funding level of \$646.5 million in FY04.
- The FY07 S&T request includes nearly \$9 million for research on the environmental implications of nanotechnology, an 80 percent increase over the FY06 enacted level. At a recent Committee hearing on nanotechnology, industry and environmental community witnesses called for a substantial increase in the federal R&D investment in environmental implications of nanotechnology.
- The FY07 S&T request includes \$92 million for research related to homeland security, an 83 percent increase over the FY06 enacted level. This represents 12 percent of the S&T account. Almost 50 percent of the request (\$45 million) is for the Office of Water's Water Sentinel pilot program, which would receive an increase of more than 500 percent above the FY06 enacted level of \$8.1 million. The program (described in more detail below) is designed to help protect the Nation's drinking water from intentional contamination.
- The FY07 S&T request includes \$79 million for Ecosystem Research, \$7 million (or eight percent) below the FY06 enacted level, and \$28 million (26 percent) below the FY04 enacted level. Almost all of the FY07 reduction (\$5 million) would be taken from the Environmental Monitoring Assessment Program, (EMAP), which supports states' measurements of water quality conditions and ecosystem health.
- ORD's Sustainability Research program (formerly called the Pollution Prevention Research program) would receive \$21 million in FY07, \$8 million (or 23 percent) less than the FY06 enacted level, and \$16 million (or 43 percent) less than FY05.
- The budget request would reduce funding for the Science to Achieve Results (STAR) Graduate Fellowships from the FY06 level of \$9.3 million to \$5.9 million, a \$3.4 million (or 37 percent) decrease.
- The FY07 budget proposes two reductions in research related to climate change. The largest is a \$6 million (33 percent) reduction in S&T funding for the Clean Automotive Technology program in the Office of Air and Radiation. This follows a 10 percent reduction between FY06 and FY05. The FY07 budget also proposes a reduction in ORD's global change research program of \$1.2 million from the FY06 enacted level of \$19 million. This program focuses on understanding the consequences of global change, particularly climate variability and change, for human health and ecosystems. The proposed reduction follows a previous reduction of \$1 million between FY06 and FY05.
- The FY07 budget proposes the elimination of the Superfund Innovative Technology Evaluation (SITE) Program (\$3.7 million) and the near elimination of funding for the Environmental Technology Verification (ETV) program (\$2.9 million). Both programs support the development and implementation of innovative environmental technologies. The SITE program was created in the Superfund statute.

6. Key Issues

The overall spending by EPA's research programs has been declining for several years. The Administration argues that the agency's research is adequately funded given overall constraints on the federal budget and that EPA S&T funds have been focused on emerging priorities, while programs that are not as pressing or effective have been scaled back. Critics of the budget, including EPA's Science Advisory Board, have argued that EPA's core research programs are being eroded in ways that will limit understanding of the environment and hamper the agency's ability to formulate sound policies. Both viewpoints will be represented at the hearing.

The information below describes programs that have received some of the most significant cuts or increases.

Ecological Research. ORD's ecological research aims to assess ecosystem conditions and trends, diagnose impairments, forecast ecosystem vulnerability and, ultimately, restore degraded ecosystems. The proposed FY07 budget represents an eight percent reduction from the FY06 enacted level and a 26 percent reduction since FY04. The proposed FY07 cut would be taken primarily in the Environmental Monitoring Assessment Program (EMAP), which would be reduced by \$5 million, a cut that would leave the program with about half of what it had received in FY04. The Office of Management and Budget (OMB) gave the program a low rating, concluding that it had shown a "lack of progress in developing adequate performance measures." Others have come to different conclusions. EPA's Board of Scientific Counselors rated the program highly, and its supporters argue that the program has helped develop ways to measure water and ecosystem quality along the Nation's coastal areas and in the mid-Atlantic region.

Sustainability research. ORD's Sustainability Research program (formerly called the Pollution Prevention Research program) would receive an \$8 million or 23 percent decrease in FY07 from the FY06 enacted level of \$29 million, and would result in a 43 percent decline since FY05. Included in the FY07 proposed reductions is a cut to the agency's green chemistry research by 23 percent to \$5.1 million from the FY06 enacted level of \$6.6 million. The Science Committee approved a bill last March, sponsored by Rep. Gingrey, seeking to increase the focus on green chemistry research across the government.

Another proposed reduction in sustainability is for research on pollution prevention tools, including life cycle assessment, that is, research on how to reduce pollution throughout the life cycle of a product from manufacturing through use and disposal. It is unclear whether the cut would have an effect on life cycle assessments related to nanotechnology, which both industry and environmental groups have sought.

The sustainability programs have not performed well in OMB reviews, which try to determine if programs have clear quantitative goals and whether those goals are being met.

Climate change research. The FY07 budget proposes a cut of \$6 million (33 percent) in FY07 for the Clean Automatic Technology program. EPA says the budget reflects the phase out of a multi-year federal investment in hydraulic hybrid technology development as the private sector picks up the technologies.

The FY07 budget also proposes a reduction in ORD's global change research program of \$1.2 million from the FY06 enacted level of \$19 million. The proposed reduction would reduce investment in computer modeling of climate change impacts on watersheds, coral reefs, and sewer systems in this program that is closely aligned with the government-wide Climate Change Science Program (CCSP). EPA's global change budget was stable for a number of years until a \$1 million reduction in FY06. EPA's budget documents do not provide a rationale for the cut. Government-wide climate research is flat-funded in the FY07 budget at about \$1.7 billion.

Homeland security. EPA's homeland security responsibilities include setting clean-up standards for remediation after an attack, protecting the Nation's water infrastructure and ensuring that the Nation has adequate laboratory capacity. Homeland security research competes for funding with the more traditional research responsibilities of the agency. The Administration argues this is a necessary setting of priorities in an era of constrained funding. Others, including the EPA Science Advisory Board, are concerned that homeland security research is eroding the agency's ability to conduct research in other important areas, and argue that the homeland research should be funded at least in part with "new money."

Water Sentinel. Run by the agency's Office of Water, with some support from ORD, Water Sentinel is a pilot program to develop a drinking water monitoring and surveillance system to protect against, and respond more quickly to an attack on the Nation's water supply. EPA's FY07 request of \$45 million from the S&T account is a 500 percent increase over the FY06 enacted level of \$8.1 million and would expand the pilot program to five more cities.

While the knowledge gained from Water Sentinel could be critical in the event of a chemical or biological attack on the Nation's drinking water systems, a number of questions remain unanswered. For example, has the pilot program been subject to peer review to ensure that it is properly focused? Is EPA appropriately involving State and local governments in carrying out the pilot program? Does EPA have adequate plans for turning Water Sentinel into an operational program?

Moreover, there are also questions related to funding. Water Sentinel is entirely funded out of the S&T account, although aspects of it are more like an operational program than like traditional research. Operations cost significantly more than research and therefore cut into the funding available for other, more typical research programs.

STAR Grants. EPA created the Science to Achieve Results (STAR) grant program in 1995 and program was funded at just over \$100 million per year between the late 1990s and 2002. The program was recommended by an outside advisory panel convened in 1992 and that recommendation has been reaffirmed in National Academy of Sciences reports in 2000 and 2003. The point in all these reports was that EPA should increase its funding of students and research in academia to draw on a wider range of research. The bulk of STAR funds have been allocated to competitive research grants in targeted mission-critical areas, with a smaller portion reserved for graduate fellowships and for exploratory research on the next generation of environmental challenges.

The STAR program provides both research grants and graduate student fellowships. Since its peak funding level of just over \$102 million in FY02, the grants program has declined every year. The \$65 million FY07 proposal is five percent below FY06 levels and 36 percent reduction below peak funding levels. The agency has proposed eliminating or cutting the fellowships every year for the last five years. The FY07 budget proposes reducing the fellowships by \$3.4 million or 37 percent below the FY06 enacted level of \$9.3 million.

EPA apparently just views the cuts as a question of priorities as it continues to cite extramural research as an important aspect of its research portfolio. For example, EPA references the value of the STAR program in its testimony for this hearing.

Nanotechnology. The *21st Century Nanotechnology Research and Development Act* (P.L. 108-153), which originated in the Science Committee, created an interagency nanotechnology research program that includes EPA, which focuses particularly on the environmental and safety implications of nanotechnology. As it has done in other emerging areas of science, the agency turned to its STAR extramural grants program to jump-start its research in FY04-FY06. In FY07, ORD proposes nearly doubling its funding from \$5 million to \$9 million, a response to calls from industry and environmental groups for increased research on potential environmental consequences of nanotechnology.

Technology programs. Section 311 of the Superfund Act establishes the SITE program and directs EPA "to carry out a program of research, evaluation, testing, development and demonstration... of innovative treatment technologies." (Sec 311 (b)(1)). After significantly downsizing the program in FY06, EPA proposes eliminating it in FY07. By all accounts, including EPA's own, the SITE program has conducted high-quality field demonstrations of remediation technologies, and there are many SITE evaluated technologies now on the market that have saved money and led to more effective remediation efforts. The rationale offered in the budget justification for terminating program is that the "Superfund program has matured."

The budget also proposes to eliminate the ETV program. ETV was created in the mid-1990s to help technology developers verify the performance of their products in areas other than remediation technologies. It was developed using SITE as a model. The FY07 request would eliminate the remaining \$3 million in funding that the agency has used to partner with technology vendors to test the performance of their products. The budget would retain a minimal level of internal agency funding (less than \$.1 million) and staff time for ORD staff to do quality control work with companies that wanted to support their own performance testing.

7. Witness Questions

Dr. Gray, Assistant Administrator for the Office of Research and Development and Science Advisor, Environmental Protection Agency

Please briefly summarize EPA's proposed fiscal year 2007 (FY07) Science and Technology (S&T) budget, including those programmatic areas that would receive significant increases or decreases from FY06 and the rationale for these proposed changes. In addition, please answer the following questions:

1. Given that the funding levels in the FY07 proposed budget for the Office of Research and Development (ORD) are 14 percent below FY04 appropriations,

what specific steps has EPA taken over the past few years and what specific steps will it take in FY07 to ensure that these budget cuts do not affect ORD's ability to:

- a. keep up with and use the newest scientific methods;
 - b. provide the most up to date scientific information for the agency's regulatory decisions; and
 - c. build strong ties with the external research community and foster graduate student work in the environmental sciences.
2. What are the agency's scientific priorities in homeland security? How have those priorities been determined? Given the increasing share of the S&T budget allocated to homeland security, how are you ensuring that the agency's more traditional research programs are receiving adequate funding?
 3. Why is the proposed 500 percent expansion of the Water Sentinel pilot program relying solely on S&T funding? What specific portions of the Water Sentinel program are operational and which are than research? How does the Agency plan to transition Water Sentinel to an operational program?

Dr. Morgan, Chair, Science Advisory Board (SAB), Environmental Protection Agency; Lord Chair Professor in Engineering and Professor and Department Head, Department of Engineering and Public Policy, Carnegie Mellon University

Please describe the results of the Science Advisory Board's review of EPA's fiscal year 2007 (FY07) budget request for science and technology (S&T). In addition, please address the following questions:

1. Is the proposed overall level of S&T funding appropriate and are the priorities balanced adequately among core research, mission-driven research, emerging issues, and homeland security?
2. What impact are the recent and proposed reductions having on the ORD's ability to:
 - a. keep up with and use the newest scientific methods;
 - b. provide the most up-to-date scientific information for the agency's regulatory decisions; and
 - c. build strong ties with the external research community and foster graduate student work in the environmental sciences?
3. Has the agency set the appropriate priorities for meeting the science needs of its homeland security responsibilities? Is the proposed allocation of 12 percent of the S&T budget to homeland security an appropriate amount? What are the consequences of this level of investment for more traditional R&D activities?
4. Should the proposed expansion of the Water Sentinel pilot program rely solely on S&T funding? Does EPA have adequate plans for transitioning Water Sentinel to an operational program?

Dr. Langenberg, Vice-Chair, the National Council for Science and the Environment. Chancellor Emeritus of the University of Maryland System; past Chancellor, University of Illinois-Chicago, former President, American Association for the Advancement of Science

Please address the following questions:

1. From a research university perspective, what are the most important strengths and weaknesses of EPA's proposed S&T budget?
2. What impact are the recent and proposed reductions having on the ORD's ability to:
 - a. keep up with and use the newest scientific methods;
 - b. provide the most up-to-date scientific information for the agency's regulatory decisions; and
 - c. build strong ties with the external research community and foster graduate student work in the environmental sciences?

Mr. Jeff Ruch, Executive Director, Public Employees for Environmental Responsibility (PEER)

Please answer the following questions:

1. What are the most important strengths and weaknesses of EPA's proposed Science and Technology budget?
2. What impact are the recent and proposed reductions having on the ORD's ability to:
 - a. keep up with and use the newest scientific methods;
 - b. provide the most up-to-date scientific information for the agency's regulatory decisions; and
 - c. build strong ties with the external research community and foster graduate student work in the environmental sciences?

Chairman EHLERS. I am pleased to call this hearing to order.

Normally, we wait for a Member of the Minority to show up as well, but since we are battling deadline, presumably some time between now and 10:30, we will be called to vote. I am anxious to get this hearing started, and try and receive all of your testimony before the vote barrage hits. We will probably then be voting until noon, and we will have to come back and renew our efforts at that point. So, let me begin with my opening statement, and I will try to condense it a bit, so we can speed things along.

I am very pleased today to have a hearing on the Environmental Protection Agency's Fiscal Year 2007 science and technology budget. I suspect this is a little more important than most of the hearings we have had in the past, because of the financial difficulties faced by the Agency. At the outset of the hearing, I want to recognize Dr. George Gray, the EPA's Assistant Administrator for Research and Development, who is making his first appearance before the Subcommittee. So welcome. We will try not to chew you up too badly this time. And we will try to—whatever chewing we do will be accompanied with a great deal of sympathy.

I had the opportunity with Dr. Gray several months ago, and was very pleased to learn about his interest and expertise in the subject of risk assessment. I am looking forward to learning more about what you are trying to improve—do—pardon me, trying to do to improve risk assessment at the Agency, which is very badly needed.

Every year at our EPA science budget hearing, I have pointed out the importance of science and technology at EPA, and no one can disagree. EPA's Office of Research and Development has been at the forefront of every one of the Agency's major regulatory actions. It conducts the research on what we know about the health and ecological effects of mercury and other contaminants. It prepares the scientific underpinnings of all of the Agency's clean air rules on particulate matter and ozone. It has helped develop and commercialize better environmental technologies to clean up hazardous, and it is always looking for the next scientific advance that may help us better understand the environment or threats to it, and how to counter those threats.

That is why I come to this hearing very concerned about what I see happening to EPA's science budget. The six percent proposed reduction in the ORD's budget for fiscal year 2007 is troubling, but not as much as the trend in the budget over the last few years, which would be down 14 percent since 2004. This trend, together with the rapid growth in spending on Homeland Security research, which alone accounts for almost 12 percent of the science budget, seems to be making it harder for ORD to continue producing the valuable scientific knowledge I just mentioned. I say all of this, mindful of the significant constraints we face in the discretionary budget, but just as we can't afford to spend too much, we can't afford to spend too little.

EPA's Science Advisory Board takes a close look at the EPA's science budget every year, and has in the past sounded the alarm bells when it thought it was necessary. I am looking forward to the Board's thoughts and comments on the current budget request.

Finally, I am interested in learning more about how the budget treats particular areas of research, such as nanotechnology, ecological research, university grants and fellowships, green chemistry, and climate change.

We have an excellent panel of witnesses today, and I expect that we will learn a great deal. I certainly look forward to receiving your testimony.

And now, I apologize to Mr. Wu for starting without him. Normally, we would never do this, but I explained we are in a great rush today because of the votes. We are trying to conclude their testimony before the votes, and pick up questions afterwards.

I am pleased now to recognize the Ranking Member, Mr. Wu, for his opening statement.

[The prepared statement of Chairman Ehlert follows:]

PREPARED STATEMENT OF CHAIRMAN VERNON J. EHLERS

Good Morning. Welcome to today's hearing on the Environmental Protection Agency's fiscal year 2007 Science and Technology budget.

At the outset of the hearing, I would like to recognize Dr. George Gray, EPA's Assistant Administrator for Research and Development, who is making his first appearance before this subcommittee. Welcome!

I had the opportunity to meet briefly with Dr. Gray several months ago, and I was very pleased to learn about his interest and expertise in the subject of risk assessment. I am looking forward to learning more about what you are doing to improve risk assessment at the agency.

Every year at our EPA Science budget hearing, I have pointed out the importance of science and technology at EPA. And, who could disagree. EPA's Office of Research and Development has been at the forefront of every one of the agency's major regulatory actions. It conducts the research on what we know about the health and ecological effects of mercury and other contaminants. It prepares the scientific underpinnings of all of the agency's clean air rules on particulate matter and ozone. It has helped develop and commercialize better environmental technologies to clean up hazardous wastes. And, it is always looking for the next scientific advance or revolution that may help us better understand the environment or threats to it, and how to counter those threats.

That is why I come to this hearing very concerned about what I see happening to EPA's science budget. The six percent proposed reduction in the ORD's budget for fiscal year 2007 is troubling, but not as much as the trend in the budget over the last few years—which would be down 14 percent since 2004. This trend, together with the rapid growth in spending on homeland security research, which alone accounts for almost 12 percent of the science budget, seems to be making it harder for ORD to continue producing the valuable scientific knowledge I just mentioned. I say all of this mindful of the significant constraints we face in the discretionary budget. But just as we can't afford to spend too much, we can't afford to spend too little.

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Finally, I am interested in learning more about how the budget treats particular areas of research, such as nanotechnology, ecological research, university grants and fellowships, green chemistry and climate change.

We have an excellent panel of witness today and I expect that we will learn a great deal. I look forward to your testimony.

Mr. WU. Terrific. Thank you very much, Mr. Chairman, and thank you for holding this important hearing today.

Environmental issues present increasing challenges for us. We all want a robust economy and access to products and services that sustain and improve our quality of life. Through our investments and research and development, we have been able to promote both environmental protection and economic growth. Done right, these interests are not in conflict, rather, they go hand in hand.

A clean, healthy environment is not a luxury. It is a necessity. Unfortunately, this Administration has failed, for the third consecutive year, to offer a budget that will enable us to achieve further successes in environmental protection. Three years ago, the EPA science and technology budget was cut five percent. In fiscal year 2006, it was reduced again by two percent, and this year's proposal further reduces the budget by one percent, under the heading "Advancing Science and Innovation." This is clearly false advertising. EPA cannot advance environmental research if its budget is retreating.

Targets for cuts include programs in mercury contamination, pesticides, ecosystem research, global change and sustainability, and the STAR grants program.

I am particularly concerned about proposed cuts to ecosystem research. Research at EPA's Western Ecology Division in Corvallis addresses ecological processes and environmental change, in order to best protect and manage ecological resources. We need more of this kind of research, not less.

In addition to the budget, I continue to be deeply troubled about another issue important to science at EPA and across the country and the Federal Government, and that issue is scientific integrity.

I am very disturbed by the continuing reports of manipulation of science advisory committees, suppression of information, and censorship of federal scientists. These reports are not restricted to one agency or department, and they encompass a wide range of topic areas. Although the Administration dismisses these events as random, the sheer number and distribution of complaints across the Federal Government suggests an overall political agenda to twist science to suit ideological goals.

I am pleased that we have a witness today who will offer some insights into these claims, Mr. Ruch from Public Employees for Environmental Responsibility, PEER.

I want to welcome our entire distinguished panel for this morning's hearing, and I look forward to your recommendations and comments. Thank you, Mr. Chairman.

[The prepared statement of Mr. Wu follows:]

PREPARED STATEMENT OF REPRESENTATIVE DAVID WU

Good morning. Thank you, Chairman Ehlert for holding this hearing today.

Environmental issues present increasing challenges for us. We all want a robust economy and access to products and services that sustain and improve our quality of life. Through our investments in research and development, we have been able to strike a balance between environmental protection and economic growth.

A clean, healthy environment is not a luxury. It is a necessity. Unfortunately, the Administration has failed for the third consecutive year to offer a budget that will enable us to achieve further successes in environmental protection.

Three years ago, the EPA S&T budget sustained a five percent cut. In FY06, it was reduced again by two percent, and this year's proposal further reduces the budget by one percent under the heading: "Advancing Science and Innovation." This is false advertising.

EPA cannot advance environmental research if their budget is retreating.

Targets for cuts include programs in mercury contamination, pesticides, ecosystem research, global change and sustainability and the STAR grants program.

I am particularly concerned about proposed cuts to ecosystem research. Research at EPA's Western Ecology Division in Corvallis addresses ecological processes and environmental change in order to best protect and manage ecological resources. We need more of this type of research, not less.

In addition to the budget, I continue to be concerned about another issue important to science at EPA and across the Federal Government. That issue is broadly defined by the term scientific integrity.

I am very disturbed by the continuing reports of manipulation of science advisory committees, suppression of information, and censorship of federal scientists. These reports are not restricted to one agency or department and they encompass a wide-range of topic areas. Although the Administration claims these events are random, the sheer number and distribution of complaints across the Federal Government suggests an overall political agenda to science.

I am pleased that we have a witness today who will offer some insights into these claims, Mr. Jeff Ruch from Public Employees for Environmental Responsibility—PEER.

I want to welcome our entire distinguished panel to this morning's hearing. I look forward to your testimony and to your recommendations for improving EPA's scientific enterprise.

Chairman EHLERS. And thank you, Mr. Wu.

If there are other Members who wish to submit additional opening statements, all such statements will be automatically added to the record without objection.

At this time, I would like to introduce our witnesses. Dr. George Gray is the Assistant Administrator for Research and Development, and the Science Advisor at the United States EPA. This is Dr. Gray's first appearance before the Committee, and we are pleased to have him here with us today. I ask everyone to treat him well, so that it will not be his only appearance before this committee.

Next, we have Dr. M. Granger Morgan, who is the Chairman of the EPA Science Advisory Board, and the Lord Chair Professor in Engineering at Carnegie Mellon University. That is interesting, to have the Lord here. I was thinking last night, I was reading all this material about ORD, and said maybe we should call it the laboratory.

Dr. MORGAN. It is a very well endowed professorship.

Chairman EHLERS. Yes. We might get more money if you were the Lord rather than the ORD.

Dr. Don Langenberg is the Vice Chairman of the National Council for Science and the Environment, and the Chancellor Emeritus of the University System of Maryland. In addition, I have the distinction of having worked in the laboratory next door to him at the University of Berkeley some years ago as graduate students, and I continue to bask in the reflected glory from Mr. Langenberg.

Next, we have Mr. Jeffrey Ruch. He is the Executive Director of Public Employees for Environmental Responsibility, better known as PEER, P-E-E-R. As I am sure our witnesses know, spoken testimony is limited to five minutes each, and I will enforce that, simply because we are trying to get all of your testimony completed before the votes begin. After that time, we will have plenty of time to question you.

And I do have to make one comment just in case I am not here during the question period. It seems very strange to me that EPA is being forced to swallow the cost of the research that is being done at the request and on behalf of the Department of Homeland Security, which has continued to receive very large increases in their budget every year, and while EPA's budget is going down, I think we should do our best to reverse that. I wanted to get that statement on the record.

At this point, we will turn to Dr. Gray for his testimony.

STATEMENT OF DR. GEORGE M. GRAY, ASSISTANT ADMINISTRATOR FOR RESEARCH AND DEVELOPMENT AND EPA SCIENCE ADVISOR, UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Dr. GRAY. Well, thank you, Mr. Chairman, Mr. Wu. I appreciate the opportunity to be here before you today to discuss the fiscal year 2007 budget request for the Environmental Protection Agency. I also—I appreciate your kind words, and as a fellow Michigander, I would like to wish you a happy Great Lakes Day, and recognize your leadership and efforts in supporting and restoring the Great Lakes.

The President request \$788.3 million for EPA's science and technology. This demonstrates the President's continued commitment to providing the resources needed to address our nation's highest priorities, while including continued support for homeland security, protecting our environment, and ensuring economic growth. The request includes \$557 million for the Office of Research and Development to continue the work of providing the sound science that informs Agency decisions.

The budget reflects a continued focus on emerging issues, as well as our body of base work. We are confronted with new opportunities and new challenges all the time, such as computational toxicology or the impact of manufactured nanomaterials on human health, and in those areas, we will make increased or renewed investments. In areas where the major science and technology questions have been answered, and where additional spending would not be cost effective, there we scale back or even cease work. EPA is mindful of our responsibility to consider nanotechnology's environmental and health implications, so that the American economy can safely realize the nanotechnology revolution.

To meet this responsibility better, the President includes an increase of \$4 million, including an additional \$1 million for exploratory grants, for ORD to study the impacts of manufactured nanomaterials on human health and the environment, and the potential environmental uses of this technology.

One of the goals of the Administration is to enhance the transparency and inclusiveness of the chemical risk assessment process, especially that utilizing the Integrated Risk Information System. IRIS is an Internet database containing information on human health effects that may result from exposure to various chemicals in the environment. IRIS was initially developed for EPA staff in response to a growing demand for consistent information on chemical substances for use in risk assessment, decision-making, and regulatory activities. It has since grown into the premier national, and indeed international database for qualitative and quantitative risk information. The information in IRIS is intended for those without extensive training in toxicology, but with some knowledge of health sciences.

Since fiscal year 2002, EPA has been involved in a forward-looking, results-oriented, targeted research effort to address the questions of when and how to test chemicals for hazard identification and dose response information. One objective of this research is to develop approaches, new approaches for prioritizing chemicals for subsequent screening and testing, and we would do this novel tech-

nologies that are derived from computational chemistry, and molecular biology, and systems biology. All of this would, in fact, decrease our use of—reliance on tests on animals. These three scientific disciplines form the core of our computational toxicology research program.

Our computational toxicology, or we call it comptox program, has begun to show promise to reduce the reliance on animal testing. For example, this past year, with the successful development of an in vitro assay for the evaluation of the effects of chemicals on steroidogenesis, the committee that advises the Agency on the Endocrine Disruptors Screening Program recommended that validation work on the rat assay be halted, and that we pay full attention to this in vitro assay. This represents for the first time the substitution of an in vitro assay for one that uses animals by the Endocrine Disruptors Screening Program.

The President's budget also includes \$7 million for a water infrastructure research initiative. This effort will identify new and innovative approaches for managing the water, the Nation's water infrastructure, especially for upgrading and improving the performance of deteriorating wastewater collection systems and drinking water distribution systems. The U.S. Conference of Mayors, in its 2005 National City Water Survey, rated aging water resource infrastructure as a top priority. This is a widespread national problem small and large communities alike. A diverse set of innovative, technologically advanced, engineered solutions will build the Agency's multi-tiered effort to address the Nation's aging water infrastructure.

EPA shares the responsibility to support the President's top priority, the safety and security of the American people. ORD science plays a vital role in developing the means to mitigate the effects on human health and the environment in the aftermath of attacks using chemical, biological, or radiological weapons. Specific priorities include providing tools and training to help communities protect their water infrastructure, through the detection, containment, and decontamination of their water systems, the development and evaluation of decontamination and disposal methods for contaminated and decontaminated materials from the insides of buildings and from outdoors, the development and refinement of sampling and analytical methods for chemical, biological, and radiological contaminants in both air and water, and the preparation of risk assessment methods for both short-term and medium-term exposures from chemical, biological, or radiological contaminants.

The President's fiscal year 2007 budget request for ORD continues this tradition of excellence by emphasizing the best available cutting edge science and technology, collaboration and innovation, with an orientation on results.

Thank you for this opportunity to tell you about the exciting work that we carry out at ORD, and I will be happy to answer your questions about these or any other program areas.

[The prepared statement of Dr. Gray follows:]

PREPARED STATEMENT OF GEORGE M. GRAY

Mr. Chairman and Members of the Committee, I am pleased to be here today to discuss the Fiscal Year (FY) 2007 budget request for the Environmental Protection Agency (EPA). The President's FY 2007 budget request of \$788.3 million for EPA

science and technology reflects the Administration's strong commitment to carrying out EPA's mission to protect human health and the natural environment. The request demonstrates the President's continued commitment to providing the resources needed to address our nation's highest priorities, which include continued support for homeland security and protecting our environment while sustaining our economy's growth. This request includes \$557.2 million for the Office of Research and Development (ORD) to continue the work of providing the sound science that informs the Agency's decisions.

EPA shares in the responsibility for being good stewards of tax dollars. In keeping with the principles of good stewardship, the President has included \$7.3 billion dollars to support the work of the Environmental Protection Agency and our partners in his budget. This budget fulfills presidential environmental commitments and maintains the goals laid out in EPA's strategic plan, while spending tax dollars more effectively.

This budget reflects a continued focus on emerging issues, as well as on our body of base work. As we are confronted with new opportunities and new challenges, such as computational toxicology or the impacts of manufactured nanomaterials on human health, we make new or increased investments. In areas where the major science and technology questions have been answered and where additional spending would not be cost effective, we scale back or even cease work. The work at ORD laboratories, research centers, and offices across the country helps improve the quality of air, water, soil, and the way we use resources. Applied science at ORD builds our understanding of how to protect and enhance the relationship between humans and the Earth's ecosystems.

As we prepare for tomorrow's environmental challenges, EPA will meet the President's charge by focusing on three principles. The first is results and accountability. The second principle is innovation and collaboration. The third principle is using the best available science to accelerate environmental protection. These three principles are consistent with the President's mandate to create a government that is citizen-centered, results-oriented, and market-based. The best available science principle is the one that I am focusing on today. The President and Administrator Johnson share my commitment to sound science.

This focus on science is evident in additional funds in this year's budget for researching the impacts on human health of manufactured nanomaterials, enhancements to health hazard assessment, and expansion of the effective computational toxicology program. Two additional areas on which I'd like to focus on in my testimony are water infrastructure and EPA's homeland security responsibilities.

But before I do, I would like to address how the President's FY 2007 budget request continues to enable ORD to both develop and apply the latest scientific methods and provide the best available science to inform the Agency's, and others', environmental decision-making. One important way is by working with our partners within the Agency—the Program and Regional Offices—to ensure our research program is responsive to their policy needs. Another is to coordinate and thereby leverage our research efforts with other federal agencies through the Committee on Environmental and Natural Resources. Lastly, through our Science to Achieve Results (STAR) research, ORD draws upon the expertise in our colleges and universities in the environmental sciences, and through our fellowship programs, continues to develop that expertise.

An example that combines all of these approaches is our computational toxicology program, which I will address in more detail later. By developing new methods to test the environmental performance of chemicals, this research effort draws upon the recent developments in the fields of genomics, to which our federal and private sector partners—academia and industry—contribute greatly, to address the policy needs of EPA's Office of Prevention, Pesticides, and Toxic Substances. Clearly, by taking advantage of all of the approaches above, ORD continues to make a significant contribution to our understanding of the environment, and the President's fiscal year 2007 budget request will enable us to continue to make such important contributions.

I believe that the fiscal year 2007 request is adequate to continue providing the sound science needed to address the Nation's critical environmental problems and risks.

FY 2007 President's Budget

Nanotechnology

Nanotechnology, the manipulation of matter at the atomic and molecular scales where unique phenomena enable novel applications, is likely to have profound effects on the world economy and on our quality of life. EPA is optimistic about nanotechnology's potential to improve environmental monitoring, pollution control

and remediation techniques. However, EPA is also mindful of our responsibility to consider nanotechnology's environmental and health implications, so that the American economy can safely realize the nanotechnology revolution.

To meet this responsibility better, the President's Budget includes an increase of \$4 million, which includes an additional \$1 million from exploratory grants, for ORD to study the impacts of manufactured nanomaterials on human health and the environment and nanotechnology's potential beneficial environmental uses. Our research will be guided by an EPA white paper on nanotechnology currently undergoing external peer review and an interagency environmental and health research needs document being prepared under the National Nanotechnology Initiative. EPA's nanotechnology research has, to date, primarily been conducted through the Science to Achieve Results grants program. The President's FY 2007 investment in nanotechnology research at EPA will allow us to establish an in-house effort to complement our existing grants program. Together, these programs can help lay the scientific foundation for EPA's understanding of nanotechnology.

Enhancing Health Hazard Assessment

One of the goals of the Administration is to enhance the transparency and inclusiveness of the chemical risk assessment process utilizing the Integrated Risk Information System (IRIS). IRIS is an Internet database containing information on human health effects that may result from exposure to various chemicals in the environment. IRIS was initially developed for EPA staff in response to a growing demand for consistent information on chemical substances for use in risk assessments, decision-making and regulatory activities. It has since grown into the premier national and international source for such qualitative and quantitative risk information. The information in IRIS is intended for those without extensive training in toxicology, but with some knowledge of health sciences.

The heart of IRIS is its collection of health hazard assessments covering individual chemicals. These chemical assessments contain descriptive and quantitative information on hazard identification and dose-response information for both cancer and non-cancer effects. The benefits of the IRIS database lie principally in the quality of its health hazard assessments, the provision of quantitative risk information, and the consistency provided by a single database among the various clients for this information.

Computational Toxicology

Since FY 2002, EPA has been involved in a forward looking, results-oriented, targeted research effort to address the question of "when and how" to test chemicals for hazard identification and improve quantitative dose-response assessment. One objective of this research is to develop approaches for prioritizing chemicals for subsequent screening and testing using novel technologies derived from computational chemistry, molecular biology and systems biology, all while decreasing our use of tests on animals. Those three scientific disciplines form the core of our computational toxicology research program.

In 2005, ORD established a National Center for Computational Toxicology (NCCT). Utilizing cutting-edge research techniques, NCCT scientists are providing leadership in efforts to improve understanding of the fate and transport of pollutants and of the toxicity and risks posed by environmental contaminants.

Our computational toxicology (comptox) work has begun to show promise to reduce the reliance on animal toxicity testing. For example, this past year, with successful development of an *in vitro* assay for the evaluation of the effects of chemicals on steroidogenesis, the committee advising the Agency on the Endocrine Disruptors Screening Program (EDSP) recommended that validation work on the rat assay be halted, and that full attention be paid to the new *in vitro* assay. This represents the first substitution of an *in vitro* assay in place of an *in vivo* assay by the EDSP.

Water Infrastructure

The President's budget request includes \$7 million for a water infrastructure research initiative. This effort will identify new and innovative approaches for managing the Nation's water infrastructure, especially for upgrading and improving the performance of deteriorating wastewater collection systems and drinking water distribution systems. The U.S. Conference of Mayors in its 2005 National City Water Survey rated "aging water resources infrastructure" as the top priority. This is a widespread, national problem facing large and small communities alike. A diverse set of innovative, technologically advanced engineered solutions will build on the Agency's multi-tiered effort to address the Nation's aging water infrastructure.

Homeland Security

EPA shares the responsibility to support the President's top priority: the safety and security of the American people. ORD science plays a vital role in developing the means to mitigate the effects on human health and the environment in the aftermath of attacks using chemical, biological, and radiological agents. Specific priorities include providing tools and training to help communities protect their water infrastructure through detection, containment, and decontamination in water systems; the development and evaluation of decontamination and disposal methods for contaminated and decontaminated materials from the inside of buildings and outdoors; development and refinement of sampling and analytical methods for chemical, biological, and radiological contaminants both in air and water; and the preparation of risk assessment methods for both short-term and medium-term exposures from chemical, biological, and radiological contaminants.

These priorities were developed using threat scenarios and informed scientific and technical judgment. A threat scenario includes a specific type of attack targeted against a situation or setting. As a result, EPA works with the Department of Homeland Security to evaluate thousands of possible combinations of facility types and methods and means of attack. Priority scenarios identified through this process are those that are considered more likely to happen than others or that are more likely to cause widespread or significant harm. EPA also uses informed scientific and technical judgment to help identify priorities. EPA solicits input from scientific and technical experts such as the National Academy of Sciences, and the Science Advisory Board, Agency decision-makers, and stakeholders such as the Department of Homeland Security, the Department of Defense, and information users—such as first responders—directly affected by a threat or attack. The results of both approaches are used to identify priorities and refine them as necessary over time.

Conclusion

By uniquely combining human health and ecological research in one federal agency employing world-class research scientists, ORD has made, and will continue to make, significant contributions to developing a better understanding of environmental risks to both human health and ecosystems. The results of this research have consistently and effectively informed EPA's environmental decision-making as well as that of others, leading to environmental policies based on sound science at the federal, State, tribal and local levels.

The President's FY 2007 budget request for ORD continues this tradition of excellence, by emphasizing the best available cutting-edge science and technology, collaboration and innovation, with an orientation on results.

Thank you for this opportunity to tell you about the exciting work we conduct in ORD, especially in the areas of nanotechnology, the IRIS database, computational toxicology, water infrastructure and homeland security. These are but a few highlights from our portfolio of science and technology work. I am happy to answer your questions about these or any ORD matters.

BIOGRAPHY FOR GEORGE M. GRAY

On November 1, 2005, Dr. George Gray was sworn in to serve as the Assistant Administrator for the Office of Research and Development (ORD) at the U.S. Environmental Protection Agency. ORD is the 1,900-person, \$600 million science and technology arm of EPA. Dr. Gray was appointed to this position by President George W. Bush and confirmed—by unanimous consent—by the U.S. Senate. EPA Administrator Stephen L. Johnson appointed Dr. Gray to serve as EPA Science Advisor on January 24, 2006.

The U.S. Environmental Protection Agency relies on sound science to safeguard both human health and the environment. ORD's leading-edge research helps provide the solid underpinning of science and technology for the Agency. ORD conducts research on ways to prevent pollution, protect human health, and reduce risk. The work at ORD laboratories, research centers, and offices across the country helps improve the quality of air, water, soil, and the way we use resources. Applied science at ORD builds our understanding of how to protect and enhance the relationship between humans and the ecosystems of Earth.

Prior to joining EPA George was a member of the faculty of the Harvard School of Public Health and Executive Director of the Harvard Center for Risk Analysis. His research focused on the scientific basis of human health risk assessment, on methods for characterizing and communicating risks, and on identifying and evaluating risk/risk tradeoffs in public health protection. George professional service has included membership on the National Advisory Health Sciences Council of the National Institute of Environmental Health Sciences, Food and Drug Administration

Advisory Committees and a National Academy of Science/Institute of Medicine panel along with active participation in the Society for Risk Analysis and the Society of Toxicology. George has a B.S. degree in biology from the University of Michigan and M.S. and Ph.D. degrees in toxicology from the University of Rochester.

He and his wife, Ann, and their two children make their home in McLean, Virginia.

ORD's Mission is to perform research and development to identify, understand, and solve current and future environmental problems; to provide responsive technical support to EPA's mission; integrate the work of ORD's scientific partners (other agencies, nations, private sector organizations, and academia); and to provide leadership in addressing emerging environmental issues and in advancing the science and technology of risk assessment and risk management.

Chairman EHLERS. Thank you very much. Dr. Morgan.

**STATEMENT OF DR. M. GRANGER MORGAN, CHAIRMAN,
SCIENCE ADVISORY BOARD, UNITED STATES ENVIRONMENTAL
PROTECTION AGENCY**

Dr. MORGAN. Thank you, Mr. Chairman and Mr. Wu. I am Granger Morgan, and I chair EPA's Science Advisory Board. I am joined today by two fellow members of the Board, Dr. James Johnson, who incidentally also chairs the Board of Scientific Counselors, the BOSC of the Office of Research and Development, and Dr. Gene Matanoski, who is a former Chair of the Committee.

Between 2004 and the proposed 2007 budget, the inflation adjusted budget for EPA's Office of Research and Development has declined by just over 16 percent, and yet, the environmental challenges we face have grown, and EPA will face increasingly complex and difficult science challenges over the coming decades.

We all want environmental decision-making to be based on sound science. However, our nation is not investing adequately in producing that science.

Now, I know a number of people who think that this lack of investment reflects a hope that if the science isn't there, somehow, additional regulation will not follow. A much more likely outcome is that if we don't do the needed research, we will simply get poorer regulation, which could end up costing the Nation a great deal more in the long run.

In my view, we all need to work harder on explaining the importance of investing in R&D at EPA if we want to assure that America will enjoy a clean, safe, healthy and sustainable environment in the years to come.

Now, you have specifically asked if the Agency's overall level of science and technology funding is appropriate, and whether its research priorities are adequately balanced. I have elaborated in the written testimony that I have submitted, but the short answer is no.

You have also asked what impacts the proposed budget reductions may have on ORD's ability to use the latest scientific methods and information in its regulatory decisions, and to build strong ties to the external scientific research community. Again, while I have elaborated in the written testimony, the short answer is these impacts will be serious, and they will be negative.

In my written remarks, I have addressed three issues. The first is the need for a government-wide view of environmental research and development. Before us on the Science Advisory Board, or for that matter, you and the Congress, can hope to determine if the

U.S. has a balanced and comprehensive national strategy for environmental research, we need a clearer picture of what is being done. I urge the committee to work with the executive and independent agencies to realize the development of such a comprehensive description of all of our nation's environmental research.

In my written testimony, I then offer comments on proposed changes in EPA's research programs in mercury, in ecology and ecosystems, in human health, and in global change and sustainability. I then respond to your questions about appropriate science priorities and needs for homeland security. While all of us on the SAB agree that this is an important area of national need, we are concerned that it not be met at the cost of serious erosion in the support of the Agency's core research needs in health and environmental research.

I also offer two other words of caution. First, there is some risk that the Agency's homeland security work will focus too much at the level of individual devices and subsystems without first understanding at a broad level such key issues as how effective alternative approaches can hope to be in providing needed protection at an affordable cost. And second, we are concerned that the current programs are not sufficiently informed by the behavioral and social sciences.

I end my written remarks with a discussion of the importance of longer-term, more fundamental research at EPA. In our meetings with Agency research managers, we were deeply troubled when we were told that the basic, or core portions of ORD's research budget have shrunk from roughly 40 percent to 25 percent of current research investments. It is difficult to know exactly what those numbers are, but the reduction is quite clear. Looking back at the analysis that the SAB has done of EPA's science and research budgets over the past several years, the SAB has become convinced that the Agency is in danger of losing core scientific expertise in both conventional and emerging environmental issues.

I close my written remarks by urging the committee to restore the proposed cuts in the STAR Doctoral Fellowship program.

Thank you again for the opportunity to testify about EPA's science and research budget, and my colleagues and I would be pleased to try to answer your questions.

[The prepared statement of Dr. Morgan follows:]

PREPARED STATEMENT OF M. GRANGER MORGAN

Good morning Mr. Chairman and Members of the Subcommittee on Environment, Technology, and Standards. My name is Granger Morgan. I chair EPA's Science Advisory Board (SAB or Board). I am a faculty member at Carnegie Mellon University where I am a University Professor, hold the Lord Chaired Professorship in Engineering, and am Head of the Department of Engineering and Public Policy, a department in the Engineering College.

Thank you for this opportunity to present the SAB's views about the Agency's 2007 Science and Research Budget Request. The Board is completing approval of its final report, and with the permission of the Chairman, we will submit that report for the record.

Over the past few years, the Board has been working with EPA to review the Agency's science and research programs and budget on a systematic and ongoing basis. The Agency now presents that information to the Board in ways that correlate with EPA's Strategic Plan.

Between 2004 and the proposal for 2007, the inflation adjusted¹ budget for EPA's Office of Research and Development has declined by just over 16 percent. Yet, the environmental challenges that face the Agency have grown and EPA will face increasingly complex and difficult science challenges over the coming decades. It will also face opportunities to improve our environmental and international competitiveness with new technologies—but, to paraphrase the microbiologist Louis Pasteur, opportunity favors those who are prepared.

We all want environmental decision-making to be based on sound science. However, our nation is not investing adequately in producing that sound science.

I know a number of people who argue that this lack of investment reflects a hope that if the science is not there, somehow additional regulation will not follow. A much more likely outcome is that, if we don't do the needed research we will simply get poorer regulation—which could end up costing the Nation a great deal more in the long run.

In my view we all need to work harder on explaining the importance of investing in R&D at EPA if we want to ensure that America will enjoy a clean, safe, healthy and sustainable environment in the years to come.

You have specifically asked if the Agency's overall level of Science and Technology funding is appropriate and whether its research priorities are adequately balanced among core research, mission-driven research, emerging issues, and homeland security. I will elaborate below, but the short answer is no.

You have also asked what impacts the proposed budget reduction may have on the Office of Research and Development's ability to use the latest scientific methods and information in its regulatory decisions, and to build strong ties to the external scientific research community and foster graduate student work in the environmental sciences. Again, while I'll elaborate below, the short answer is these impacts will be serious and negative.

In the discussion below I elaborate on these, and related points, in three contexts:

1. The need for government-wide, systematic tracking of environmental research;
2. Some specific aspects of EPA's proposed 2007 research budget; and
3. The critical problem of continuing reductions in long-term, more fundamental environmental research at EPA.

1. Need for a Government-wide View of Environmental Research and Development

EPA is not the only federal agency that collects environmental data or performs environmental research. The Departments of Agriculture, Energy, Homeland Security, and Interior, as well as the CDC, NASA, NIEHS, NIH, NSF, USGS, and a number of other federal entities all make significant contributions. Some of these organizations work on topics that may sound similar; in many cases the details turn out to be different in important ways.

In many specific areas of research, there are examples of excellent coordination and cooperation between some of these programs.

But today, across the federal system as a whole, it is virtually impossible to develop an informed understanding of what research is being done; where it is being done; where there are duplications; and where there are critical gaps. A simple list of topics is not sufficient. Just because the same noun appears in two agency lists of research topics does not mean that they are doing the same thing, or that there is duplication.

Before we on the Science Advisory Board, or you in the Congress, can hope to determine if the U.S. has a balanced and comprehensive national strategy for environmental research, we need a clear picture of what is being done in the form of concise substantive descriptions of all the environmental research programs across the federal system. Conceivably, things could be better than they look from the isolated EPA's budgetary perspective. I suspect that they are worse. However, we need a comprehensive picture.

I urge the Committee to work with the executive and independent agencies to realize the development of such a comprehensive description of all our nation's environmental research. Such a summary would assist everyone involved in ensuring: that needed federal environmental research is being done efficiently; that the different federal agencies involved are sharing information; and that the results are readily accessible to the scientific community, the public, and environmental decision-makers.

¹ Computed using the NASA Gross Domestic Product Deflator Inflation Calculator, available at <http://cost.jsc.nasa.gov/inflateGDP.html>

2. Comments on Several Proposed Changes in Individual EPA Programs

Now I'd like to offer four examples of how the proposed cuts to the EPA 2007 research budget will adversely impact the Agency's mission to protect human health and the environment as well as offer some brief comments in response to your question about the expansion of the Agencies program related to Homeland Security.

First, I will address *mercury* research. While some of the mercury in our food and water comes from power plants and other human activities, much comes from natural sources or is carried across the Pacific from natural and anthropogenic sources in Asia. On a global scale, science cannot yet accurately tell us where all the mercury in the U.S. comes from, where it goes, or in what chemical forms it exists. If we are going to be able to assess the adequacy and effectiveness of the costly mercury controls that EPA regulation is imposing on U.S. industry, we need to understand those planetary flows. However, last year's EPA research budget for mercury was reduced approximately 35 percent to \$3.4 million. This year's budget proposes only a slight increase. Funding at these levels is too small to even adequately address the issues that EPA-ORD has been addressing, let alone to allow any work on the key problem of planetary flows of mercury.

A second important and undervalued area of research, that the Board is especially concerned about is *Ecology and Ecosystems Research* which has been systematically cut for several years. While we all value and marvel at the beauty and complexity of natural ecosystems, it is easy to forget that every year these systems also provide us with billions of dollars worth of services that are critical to our way of life.

As an example, the salt-water marshes of the Gulf Coast provide more than wildlife habitat. They also provide protection against erosion, and they buffer the effect of storms on coastal lands. How are we to protect such vulnerable natural systems as the salt-water marshes of the Gulf Coast, the Great Lakes, the Chesapeake Bay, the Mississippi River Basin, and countless other smaller natural systems in every state in the country, if we don't adequately invest in understanding them?

The \$79.2 million for ecological research in the proposed 2007 amounts to just 15 percent of the overall ORD research budget. For well over a decade the Board has called on both the Agency and the Congress to revitalize, raise the profile, and increase the funding of ecological research at EPA. Since 2004, the Board has watched budgetary support for ecological research decline by 26 percent. This is not the route to a clean and healthy future for either us, or for our air, land and waters.

Third, I will say a word about research in *human health*. The SAB was delighted to see a proposed increase of just under \$3 million in Computational Toxicology. This work holds great potential to streamline the process of assessing the safety of chemicals, speed approval of new products, and in so doing, enhance the productivity and competitiveness of American industry.

However, to make effective use of these powerful new computational tools, researchers also need data to put in the computer models. The Board is deeply troubled by proposed cuts in human health research areas that are needed to provide the data necessary for computational toxicology to be effective. These cuts include a proposed 13 percent reduction for work on endocrine disruptors, a proposed 14 percent reduction for pesticides, and an increase of only three percent for other core programs in human health research.

Finally, the Board is concerned about research in Global Change and Sustainability. For each of the past two years, research support for global change has declined by roughly one million dollars. The current budget proposal of \$17.5 million will only allow the agency to meet its impact assessment obligations under the government-wide Climate Change Science Program. The Agency will be forced to terminate, in midstream, research vital to understanding ongoing changes in temperature, precipitation, flooding, snow pack, and other factors will affect water quality across the U.S. To our knowledge, no other federal agency is supporting such work on a national scale.

Following \$9.6 million dollar reduction in 2006, sustainability research is slated for further reduction of \$4.4 million in 2007. These reductions are coupled with the termination of the Superfund Innovative Technology Evaluation Program and Environmental Technology Validation Program. This means that the Agency will lose much of its ability to test and verify new environmental technologies. This loss harms American industry's competitive position for environmental technology in world markets, at a time when other nations treat these technologies as opportunities.

I turn now to your questions about appropriate science priorities and needs for Homeland Security. The proposed 2007 budget calls for an increase of almost 25 percent to \$39.5 million for Homeland Security research in ORD, and an increase of just under 30 percent to \$58.1 million for work in other parts of the Agency.

These increases will support research and other activities related to increased preparedness and better response for water security, analytical methods, decontamination, clean-up goals, radiation monitoring and biodefense. Clearly improving our ability to deal with terrorist and other threats is a critical national need and the SAB has been most favorably impressed by the dedication and hard work of the staff addressing these important national priorities. However, while all of us on the SAB agree that this is an important area of national need, we are concerned that it not be met through serious erosion of support for the Agency's core research needs in health and environmental research.

I would like to offer two other cautions regarding the Agency's current research program in homeland security research. First, there is some risk of focusing too much at the level of individual devices and sub-systems, without first understanding at a broad level such key issues as how effective alternative approaches can hope to be in providing needed protection, and whether the Nation can afford them. Second, we are concerned that current programs are not sufficiently informed by the behavioral and social sciences, which are crucial to effectively organizing the complex systems needed to manage these technologies and communicating research results and risk to the general public.

You also asked about sole reliance on Science and Technology funding for the WaterSentinel pilot program expansion, and if EPA has adequate plans for transitioning WaterSentinel to an operational program. The SAB understands the need for WaterSentinel, but EPA's strategy for allocating resources to this program is unclear. Science and Technology funding is probably appropriate for developing the scientific aspects of WaterSentinel, but other aspects of the program appear to be operational. Accordingly, the SAB believes that operational aspects of WaterSentinel should be funded by appropriate operational funds. The SAB Panel that reviewed WaterSentinel recommended development of a plan to transition WaterSentinel from research and development to an operational program. The SAB is concerned that WaterSentinel funding comes at the expense of the Agency's other responsibilities.

3. Longer-term More Fundamental Research

EPA is a mission-oriented agency, charged with assuring that America enjoys, and will continue to enjoy, a clean and healthy environment. Earlier I paraphrased Louis Pasteur. Don Stokes, the former dean at Princeton's Woodrow Wilson School wrote a wonderful little book² that argues that research cannot simply be sorted out along a line between basic and applied. Some important real world problems, such as those that lead Pasteur to understand how to preserve milk, can only be addressed by doing fundamental research that is *motivated* by real-world needs. Many environmental problems fall into this category—what Stokes termed “Pasteur's quadrant.” Much of the knowledge that is needed to assure continued success in EPA's mission requires research of this kind—research which is not being done anywhere else across the federal system.

In our meetings with agency research managers, we were deeply troubled when we were told that the basic or “core” portions of ORD's research budget have shrunk from roughly 40 percent to 25 percent of current research investments. Environmental issues are complex, and often subtle. If EPA does not continue to invest in a significant amount of basic environmental science, we will likely find ourselves making costly regulatory mistakes in the future. We also run the risk of paralyzing innovative industries, like nanotechnology, uncertain about the regulatory rules that they will face.

The SAB is especially troubled by the ongoing difficulty that EPA has had with the application of the OMB Performance Assessment Review Tool or “PART” process. My own view is that both the agency and the OMB need to work harder to resolve this issue, especially in the context of ecosystem research. On the one hand, OMB needs to recognize the need for a portion of EPA's research to be fairly fundamental in nature. As I have argued above, not all EPA research has immediate short-term applications—nor should it have. Long-term investments in developing basic understanding of environmental and ecological science are very important if we are to achieve sensible and efficient environmental protection. At the same time, EPA needs to do a better job of refining and communicating several of its research programs, especially those in ecosystem research, a topic whose importance has been stressed by both the SAB and National Academy of Sciences. Simply continuing to cut the budget is not a viable strategy for achieving future improvement.

² Donald E. Stokes, *Pasteur's Quadrant: Basic Science and Technological Innovation*, Brookings Institution Press, 180 pp., 1997.

Looking back at the analyses that the SAB has done of EPA's science and research budgets over the past several years, the SAB has become convinced that the Agency is in danger of losing core scientific expertise in both conventional and emerging environmental issues. A number of the agency's research programs are in need of major rejuvenation and modernization, but this is almost impossible in the face of ever shrinking resources. On top of this, a significant number of retirements is anticipated over the coming decade. If proposed cuts in the STAR Doctoral Fellowship program are not restored, where will the next generation of U.S. environmental scientists come from?

Thank you again for the opportunity to testify about EPA's science and research budget request. My colleagues and I would be pleased to answer your questions.

BIOGRAPHY FOR M. GRANGER MORGAN

Dr. M. Granger Morgan is University Professor and Head of the Department of Engineering and Public Policy at Carnegie Mellon University where he is also Lord Chair Professor in Engineering, and is a Professor in the Department of Electrical and Computer Engineering and in the H. John Heinz III School of Public Policy and Management. He holds a B.A. from Harvard College (1963) where he concentrated in physics, an M.S. in astronomy and space science from Cornell (1965), and a Ph.D. from the department of applied physics and information sciences at the University of California at San Diego (1969).

Dr. Morgan's research addresses problems in science, technology, and public policy. Much of it has involved the development and demonstration of methods to characterize and treat uncertainty in quantitative policy analysis. He works on risk analysis, management and communication; on problems in the integrated assessment of global change; on energy systems, focused particularly on electric power; on problems in technology and domestic security; on improving health, safety, and environmental regulation; and on several other topics in technology and public policy.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON D.C. 20460

OFFICE OF THE ADMINISTRATOR
SCIENCE ADVISORY BOARD

March 14, 2006

The Honorable Vernon J. Ehlers
Chairman, Subcommittee on Environment, Technology and Standards
House Science Committee
2320 Rayburn House Office Building
Washington, D.C. 20515

Dear Congressman Ehlers:

This letter is in response to your request for a clarification of any potential conflict of interest that might influence my ability to carry out the charge from the Subcommittee on Environment, Technology and Standards. I currently receive no research funding from the Environmental Protection Agency (EPA) except compensation received in connection with my service as Chair of the Science Advisory Board (SAB). I do receive funding from the National Science Foundation (NSF) through a cooperative agreement on global environmental change. I also receive funding from the Sloan Foundation, Electric Power Research Institute and the MacArthur Foundation. From time-to-time, I receive modest amounts of income in connection with consulting activities, none of which relate directly to the work of the Agency or its research programs.

I believe that none of these sources of funding influence my ability to present to this Subcommittee the opinion of the SAB with regard to the proposed budget for science and technology at EPA. My funding also will not influence my ability to answer any questions related to these topics.

I would be glad to answer any specific questions that might arise with regard to this matter and to provide any additional detail you might wish.

Sincerely,

A handwritten signature in black ink that reads "Granger Morgan".

Dr. M. Granger Morgan
Chair
EPA Science Advisory Board

Chairman EHLERS. Thank you. Dr. Langenberg.

STATEMENT OF DR. DONALD N. LANGENBERG, VICE CHAIRMAN, NATIONAL COUNCIL FOR SCIENCE AND THE ENVIRONMENT

Dr. LANGENBERG. Thank you, Mr. Chairman, Mr. Wu, and thank you for the opportunity to testify here on behalf of the National Council for Science and the Environment.

That organization is dedicated to proving the scientific basis for environmental decision-making, and it does not take positions on environmental issues, per se. You have my written testimony. I would like to focus my oral remarks on several broad brush, big picture topics that help me understand the context for today's hearing.

It is becoming obvious to most Americans, not just citizens of Louisiana and Kansas, that environmental issues are becoming increasingly important all societal levels, from local, through state and national to global. Our leaders are being told do something. What to do? Well, when we confront that question, we encounter a reality once described by the biologist E. O. Wilson, who said, and I quote: "Men who would rather believe than know." I find that a rather ominous truth, especially at a time when a recent survey shows that about a quarter of the American population still believes that the Sun orbits around the Earth.

That being the case, what do decision-makers like you do when confronted with an environmental issue? And my answer is make policy, make your decisions based on a thorough understanding of the best available scientific knowledge that is relevant to the issue. It is easier said than done for environmental issues, which are extremely systemic, complicated, and multidisciplinary. Although the scientific knowledgebase is growing, it remains full of gaps and unanswered questions, but that means that we have to do all we can to support those scientists who can enlarge the knowledgebase, and that also means that we must attend to the development of the next generation of scientists, who can continue to do that, which brings me to EPA.

In my view, EPA is a mission agency, whose primary functions are policy development and regulation. To accomplish that mission properly, EPA must base its actions on sound scientific knowledge, and to do that, it needs to contribute to the scientific knowledgebase, particularly by supporting research that is directly and immediately relevant to the policy and regulatory issues that it confronts.

EPA's Office of Research and Development can and does make its contribution to the scientific knowledgebase by supporting both intramural and extramural research, and in that, it parallels the work of other mission agencies, like Health and Human Services, Energy, and NASA.

The extramural research effort of EPA's STAR, Science to Achieve Results, is particularly important, because it not only helps expand the relevant scientific knowledgebase, but it gives EPA direct access to the expertise and advice of some of the leading—Nation's leading environmental scientists, most of whom work in research universities. They have another unique and very impor-

tant function. Those universities are also the breeding grounds for the next generation of environmental scientists, so STAR research projects and the STAR Fellowship Program, to help ensure that tomorrow's policy decisions will continue to well informed by the best available science.

Is STAR any good? Well, the National Academy of Sciences addressed that question in detail, and gave STAR high marks. As far as I can tell, among federal programs, STAR seems to have accomplished its objectives in a manner that should make it a "star" among federal programs, but yet, its funding has been declining in recent years, and that is, frankly, not the responsible response this citizen would have expected from his government when confronted with a burgeoning set of environmental challenges. And let me remind you that those challenges are not confined to the immediate present, like Katrina and tornados in Kansas. They include the possibility of an avian influenza pandemic, and the possibility of the inundation of my Maryland Eastern shore home if the Greenland ice sheet melts.

Let me answer the specific questions that the staff has asked. What are the most important strengths and weaknesses of EPA's proposed S&T budget? The most important strength, I think, is that it exists at all, and the most important weakness is that it is substantially inadequate to support EPA meeting its present and looming future challenges. What impact are the recent proposed reductions having on the ORD's ability to—and to provide several things that are relevant. My answer is, so far as I know, ORD continues to do a creditable job with the resources that it has, but in my opinion, those resources are substantially inadequate to enable EPA to respond responsibly to the challenges it faces today, and the greater challenges it will face in the near future.

I would refer you to the conclusion of my written testimony for some recommendations from NCSE about restoring some of the declines in various aspects of ORD and STAR. I understand, Mr. Chairman, Mr. Wu, that you can accomplish only what is financially and politically feasible at this moment, but of all the issues that our government faces, environmental issues are surely the longest-term.

I think I can assure you that our children and our grandchildren will have to deal with them in whatever forms they may take in the decades and centuries to come, and I think it is our duty and obligation to do what we can today to make their tasks easier tomorrow.

Thank you very much for the opportunity to be here.
[The prepared statement of Dr. Langenberg follows:]

PREPARED STATEMENT OF DONALD N. LANGENBERG

Summary

In order to fulfill its mission, EPA needs increased investments in both its intramural and extramural science programs. The National Council for Science and the Environment (NCSE) urges Congress to appropriate a minimum of \$700 million for EPA's Office of Research and Development (bringing it back to FY 2004 levels), including at least \$150 million for EPA's Science to Achieve Results (STAR) research grants program and \$20 million for EPA's STAR graduate fellowship program. We recommend a total of \$900 million for EPA's Science and Technology account. NCSE also urges Congress to restore full funding for the Office of Environmental Education at a level of at least \$10 million.

The National Council for Science and the Environment is dedicated to *improving the scientific basis for environmental decision-making*. We are supported by over 500 organizations, including universities, scientific societies, government associations, businesses and chambers of commerce, and environmental and other civic organizations. NCSE promotes science and its essential role in decision-making but does not take positions on environmental issues themselves.

Introduction

Mr. Chairman, thank you for the opportunity to testify at this important hearing on science and technology at the Environmental Protection Agency (EPA). My name is Don Langenberg. I am testifying in my capacity as Vice Chair of the National Council for Science and the Environment (NCSE). I am also Chancellor Emeritus of the University System of Maryland and Professor of Physics and Electrical Engineering at the University of Maryland. I bring several perspectives to this hearing. I have served as Deputy Director and Acting Director of the National Science Foundation (NSF), President of the American Association for the Advancement of Science (AAAS), President of the American Physical Society (APS), and Chairman of the Executive Committee of the National Association of State Universities and Land Grant Colleges (NASULGC).

In my capacity as Chancellor of the University System of Maryland, I was a leader of an institution that receives large amounts of federal funding for research and education. In my capacity as Deputy Director and Acting Director of the National Science Foundation, I was a leader of an institution that provides a significant fraction of the total federal investment in research and education at our nation's universities. I am both a scientist and a science educator. From 2002–2004, I served as Regents' Professor of Education at the University of Maryland.

I am a physicist by training, but I am not here to discuss the physical sciences. Just as Harold Varmus, the eminent biologist and former Director of the National Institutes of Health, made a strong case for the need for greater investments in the physical sciences, I am a physicist who is here to discuss the importance of greater investments in environmental research and education.

Environmental Science and Decision-making

The call for decisions, environmental and otherwise, to be made on the basis of science is almost a mantra used across the political spectrum. Yet, behind the rhetoric, a simple truth remains. Without investment in science and in scientists, there can be no science-based decision-making.

Despite this statement of the obvious, many federal departments and agencies and those in Congress who fund them try to get environmental decision-making on the cheap. In real dollar terms, **EPA's funding of science is nearly unchanged since 1990** (Figure 1). During this time, the complexity of the challenges has increased many-fold. Science has helped us to make great advances with the local issues of point-source pollution. The problems faced by EPA, our nation and our planet today encompass local, regional, national and even global scales.

EPA's current list of high priority research areas includes:

- Human Health
- Particulate Matter
- Drinking Water
- Clean Water
- Global Change
- Endocrine Disruptors
- Ecological Risk
- Pollution Prevention
- Homeland Security

Half of these issues were largely unknown 25 years ago, yet the amount of available funding is largely unchanged.

A research budget of less than \$600 million for an agency dealing with these challenges is simply unacceptable. In contrast, the National Institutes of Health (NIH) receives nearly \$30 billion (50 times more than EPA research). Yet we increasingly understand the connection between environmental quality and human health. For example, reducing methane emissions by 20 percent could prevent 370,000 deaths worldwide between 2010 and 2030, say Princeton University researchers in *Proceedings of the National Academy of Sciences* last week (March 6, 2007).

EPA's strategic plan calls for science-based decision-making, but it's not possible to achieve this goal if the agency's capacity to conduct science is continually re-

duced. EPA's strategic plan for 2003–2008 says, "EPA has identified reliance on sound science and credible data among the guiding principles we will follow to fulfill our mission to protect human health and the environment." EPA needs to reverse the decline in its capacity to conduct science in order to fulfill its mission.

EPA's proposed science budget

Under the President's FY 2007 budget, EPA's overall budget would fall \$310 million or 4.1 percent to \$7.3 billion, after a similar cut in 2006. EPA's R&D portfolio of \$557 million would suffer a \$37.5 million (six percent cut), after a similar cut in 2006. Funding for most EPA research areas would decline, with the exception of homeland security R&D. **EPA's R&D funding would fall to its lowest level in almost two decades in real terms** (Figure 1). If EPA's FY 2007 budget proposal were enacted, the agency's Science and Technology (S&T) funding will have declined by \$71 million (12 percent) since FY 2004 and the Office of Research and Development budget will have declined by \$90 million (14 percent) during the same period.

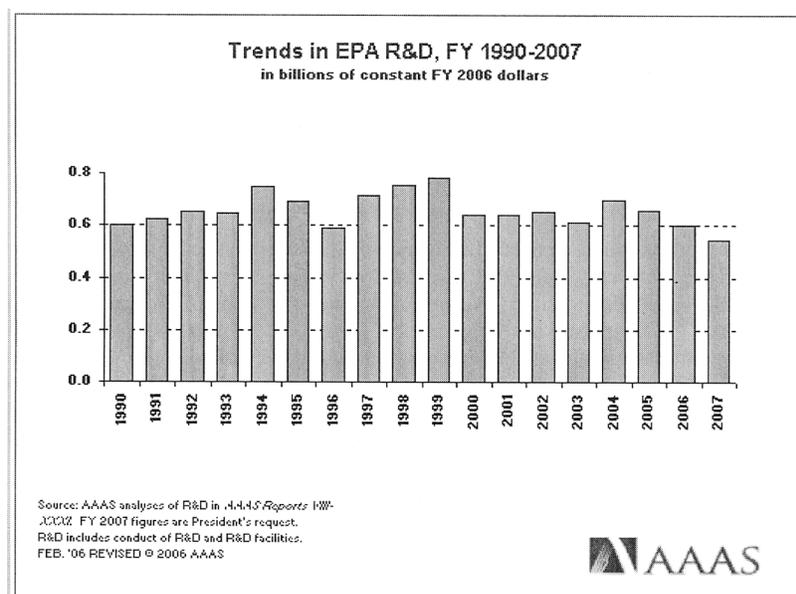


Figure 1. Trends in EPA R&D, FY 1990-2007 in real dollars.

A healthy research program depends on having sufficient resources to:

- keep up with and use the newest scientific methods,
- provide the most up-to-date scientific information for the agency's regulatory decisions, and
- build and maintain strong ties with the external research community and foster graduate student work in the environmental sciences.

Unfortunately EPA's research program is in a chronically unhealthy state. Despite major successful reforms in response to criticisms leveled in the 1980s and early 1990s, EPA's ability to garner the best science for its decision-making has been hamstrung by a severe lack of resources. This is particularly vexing given the desire of many policy-makers to move away from a "command and control model" to a more flexible market-based approach to environmental performance. A market-based approach will only succeed if all participants have access to high quality science-based information on which to make their decisions. Additional science is needed to develop metrics of success and to monitor progress toward desired outcomes.

Funding for EPA's S&T account is projected to fall in 2008, 2009, and 2010 before rebounding slightly in 2011. After adjusting for inflation, EPA R&D could fall a further 16 percent over the next five years. Even if Congress adds to the Administra-

tion's request during the appropriations process, congressional add-ons may end up going to earmarked projects rather than to boost core EPA research programs, leaving most EPA research on a downward path with further cuts to come. This situation is unsustainable and should be unacceptable to this committee.

EPA's Extramural Science and Education Programs

EPA created the extramural Science to Achieve Results (STAR) program as part of a set of reforms to EPA science proposed by the National Academy of Sciences in the 1990s. STAR provides EPA an opportunity to better take advantage of the intellectual and scientific resources of the academic community and apply these resources to the challenges faced by EPA.

The STAR program has been widely praised. The National Academies issued a laudatory report, *The Measure of STAR*, which concludes that the program supports excellent science that is directly relevant to the agency's mission. According to the report, the STAR program has "yielded significant new findings and knowledge critical for regulatory decision-making." The report says, "The program has established and maintains a high degree of scientific excellence." It also concludes, "The STAR program funds important research that is not conducted or funded by other agencies. The STAR program has also made commendable efforts to leverage funds through establishment of research partnerships with other agencies and organizations."

The EPA STAR research program compares favorably with programs at other science agencies. According to the National Academies report, "The STAR program has developed a grant-award process that compares favorably with and in some ways exceeds that in place at other agencies that have extramural research programs, such as the National Science Foundation and the National Institute of Environmental Health Sciences."

The STAR research grants program expands the scientific expertise available to EPA by awarding competitive grants to universities and independent institutions, to investigate scientific questions of particular relevance to the agency's mission. The National Academies report says, "The STAR program should continue to be an important part of EPA's research program."

From the standpoint of a university administrator, our ability to set priorities is greatly influenced by patterns of federal funding. Where resources are made available, academic research will flourish and new discoveries will be made. This is happening in the biomedical sciences and society is reaping the benefits of increased funding for biomedical research. In areas such as environmental science, even though there is great interest among student and faculty, it is hard for us to establish new programs and hire new faculty and take on additional students if we know that funding is not likely to be available. STAR grants that support research centers and individual scientists allow universities to make their own investments with some assurance of concurrent federal support.

Research centers funded by the STAR program at universities affiliated with NCSE are making scientific breakthroughs on topics including:

- remediation of mine waste sites
- microbial risk assessment
- remediation of volatile organic compounds in groundwater and soil
- air quality—reducing the health effects of particulate matter and aerosols
- assessment of aquatic resources
- children's environmental health and disease prevention (several centers).

Funding for the STAR program has been cut repeatedly over the past several years. The FY 2007 request for the STAR programs is \$63 million, which is 40 percent below the FY 2004 request of \$104.7 million. If the proposal is enacted, STAR will have been cut by \$20 million (24 percent) since FY 2004. NCSE proposes that the STAR research budget be increased to \$150 million, which would allow expansion of areas and scientists supported and would send a signal that Congress is serious about science for environmental decision-making.

To ensure a strong supply of future environmental scientists and engineers, EPA created the STAR Fellowship program. As you know, there is considerable concern about the retirements of the baby boom generation and the need to replace the scientific and technical skills of the federal, State and private work force. The STAR fellowship program is the only federal program aimed specifically at students pursuing advanced degrees in environmental sciences. According to the National Academies report, "The STAR fellowship program is a valuable mechanism for enabling a continuing supply of graduate students in environmental sciences and engineering

to help build a stronger scientific foundation for the Nation's environmental research and management efforts."

The STAR Fellowship program has also been repeatedly proposed for budget cuts by the Administration, only to be restored each year by Congress. The President's budget request has again proposed deep cuts in the STAR graduate fellowship program. The budget request would have cut funding for the STAR graduate fellowship program by 50 percent in FY 2004 and by 100 percent in FY 2003. Congress restored full funding for the EPA STAR graduate fellowship program in both years. The FY 2007 proposed budget would be a \$3.4 million (26 percent) reduction in funding for graduate fellowships. As you have noted in the Committee's Views and Estimates on the budget, this is "one of the most troubling decreases." You state that "the fellowship program should be funded at \$10 million, the level restored by Congress in each year beginning with FY03."

The STAR fellowship program is highly competitive, with only seven percent of applicants being awarded fellowships. The current level of funding is insufficient to allow all students whose applications are rated as excellent to receive fellowships and it is insufficient to meet national needs for a scientifically trained workforce. Based on the experience of NCSE staff as reviewers of the STAR fellowship applications, we recommend doubling the funding for STAR fellowships to \$20 million, which can be accomplished without any decrease in the quality of the awardees.

Office of Environmental Education

The FY 2007 budget request once again proposes no funding for the EPA Office of Environmental Education. Since 2003, the Administration has tried to zero out this office, which support the programs mandated by the National Environmental Education and Training Act, programs administered by this office. NCSE strongly encourages Congress to restore full funding of at least \$10 million. These programs provide national leadership for environmental education at the local, State, national and international levels, encourage careers related to the environment, and leverage non-federal investment in environmental education and training programs.

Conclusion

In order to fulfill its mission, EPA needs increased investments in both its intramural and extramural science programs. The National Council for Science and the Environment urges Congress to appropriate a minimum of \$700 million for EPA's Office of Research and Development (bringing it back to FY 2004 levels), including at least \$150 million for EPA's Science to Achieve Results (STAR) research grants program and \$20 million for EPA's STAR graduate fellowship program. We recommend a total of \$900 million for EPA's Science and Technology account. This would include the \$62 million proposed transfer from the Environmental Programs and Management Account. NCSE also urges Congress to restore full funding for the Office of Environmental Education at a level of at least \$10 million. Even these levels of funding would, for the most part, bring EPA science back to its level in FY 2004. We hope that in future years, EPA's science budget will grow to better match our national needs.

In the case of EPA, there is a strong relationship between input to environmental research and education and output in terms of environmental protection. If the Nation wants more effective and efficient environmental protection, we need to make the upfront investment in science. It really is the ounce of prevention that is worth tons of cure.

BIOGRAPHY FOR DONALD N. LANGENBERG

Donald N. Langenberg was educated at Iowa State University (B.S.), the University of California, Los Angeles (M.S.), and the University of California, Berkeley (Ph.D.). All his earned degrees are in physics. He also holds honorary degrees from the University of Pennsylvania (M.A. and D.Sc.) and from the State University of New York (D.Sc.).

After a postdoctoral year at Oxford University, Dr. Langenberg joined the faculty of the University of Pennsylvania in 1960, as Assistant Professor of Physics. He held the rank of Professor of Physics from 1967 to 1983, and had a secondary appointment as Professor of Electrical Engineering and Science from 1976 to 1983. While at Penn, he served as Director of the Laboratory for Research on the Structure of Matter (an interdisciplinary materials research laboratory) and as Vice Provost for Graduate Studies and Research.

In July 1980, President Jimmy Carter appointed Dr. Langenberg Deputy Director of the National Science Foundation. He served in that position through December,

1982, and served also as Acting Director of the Foundation during the first six months of his tenure.

On February 1, 1983, Dr. Langenberg became Chancellor of the University of Illinois at Chicago (UIC), where he also held the rank of Professor of Physics.

On July 1, 1990, Dr. Langenberg became Chancellor of the University System of Maryland. The System comprises eleven degree-granting institutions and two research and service units. He retired as Chancellor on April 30, 2002 to become Chancellor Emeritus and Regents' Professor of Education K-16. He also continues as Professor of Physics and Electrical Engineering at the University of Maryland, College Park.

Dr. Langenberg's research was in experimental condensed matter physics and materials science. His earliest research was concerned with the electronic properties and Fermi surfaces of metals and degenerate semiconductors. A major part of his research career was devoted to the study of superconductivity, particularly the Josephson effects and non-equilibrium superconductivity. He is perhaps best known for his work on the determination of certain fundamental physical constants using the ac Josephson effect. A practical consequence of this work was the development of a radically new type of voltage standard which is now in use around the world. One of the major publications resulting from this work is among the most frequently cited papers published by the Reviews of Modern Physics during the 1955-86 period, and has been dubbed a "citation classic." The work has also been recognized by the award to Dr. Langenberg and his co-workers of the John Price Wetherill Medal of the Franklin Institute. Dr. Langenberg is the author or co-author of over one hundred papers and articles, and has edited several books.

Dr. Langenberg has held predoctoral and postdoctoral fellowships from the National Science Foundation, the Alfred P. Sloan Foundation, and the John Simon Guggenheim Foundation. He has been a Visiting Professor or Researcher at Oxford University, the Ecole Normale Supérieure, the California Institute of Technology, and the Technische Universität München. In addition to the Wetherill Medal, he has been awarded the Distinguished Contribution to Research Administration Award of the Society of Research Administrators, the Distinguished Achievement Citation of the Iowa State University Alumni Association, and the Significant Sig Award of the Sigma Chi Fraternity.

Dr. Langenberg has served as advisor or consultant to a variety of universities, industrial firms, and governmental agencies. He is currently Chairman of the Board of Directors of The Education Trust, Vice Chairman of the Board of Directors of the National Council for Science and the Environment, and a member of the Board of Trustees of the University of the District of Columbia. He has been a member of the Board of Trustees of the Alfred P. Sloan Foundation; member of the Board of Trustees of the University of Pennsylvania; President of the National Association of System Heads (NASH); Chairman of the Presidents' Council of the Association of Governing Boards of Universities and Colleges (AGB); President and Chairman of the Board of the American Association for the Advancement of Science (AAAS); Chairman of the Board of the National Association of State Universities and Land-Grant Colleges (NASULGC); and President of the American Physical Society (APS).

Dr. Langenberg is a nationally recognized leader in education issues, particularly K-16 education partnerships and information technology as a revolutionary change agent in higher education. He was appointed Chairman of the National Reading Panel (NRP) in 1998 by the U.S. Department of Education and the National Institute of Child Health and Human Development. The Panel was charged by Congress to study the effectiveness of various approaches to teaching children how to read and to report on the best ways of applying its findings in the classroom and the home. He currently serves as a member of the National Research Council Committee on the Study of Teacher Preparation Programs in the United States.

Dr. Langenberg was born March 17, 1932, in Devils Lake, North Dakota. Since 1953 he has been married to the former Patricia Warrington, a biostatistician who is currently Professor of Epidemiology and Preventive Medicine in the University of Maryland School of Medicine. They have four children: Karen, a marketing executive; Julia, a veterinarian; John, a physician; and Amy, a mother. Dr. Langenberg's avocational interests include photography, history, and travel; he has visited or resided on all seven continents.

Chairman EHLERS. Thank you very much, Dr. Langenberg. Mr. Ruch.

**STATEMENT OF JEFFREY P. RUCH, EXECUTIVE DIRECTOR,
PUBLIC EMPLOYEES FOR ENVIRONMENTAL RESPONSIBILITY**

Mr. RUCH. Mr. Chairman and Mr. Wu, thank you very much for the opportunity to be here.

I bring a somewhat different perspective, in that PEER is a service organization for rangers, naturalists, lawyers, scientists, who find themselves in ethical conflicts with their own agencies. In essence, we act as kind of a giant battered staff shelter for federal service, with our clients ranging from the Chief of the U.S. Park Police to the monitors of chemical weapons depots across the country.

So the perspective I bring to you is kind of a cubicle's eye view of the Agency's S&T budget. A budgetary document is really a policy document that includes not only the numerical levels of funding, but also, the terms and conditions under which that funding is provided, and one major lapse in the S&T budget of the Agency is the failure to address in any way growing concerns about political intervention that dilutes the value of the science. The work, if it is compromised, and if the research that is reported is divorced from reality, the public does not get the benefit of the bargain.

In contrast to the open science policies that have recently been adopted by NOAA and NASA, EPA has actually taken an opposite tack, and instead, reinforce their policy that scientists are not able to not make public statements without approval from their political chain of command. With scientists not being able to understand what they can clearly share with colleagues or publicly talk about, or which questions they can answer, it makes it difficult for the scientific process to proceed. We understand the need for an administration to have a one voice policy, but a one voice policy as applied to science is somewhat problematical.

Secondly, as Mr. Wu had averred to, there are growing reports of suppression of research from everywhere from the World Trade Center to the Western oilfields of Colorado, and I can assure you that the cases that have been reported in the media are only a very, very small percentage of what is happening in hundreds of instances in laboratories, in field offices throughout the country. In the written testimony, I have pointed out that the Agency's dioxin reassessment has been held in draft status for more than 12 years. If the research is never reported, it can never be used by you and other policymakers in making sure that regulation fits the problem, and I would urge that the committee recommend that EPA inventory the documents that it has in draft status, and indicate why they remain in draft status.

And finally, the absence of any kind of policy by the Agency to protect their scientists who report manipulation of findings. Scientists often do not fit neatly into the whistleblower box, in that they are not reporting necessarily violations of laws, but that recommendations are dropped, or that methodologies are skewed. EPA, we would urge the committee to consider, urging EPA to adopt policies that protect their scientists when they express what their findings determine, and also, do not reward managers who suppress those findings.

We also think that it is significant, in addition to what is funded, what is not funded in the EPA budget, is to what they have chosen

to fund. The priorities chosen send a message to the scientists basically on the ground. So, for example, while the Agency is cutting back on funding for global warming, ecological research, sustainability, they are committed to a multi-year public relations effort called "Science for You," that is designed to provide a corporate branding campaign for EPA's science, and this multimillion dollar multiyear effort is coming out of money that would otherwise be used for research.

Similarly, as we have reported, EPA has decided to cut its library program by 80 percent, and just yesterday, Region 5, representing the six Midwestern states, announced they are going to close their library. The same research program that has indicated that it can't close its library is spending \$7.2 million, almost three times the library budget, on a new information technology system that staff is finding complicated and as problematical as the record-keeping system for the FBI. So, we would urge the committee to consider recommending that research funds not be diverted to peripheral activities, such as public relations campaigns that couldn't be fairly called research.

And then finally, I wanted to just note one aspect of the dearth of funding that has been referred to by the other witnesses is that it makes the Agency's priorities and projects much more susceptible to outside influence, and what I am specifically referring to are offers of funding from corporate interests. We noted the fact that corporate research agreements, cooperative research agreements with corporations have skyrocketed during the Bush Administration, and the idea that corporations can, by the offer of money, skew what projects the Agency does, we think is somewhat disturbing.

As you know, this past spring, GAO reported that the Agency lacks any kind of safeguards against conflicts of interest in these kind of relationships, and the one that we think is kind of the paradigm is the one that the Agency entered into for the human experiment CHEERS in Florida, the pesticide experiment, in which parents were recruited to apply pesticides in the rooms primarily occupied by their infants under age three. In return for a \$3.2 million contribution by the American Chemistry Council, EPA expanded the study to include exposure by infants to other chemicals in addition to pesticides. What disturbed scientists about this, among other things, was the fact that the point of the experiment was to determine not what health effects it may have, but the extent to which these chemicals were absorbed in the infant's system, as measured by urine tests.

These type of things are the sort of thing that require some outside review, and present, we think, a danger to both the integrity and to the system of priorities that should govern the Agency's budget, so we would urge that the Committee recommend that the Agency adopt safeguards, and provide some sort of external review for these cooperative agreements.

Finally, I guess I would like to note that we think that both the committee and the Agency leadership would be better informed if they actually asked their scientists what was going on. We noted that ORD has stopped doing internal surveys of its scientists in 2003, and even when they did those surveys, they were not publicly

reported. We actually had to sue to get the results of these surveys. We would urge the Committee to consider asking the Agency routinely, as a feedback mechanism, to have their scientists independently surveyed, and that the results of those surveys be used by the Congress as a way to evaluate the management of EPA's science and technology program.

Thank you very much for this opportunity.
[The prepared statement of Mr. Ruch follows:]

PREPARED STATEMENT OF JEFFREY P. RUCH

Good morning. My name is Jeff Ruch and I am the Executive Director of Public Employees for Environmental Responsibility (PEER).

PEER is a service organization dedicated to protecting those who protect our environment. PEER provides federal, State, local and tribal employees dedicated to ecologically responsible management with a safe, collective and credible voice for expressing concerns. Headquartered in Washington, D.C., PEER has a network of ten state and regional offices. Most of our staff and board members are themselves former public employees who left public service after experiencing ethical conflicts within their former agencies.

On a daily basis, public employees in crisis contact PEER. In our D.C. office alone, we average five "intakes" per day. A typical intake involves a scientist or other specialist who is asked to shade or distort the truth in order to reach a pre-determined result, such as a favorable recommendation on a project or approval of the commercial release of a new chemical. It is in this context that PEER hears from scientists working within the U.S. Environmental Protection Agency (EPA). My remarks reflect the input we have received from EPA scientists who are not afforded an opportunity to openly voice their concerns.

In this morning's testimony I have been asked by the Committee to comment on the relative strengths and weaknesses of EPA's proposed Science and Technology Budget. In addressing this topic, I will: 1) spotlight three structural weaknesses in the budget proposal; 2) analyze the priorities reflected by proposed budgetary cuts compared with proposed augmentations; and finally 3) focus on several emerging challenges that are not provided for in the budget plan.

I. Structural Weaknesses: Building on Sand

Regardless of the particular budgetary levels, the paramount measure of a budget is whether it delivers value for what is expended. Thus, with respect to its expenditures on science, technology and research, the essential question is what the public is getting for its investment.

A. Politicized Science

The failure of EPA to dispel concerns voiced by its own scientists, as well as outside observers, compromises the perceived value and reliability of agency science. The past several years have witnessed numerous instances in which EPA scientific work is altered, manipulated or suppressed (in "draft" status) for non-scientific reasons.

Rather than confront this issue, EPA shrinks from these questions or offers only bland, non-specific denials. Until EPA offers its scientists some meaningful protections for discussing emerging issues or reporting findings without prior political vetting, the agency's entire science program will be tainted in the eyes of both the scientific community and the general public.

For example, in contrast with recent "open science" policies announced by the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA), EPA has reiterated its policy of requiring prior headquarters approval for all communications by its scientists with the media.

In a February 9, 2006 e-mail to all staff, Ann Brown, the News Director for the agency's science arm, the Office of Research and Development (ORD), admonished—

"We are asked to remind all employees that EPA's standard media procedure is to refer all media queries regarding ORD to Ann Brown, ORD News Director, prior to agreeing to or conducting any interviews. . . .Support for this policy also will allow reasonable time for appropriate management response."

By contrast, less than a week earlier on February 4, 2006, NASA Administrator Michael Griffin sent an all-employee e-mail in which he committed the agency to "open scientific and technical inquiry and dialogue with the public." Mr. Griffin stat-

ed, “It is not the job of public affairs officers to alter, filter or adjust engineering or scientific material produced by NASA’s technical staff.”

Ten days later, in a Valentine’s Day message to all staff, NOAA Administrator Conrad Lautenbacher wrote—

“Our media standards also reflect an open policy. We encourage our public affairs staff to keep abreast of media interests. I encourage our scientists to speak freely and openly. Dozens of you every day are talking to the media and providing the results of peer reviewed science across a wide variety of NOAA topics. We ask only that you specify when you are communicating personal views and when you are characterizing your work as part of your specific contribution to NOAA’s mission.”

Why are scientists at NASA free to answer questions about global warming while their colleagues at EPA are not? Unless the EPA believes that science comes in Republican or Democratic flavors, agency scientists should be able to discuss findings without having to check whether facts comport with management policy.

B. Alienating Scientists

In any organization, it is difficult to be successful without the support and cooperation of the staff required to implement the agency’s programs. In EPA, its own internal surveys signal a growing disconnect between scientists and managers within its research program.

Breakdowns in trust, communication and shared vision are beginning to threaten the Nation’s largest scientific organization dedicated to studying human health and the environment.

EPA’s Office of Research and Development consists of three national laboratories, four national centers, and two offices located in 14 facilities around the country employing approximately 2,000 scientists. Internal surveys were taken in 1999, 2001 and 2003 to gauge “organizational climate.”

While overall morale remains high, survey results show increasing doubts about the “competence” and trustworthiness of ORD leadership. With a 66 percent response rate, the latest survey (2003) found—

- Scientists’ trust in leadership declines markedly at each step higher up in the chain-of-command, with 38 percent of staff scientists reporting distrust of laboratory managers versus only 23 percent who expressed trust;
- Less than one in three respondents (30 percent) felt that lab managers “address challenging situations competently;” and
- Barely half (56 percent) were optimistic about ORD’s future.

In essays accompanying the survey, one scientist wrote “Despite e-mail and the like, there is no real communication in the organization and no consistent mechanism to share knowledge.” Another added, “A complete lack of communication exists leading to the strong distrust that is present today.”

While these results may be the early warning signs of a scientific organization drifting toward dysfunction, ORD has stopped conducting these surveys. Nor does there appear to be any effort by the current ORD leadership to address trust and communication breakdowns.

Although these survey results predate the proposed 2007 Science & Technology Budget, the proposed cutbacks in research funding will only aggravate trust and credibility concerns by agency scientists.

Significantly, PEER had to file suit under the Freedom of Information Act to obtain the surveys after ORD refused to release them. In July 2005, EPA surrendered the surveys and paid PEER’s attorney fees and costs out of funds that should have been used for research.

C. Lack of Coherence

In a different context, California Governor Arnold Schwarzenegger recently commented that a good bodybuilder could not focus on developing his chest, back and arms to the neglect of his abdominal muscles and legs. So, too, does EPA have to effectively address all areas affecting human health and the environment to have a coherent science program.

In a draft report issued almost exactly one year ago today, EPA’s Science Advisory Board warned that the agency is no longer funding a credible public health research program:

“[R]esource constraints. . .preclude EPA from conducting science in all the areas necessary for supporting effective environmental policy development.”

Among the deficiencies highlighted by SAB were ecosystem research, mercury and ammonia monitoring, human responses to toxic pollution and an array of emerging contaminants being introduced into the stream of commerce. Comparing the 2007 proposed budget with the one commented upon by the SAB, this coherence gap has only grown more profound, hobbling EPA's research program like the unbalanced bodybuilder.

II. Perverse Priorities

The overall reduced funding levels in the Science & Technology Budget plan only magnify the impact of cuts as well as funding augmentations. A review of these shifts in funding shows increases in areas that appear to benefit corporate regulatory needs and cutbacks in areas affecting human health and basic ecological research.

A. Corporate Contributions Setting the Research Agenda

EPA is increasingly relying on corporate joint ventures in its research program, according to agency documents obtained by PEER under the Freedom of Information Act. This trend, coupled with declining research budgets, suggests that EPA is diverting funds from basic public health and environmental research toward applied research to address regulatory concerns of corporate funders.

The records obtained by PEER show a marked increase in "cooperative research and development agreements" (or CRADAs) with individual corporations or industry associations since the advent of the Bush Administration. During the first Bush term EPA entered into 57 corporate CRADAs, compared with 34 such agreements during Clinton's second term. Corporate CRADAs executed during the Bush Administration outnumber those entered into with universities or local governments.

As a result of this trend, the American Chemical Council (ACC) is now EPA's leading research partner. In internal agency surveys, EPA scientists maintain that corporations are influencing the agency's research agenda through financial inducements. As one EPA scientist wrote, "Many of us in the labs feel like we work for contracts."

A classic example of recent EPA/corporate joint ventures is the 2004 agreement reached with the ACC to fund the now-canceled CHEERS experiment in which parents would have received payments and gifts in return for spraying pesticides and other chemicals in the rooms primarily occupied by their infant children. The object of this experiment was to test (through urine samples) the extent to which the chemicals were absorbed in to the infants' systems. The study protocol contained no provision for medical monitoring of subject children or any controls against improper chemical application by parents.

In return for its \$2 million contribution to CHEERS, the ACC obtained an agreement to expand the scope of the study beyond pesticides to include the exposure of the subject infants to flame retardants and other household chemicals.

As Members of this committee know, a Government Accountability Office study released in April 2005 concluded that EPA lacks safeguards to "evaluate or manage potential conflicts of interest" in corporate research agreements. No such safeguards are proposed for FY 2007.

Thus, under its current leadership, EPA is signaling its willingness to become an arm of corporate R&D in which the selection of agency research topics will increasingly be influenced by the availability of corporate underwriting.

B. Winners and Losers in 2007

An examination of the proposed changes in funding levels contained within the 2007 Science & Technology Budget reveals a pattern in which public health-related research is reduced while research with corporate regulatory applications is enhanced:

- Research on the toxic effects of pesticides on humans and the environment would be reduced by \$4.1 million while the proposed budget for registering new pesticides and re-registering existing chemical agents would grow by \$643,000;
- The climate protection program would lose approximately one-third (\$6.1 million) of its funding and research on air pollution's contribution to global warming would be also be cut by more than \$1.1 million. Support for corporate clean air trading credits would, by contrast, jump by three-quarters of a million dollars; and
- Support for work on human health and ecosystems would fall by almost \$10 million; research in land protection would lose more than a million dollars; and agency efforts to promote sustainability (including appliance efficiency) would be slashed by nearly a fourth (\$7.2 million).

At the same time, the Science & Technology Budget proposes healthy increases in a number of Homeland Security-related areas. Regardless of the merits of these security-related programs, it appears that these new expenditures have come at the expense of longer-term environmental research.

C. Public Relations Budget Intact

Despite these cutbacks in health and environment-related research, EPA is financing a “multi-year” public relations campaign, including public service announcements, video news releases plus “major events, tours and advance [work]” to “enhance [its] corporate image,” according to agency documents. The campaign began in 2004 and runs through September 2007.

This ambitious rollout features a media campaign called “Science for You” run out of ORD. The effort also includes—

- Operating a “radio and television news director science awareness program;”
- Placing “feature” media accounts;
- Developing a “print and virtual press media kit;”
- Conducting a “readership/product use survey;” and
- Operating a “Science Writer’s Circle” to enlist professional writers to re-write scientific tracts.

As part of this program, EPA surveyed what it considers to be “influential” news editors to assess their “awareness of and opinions about EPA’s scientific research program,” according to a copy of the questionnaire distributed this past November by JDG Communications, Inc., a public relations firm based in Falls Church, Virginia under contract to EPA. The survey consisted of 15 questions, including—

- “Do you feel that U.S. environmental policy is influenced more by political interest or research findings?”
- “When you receive information from EPA, do you think there is research behind this information?” and
- Asking editors to compare the scientific credibility of EPA against other entities, such as the National Science Foundation, the National Institutes of Health and the Centers for Disease Control and Prevention.

To the extent that EPA seeks to measure its scientific credibility, one would think that the agency should be surveying scientists rather than journalists. Of greater concern, however, is that this public relations effort is being financed out of funds that could otherwise be used for public health and environmental research.

At our request, the EPA Office of Inspector General has reviewed the legality of this program and concluded that it does not violate the Congressional prohibition on the use of appropriated funds to generate “publicity or propaganda.” In a letter dated January 30, 2006, the EPA/OIG Director of Public Liaison informed PEER that the program as currently constituted was not illegal. We are seeking the basis of this conclusion through a pending Freedom of Information Act request.

One area that the EPA/OIG declined to review was the appropriateness of using research funds for public relations efforts. Since the OIG considers this question beyond its purview, it is incumbent upon Congress to consider whether EPA’s scarce research dollars ought to be shielded from diversion to public relations efforts.

D. Research Without Libraries

Under EPA’s proposed FY 2007 budget, the agency is slated to shut down its network of libraries that serve its own scientists as well as the public. Approximately \$2 million of a total agency library budget of \$2.5 million will be lost.

According to staff documents, the initial plan included shutting down the electronic catalog which tracks tens of thousands of unique documents and research studies that are available nowhere else. After this plan was revealed last month, EPA backtracked and pledged to restore the \$500,000 budget for the EPA Headquarters library and its electronic catalog, but this reversal will likely mean deeper cuts elsewhere in the library network.

EPA’s own scientists and enforcement staff are the principal library users. EPA’s scientists use the libraries to research questions such as the safety of chemicals and the environmental effects of new technologies. EPA enforcement staff use the libraries to obtain technical information to support pollution prosecutions and to track the business histories of regulated industries.

EPA currently operates a network of 27 libraries out of its Washington, D.C. Headquarters and ten regional offices across the country. The size of the cuts will force most of the libraries to shut their doors and cease operations. Each year, the EPA libraries—

- Handle more than 134,000 research requests from its own scientific and enforcement staff;
- House and catalog an estimated 50,000 “unique” documents that are available nowhere else; and
- Operate public reading rooms and provide the public with access to EPA databases.

This cutback stands in sharp contrast with President Bush’s plan to significantly increase “cutting edge” research as part of his “American Competitive Initiative” as it is not at all clear how EPA scientists are supposed to engage in cutting edge research when they cannot find what the agency has already done and must spend considerable time reinventing the proverbial wheel.

Access to information is one of the best tools we have for protecting the environment. In considering EPA’s Science & Technology Budget, the Congress should also take into account the extent to which agency research will remain accessible to EPA’s own staff, as well as to university scientists and other researchers.

E. High Cost of Going Partially Paperless

While the Science & Technology Budget contains only a modest increase (\$95,000) in Information Technology Management, elsewhere in its budget, EPA is making a relatively large investment in what appear to be marginally useful and potentially disruptive information systems. In an effort to reduce paperwork, EPA is paying an estimated \$7.2 million to obtain 18,000 site licenses for something called the Enterprise Content Management System.

In addition to the licenses, EPA has committed itself to approximately \$4.3 million per year in ongoing maintenance cost (\$234.00 per person/per year × 18,000) for the system.

ECMS describes itself as “The official EPA content management program which includes software, hardware, policies, standards and guidance to manage unstructured information such as documents, records and web content.” According to its PowerPoint presentation, this elaborate new information regime is supposed to “Reduce costs and improve efficiency; Improve institutional memory; Streamline processes; Manage workflows; [and] Automate records capture.”

Despite this investment, the new system software will never be applicable to research records. Thus, the agency will have to maintain a wholly separate information system for its research programs—which constitute the bulk of the agency’s paper holdings.

It is puzzling how an agency that can no longer afford to maintain libraries can afford to invest in new information systems that appear to be both costly and ineffective. For what the agency is spending on ECMS, EPA could, for example, restore its global warming research programs to previous levels.

III. Emerging Challenges

The proposed FY07 Science & Technology Budget does not appear to make any allowances for expenditures to address a series of emerging challenges confronting EPA.

A. Brave New World of Human Experimentation

Under new rules that are slated to become effective April 7, 2006, EPA will welcome industry experiments using human subjects to test the effects of pesticides and other commercial toxins. In addition, EPA itself will be able to conduct or finance a broad range of experiments in which humans are exposed to potentially harmful chemicals.

According to its industry supporters, the new EPA rules will enable experiments on humans to replace reliance on animal studies. During the past decade, human testing has become central to the regulatory plans of the chemical industry. These companies are challenging the utility of animal studies and demanding that EPA use human subject tests as the new safety benchmark. Because human tests cannot use the same high concentrations used in animal tests, companies can argue that there is no definitive proof of harm from the introduction of chemicals based upon small-scale human studies of dubious probative value.

The agency’s latest plan is the product of a Congressional ultimatum this past summer to ban all future human tests until EPA finally adopted ethical safeguards. Congress acted after mushrooming controversy concerning the “CHEERS” study. In order to dissolve the Congressional human subject ban, EPA has offered a grudging plan that imposes few absolute safeguards. For example, EPA’s plan would allow—

- Dosing experiments involving infants and pregnant women using any chemical (except pesticides). Thus, companies will be free to test other toxic agents, such as perchlorate, on nursing mothers;
- A repeat of the infamous (now canceled) CHEERS study because EPA pointedly omits any check against undue economic inducement, i.e., paying poor people enough to lure them into signing informed consent papers; and
- Studies on orphans, mentally ill children and prisoners without informed consent.

We are not able to find funds reserved for staffing human subject review boards or for providing ethics training to agency scientists who will be involved in this burgeoning field of human experimentation.

In addition, there is another potential unplanned budgetary impact in the legal and financial liability of EPA and its contractors for human experiments conducted or sponsored by the agency in which subjects suffer harm. In a recent Maryland Court of Appeals case (*Grimes v. Krieger*, (2001) 362 Md. 623, 766 A.2d 147), Johns Hopkins University was held to answer for a study involving public health concerns associated with children and lead paint. The study looked at the lowest cost methods of effective lead abatement.

Aggrieved families of participants sued for damages from the effects of lead exposure. The lower court dismissed the suit but Maryland's highest court reinstated the claim, writing—

“We hold that in Maryland a parent, appropriate relative, or other applicable surrogate, cannot consent to the participation of a child or other person under legal disability in nontherapeutic research or studies in which there is any risk of injury or damage to the health of the subject.”

The experiments in the *Grimes* case parallel the type of experiments to which EPA will be throwing open its doors. Neither its researchers nor its Office of General Counsel have formally considered policies and practices to minimize agency (and thus taxpayer) liability for the hundreds of new human studies expected to be conducted each year.

B. Waves of New Chemicals

Each year, an estimated 1,700 new chemicals are introduced into the stream of American commerce. EPA has no mechanism to regulate these new chemicals. Even more fundamentally, EPA's research program is not equipped or funded to monitor these new chemical agents.

The consequences of this huge blind spot are illustrated by the case of perfluorochemicals, better known as PFCs. Introduced by 3M in products such as Scotchgard, Teflon, Stainmaster and Gore-Tex, the chemicals are now widely distributed across the globe. This highly toxic and persistent class of chemicals can now be found in the blood of over 95 percent of Americans. PFCs have been linked to developmental defects, high cholesterol, and immune disorders.

Without the ability to carefully monitor the chemical and conduct strict oversight to accompany voluntary phase outs that EPA negotiated earlier this year with 3M, DuPont and other companies, these toxic chemicals will continue to pollute people, their food, and their environment with unknown adverse effects.

Each year, a new chemical horror story is unfolding but the agency charged with protecting the environment is more than a day late and a dollar short. If EPA is ever to get a handle on the threats posed by what are called “emerging contaminants” there must be both a dedicated commitment of funds and agency leadership.

Unfortunately, a review of the proposed Science & Technology Budget suggests that neither the funds nor the leadership will be available.

C. Candor Backlog

Even as waves of new chemicals are being introduced, EPA has been mired in assessing known chemicals and their impacts. For example, the EPA Reassessment of Dioxin and its effects has been kept in draft form since 1994. Thus, agency decisions on one of the most persistent and widespread pollutants has been held hostage for 12 years by political complicity to corporate pressure.

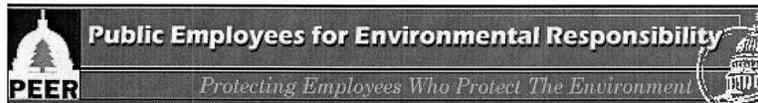
Similarly, under Defense Department and defense contractor pressure, EPA delayed setting standards for perchlorate, a chemical found to contaminate hundreds of drinking water aquifers in more than 20 states. The resulting overdue standards were so weak that affected states, such as California and Massachusetts, are adopting their own, much stricter standards.

So long as the publication of EPA scientific findings (unaltered by politics) remains so vulnerable to corporate and interagency manipulation, the Science & Tech-

nology program will be relegated to producing useful work only around the margins, timidly leaving the major public health and environmental challenges for others.

BIOGRAPHY FOR JEFFREY P. RUCH

Jeff Ruch has been the Executive Director of PEER since 1997. With Jeff DeBonis, he helped to start PEER and for its first four years served as General Counsel & Program Director. Prior to that Jeff was the Policy Director and a staff attorney at the Government Accountability Project representing whistleblowers from both the public and private sector. Before coming to D.C., Jeff worked in California state government for 17 years, mostly in the State Legislature as counsel to various committees where he drafted literally hundreds of laws on topics ranging from energy conservation to the rights of employed inventors. Jeff served stints as a deputy district attorney, an appellate court clerk and is a graduate of the California Correctional Officers Academy.



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March 15, 2006

The Honorable Vernon J. Ehlers
Chairman, Subcommittee on Environment, Technology and Standards
House Science Committee
2320 Rayburn House Office Building
Washington, D.C. 20515

Dear Congressman Ehlers:

I am writing in response to your request for a letter revealing any sources of federal funding received by Public Employees for Environmental Responsibility (PEER) which may influence my testimony before the Subcommittee on Environment, Technology and Standards.

PEER does not receive any federal grants, contracts or other funding as such. PEER receives federal dollars only as a result of judgments or settlements in litigation cases that we have brought against federal agencies or officials. Much of PEER's litigation against federal agencies involves whistleblower cases in the context of personnel actions. Other litigation consists of environmental enforcement actions against agencies which have been identified to us by their own staff specialists to be violating the law. In addition, PEER brings litigation under the federal Freedom of Information Act and, when we prevail, we petition and receive our attorney fees and costs.

These "involuntary" federal sources of funding do inform my presentation to this Subcommittee but I believe that any effect is actually beneficial or at least benign.

If you would like additional information on this matter, please do not hesitate to inquire.

Sincerely,

Jeff Ruch
Executive Director

DISCUSSION

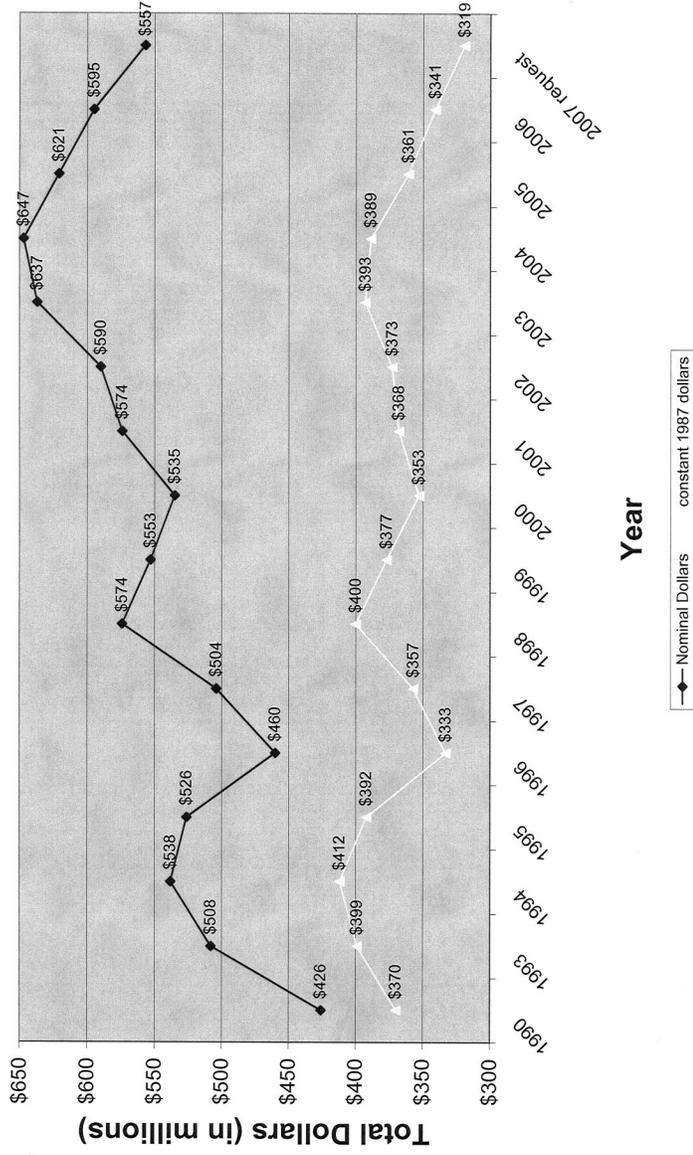
Chairman EHLERS. Thank you very much.

You have probably heard the bells and the whistles and the buzzers. We do have votes on—we have—probably had best not start the questioning process at this point, but we will resume it when we return from voting, and I would just like to make a few comments, just as—

The staff has been kind enough to put a chart, which without objection, I will order into the record, of the history of funding for ORD in current dollars and in constant 1987 dollars, indicating that ORD's budget today is well below what it was in 1990, and in current dollars, it is well below what it was four years ago, to the tune of almost \$90 million drop. So clearly there are some problems here.

[The information follows:]

ORD Funding History



Year

Nominal Dollars
 constant 1987 dollars

PAYING FOR HOMELAND SECURITY RESEARCH

Chairman EHLERS. I will ask Dr. Gray a quick question before we go, and that is my earlier comment about why in the world would—should you have to pay for doing Homeland Security research. Normally, the interagency agreements, if some agency wants another agency to do something, there is a transfer of funding for that.

Has this been discussed with Homeland Security, and if so, what has their response been?

Dr. GRAY. Well, thank you, Mr. Chairman.

Our work in homeland security is guided by a number of different directions, including Presidential directives that order, because of our level of expertise in specific areas, to be responsible for decontamination and water security work. That work was given to us, because it builds on expertise within ORD and within the Agency.

What that means is that the work that we do in homeland security often, virtually always, has opportunities to be beneficial in other parts of Agency activities. As a quick example, some of the things that we are looking at in the area of decontamination and risk assessment is microbiological risk assessment. We have recently funded, together with the Department of Homeland Security, the Center for the Advancement of Microbiological Risk Assessment. The work that comes from that will be helpful in the case of an attack with some kind of a microorganism. It would also help us in water—in our water program. It will help us in our land program. It will help us to understand the risks that microorganisms might pose in a variety of different places.

The work that we have done in rapid risk assessment to help support homeland security played a role in the response to Katrina. So I actually believe that the work that we are doing builds on expertise and knowledge we already have in ORD, and it has dual use, use not only in homeland security, but a variety of other uses that are very important and useful to the Agency.

Chairman EHLERS. Has anyone in the EPA asked the Homeland Security Department to cover part of the costs?

Dr. GRAY. I don't know the answer to that.

Chairman EHLERS. I would appreciate if you would check and let me know.

Dr. GRAY. Will do.

Chairman EHLERS. It seems to me grossly unfair in this situation, and I recognize the dual role, but the principle still holds, even when one agency asks another, or when they are working together, they at least share the costs together, and I think in view of your budget situation, I think that is essential at this point.

I do want to make it clear, I am extremely grateful to the President for the large increase in research funding that he has proposed in his current budget. It is obviously a recognition of the needs of the country, and he is meeting those needs. I am very encouraged by that. I just want to make sure that you don't get hurt in the process, because—simply because you are small and off to the side.

I hear the buzzer again, and we will have to adjourn, and we will return as soon as we can. The hearing is in recess.

[Recess.]

Chairman EHLERS. Thank you. I apologize for the interruption, and a long series of votes on an appropriations bill, and you know, everyone feels very strongly about appropriations bills. So we will resume, and I will continue with my questioning.

WATER SENTINEL

Dr. Morgan, this is somewhat along the lines of what I started with earlier. In your testimony, you state that some aspects of the Water Sentinel Program appear to be operational. Specifically, what aspects of Water Sentinel are operational?

Dr. MORGAN. Well, we have had a little difficulty figuring this out, and you might ask Dr. Gray, but our sense is that there are elements that go beyond simply developing new technology. Once you have deployed this in a number of states and regions, presumably at some stage, you need to transition it over to—from an operational arm, as opposed to a research arm of the Agency, and that is the basis for our concern. But as I say, it has been a little difficult to kind of figure out how this is distributed across the Agency, and Dr. Gray may be in a position to provide you with a better answer than I.

Chairman EHLERS. Yes, he is next in line on this question. Dr. Gray, first, yeah, do you basically agree with the comments of Dr. Morgan in his testimony, and if not, why not? And in particular, what—why is EPA proposing to fund these operational activities with science and technology money, if in fact, it is becoming operational?

Dr. GRAY. Well, Mr. Chairman, Water Sentinel is an important program to help us in protecting our country's water infrastructure, and the point it is at now is really still a research and a demonstration project. It has portions that are research, looking at sensors, trying to understand distribution systems, modeling these so that we can do the best job we can of protecting them.

Another part of it is demonstration, and that is making sure that our new technologies and our new approaches actually work. In fact, that is what we are asking for in 2007 is an opportunity to expand those demonstration projects beyond a single pilot, to some more water systems, where we can look at whether differences in water type, water disinfection processes, distribution systems, affect the ability of these systems to work. That is demonstration.

We do imagine that soon, there will be the beginnings of transition, as we take these technologies, these methods, these approaches, from the research and demonstration mode into use in these water—in water utilities, and we have, we are committed to making, getting that information into the hands of the water utilities as soon as we can.

Chairman EHLERS. Dr. Morgan.

Dr. MORGAN. Yeah, one of the issues we haven't really been able to understand is the extent to which the homeland security research program is thinking about these issues at a sufficiently high systems level. I mean, you could devise a whole lot of wonderful sensors and other devices, and still, at an operational level, for ex-

ample, not turn out to be able to detect stuff with sufficient lead time, or produce a system that was sufficiently economical to use widely.

We are not—we simply can't understand how much of that kind of analysis has been done, and when I say we, I am referring to our Homeland Security Subcommittee, which has talked at some length with the homeland security folks within the Agency. And we are simply concerned that one not put a whole lot of money into instruments that will produce interesting results, but which collectively, don't provide us all that much protection. We would like to see arguments for how, in fact, these devices will provide that protection.

Chairman EHLERS. Thank you for your comments, and we will pursue that further later on, probably not in this hearing, but with written questions.

I am pleased to recognize my Ranking Member, Mr. Wu.

SCIENTIFIC INTEGRITY

Mr. WU. Thank you very much, Mr. Chairman.

Mr. Ruch, I want to follow up on your testimony concerning the politicization of science, and scientific integrity. As you probably know, there was a disturbing incident in Oregon in February, late January, early February, where a graduate student, well, a lot of not too good news is on the front page of a newspaper, and I have the front page of the *Oregonian* here. It is dated February 7, 2006, and let me just read the first couple of paragraphs, and then, the last couple of paragraphs of the story.

"The Federal Government has abruptly suspended funding for Oregon State University research that concluded federally sponsored logging after the 2002 Biscuit fire in southwest Oregon set back the recovery of forests."

"The action came after a team of scientists from OSU and the U.S. Forest Service published their results last month in *Science*, the Nation's leading scientific journal."

"It escalated the controversy surrounding the findings, which undercut Bush administration-backed arguments for logging after wildfires. The research, led by a 29-year-old graduate student, already had come under attack within OSU's College of Forestry by professors who contend that logging and replanting speed the recovery of burned forests."

"Those professors tried but failed to persuade *Science* not to publish the one-page report."

"It is totally without precedent as far as I can recollect," said Jerry Franklin, a Professor at the University of Washington—"

And I am going to skip to the conclusion of this.

"The editor of *Science*, Donald Kennedy, in addressing the BLM's concerns about whether this paper had public policy implications and inappropriately crossed the line, said the BLM's view "would cripple anyone from ever working on a science problem with a policy impact."

"Andy Stahl, executive director of Forest Service Employees for Environmental Ethics, said the suspension of funding was a "shot across the bows" to researchers who produce findings the government does not like."

“Either way, the Administration, regardless of the outcome of this incident, has made its message clear. You knuckle under and give us the results we want, or we don’t fund you.”

And this is an article dated February 7, by Michael Milstein of the *Oregonian*. Even though the BLM, in response to the furor about the pulling of funding, eventually restored funding this program, I think this sends a chilling signal to researchers everywhere, and as far as I am concerned, this incident is not over until federal agencies pledge not to take actions like this, and not to send a chill through the scientific community.

Mr. Ruch, do you know of similar or parallel incidents in agencies other than the BLM, in the EPA or NOAA, or in any other agencies that fund or do environmental or health-related research?

Mr. RUCH. Yes. I guess I would amend Mr. Stahl’s comment. I don’t think it is a shot across the bow. I think we are in a shooting gallery. I don’t think this was the most prominent, and it may only be the latest incident.

For example, in BLM, we are representing one of their managers, where the agency withdrew \$700,000 in funding concerning the health effects of a mine in Nevada, rather than have inconvenient information come out, and so, rather than conduct the public research, which may have implications that upset some of the people in the agency, they withdrew the money altogether.

In the Department of Interior and elsewhere, I mean, even at the earliest stages of the Bush Administration, one of our clients was, you may recall, the mapmaker for the U.S. Geological Survey, who was fired because he put online a map of the Arctic Refuge Exploration Area crosshatched with the migratory path of the caribou, so even at the earliest stages, it was clear that science, even down to the level of maps, was going to be politically vetted.

And in agencies like the U.S. Forest Service, if you talk to researchers in their research system, they have about 2,000 scientists who work in their network of research stations. They can give you example after example of where the Forest Service has altered funding on issues like grazing’s effect on the health of lands, the effect of declining water quality on native fish stocks, et cetera, et cetera.

In the EPA and, specifically, ORD, the most frequent complaint we hear is not so much about that kind of aggressive or naked suppression, so much as things like reports being kept in draft form, or a promising report in one area not being followed up, or preliminary information that is not coupled to other information. In other words, it is almost like the research is deliberately kept balkanized so it is marginal, and never can be used in a policy-making setting.

Mr. WU. Well, I have some followup questions for you, Mr. Ruch, but since my time is expiring, I want to flip over to Dr. Gray.

Dr. Gray, Mr. Ruch has stated that there is an unusual inventory of delayed reports, reports that are in draft form? Is the Agency, is the EPA amenable to doing an inventory of just how many draft reports are in draft form, how long they have been held in draft form, and the reasons why, if some of them have been held for a long time, what the reasons are for having held these reports in draft form for such a long time?

Dr. GRAY. Well, thank you for the question, Mr. Wu.

It is very clear that EPA has reports that are in draft form, and we do that, because we put our reports, we put our work, we put all of our products through a very rigorous peer review process. That peer review means that we are working with scientists outside the Agency, independent scientists in academia, in the private sector, in NGOs, who make sure that our work is of the highest quality.

Mr. WU. But we hear a report of a 12-year period that a report is in draft form. I mean, wouldn't you think that in 12 years, that the paper would either be approved or rejected, rather than kind of living in limbo?

Dr. GRAY. Well, see, that is the wonderful thing about the peer review process is, we are not going to reject a report that our scientists have put together. We are going to learn from the outside world. We are going to learn from the experts that are outside of the Agency, and we are going to make that better. Making it better takes time.

Mr. WU. Twelve years.

Dr. GRAY. Sometimes, it takes a long time. That is now at the National Academy of Sciences, and they have had it for two years. It takes time to get science right, and we are very careful about getting our science right.

Mr. WU. Would you be willing to subject the Agency to an inventory of just how many reports are in draft form and held in that form?

Dr. GRAY. Well, sir, I am unable to speak for the whole Agency, but as the Office of Research and Development, we keep—we have something called our science inventory, where we keep track of our scientific products, and it is something that is open and available to anyone who wants to see where we are in terms of what we have published in our science.

Mr. WU. Including the documents that you have not published?

Dr. GRAY. No, we—when we release something for draft, for peer review, it is then available. It is publicly available.

Mr. WU. Okay.

Dr. GRAY. And we are happy to share those with you.

Mr. WU. Mr. Ruch, are there documents that are not released, but being held by the Agency for a long period of time?

Mr. RUCH. That is my understanding. I am not in a position right now where I can list them, but if you gave me a couple days, I could provide you with a list.

Mr. WU. Well, it looks like we have a little factual issue to work out here.

Chairman EHLERS. The gentleman's time has expired, and we will wait for both of them to report back to the Committee. Let me proceed with—if we have no other questioners, I will go into a second round.

IRIS REFORM

Dr. Gray, in your testimony, you mentioned that you are reforming the IRIS program, better known as Integrated Risk Information System. Please tell us about what problems these reforms are trying to fix, and what changes you are contemplating to the review process.

Dr. GRAY. Well, as I mentioned in my testimony, the Chairman, the IRIS database began in EPA 25 years ago or so, as something that was there to just make sure everyone in the Agency was using the same values and singing from the same song sheet. At this point, IRIS has now become, through the success, the hard work of the people in ORD, the kind of science that we do, and that we make available, a worldwide resource.

Right now, fully a third of all of the hits on the IRIS website are from outside of this country. This is a very important national and international database. Our goal is to make sure that the process that we use to develop our IRIS profiles that are then disseminated to the broader world are open, transparent, and accepting of data and information and expertise from all parts of the scientific community. And so, the process changes that we are contemplating, and none of these are official yet. This is something that we are actively working through, are intended to help make a system that people understand how we choose the chemicals we choose to review, how we are going to review them, the data that we are going to use, and the approaches that we are going to take. So that it is a process that when IRIS is done, IRIS remaining an important EPA product, but when IRIS files are done, they can be supported by the entire scientific community.

Chairman EHLERS. I understand for the first time in many years, the EPA is not proposing any new chemicals to be added to the list. What is the reason for this?

Dr. GRAY. Really, it is a situation in which we want to clear a backlog of assessments that we have in the IRIS process, where we want to make sure that those that we have committed to and we are actively working on get finished. So it is really a situation in which we want to address the chemicals that we are addressing now, make sure we can finish those up, and then, we will move forward and continue to both add new chemicals to IRIS, and revise those files that are there.

Chairman EHLERS. Do you have a priority process in making those decisions? You know, I certainly understand the desire to clean up what you have got, but if some new chemicals come on the scene that appear to need investigation quickly, don't you have a process for just incorporating ones of the higher priority into your system?

Dr. GRAY. Priority in the IRIS process are—intend to be responsive, and when new, something new, something important comes along that needs to be addressed immediately, we have ways to address those. We can construct what we call provisional values that can be used in—that are—go through a less involved process in IRIS, and we can get those values out more quickly. We have a priority setting process, in which we ask for nominations for chemicals that people from the entire world, that people would like to see us evaluate. We look at those, we compare those with Agency priorities, the needs from the programs, the regions, the states that we work with, and through that process, set our priorities. But we are always wanting to be responsive, if there are needs.

Chairman EHLERS. Now, with the reforms that you are developing, do you expect that to add time to the process, or are you hoping to speed things up with your reforms?

Dr. GRAY. I share the concern that many people have about the timeliness of the IRIS process. I think that is—recognizing how important this database is, it is very important for us to come up with a process that is inclusive, transparent, scientifically sound, but also is predictable, manageable, and gets things done, and being timely is an important part of the process that we are looking at.

Chairman EHLERS. I assume you are planning for these additional features in the budget, the 2007 budget, so I would certainly hope that you can at least request the money you need to get moving faster on this, and you may not get it, but at least try for it.

IMPACT OF BUDGET CUTS

Okay. I have another question here for Dr. Morgan and Langenberg. Both of you stated that EPA does unique work in fundamental environmental research. I would appreciate it if you would expand on your comments, and give some specific examples of unique work, and the long-term implications of decreases in the EPA science budget.

Dr. MORGAN. Well, let me give you just a couple of examples. As you well know, many environmental processes are very complicated. So for example, in photochemical air pollution, it is not the case that if I reduce just volatile organics, or reduce just oxides of nitrogen, that I always get less smog. Sometimes you get more, despite the fact that I have made a reduction, because the system is not linear. That is a well known example, but there are many areas of environmental science that we don't know that well, particularly ecosystem processes that are complex and nonlinear, and so one does need to invest in fairly fundamental work in order to solve real, applied problems.

And so, it was with that kind of thinking in mind that we argue that a significant portion of fundamental research in ORD is critical, because if you don't invest in sort of understanding these complex, dynamic systems, you could end up doing things which, in terms of regulatory outcome, are not as effectively, and may even be counterproductive from what you are trying to achieve.

Have I understood correctly your question?

Chairman EHLERS. I believe so. Dr. Langenberg.

Dr. LANGENBERG. I regret, Mr. Chairman, I really can't give you an authoritative answer to that question with examples, because I don't follow the work of EPA as closely as my colleague here does.

But I would remark that the effects of a deficiency of funding, it seems to me, may have a large, and I would say nonlinear effect on the flexibility and the adaptability of EPA to respond to issues that may come up fairly suddenly. One of the things I learned over a couple of decades running universities is that very often, things pop up when you least expect them. You have to make a decision, you have to choose a wise course, and if you are a data-driven person like an experimental physicist, you want all the information there is available, and it is always unpleasant when you discover that critical pieces of information aren't available. Very often you don't have time to go out and get them. So you have to decide the best possible course, using a combination of information and judgment.

Well, given the fallibility of human judgment, I would opt for more information, and it seems to me that one of the things that EPA and ORD must do is to anticipate, to have a broad enough portfolio of scientific research going on, either in the intramural or the extramural community, so that the chances are at least reasonable that if something new crops up, they will know something about it.

Chairman EHLERS. Very well put. It would probably be discomfoting to you to know that the Congress tends to operate mostly on the basis of judgment rather than data. But we do the best we can.

I am tempted to give a little sermon here about the importance of the fundamental environmental research, because you really have to do that just to be prepared for the unexpected, and I would suspect that part of your backlog of IRIS, if you don't do the fundamental research, and really keep up with it, that contributes to a backlog of the more mundane research you have to do, because you are not using the newest and best ideas and methodologies.

So I will certainly be happy to support any requests to improve your capability in EPA to maintain a high level of competency in the fundamental research, because those individuals doing that are likely to be invaluable in the rest of the Agency in advising with the new problems that come up.

I see two heads here, nodding. Maybe a head over there, too. Yeah, three heads nodding yes. So I am not alone in this opinion. I have gone past my time. I am pleased to recognize Mr. Wu if you have further questions.

SCIENTIFIC INTEGRITY

Mr. WU. Thank you very much, Mr. Chairman, and just to follow on your comments. We really count on information from you all and other experts.

Returning to the issue of scientific integrity, there has been a back and forth about this issue, and the Administration claims that this Administration is no different from any prior Administration, and these are random incidents that just kind of pop up periodically.

Mr. Ruch, having gone through several Administrations in your organization, and hearing of these incidents from several different Administrations, is it your impression that things are qualitatively or quantitatively different in this Administration, with respect to the twisting of science for ideological purposes?

Mr. RUCH. The short answer is yes. We have done surveys, in conjunction with the Union of Concerned Scientists, of field biologists and other specialists in agencies such as the Fish and Wildlife Service and NOAA, and those surveys report, for example, in NOAA, NOAA fishery scientists reported that a solid majority had instances where they directly experienced scientific findings reversed for nonscientific reasons.

Mr. WU. And that is different from the past?

Mr. RUCH. What they are reporting is that this sort of influence has increased, and that what used to be an extraordinary circumstance has now become routine. So for example, in the Fish and Wildlife Service, it was not unheard of for Secretary Babbitt

or his staff to intervene in high profile cases in a way that some would judge inappropriate.

What is different now is that that same type of intervention is almost a daily matter, so that you have field managers, or in some cases, field biologists reporting they are getting calls from the Deputy Assistant Secretary of Interior. That is somewhat unheard of.

But I must say that one of the things that we were pointing to that as a possible avenue is that in response to recent controversies, both the head of NASA and NOAA have issued open science policies.

Mr. WU. And commendably so. Commendably so.

Mr. RUCH. And we were struck that in the same timeframe, the Office of Research and Development issued a closed science policy.

Mr. WU. Perhaps we will return to that in a moment. You mentioned the possibility of further protecting scientists and technical people when they express opinions or, actually, produce scientific results that are potentially contrary to current or potential policy. What are some of the suggestions that you or your organization have for better protection of people who are producing the information?

Mr. RUCH. Well, actually, most of those suggestions are incorporated in a bill I believe you are a cosponsor of, by Mr. Waxman, that expand the notion of what is protected speech. As I was saying that—typically, that—at least in the civil service world, in order to be a “whistleblower” and be protected, somebody must make a disclosure of some sort outside of their normal working chain of command that evidences a violation of law, gross mismanagement, or an imminent danger to public health and safety.

When you think of a lot of these scientific cases that we are talking about, they don’t fall into those categories, or in many instances, the scientist isn’t making a disclosure. The scientist is basically reporting findings through the chain of command, or in some instances, is not allowed to report, and it is almost like the reverse of a whistleblower.

The other aspect of it is that scientific careers are somewhat delicate. They are very easy to derail through things that other people might consider subtle, being left off of certain routing slips, not being invited to conferences. In other disciplines, that would be a welcome simplification of their life. In a scientific context, it could mean professional death.

ENVIRONMENTAL TECHNOLOGY VERIFICATION PROGRAM

Mr. WU. I want to jump to a different arena, and perhaps, either Dr. Gray or Dr. Morgan could best address this. It is my understanding that the Environmental Technologies Verification Program has been zero funded in the Administration’s budget, and it is my further understanding that the 1986 amendments to the Superfund law don’t leave that as discretionary funding. I believe that the Administrator is authorized and directed to carry out a program of technology verification.

The reason why I am asking this is I think this is very, very important, that this is one of those arenas where better environmental protection through verification of environmental technologies actually helps build our economy. It is not an economic

drag. It is an economic asset, and yet, this Administration has chosen to zero fund this.

Can you explain how this has happened?

Dr. GRAY. Well, the Environmental Technology Verification Program, we call it the ETV, was first put in place in 1995. In fact, the legislation that authorized it suggested that it would be privatized within three years, that this was something that was intended to begin to help the private sector to identify and to verify that their technologies performed as—that they could demonstrate performance of their technologies, and in fact, these verifications, which are carried out in six centers around this country, are used in advertising, for example, by the private sector, when they have something verified.

But we haven't been quite as quick as we have been asked to be. This program has been on a trajectory toward private funding, and in fact, the plan is, in 2007, to have it entirely as funded by the private sector, though still supported through in-kind efforts by the Environmental Protection Agency, by ORD, to provide technical oversight and quality assurance, to make sure that the protocols in place for doing this testing are appropriate.

Mr. WU. Dr. Morgan, do you share Dr. Gray's optimism that this could be shifted this quickly to the private sector?

Dr. MORGAN. Let me just read you a short paragraph from my written testimony that addresses this.

"Following \$9.6 million dollar reduction in 2006, sustainability research is slated for further reduction of \$4.4 million in 2007. These reductions are coupled with the termination of the Superfund Innovative Technology Evaluation Program, and the Environmental Technology Validation Program. This means that the Agency will lose much of its ability to test and verify new environmental technologies. This loss harms American industry's competitive position for environmental technology in world markets, at a time when other nations treat these technologies as opportunities."

My own view is that there may be ways that these sorts of activities could be made more effective, but if folks in the private sector are going to develop technologies which we can sell internationally in competitive global markets, some form of testing, certification, validation ought to be continued.

Mr. WU. Dr. Morgan, I am delighted. I saw that in your written testimony. I am delighted that you had an opportunity to bring that to the oral attention of everyone in this hearing room.

I must share with you some grave reservations I have about an overall ideology of privatization. We have a private sector economy. I was active in that economy. I believe in the private sector economy, but when you start pushing embryonic things out without standards into the economy, you threaten some forms of development. This Administration believes in privatizing everything from Moon launches to the Marine Corps.

When I went to Iraq, it was a clear instance where there were not enough ground troops on the ground, and there were a lot of people being paid \$100,000, \$120,000 a year as supplemental troops to the Marine Corps or the U.S. Army, and I had said that this Administration would privatize everything except for the U.S. Marine Corps, and I guess that is no exception.

I thank the Chairman for his forbearance, and I ask unanimous consent to enter the February 7 *Oregonian* article into the record. Chairman EHLERS. Without objection, so ordered.
[The information follows:]



The Oregonian

BLM freezes OSU's grant behind study

Forestry - The suspension adds a new element to the furor over salvage logging

Tuesday, February 07, 2006

MICHAEL MILSTEIN
The Oregonian

The federal government has abruptly suspended funding for Oregon State University research that concluded federally sponsored logging after the 2002 Biscuit fire in southwest Oregon set back the recovery of forests.

The action came after a team of scientists from OSU and the U.S. Forest Service published their results last month in *Science*, the nation's leading scientific journal.

It escalated the controversy surrounding the findings, which undercut Bush administration-backed arguments for logging after wildfires. The research, led by a 29-year-old graduate student, already had come under attack within OSU's College of Forestry by professors who contend that logging and replanting speed recovery of burned forests.

Those professors tried but failed to persuade *Science* not to publish the one-page report.

Administrators at OSU and scientists elsewhere said they could not recall another instance of the federal government suspending funding for research after controversial results emerge.

"It's totally without precedent as far as I can recollect," said Jerry Franklin, a professor at the University of Washington who has studied Northwest forests for decades. "It says, 'If we don't like what you're saying, we'll cut off your money.'"

Federal officials said the publication appeared to violate the terms of the research funding awarded by the U.S. Bureau of Land Management through a federal Joint Fire Science program.

They suggested an online version of the report could be seen as illegally trying to influence federal legislation because it mentioned a bill co-sponsored by Rep. Greg Walden, R-Ore., to speed logging after fires. They also said the scientists had not consulted with the BLM before publishing their report or included a disclaimer saying the conclusions do not represent a government opinion.

The BLM outlined the points in a letter to Oregon State last week and gave the university until Wednesday to respond.

The BLM suspended funding until the response is received "and any corrective actions if necessary are taken by OSU."

Donald Kennedy, editor in chief of *Science* and former president of Stanford University, said the federal move was a "considerable political escalation," coming after the attempt by OSU professors to derail publication of the paper.

He said the mention of the Walden bill was the journal's mistake. The authors of the research report had

asked journal editors to remove the mention, but they inadvertently did not.

The mention said that the research results could "help inform the dialogue" about Walden's bill.

Federal officials said the cutoff of money was not politically driven or retaliation for research conclusions that ran against federal arguments for logging.

"I don't think it's politics; I think it's a matter of violating research protocols," said Jim Golden, deputy regional forester with the Forest Service. He said the report's mention of Walden's bill "came across to me as if they were trying to influence the dialogue."

Federal law prohibits the use of federal research funds to influence federal legislation.

Golden echoed the OSU professors who criticized the researchers for drawing conclusions about the lasting impacts of logging after only two years of study.

"They launched into conclusions that were not supported by the data," he said.

He said the findings are likely to be cited by logging opponents who want to hold up future timber sales.

Luanne Lawrence, vice president for advancement at Oregon State, said the university is taking the issue very seriously. She said OSU officials hope to satisfy the BLM's concerns so the research can continue.

The university has no doubts about the integrity of the research, she said.

The \$307,000 in federal funding came in the form of a three-year grant to examine the effects of logging after wildfires. Oregon State so far has received \$207,000, and the grant is entering its final year, Lawrence said. The remaining funds were to pay stipends for two OSU graduate students, including Daniel Donato, the lead author of the paper published in *Science*.

Kennedy, the editor of *Science*, said he could not see how Donato's paper could be seen as trying to influence legislation. The research findings might be influential, he said, but to bar them "would cripple anyone from ever working on a science problem with a policy impact."

Andy Stahl, executive director of Forest Service Employees for Environmental Ethics, said the suspension of funding was a "shot across the bows" to researchers who produce findings the government does not like.

"Either way, the administration, regardless of the outcome of this incident, has made its message clear," he said. "You knuckle under and give us the results we want, or we won't fund you."

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Chairman EHLERS. And yes, you are testing my forbearance, but since—

Mr. WU. My job.

Chairman EHLERS. Since we are good friends, I let you continue. But I am concerned about the fact that we have kept our witnesses here much longer than we normally would, and much longer than we have a right to expect.

So I would like to conclude the questioning at this point, and give you an opportunity to be on your way. I would ask that if we have further questions for you, we would submit them in writing to you, and appreciate your willingness to respond to those in writing as well, so we can, if anything else occurs to us, we can make the record complete.

Thank you very much. You have been an excellent panel. It is outstanding in every way, and we have addressed a lot of tough issues. But what—toughest issue I believe is not so much the management of the EPA, but the funding of the EPA, and I don't think

we can meet the scientific requirements of this country unless we recognize that science does cost money, equipment costs money, and that we will soon be able to get you back on a track where your funding actually increases, rather than decreases.

So we will work with that, and I am sure my colleague will join me in that effort, to try to perhaps not this fiscal year, but certainly in future fiscal years, ensure that you have the funding to do the research adequately.

Thank you again for being here. We appreciate your efforts. And with that, the hearing is adjourned.

[Whereupon, at 12:50 p.m., the Subcommittee was adjourned.]

Appendix 1:

ANSWERS TO POST-HEARING QUESTIONS

ANSWERS TO POST-HEARING QUESTIONS

Responses by George M. Gray, Assistant Administrator for Research and Development and EPA Science Advisor, United States Environmental Protection Agency

Questions submitted by Chairman Vernon J. Ehlers

Q1. Has the Environmental Protection Agency (EPA) asked the Department of Homeland Security (DHS) to cover part of the costs of the EPA's homeland security activities? Has EPA discussed with DHS the possibility of an interagency agreement that would provide funds for EPA to carry out its homeland security responsibilities?

A1. EPA's Office of Homeland Security (OHS) coordinates interactions between EPA and DHS on matters related to homeland security.

EPA's homeland security roles and responsibilities are delineated in existing statutory authorities, Homeland Security Presidential Directives (HSPDs), and Memorandums of Understanding (MOUs) with other agencies. Planning documents and deliverables associated with a wide variety of collaborative homeland security-related projects are already under way between EPA and DHS and provide additional information about these activities. Those homeland security taskings that fall to EPA do so because of our expertise and experience as well as statutory roles and responsibilities. The President's Budget requests funding directly for EPA for these tasks assigned to EPA.

EPA and DHS coordinate to make sure their respective homeland security roles remain complementary and coordinated. A Report to Congress was submitted to the Appropriations Committees last November which details the different roles and responsibilities and various Memorandums of Agreement that have been put in place to facilitate communication and coordination. EPA and DHS are working together to implement a number of homeland security-related efforts and personnel at all levels within our respective organizations communicate regularly. EPA and DHS co-chair standing committees and work groups regularly review one another's planning documents and deliverables and support one another on projects and activities of interest to both agencies.

We feel the appropriate agreements and communication networks are in place to ensure a coordinated effort between our two agencies on homeland security collaboration.

Q2. EPA is funding a one-city pilot of Water Sentinel in fiscal year (FY) 2006. Please identify the total federal funding that has been and will be spent on the pilot in each of FY06 and FY07. Please describe in detail the activities, equipment, and services that have or will be purchased with these funds. For each expenditure, please identify it as either intramural or extramural and categorize it in one or more of the following categories: basic research, applied research, development, or demonstration. If an activity falls into more than one category, please indicate as much. Please provide similar information for any other Water Sentinel expenditures in FY06 and to the extent possible for expenditures planned in FY07.

A2. EPA's Office of Water (OW) is responsible for implementing Water Sentinel.

For FY 2006, EPA received approximately \$7.9 million for the Water Sentinel pilot program, with another \$1.0 million appropriated for the Water Alliance for Threat Reduction. Of the \$7.9 million, about \$1.4 million funds the installation, evaluation, and operation of online water quality monitors (extramural: applied research, demonstration); \$0.3 million supports routine and triggered sampling of high-priority contaminants (extramural: demonstration); \$1.0 million funds consumer complaint monitoring, public health surveillance, and enhanced physical security (extramural: demonstration); \$1.5 million provides laboratory support for processing samples (extramural: demonstration); \$2.6 million supports research and pilot support activities (extramural: applied research); \$500,000 supports staff (intramural); and \$600,000 funds pilot evaluation (extramural: demonstration).

For FY 2007, EPA requests \$38 million for Water Sentinel, which includes funding for the second year of the FY06 pilot at approximately \$2.7 million. Of the \$38 million, approximately \$7 million would fund the installation, operation, and evaluation of water quality sensors (extramural: applied research, demonstration). About \$5 million would support routine and triggered sampling of high-priority contaminants (extramural: demonstration); \$6 million would fund consumer complaint monitoring, public health surveillance, and enhanced physical security (extramural: demonstration); \$7 million would provide laboratory support for processing samples

(extramural: demonstration); \$10 million would fund key research into evaluating detection technologies, validating analytical methods, and improving distribution system models; and about \$3 million would support staff and pilot evaluation costs (50 percent intramural for staff, 50 percent extramural for evaluation: applied research, demonstration).

Q3. Does EPA expect States or local governments to fund or provide in-kind services during the Water Sentinel pilots? If so, what portions of the costs are they expected to contribute? Does EPA have any plans for deploying Water Sentinel after the pilots are completed? If so, please provide a copy of those plans. When are the Water Sentinel pilots expected to be completed, and when does EPA expect deployment to occur? Does the agency have any rough estimates of what it might cost to deploy Water Sentinel? If so, what are those estimates? What funding sources are being considered for funding deployment?

A3. EPA's Office of Water (OW) is responsible for implementing Water Sentinel.

In general, the local government will contribute in-kind services in two critical areas to the pilot. First, the drinking water utility will make its distribution system available as a test bed for the Water Sentinel pilot program by coordinating with EPA in the installation of water monitoring stations and the deployment of other enhancements as appropriate (e.g., hardening remote distribution system facilities). Second, the local government will make key staff available to participate in the development of implementation and evaluation plans, which would include addressing consumer complaints, physical monitoring, online water quality monitoring, routine and triggered sampling, coordination with public health, data management, consequence management, and other activities necessary to initiate and sustain the pilot. In addition, EPA is developing a formal agreement with a State public health lab which has access to the resources (e.g., training and reagents) of the CDC's Laboratory Response Network (LRN). This arrangement will enable the Water Sentinel pilot to conduct critical analyses of high-priority biological agents.

While FYs 2006 and 2007 involve preparing for and deploying Water Sentinel, the following years entail calibrating the contaminant warning systems and conducting extensive and thorough evaluation of each pilot. It is expected that the two years subsequent to the full deployment of Water Sentinel will focus on program evaluation. In the years following FY 2007, evaluating the utilities' experience with each of the five components of the contaminant warning system coupled with ongoing research and modeling activities will serve to improve EPA's understanding of how an effective contaminant warning system functions. Each of the five principal components of Water Sentinel (i.e., online water quality monitoring, sampling and analysis, consumer complaints, public health surveillance, enhanced physical monitoring) will have been subjected to field applications and evaluations throughout FYs 2006 and 2007 so that, likely by FY 2009, EPA and the utilities can determine the most effective combination of data sources that can provide early indication of a contamination event.

Q4. In your testimony, you mentioned that you are reforming the Integrated Risk Information System (IRIS).

Q4a. Please identify the problems that these reforms are trying to fix and what changes you are contemplating to the review process.

A4a. IRIS began in the mid-1980s, and procedures have changed as needed. As with any maturing program, the IRIS program could benefit from enhancements and reforms that would make it even better. EPA recognizes that there are improvements that could be made to its IRIS health assessment process that would increase transparency, thus helping to improve full and open consideration and scientific review of relevant information. These proposed enhancements would focus on new approaches in risk assessment, new processes and procedures, and a more technically advanced web site.

In the area of risk assessment approaches, one issue that the Agency is exploring is a more adequate explanation of uncertainty in IRIS assessments. An expanded discussion of uncertainty—the evaluation of the strengths and weaknesses of the underlying quantitative data and how we analyze, characterize, and communicate that information—will serve to increase the transparency of EPA's IRIS assessments. It will also continue to assure high-quality interpretation of scientific information in the development of IRIS products.

In addition, EPA requested an increase of \$500K to support IRIS assessments by providing peer review and consultation by the National Academies of Science (NAS). Expansion of reviews by the NAS directly improves the quality, objectivity, utility and integrity of information disseminated by EPA. NAS involvement will contribute

to the identification and resolution of scientific issues and increased confidence in the scientific quality of EPA assessments. Review by the NAS ensures wide acceptance of the scientific conclusions reached in IRIS assessments.

In the area of new processes and procedures, EPA is working to expand the ways and opportunities for the public and other federal agencies and states to engage in the development of IRIS assessments. EPA is working on a proposal to include earlier and more extensive interagency and stakeholder review and dialogue on IRIS assessments. This will also help to improve the assessments by identifying and resolving major scientific issues early in the assessment development process, which could facilitate high-quality and timely completion of assessments.

As for the IRIS web site (www.epa.gov/IRIS), the current IRIS web site is very static and is structured like a paper data base, very linear. A more technologically advanced IRIS Internet site that would utilize the power of the Internet is envisioned for IRIS. This could include a more interactive data base, with links to key studies, links to relevant dose-response models or pharmacokinetic models, and a data base that could allow for complicated queries and reports.

Q4b. Will your upcoming reforms add time to the process or require additional resources?

A4b. The IRIS reforms and enhancements that are briefly discussed above may result in added time to the development process as well as requiring additional resources. At this time, it is too early to determine the extent of the time and resources that may be needed. It is also possible that these changes may lead to quicker acceptance in the peer review stage, thus ultimately decreasing the total time it takes to finalize an IRIS document.

Q4c. Will the agency seek public comment before finalizing any reforms?

A4c. EPA will hold a public workshop and will invite public comment on the revised IRIS processes. EPA is committed to an open and transparent process as it moves forward to enhance and strengthen this important Agency data base.

Q5. During the hearing, you explained that EPA plans to focus IRIS resources on completing chemical reviews already under-way instead of adding new chemicals to the review list in FY07.

Q5a. Why is there a backlog of IRIS reviews?

A5a. When the IRIS program began in the mid-1980s, it was conceived of as a cross-agency program for the purpose of developing EPA consensus risk information, both qualitative and quantitative, on environmental contaminants of interest to EPA's Programs and Regions. In the beginning, IRIS was an internal EPA communication method to ensure that the Agency was not producing conflicting risk assessments that generated different risk values. Shortly after the start of IRIS, EPA decided to share the data base with the public to quell the practice of "number shopping" by external groups who would search among existing Agency assessments to find the number, or risk value, that most suited their purposes.

For 15 years, IRIS was strictly a voluntary program with a staff of two, and less than a \$100K budget. In the early years of IRIS, EPA programs nominated many chemicals for consideration by IRIS work groups—all voluntary, made up of program office, regional, and research and development scientists. All work group deliberations were internal to the Agency. When consensus was reached (which was not an easy achievement), the final IRIS summary assessment was posted on IRIS. It represented solely EPA's scientific consensus opinion. Because the IRIS program was voluntary and depended on donated time by already busy scientists, progress on completing the IRIS chemical nomination list was very slow. As the IRIS program evolved, growing in importance and gaining a higher profile in the environmental health and regulated communities, the chemical list also grew. Older assessments needed renewal and new chemicals were nominated to an already overflowing list.

As IRIS continued to grow and attract interest, Congress and the President responded by providing additional resources and encouraging independent external peer review of all draft IRIS assessments before they were posted on IRIS. In addition, interagency review now occurs before each draft IRIS assessment is released for independent expert external peer review and public review before being publicly released on IRIS. These steps, while enhancing the quality and credibility of IRIS assessments, typically increase the time to complete assessments.

It is also useful to note that many of the health assessments already in the IRIS queue have a large amount of underlying available scientific literature that needs to be analyzed and characterized, and many have complex scientific issues associ-

ated with them. Consideration of all the relevant data and analysis of the scientific issues takes time.

In addition, as explained previously, the IRIS program is in the process of transition to consider some of the reforms and enhancements discussed earlier, which has led to some reconsideration of the direction of the assessments under development. Given the issues discussed above, and the nature and complexities of the review processes, developing and completing these assessments can take several years. Thus, EPA decided to concentrate current resources on the development of chemical assessments to which EPA has already committed.

Q5b. How much more funding is needed per review to eliminate the backlog?

A5b. The FY 2007 President's Budget request for Human Health Risk Assessment is sufficient to complete planned assessments and to support proposed enhancements to the risk assessment process.

Q5c. How much of this funding has EPA budgeted for in FY07?

A5c. EPA has requested an additional \$500K for FY 2007 in the President's Budget for the IRIS program. In addition, over the past years EPA has increased the IRIS scientific staff from four to over 30 experienced scientists representing a variety of scientific disciplines pertinent to IRIS health assessments. Available funding for IRIS has also increased. The total FY 2007 President's Budget Request for IRIS is \$8.9M.

Q6. In your testimony you explained that EPA's nanotechnology research to date has primarily been conducted through extramural research grants under the Science to Achieve Results program and that the FY07 request proposes to establish an in-house capability on nanotechnology. Could you explain specifically what the in-house program would do and how it would complement the proposed FY07 extramural program?

A6. EPA will continue its emphasis on supporting research that enhances understanding of the potential environmental implications of nanotechnology. Of the \$8.6 million requested in the FY 2007 President's Budget, \$5.0 million will be devoted to extramural research funded through the Science to Achieve Results (STAR) program, supporting research in engineered nanomaterials in the areas of ecological toxicity; fate, transport, and transformation in the ecosystem; monitoring and detection techniques; and environmentally benign (pollution prevention) applications of nanotechnology.

The \$3.6 million in-house research program will focus on those areas where EPA has particular expertise and can complement the activities of other research organizations, and where Agency decision-support needs are greatest. Although EPA is currently in the process of planning its research program for 2007 and beyond, potential research areas include assessing potential hazards from the use of nanomaterials for remediation and pollution control, because some of these uses involve the direct application of free nanoparticles into the environment and therefore present near-term potential for human or ecological exposure; developing risk assessment approaches; and ecological assessment, including understanding the transformation, fate and transport of nanomaterials in the environment; and developing technologies for pollution control and prevention. The in-house and extramural programs will be jointly planned and closely coordinated to ensure that they are complementary, as is done currently with other areas of research.

Questions submitted by Representative David Wu

Q1. The Superfund Innovative Technology Evaluation or SITE program was established in response to the 1986 amendments to the Superfund law. Under the amendments, the Administrator is "authorized and directed" to carry out such a program. This program is not discretionary. It is mandatory. There is no funding in the 2007 budget proposal for this program. How does the Agency plan to carry out the activities mandated in the 1986 amendments with no funding for the program?

A1. The 1986 Superfund Amendments and Reauthorization Act (SARA) recognized a need for an "Alternative or Innovative Treatment Technology Research and Demonstration Program." Part of the Agency's response to that need was the establishment of the SITE program. The purpose of the SITE program, which it carried out, was to demonstrate full-scale innovative hazardous waste treatment technologies and site characterization techniques. Since its inception, the SITE program has successfully demonstrated 154 treatment technologies and 47 site characterization/mon-

itoring techniques. Through an evaluation of 105 Records of Decision (RODs) in which innovative technologies were selected and documented, EPA found that SITE-demonstrated technology types provided a cost savings of \$2.7 billion compared to the use of conventional technologies. This is an average savings of 71 percent per site. The SITE program has matured, and innovative approaches evaluated through it and other mechanisms have become standard tools for industry.

With \$1.2M in funding in FY 2006, the SITE program is completing ongoing and planned demonstrations of innovative remediation, monitoring, and measurement approaches. The Agency continues to support a rigorous research program that focuses on both the proper management of solid and hazardous wastes and the effective remediation of contaminated waste sites. ORD will continue to participate actively in the DOD-DOE-EPA Environmental Security Technology Certification Program for testing of new technologies applicable to environmental restoration at federal sites.

Q2. In response to Dr. Ehlers' question on why EPA was not proposing any new chemicals to be added to the IRIS data base, you indicated EPA intends to "clear the backlog of assessments" that are now in process. Please provide a list of the assessments now in the process of assessment and a list of the assessments that will be completed in FY06 and FY07.

Q2a. Please provide a list of the assessments now in the process of assessment.

A2a. There are 72 health assessments under way in the IRIS program (please see Attachment 1). Attachment 1 is the *Federal Register* notice published on February 23, 2006, that announced the IRIS agenda for FY 2006. On May 19, 2006, EPA published a corrected Notice that identified four substances that were deleted from the February 23, 2006, Notice. Bromodichloromethane, bromoform, dibromochloromethane, and cryptosporidium were included in the Notice in error. They were removed from the IRIS agenda at the request of EPA's Office of Water.

Q2b. Please provide a list of the assessments that will be completed in FY06 and FY07.

A2b. Two chemical assessments for IRIS have already been completed and posted on the data base in FY 2006. They are n-hexane and phosgene. While it is difficult to predict with any accuracy the other assessments that may be completed and posted on IRIS in FY 2006, the health assessments that may reach that stage are: 1,2-dichlorobenzene; 1,3-dichlorobenzene; and 1,4-dichlorobenzene.

It is difficult to provide a list of expected completions in FY 2007 with much precision. EPA's current estimation is that the IRIS health assessments that may be completed during FY 2007 are: four polybrominated diphenyl ethers, inorganic arsenic, tetrahydrofuran, nitrobenzene, dibutyl phthalate, trichloroacetic acid, ethylene oxide, 2,2,4-trimethylpentane, bromobenzene, methyl tertiary butyl ether, carbon tetrachloride, acrylamide, 1,1,1-trichloroethane, and acute assessments for hexachlorocyclopentadiene, ethylene oxide, hydrogen sulfide, and phosgene. It should be noted that this list of expected completions does not match the list of expected completions, compiled in 2005, which was included in the FY 2007 Congressional Justification.

Q3. During the hearing, a question arose regarding the time that EPA research reports are maintained in draft form and a question about whether draft reports are available to the public.

Q3a. At what stage of the report-development process do EPA's draft reports become available to the public?

A3a. Scientific and Technical Work Products (non-IRIS)

EPA has a policy of independent, expert review of scientific and technical work products that are used to inform Agency decisions. The draft reports discussed at the March 16, 2006, hearing would generally be covered by the EPA peer review policy.

That policy, which is consistent with the Office of Management and Budget's guidance on peer review, provides for public comment to inform the independent expert review of influential scientific and technical work products. Therefore, we attempt to time the public availability of draft reports to coincide with scientific peer review. Such reports are available for review and comment in the EPA Science Inventory, as part of the EPA Peer Review Agenda, at www.epa.gov/si. Prior to peer review, we consider draft reports to be preliminary and generally not to be quoted or cited outside the Agency. We do not use draft reports as the basis for regulatory or policy decisions, although in some cases specific studies cited in the reports have been published in the scientific literature and are themselves used to inform decisions.

IRIS Assessments

The current IRIS assessment development process generally provides for one opportunity for the public to review and comment on a draft document. When an internal draft is determined of sufficient quality and completeness, an independent external expert peer review is scheduled. The draft document is provided to the peer review panel and, at the same time, the draft document is provided to the public for a 45- to 60-day comment period. The length of the comment period is dependent on the size, interest level, and complexities of the assessment. The announcement of the availability of the draft document, the start of the public comment period, directions on how to submit comments and, often times, the time and place of the peer review workshop are included in a *Federal Register* notice and on EPA's web site. If the details of the peer review meeting are not available when the draft document is released for comment, the Agency then follows up with a subsequent *Federal Register* notice. The public comments received by the end of the public comment period are then shared with the members of the expert peer review panel to inform them as they review and critique the EPA's draft health assessment. In rare cases, however, the peer review results in substantive revisions to a draft document such that the Agency determines that a second peer review is necessary. In that case, public comments are solicited on the 2nd external review draft as well.

Q3b. Please provide a list of the reports that moved from draft status to final status during 2004 and 2005.

A3b. The following chemicals were completed and added to IRIS in FY 2004 and FY 2005.

2004: boron; lead; 1,2-dibromoethane; 2-methylnaphthalene

2005: perchlorate; barium; zinc; toluene

Q3c. For each of these reports, indicate the period of time the report was in draft form prior to being finalized.

A3c. The time span below represents the time from availability of the first external review draft to the posting on IRIS.

2004:

Boron—May 2002–August 2004 (28 months)

Lead—September 2003–July 2004 (11 months)

1,2-Dibromoethane—November 2002–July 2004 (21 months)

2-Methylnaphthalene—April 2003–December 2003 (nine months)

2005:

Perchlorate—December 1998–February 2005 (74 months)

Barium—May 2004–July 2005 (15 months)

Zinc—November 2003–August 2005 (22 months)

Toluene—August 2002–September 2005 (28 months)

Internal Review Draft Deliberative

d. Please indicate the status of each of the following reports (e.g. internal agency review, outside peer review, SAB review), whether they are publicly available, and where the public can access a copy of the report.

ORD Center	Product Type	Product ID	EIMS ID	Citation	Status	Publicly Available (Y/N)	How to Obtain Copy
1. National Center for Environmental Assessment (NCEA)	IRIS ASSESSMENT	NCEA-R-0395	85873	IRIS Toxicological Review and Summary Documents for Dibromomethane (External Review Draft)	Final Assessment on IRIS	Yes	Final Document at www.epa.gov/iris Draft is available by request from IRIS Risk Information Hotline: 202-566-1678
2. NCEA	IRIS ASSESSMENT	NCEA-S-0455	121289	Toxicological Review of Benzene (Noncancer Effects) and IRIS Summary (Consensus Review Draft).	Final Review on NCEA Web site	Consensus Review Draft unavailable; Internal EPA document; Final assessment available	Final Version is available at http://cfpub.epa.gov/nceae/cfm/recordisplay.cfm?deid=51760 as a pdf file Preliminary Draft is available at http://cfpub.epa.gov/nceae/cfm/recordisplay.cfm?deid=12160 as a pdf file Final Assessment on IRIS (www.epa.gov/iris)
3. NCEA	CRITERIA DOCUMENT	NCEA-R-1072-7	86202	Air Quality Criteria for Particulate Matter (Fourth External Review Draft) (revised Chapter 9, August 2004, 600/P-99/002bD).	Final Drafts on NCEA Web site	Yes	Final Document is available at http://cfpub.epa.gov/nceae/cfm/recordisplay.cfm?deid=88103 as a pdf file Revised Chapter 9 available at http://cfpub.epa.gov/nceae/cfm/recordisplay.cfm?deid=85763 as a pdf file
4. NCEA	CRITERIA DOCUMENT	NCEA-R-1068	114523	Air Quality Criteria for Ozone and Related Photochemical Oxidants (First External Review Draft), EPA/600/R-05/004aA-cA, 2005.	Final Version on NCEA Web site	Yes – available in three Volume format	First External Review Draft available at http://cfpub.epa.gov/nceae/cfm/recordisplay.cfm?deid=114523 as 3 Volumes in pdf files Final Document available at http://cfpub.epa.gov/nceae/cfm/record

5. NCEA	CRITERIA DOCUMENT	NCEA-R-0469	124926	Summary of Selected New Information of Effects of Ozone to Health and Vegetation; Draft Supplement to Aqc for Ozone and Other Photochemical Oxidants. EPA 600/8-88/105F (NTIS 92-235670), 1992.	Final Version on NCEA Web site	Yes	Document available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=31093 as a pdf file
6. NCEA	CRITERIA DOCUMENT	NCEA-R-1015-1	64127	Air Quality Criteria Carbon Monoxide, External Review Draft. EPA 600/P-99/001A, 1999.	Final Version on NCEA Web site	Yes	External Review Draft available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=64127 as a pdf file Final Version available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=18163 as a pdf file
7. NCEA	CRITERIA DOCUMENT	NCEA-R-1015-2	64128	Air Quality Criteria Carbon Monoxide, Second External Review Draft. EPA 600/P-99/001B, 1999.	Final Version available on NCEA Web site	Yes	2 nd External Review draft available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=12182 as a pdf file Final Version available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=18163 as a pdf file
8. NCEA	CRITERIA DOCUMENT	NCEA-R-0746-2	96571	Air Quality Criteria for Ozone and Related Photochemical Oxidants, Volumes I-III, External Review Draft, 1993.	Final Version on NCEA Web site	Yes	Copies can be ordered by contacting NSCEP at 1-800-490-9198 or on the Web at www.epa.gov/NCEP/home/orderpub.html . Paper copies can be ordered by calling 1-800-553-NTIS(6847)
9. NCEA	CRITERIA DOCUMENT	NCEA-R-1465-1	141779	Air Quality Criteria for Lead (First External Review Draft). EPA/600/R-05/144aA-bA.	2 nd Draft ready for release, May 19, 2006	Yes	First External Review Draft available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=141779 as a pdf file

10. NCEA	CRITERIA DOCUMENT	NCEA-R-1068-2	137307	2005.	Air Quality Criteria for Photochemical Oxidants (Second External Review Draft EPA/600/R-05/004aB-cB, 2005.	Posted and includes Chapter 8 and Executive Summary	Yes	Second External Review Draft available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=137307 as a pdf file Final Document available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=149923 as a pdf file
11. NCEA	CRITERIA DOCUMENT	NCEA-R-0671-1	96579		Air Quality Criteria for Particulate Matter, Volumes I-III, External Review Draft, 1995.	Final version on NCEA Website	Yes	Limited number of paper and CD-Rom copies available from NSEP. Call 1-800-490-9198 or online at www.epa.gov/NCEP/home/orderpub.html
12. NCEA	CRITERIA DOCUMENT	NCEA-R-1072-1	64130		Air Quality Criteria for Particulate Matter (External Review Draft) EPA 600/P-99/002aA-cA, 1998.	Final External Draft on NCEA Web site	Yes	1999 External Review Draft available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=64130 as a pdf file Final Drafts available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=88103 as a pdf file
13. NCEA	CRITERIA DOCUMENT	NCEA-R-1072-2	64131		Air Quality Criteria for Particulate Matter (Second External Review Draft) EPA 600/P-99/002aB-bB, 2001.	Final Version on NCEA Web site	Yes	Second External Review Draft available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=64131 as a pdf file Final Drafts available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=88103 as a pdf file
14. NCEA	CRITERIA DOCUMENT	NCEA-R-1072-5	83128		Air Quality Criteria for Particulate Matter. (Fourth External Review Draft) Revised Chapters 7 & 8 (December 2003), 600/P-99/002bD.	Final version on NCEA Web site	Yes	Fourth External Review Draft available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=58003 as a pdf file Final Drafts available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=88103 as a pdf file

15. NCEA	ASSESSMENT DOCUMENT	NCEA-W-01146	119572	Health Assessment Document for Diesel Exhaust (SAB Review Draft, July 2000), 600/8-90/057E.	Final Version on NCEA Website – Final Diesel Exhaust Assessment placed on IRIS Web site in 2003	Yes	July 2000 SAB Review Draft available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=17881 as a pdf file Final Document available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=29060 as a pdf file Final Diesel Exhaust Assessment available at www.epa.gov/iris
16. NCEA	ASSESSMENT DOCUMENT	NCEA-W-0267-2	122740	Health Assessment for 1,3-Butadiene (Consensus Review Draft, Sept. 2000), 600/P-98/001B.	Final Document on NCEA Web site	Consensus Review Drafts not available; Internal EPA document; Final assessment available	Final Document available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=54469 as a pdf file Final Summary Assessment on IRIS at www.epa.gov/iris
17. NCEA	ASSESSMENT DOCUMENT	NCEA-W-01145	119573	Health Assessment Document for Diesel Emissions (SAB Review Draft, November 1999), 600/8-90/057D.	Final Version on NCEA Web site	Yes	November 1999 SAB review Draft available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=12360 as a pdf file Final Document available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=29060 as a pdf file
18. NCEA	ASSESSMENT DOCUMENT	NCEA-W-1518	119304	Neurotoxicity of Tetrachloroethylene (Perchloroethylene); Discussion Paper (External Review Draft) 600/P-03/005A.	Discussion Paper served as background to public workshop, providing input to ongoing assessment	Yes	Draft Discussion Paper available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=76183 as a pdf file.

19. NCEA	ASSESSMENT DOCUMENT	NCEA-R-0237-3	130593	Health Assessment Document for Diesel Emissions, External Review Draft, (Volume II), EPA 600/8-90/057Bb (NTIS 95-192118).	SAB Reviews on NCEA Web site	Yes	SAB Reviews available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=12360 and http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=17881 as .pdf files
20. NCEA	ASSESSMENT DOCUMENT	NCEA-C-1498	150144	Considerations for Developing Alternative Health Risk Assessment Approaches for Addressing Multiple Chemicals, Exposures and Effects; External Review Draft, EPA/600/R-06/013A.	Released for External Review on March 31, 2006; Peer review workshop May 25 and 26, 2006	Yes	External Review Draft available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=14983 as a pdf file

Attachment 1

Federal Register / Vol. 71, No. 36 / Thursday, February 23, 2006 / Notices

9333

ENVIRONMENTAL PROTECTION AGENCY

(FRL-8036-1; Docket No. ORD 2003-0016)

Integrated Risk Information System (IRIS); Announcement of 2006 Program

Agency: Environmental Protection Agency

Action: Notice; announcement of IRIS 2006 program agenda.**SUMMARY:** The U.S. Environmental Protection Agency (EPA) is announcing the IRIS 2006 agenda.

The Integrated Risk Information System (IRIS) is an EPA database that contains the Agency's scientific positions on human health effects that may result from exposure to chemical substances in the environment. On March 4, 2005, EPA announced the 2005 IRIS agenda (42FR10616), with solicitation of scientific information from the public for consideration in assessing health effects from specific chemical substances. All assessments currently in progress are listed in this notice. EPA is not initiating new assessments in 2006 in order to focus on completion of existing assessments.

This notice also provides an update on EPA's efforts to improve the IRIS health assessment development and review processes.

DATES: While EPA is not expressly soliciting comments on this notice, the Agency will accept information related to the substances included herein. Please submit any information in accordance with the instructions provided at the end of this notice.

ADDRESSES: Please submit relevant scientific information identified by docket ID number EPA-HQ-ORD-2003-0016, online at <http://www.regulations.gov> (EPA's preferred method); by e-mail to ord.docket@epa.gov; mailed to EPA Docket Center, Environmental Protection Agency, Mail Code: 2822T, 1200 Pennsylvania Ave., NW, Washington, DC 20460-0001; or by hand delivery or courier to EPA Docket Center, EPA West, Room B102, 1301 Constitution Ave., NW, Washington, DC, between 8:30 a.m. and 4:30 p.m.

Monday through Friday, excluding legal holidays. Comments on a disk or CD-ROM should be formatted in Word or as an ASCII file, avoiding the use of special characters and any form of encryption, and may be mailed to the mailing address above.

FOR FURTHER INFORMATION CONTACT: For information on the IRIS program, contact Amy Mills, IRIS Program Director, National Center for Environmental Assessment, (mail code: 8601D), Office of Research and Development, U.S. Environmental Protection Agency, Washington, DC, 20460; telephone: (202) 564-3204, facsimile: (202) 565-0075; or e-mail: mills.amy@epa.gov.

For general questions about access to IRIS, or the content of IRIS, please call the IRIS Hotline at (202) 566-1676 or send electronic mail inquiries to hotline.iris@epa.gov.

SUPPLEMENTARY INFORMATION:**Background**

IRIS is an EPA database containing Agency scientific positions on potential adverse human health effects that may result from exposure to chemical substances found in the environment. (EPA notes that information in the IRIS database has no preclusive effect and does not predetermine the outcome of any rulemaking. When EPA uses such information to support a rulemaking, the scientific basis for, and the application of, that information are subject to comment.) IRIS currently provides information on health effects associated with more than 500 chemical substances.

The database includes chemical-specific summaries of qualitative and quantitative health information in support of the first two steps of the risk assessment process, *i.e.*, hazard identification and dose-response evaluation. Combined with specific situational exposure assessment information, the information in IRIS is an important source in evaluating potential public health risks from environmental contaminants.

EPA's overall process for developing IRIS assessments consists of: (1) An annual Federal Register announcement

of EPA's IRIS agenda and call for scientific information from the public on selected chemical substances; (2) a search of the scientific literature; (3) development of IRIS Summaries and support documents; (4) EPA-wide review; (5) external peer review; (6) management review and approval; and (7) entry of IRIS Summaries and support documents into the IRIS database (<http://Nwww.epa.gov/iris>).

The IRIS Annual Agenda

Each year, EPA develops an annual agenda for the IRIS program and announces new assessments under review. A focus of the IRIS Program for 2006 is to move forward the 76 assessments already in progress. In light of this focus, EPA will not initiate any new assessments in 2006. This notice provides: (1) A list of IRIS assessments in progress; (2) an update on improvements made to the IRIS program and preliminary notice of further improvements under consideration.

Assessments in Progress

The following assessments are underway. Each was listed in the 2005 IRIS agenda. The status and planned milestone dates for each assessment can be found on the IRIS Track system, accessible from the IRIS database. All health endpoints due to chronic exposure, cancer and noncancer, are being assessed unless otherwise noted. For all endpoints assessed, both qualitative and quantitative assessments are being developed where information is available. Those substances denoted with an asterisk (*) may require additional time for analysis or peer review due to their large databases or complex assessment issues. Substances denoted with a double asterisk (**) are being evaluated for effects from acute and/or other less-than-lifetime exposure durations. These substances are part of a pilot test to evaluate the application of methods, procedures, and resource needs for adding health effects information for less-than-lifetime exposure durations to IRIS. Additional less-than-lifetime durations may be added to ongoing chronic assessments as needs arise and resources permit.

Substance name	CAS No.
acetaldehyde	75-07-0
acrolein**	107-02-8
acrylamide	79-06-1
acrylonitrile	107-13-1
aldicarb/aldicarb sulfoxide	116-06-3/1646-87-3
aldicarb sulfone	1646-88-4
arsenic	7440-382
asbestos*	1332-21-4
benzene*	71-43-2
benzo(a)pyrene	50-32-8
beryllium (cancer effects)	7440-61-7
bromobenzene	108-86-1
bromodichloromethane	75-27-4
bromoform	75-25-2
butyl benzyl phthalate	85-68-7
cadmium	7440-43-9
carbon tetrachloride	56-23-5
cerium	1306-38-3
chloroethane	75-00-3
chloroform (inhalation route)	67-66-3
chloroprene	126-99-8
cobalt	7440-48-4
copper	7440-50-8
Cryptosporidium	(?)
dibromochloromethane	124-48-1
dibutyl phthalate (chronic; less-than-lifetime** exposures)	84-74-2
1,2-dichlorobenzene	95-50-1
1,3-dichlorobenzene	941-73-1
1,4-dichlorobenzene	106-46-7
1,2-dichloroethylene	540-59-0
di(2-ethylhexyl)adipate (DEHA)	103-23-1
di(2-ethylhexyl)phthalate	117-81-7
1,4-dioxane	123-91-1
ethanol	64-17-5
ethyl tertiary butyl ether	637-82-3
ethylbenzene	100-41-4
ethylene dichloride	107-06-2
ethylene glycol monobutyl ether (cancer effects)	111-76-2
ethylene oxide (cancer effects; noncancer acute** exp.)	75-21-8
formaldehyde*	50-00-0
hexachlorobutadiene	87-68-3
hexachloroethane	67-72-1
hexachlorocyclopentadiene**	77-47-4
hexahydro-1,3,5-trinitro-triazine (RDX)	121-82-4
2-hexanone	591-78-6
hydrogen cyanide	74-90-8
hydrogen sulfide**	7783-06-4
isopropanol	67-63-0
kepone	43-50-0
methanol	67-56-1
methyl tert-butyl ether (MTBE)	1634-04-4
methylene chloride (dichloromethane)	75-09-2
mirex	2385-85-5
naphthalene (inhalation route)*	91-20-3
nickel (soluble salts)	(?)
nitrobenzene	98-95-3
PAH mixtures*	(?)
pentachlorophenol	87-86-5
perfluorooctanoic acid-ammonium salt (PFOA)	3825-26-1
perfluorooctane sulfonate-potassium salt (PFOS)	2795-39-3
phosgene (acute** exposure)	75-44-5
platinum	7440-06-4
polybrominated diphenyl ethers (tetra, penta, hexa, deca-BDEs)	(?)
polychlorinated biphenyls (PCBs) (noncancer endpoints)	1336-36-3
propionaldehyde	123-38-6
refractory ceramic fibers	(1)
styrene	100-42-5
2,3,7,8-TCDD (dioxin)*	1746-01-6
1,1,2,2-tetrachloroethane (chronic; less-than-lifetime** exp.)	79-34-5
tetrachloroethylene (perchloroethylene)	127-18-4
tetrahydrofuran	109-99-9
thallium	7440-28-0
trichloroacetic acid	76-03-9
1,1,1-trichloroethane (chronic; less-than-lifetime** exp.)	71-55-6

Substance name	CAS No.
trichloroethylene ¹	79-01-6
1,2,3-trichloropropane	96-18-4
2,2,4-trimethylpentane	540-84-1
uranium compounds	(8)
vinyl acetate	108-05-4

¹ Not applicable.

² Not applicable—various.

Note that the asbestos noncancer assessment has been expanded to include cancer effects. This is the only substantive change to the 2005 IRIS agenda.

IRIS Summaries and support documents for all substances listed as on-going assessments in 2006 will be provided on the IRIS Web site at <http://www.epa.gov/iris> as they are completed. This publicly available Web site is EPA's primary location for IRIS documents. In addition, external peer review drafts of IRIS assessments are posted for public information and comment. These drafts will continue to be accessible via the IRIS and NCEA Web sites. Note that these drafts are intended for public information only, and do not represent the Agency's final position.

Other Improvements to the IRIS Program—Update

As discussed in the Federal Register notice announcing the 2005 agenda, EPA is improving the IRIS program and its products through a series of program reforms. EPA has expanded its central IRIS Staff to better manage the program and promote scientific quality and consistency. In addition, external scientific peer reviews are being conducted routinely by panel meetings rather than by mail reviews. This step is being taken to provide the best possible scientific evaluation of each assessment. Further, EPA now conducts each external peer review at the end of each IRIS assessment review process, strengthening the role of peer review in informing the outcome of the process. A public comment period prior to panel peer review meetings is now standard practice, and the meetings are open to the public for observation. These program reforms facilitate scientific input from the public and make the peer review process more transparent.

Further enhancements to the IRIS assessment development and review process are currently under consideration. A follow-up notice will be published in the Federal Register to announce a public workshop on proposed additions to the IRIS process in 2006.

General Information

As of Monday, November 28, 2005, EPA's EDOCKET was replaced by the Federal Docket Management System (FDMS), the new federal government-wide system. FDMS was created to provide a single point of access to all federal rulemaking activities. All materials previously found in EDOCKET are now available on the Internet at <http://www.regulations.gov>.

A. How Can I Get Copies of Related Information?

EPA has established an official public docket for this action under Docket ID No. ORD 2003-0016. The official public docket is the collection of materials that is available for public viewing at the Office of Environmental Information (OEI) Docket in the EPA Docket Center, EPA West, Room B102, 1301 Constitution Ave., NW, Washington, DC. The EPA Docket Center Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566-1744, and the telephone number for the OEI Docket is (202) 566-1752.

An electronic version of the public docket is available through EPA's electronic public docket and comment system. EPA Dockets at <http://www.regulations.gov> may be used to submit or view public submissions, access the index listing of the contents of the official public docket, and to access those documents in the public docket that are available electronically. Once in the system, select "search," then key in the appropriate docket identification number.

It is important to note that EPA's policy is that public submissions, whether submitted electronically or in paper, will be made available for public viewing in EPA's electronic public docket as EPA receives them and without change, unless the submission contains copyrighted material, CBI, or other information whose disclosure is restricted by statute. Information claimed as CBI and other information whose disclosure is restricted by statute is not included in the official public docket or in EPA's electronic public

docket. EPA's policy is that copyrighted material, including copyrighted material contained in a public comment, will not be placed in EPA's electronic public docket but will be available only in printed, paper form in the official public docket. Although not all docket materials may be available electronically, you may still access any of the publicly available docket materials through the EPA Docket Center.

B. How and To Whom Do I Submit Information?

Information on chemical substances listed in this notice may be submitted as provided in the ADDRESSES section. If you submit electronic information, EPA recommends that you include your name, mailing address, and an e-mail address or other contact information in the body of your submission and with any disk or CD-ROM you submit. This ensures that you can be identified as the submitter of the information and allows EPA to contact you in case EPA cannot read your information due to technical difficulties or needs further information on the substance of your submission. Any identifying or contact information provided in the body of submitted information will be included as part of the submission information that is placed in the official public docket, and made available in EPA's electronic public docket. If EPA cannot read your information due to technical difficulties and cannot contact you for clarification, EPA may not be able to consider your information.

Your use of EPA's electronic public docket to submit information to EPA electronically is EPA's preferred method for receiving submissions. The electronic public docket system is an "anonymous access" system, which means EPA will not know your identity, e-mail address, or other contact information unless you provide it in the body of your submission. In contrast to EPA's electronic public docket, EPA's electronic mail (e-mail) system is not an "anonymous access" system. If you send e-mail directly to the Docket without going through EPA's electronic public docket, your e-mail address is automatically captured and included as

part of the submission that is placed in the official public docket, and made available in EPA's electronic public docket.

Dated: February 15, 2006.

Peter Preuss,
Director, National Center for Environmental Assessment.

[FF Doc. E6-2576 Filed 2-22-06; 8:45 am]

BILLING CODE 6880-50-P

Appendix 2:

ADDITIONAL MATERIAL FOR THE RECORD

STATEMENT OF THE AMERICAN CHEMICAL SOCIETY

The American Chemical Society (ACS) would like to thank Chairman Sherwood Boehlert and Ranking Member Bart Gordon for the opportunity to submit testimony for the record on the Environmental Protection Agency (EPA) science and technology programs for fiscal year 2007.

ACS is a non-profit scientific and educational organization, chartered by Congress, representing more than 158,000 individual chemical scientists and engineers. The world's largest scientific society, ACS advances the chemical enterprise, increases public understanding of chemistry, and brings its expertise to bear on State, national, and international matters.

As Congress and the Administration consider funding priorities for FY 2007 in a tight budgetary environment, ACS urges policy-makers to support the important work carried out by the Environmental Protection Agency's Science and Technology Program. In reviewing the President's budget request, ACS has identified four areas of focus for EPA:

1. Growing the EPA Science & Technology account and increasing support for scientific research supported by the Agency, particularly through the Office of Research and Development (ORD).
2. Restoring important programs that build the talent pipeline for the environmental sciences, such as the Science To Achieve Results (STAR) fellowships.
3. Increasing support for green chemistry and engineering programs and reversing the short-sighted decision to eliminate the Technology for Sustainable Environment research program.
4. Reforming the management structure for science at EPA.

We look to science to understand environmental challenges and to develop more intelligent, less burdensome solutions. Over the past two decades, demand for more scientific evidence—whether it's to set or improve regulations—has grown substantially. The amount of research envisioned in EPA-related authorizations also has increased. *Nevertheless, appropriations for EPA science programs have not kept pace with the need for more and better science.*

Over the last 20 years, the EPA S&T account, which includes the ORD and research programs in other EPA Offices, has fluctuated between seven and ten percent of the Agency's total budget. In order for EPA set science-based national environmental standards, conduct research and environmental monitoring, and provide technical assistance to States, local governments, and businesses, the S&T account needs to increase as a percentage of the Agency's total budget, ultimately to a stable ten percent level. The President's budget request is nominally \$788 million, a nearly eight percent increase over FY 2006; however, \$62 million of this amount is an accounting change in Agency accounts. In real terms, S&T would be reduced one percent. ACS recognizes the tight fiscal situation the country faces, but strongly believes that substantial constant-dollar decreases in funding for the S&T account will only hinder the ability of EPA to achieve its mission.

For FY 2007, EPA should provide the ORD account \$646 million, an increase of 8.6 percent relative to FY 2006 funding levels. This total represents a return to ORD high funding point (FY 2004). ACS recommends that the additional funds be applied to the following priority areas:

- Provide \$10 million for the STAR fellowships.
- Increase overall STAR programmatic funding to \$110 million.
- Increase funding of green chemistry and engineering to advance the development and use of innovative, environmentally benign products and processes.
- Invest in EPA's ability to recruit, develop, and retain an effective scientific workforce.
- Continue investing in federal research and technology development to reduce or avoid greenhouse gas emissions and address the potential impacts of global climate change.
- Support innovative and high-risk research that may help identify and explore future environmental problems and develop new sets of technologies to solve existing problems.

The FY 2007 budget request continues a pattern of declining support for science at EPA for the Office of Research & Development, which is the largest part of the S&T account. The Administration requested \$557 million for ORD in FY 2006. This represents a 6.4 percent cut in ORD resources over FY 2006. The \$38 million decrease in ORD accounts from FY 2006 threatens ORD's mission to carry out world

class environmental research, further damaging the government's ability to provide top notch research on behalf of the American taxpayer and ensure America's policy makers use sound scientific advice in decision-making.

The Administration's proposal to eliminate the STAR fellowship program is a good case in point. This program is the only federal program dedicated to graduate study in environmental sciences at colleges and universities across the country. The STAR fellowships are part of a cohesive effort to characterize critical or emerging environmental problems and create solutions to address them. EPA designed this extramural research grant program to work in cooperation with a fellowship program. Together, they provide ideas, information, new discoveries, and new researchers. Today's STAR fellows will become tomorrow's environmental experts working for industry, government agencies like EPA, and academic institutions. The loss of this program will further erode the Agency's capability to attract an excellent workforce and will reduce the amount of scientific information available to inform Agency decisions.

ACS supports increased funding for green chemistry and engineering programs to advance the development and use of innovative products and process, reducing or eliminating the use of hazardous substances. Because chemistry and chemical products fuel the economy of every industrialized nation, the tools and strategies chemists and chemical engineers develop will be instrumental in meeting the dual challenges of protecting the environment and strengthening the economy. The elimination of the Technology for Sustainable Environment research program under STAR was an unfortunate decision that hobbles the Agency's ability to work creatively with industry and others to carry out the mission through cost-effective technology substitution as opposed regulatory burdens.

Finally, ACS remains concerned about broader management issues raised by the long-term decline in support for EPA science and technology programs. ACS understands the often confrontational nature of the regulatory process; however, EPA's organizational structure reinforces this tension by housing the Agency's main scientific functions in an office that is:

- Inadequately funded;
- Not budgeted independently or separately bylined in the annual appropriations process;
- Not often given specific authorizing legislation;
- Forced to compete with its own internal offices—its principal customers—for attention and resources; and
- Often criticized for the quality of its science and its inability to apply this science to environmental decisions.

In previous Congresses, the Science Committee passed legislation addressing many of these issues; unfortunately the situation today is even more important and urgent. The ability of the government to marshal scientific expertise and resources in the wake of the terrorist attacks has been tested severely. EPA has applied its expertise and workforce to the anthrax clean up, testing and assessment at the World Trade Center site, and other efforts. New issues also have arisen, such as the need to assure that access to government information does not provide tools to terrorists and the need for stronger data quality standards within government agencies. ACS endorses the creation of a Deputy Administrator for Science and Technology, as suggested by the National Research Council's report in 2000, *Strengthening Science at the U.S. Environmental Protection Agency*. A Deputy Administrator for Science and Technology would add considerably to an effective and efficient EPA response to these challenges.

ACS is a long-term advocate for increased attention to research programs at EPA, both in budgetary and in management terms, and our enthusiasm for these programs remains strong. We also appreciate the Science Committees support for EPA Science and Technology programs and look forward to working with the Committee, Congress, and the Administration to ensure their future vitality. ACS thanks the Committee for this opportunity to submit its written testimony and would be happy to clarify, expound, or answer any questions made in this written testimony.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON D.C. 20460

OFFICE OF THE ADMINISTRATOR
SCIENCE ADVISORY BOARD

March 30, 2006

EPA-SAB-ADV-06-003

The Honorable Stephen L. Johnson
Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

Subject: Science and Research Budgets for the U.S. Environmental Protection Agency
for Fiscal Year 2007; An Advisory Report by the Science Advisory Board

Dear Administrator Johnson:

Over the past few years, the chartered Science Advisory Board (Board) has been working with EPA to review the Agency's science and research programs and budget on a systematic and ongoing basis. This year the Board met in Washington, DC on March 2-3, 2006 to review the EPA science and research budget for FY 2007. The Board appreciates the opportunity to provide you with advice on this important matter.

The Board is aware of the budget pressures that we face as a nation in these difficult times. However, as in previous years, the Board is gravely concerned with the declining resources available to EPA's Office of Research and Development (ORD). On March 16, I provided testimony before the U.S. House of Representatives Committee on Science Subcommittee on Environment, Technology and Standards on EPA's science research budget. My testimony is attached to this report. Between 2004 and the current FY 2007 proposal, the inflation adjusted budget for ORD has declined by as much as 16%. Yet, the environmental problems faced by the Agency have grown and become increasingly complex, a trend that will surely continue over the coming decades. The erosion of research and development remains a serious impediment to the Agency's ability to meet its mission of protecting human health and the environment through science-based initiatives. This fall-off in the development of scientific knowledge will increasingly have international competitiveness dimensions as we lag our competitors in developing new technologies using new approaches. It is the opinion of the Board that EPA's research and development resources are grossly inadequate to address the scientific complexities of the nation's environmental protection needs.

Given the available limited resources, the Board understands that the Agency must make hard choices to best accommodate EPA's five environmental goals areas, i.e., clean air, clean water, land preservation and restoration, healthy communities and ecosystems, and compliance and stewardship. However, there are several issues in the FY 2007 request that concern the Board, some of which have persisted for several years.

- The proportion of EPA's research budget devoted to basic science or "core" issues has markedly and rapidly been reduced from as much as 60% only a few years ago to about 30% in the FY 2007 budget. The level of near term problem driven research has increased from about 40% to nearly 70%;
- There appears to be a systematic bias against ecosystem research in the Agency – this program has sustained a decrease of nearly 26 percent since 2004. The \$79 million for ecological research in the proposed 2007 budget amounts to just 15% of the overall ORD research budget. Over the past several years the Board has called on both the Agency and the Congress to revitalize, raise the profile of, and increase the funding for ecological research at EPA. We are distressed that instead, work in this area continues to decline;
- The Board is concerned that EPA's Homeland Security Program appears to be drawing resources away from other essential research programs. We are also concerned that the work may be too focused on individual devices and sub-systems, without first understanding broad level issues such as how effective alternative approaches can hope to be in providing needed protection at an affordable cost. The Board is also concerned that current programs are not sufficiently informed by the behavioral and social sciences to effectively manage and communicate the homeland security research and risk results to the general public.
- The Board is troubled by the ongoing difficulty that EPA has had with the application of the OMB Performance Assessment Rating Tool or "PART." EPA should continue to work to improve its performance, outcomes, and accountability systems to better communicate the benefits of research, including fundamental research, for the protection of human health and the environment.
- EPA has mature scientific staff reaching retirement age, and the Agency will face significant staffing challenges in environmental sciences, engineering, economics, behavioral, and decision sciences in the next five to ten years. The proposed reduction in the STAR Fellowship program will further exacerbate the workforce planning for the coming years.

The Board plans to have further discussions with ORD soon and we will provide additional advice as the Agency plans for its budget request for FY 2008. We look forward to receiving your response to this advisory report.

Sincerely,

/signed/

Dr. M. Granger Morgan, Chair
EPA Science Advisory Board

NOTICE

This report has been written as part of the activities of the EPA Science Advisory Board (SAB), a public advisory group providing extramural scientific information and advice to the Administrator and other officials of the Environmental Protection Agency. The SAB is structured to provide balanced, expert assessment of scientific matters related to problems facing the Agency. This report has not been reviewed for approval by the Agency and, hence, the contents of this report do not necessarily represent the views and policies of the Environmental Protection Agency, nor of other agencies in the Executive Branch of the Federal government, nor does mention of trade names of commercial products constitute a recommendation for use. Reports of the SAB are posted on the EPA website at <http://www.epa.gov/sab>.

**U.S. Environmental Protection Agency
Science Advisory Board
2007 Budget Review Participants
March 2-3, 2006**

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Dr. Lauren Zeise, California Environmental Protection Agency, Oakland, CA

SCIENCE ADVISORY BOARD STAFF

Mr. Thomas Miller, Designated Federal Officer, U.S. Environmental Protection Agency, Washington, DC

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1. INTRODUCTION

Over the past few years, the chartered Science Advisory Board (Board) has been working with EPA to review the Agency's science and research programs and budget on a systematic and ongoing basis. This year the Board met in Washington, DC on March 2-3, 2006 to review the FY 2007 EPA research budget.

The Board is traditionally guided in its consideration of EPA's research budget by a charge that asks if EPA's science programs align with the strategic priorities that have been articulated to guide the EPA mission; whether the programs reflect coordination and cooperation both inside and outside of EPA; and whether EPA's science programs are positioned to address the nation's emerging environmental issues. For the FY 2007 research advisory, the SAB also considered the program from the strategic perspective of whether significant research was missing and also the changing trends in EPA's overall research program. This year, the SAB also expanded its consideration of Regional Office science issues as a result of several events that occurred during 2005 that highlighted the need for science research and technical support to the EPA Regional Offices.

The Agency provided several types of background information to the SAB, ranging from budget documents to research program descriptions. Included were: a) EPA's FY 2007 Budget Summary (www.epa.gov/ocfo/budget/2007/2007bib.pdf); b) Portions of the FY 2007 Annual Performance Plan and Congressional Justification (www.epa.gov/ocfo/budget/2007/2007cj.htm); c) US EPA ORD Program/Project Descriptions (18 separate summaries), and d) several resource tables.

Members of the SAB were assigned the lead on one or more specific research Program/Projects prior to the date of the meeting. During the March 2 – 3, 2006 meeting, Members discussed Program/Projects with EPA representatives using logically grouped clusters and then developed their consensus remarks on each as they decided to be necessary. The groupings used were: a) Air, b) Water --including Ecosystems, c) Human Health, d) Technology, e) Economics and Decision Sciences, f) Homeland Security, and g) STAR/Fellowships. These discussions led to a series of conclusions by the SAB which are discussed in the report sections that follow. They also provided the basis for the Congressional testimony delivered on the issue by Dr. M. Granger Morgan on March 16, 2006 (this testimony before the Subcommittee on Environment, Technology and Standards of the Committee on Science of the U.S. House of Representatives, The Honorable Vernon J. Ehlers, Chair, is in Attachment A).

Between 2004 and the proposal for 2007, the inflation adjusted¹ budget for EPA's Office of Research and Development has declined by just over 16%. However, the environmental problems that face EPA have grown in number and complexity, a trend that will continue over the coming decades, and these environmental issues will also increasingly be linked to the international competitiveness and relationships of the United States and other nations.

¹ Computed using the NASA Gross Domestic Product Deflator Inflation Calculator, available at <http://cost.jsc.nasa.gov/inflateGDP.html>

2. AIR RESEARCH PROGRAMS

The Air Research Program provides knowledge, information/data, and tools that provides the scientific foundation for the Agency to fulfill its responsibilities under the Clean Air Act. The Agency focuses its research on National Ambient Air Quality Standards (NAAQS) pollutants and also studies Hazardous air pollutants (HAPs). This research intends to improve the efficacy of science-based regulations that protect human health and the environment from significant exposures to certain air pollutants. In FY 2007, EPA's air research will continue to strengthen the scientific basis for the periodic review and implementation of air quality standards. This research is concentrated on particulate matter (PM), but includes other NAAQS pollutants in a cycle that repeats (nominally) every 5 years. Air toxics research will begin to transition toward a Multiple Air Pollutant Program (MAPP) focus in FY 2007. The budget proposal is that Air Research be funded at \$77.7 million, down from \$90.4 million in 2006 (note: \$7.4 million of the 2006 total reflected Congressional add-ons thus, the actual comparative figure for 2006 would be \$83.0 million – thus the drop in funding without the add-ons would be a decrease from \$83 to \$77 million or about \$6 million across air toxics, NAAQS, and Global Change).

There is a need for greater funding for the Air Research Program. The subsections immediately below point to a number of key issues and needs.

2.1. Criteria Pollutants and Multi-Pollutant Analyses

Multi-Pollutant Focus of the Air Program: The Agency has correctly determined that we need to move from addressing one pollutant at a time to addressing sources of mixtures of pollutants in a Multiple Air Pollutant Program, as recommended by the National Research Council. Of key importance is the fact that we are exposed to a mixture of criteria and hazardous air pollutants at any given time and thus there is a need to examine health and welfare effects on a holistic basis. This shift in emphasis has a potential to save money in the future. However, realizing the benefits of a multi-pollutant focus will require an initial increase in funding to conduct research to develop the tools and information necessary to support the Agency's air programs. This initial investment will have the potential to pay future dividends in the form of regulations that are more reflective of real world exposures.

Particulate Matter Research: EPA's air research program has played a major role in helping to determine the role of fine particles in causing adverse human health effects. Most of the research related to fine particles comes from urban environments, because that is where there are sufficient people to conduct quality epidemiology studies.

There is now a critical need to determine the toxicity of coarse particles, especially rural dusts generated from such industries as mining and agricultural activities. A new NAAQS for coarse particles (PM_{10-2.5}) has been proposed for promulgation later this year and because the current understanding of the role of coarse particles in producing adverse health effects is weak, the Agency needs more information on the nature of coarse particles in urban and rural settings

and the potential health effects of these particles from a variety of sources including agriculture and mining. Additional resources will be required to begin the study of coarse particles (e.g., the relationship of the composition of particles and their physical size on associated health effects) and at the same time continue to make the significant investments needed to understand the health and ecological effects of fine particles. Thus, more research and continued funding is urgently needed in the area of particulate matter where it is necessary to integrate criteria and hazardous pollutants and increase the depth of study on coarse particulate matter. Decreasing the overall air pollution research budget is clearly counterproductive.

Criteria Documents: There is an urgent need for increased staffing to get the Agency out of the vicious cycle of rushed development of criteria documents. The development of criteria documents is an essential step in linking the output of the EPA's experimental research to the development of science-based regulations for criteria pollutants. The ORD group responsible for preparing Criteria Documents is greatly under-staffed and often only one person is available to both oversee the production of these documents and for writing the critical synthesis chapters that pull together the voluminous amounts of research data from specific chapters of the document into conclusions on the available science. The result of this is that completion of Criteria Documents is continually behind time resulting in lawsuits and Court Orders that create a work environment of duress that impedes the completion and quality of these documents and lead to the need for additional revisions of draft documents

Need for Resources for Emission Monitoring and Modeling: EPA needs resources for emissions monitoring and modeling (e.g., to deploy monitoring networks that can provide data on fine particles and mercury).

EPA has made major research investments in evaluating the role of ultrafine particles in inducing adverse health effects. However, EPA has yet to deploy a monitoring network that will provide the data sets needed to support health effects modeling and enhanced epidemiologic study. These data, and the subsequent studies and modeling will help to inform EPA policy-makers on the need for a particle number NAAQS.

EPA promulgated the Clean Air Mercury Rule (CAMR) and the Clean Air Interstate Rule (CAIR). There is a monitoring infrastructure in place to determine the changes in sulfate and nitrate levels in the air (CASTNET, IMPROVE, STN), but there is no capability for EPA to measure total gaseous mercury (TGM) and reactive gaseous mercury (RGM) over the spatial and temporal scales needed to assess the effectiveness of the CAMR. Further, there is virtually no capability to examine the global mass-balance of mercury. This baseline is likely to be changing because of the rapid increase in the use of fossil fuels in Asia (China, India, etc.). (See subsection 2.3 below for more information on Mercury research).

The Agency did an excellent job of strategically evaluating their current air monitoring system and matching their data needs and monitoring approaches for collecting critical data. However, rather than using the results of this strategic approach to maximize the benefits of their current investments in this area, the strategic analysis was used to reduce their monitoring resources. These reductions will diminish EPA's ability to make informed decisions on the effective and efficient management of air quality.

As part of the monitoring strategy, EPA properly identified the need to integrate new technology into the monitoring network through a limited number of "supersites" that will evolve and change over time. However, resources have not been available to support this activity that is an important and integral part of the overall air monitoring network.

The Agency also has a need for research information on atmospheric fate and transport to support their consideration of regulatory mechanisms. In the Program Area for Air Toxics and Quality, we commend the Agency for its efforts to support market-based methods for allocating emissions reduction. Even though benefit-cost analysis is not to be used for setting ambient standards, economists advocate the importance of its use in devising mechanisms to meet standards at the lowest possible overall cost to society. Market-based methods, such as tradable emissions permits, have been very successful in the SO₂ allowance program and for RECLAIM in Los Angeles.

However, the idealized marketable emissions permit program applies to uniformly mixing pollutants, where it does not matter which sources generate the pollution (e.g., atmospheric carbon -- as CO₂ -- is an approximately uniformly mixing pollutant). Trading programs may need to be modified where pollutants are not uniformly mixing (i.e. when there may be "hot spots"). Sometimes, these modifications can be very crude, such as a restriction that permits may not be sold upwind (e.g. RECLAIM's differentiation between inland and coastal zones), but more sophisticated modifications are potentially available.

In theory, it is possible to design elaborate systems of "ambient permits," where firms purchase the right to contribute a certain amount to ambient concentration levels at one or more receptor sites (permits for each receptor site form a distinct market). To implement such an ambient permit system, however, it is necessary to "map," back to each source, the quantity of emissions that is associated with a given change in ambient concentration at the receptor site. This connection requires a statistically estimated empirical model that connects changes in emission levels from each source with changes in ambient concentrations at receptor sites (presumably located at suspected hot spots).

Research resources are needed to improve the quantification of the connections between ambient levels (what matters to human and ecosystem health) and the patterns of emissions from different sources (what can be controlled).

The SAB is concerned that the success of simple tradable emissions permits programs will degrade as they are implemented more widely, in contexts that lie farther from the idealized case of a uniformly mixing pollutant. Tradable ambient permits programs have much greater information demands. If it is necessary to worry that a tradable emissions permit program might exacerbate hot spots, despite controlling overall emissions levels, then it is necessary to plan for empirically based and defensible fate-and-transport models that will form the basis for ambient permit systems (see the mercury case in "c" below for more information on this issue).

2.2. EPA's Global Change Program

The EPA Global Change Program received \$19.6M in FY2005, \$18.6M in FY2006, and is proposed to receive \$17.5M in FY2007. This proposed amount represents an approximate 15% decrease over the time period, in standard dollars.

As designed, the Global Change Program has five components: a) Assessments at the National/Regional level, b) Air quality, c) Ecosystems, d) Water quality, and Human health. The assessment activity is legislatively mandated and occurs through the Climate Change Science Program. The other four components have both intramural and extramural activities.

Because the Global Change program's has mandated obligations for assessment within the Climate Change Science Program, the cuts in the FY2007 budget will have to be taken from the other four program components. These cuts will eliminate almost all of EPA's research on the impacts of global change on water quality, and will essentially eliminate EPA's intramural research programs on the effects of global change on air quality and ecosystems health. These cuts cause two serious problems. First, the lack of an EPA based program on the impact of global change on national water quality and the elimination of intra-mural research on air quality and ecosystems are inconsistent with EPA's mission. Second, the elimination of intramural programs will seriously impact EPA's human infrastructure resources (human capital) and make it much more difficult to address these issues in the future. These two issues are discussed further in the paragraphs that follow.

Climate change and water quality: The Agency's climate change research appears to be limited to impact of and adaptations to climate change, rather than mitigation. Other agencies are concerned with the implications of climate change on the supplies of water (i.e. water *quantities*) but not water quality. EPA should retain its interest in the implications of climate change for water *quality*.

Human Resources: Many EPA scientists and science-based professionals are moving toward retirement age. In addition, fewer investments in intramural research will lead to fewer opportunities for providing persons with expertise in specific areas such as global change. It will be important to ensure the continuation of resources to support EPA's inhouse development of such expertise and to continue to support graduate fellowship and grants programs to help provide the knowledgeable staff to fill these positions and to meet EPA's needs.

2.3. Mercury Research Program

The proposed FY 2007 budget for mercury research represents a reduction of about 29% from the level of two years ago (2005 enacted), although at \$3.7-million the proposed FY 2007 amount is an increase of \$300k over 2006 enacted.

Because mercury is persistent in the environment and because it is a serious neurotoxin, the agency has mounted a major control effort, to limit emissions from sources such as large coal-fired power plants. In the past this program largely supported work on monitoring and control technology. From this work, measurement of "wet deposition" is available in some

regions, but measures of “dry deposition” are still being developed and ambient concentrations are more challenging to devise.

With the passage of the Clean Air Mercury Rule, this program acquired additional responsibilities to evaluate the effectiveness of control measures. It is apparent that EPA can not adequately address all its current mercury-related responsibilities at the current budget level.

With respect to the CAMR, it is therefore important to determine whether hot spots exist for mercury. Tradable permit programs are best-suited to “fund pollutants” for which the environment has some assimilative capacity. They are less well-suited to stock pollutants, where the social costs of pollution depend on the cumulative amounts received in the environment. Stock pollutants may imply that constraints need to be placed not on annual emissions, but on total cumulative emissions. This would make the stock of available permits an “exhaustible resource,” and a need for firms to manage these as a mine-owner might manage the exploitation of an exhaustible mineral resource.

EPA’s lack of adequate research resources to meet its programmatic mission for mercury is troubling, but there is a much more fundamental reason why the very low level of support for mercury research poses a serious problem. As acknowledged in the Agency’s background information for this review, mercury pollution exists on a planetary scale because mercury is transported across oceans and continents. While some comes from human sources, such as power plants all over the world, much comes from natural sources such as volcanoes and other geological sources. We simply do not know where all the mercury comes from, where it goes, how much exists in different chemical forms, and how all the transport and transformation occurs. Without this knowledge, it will be impossible to know how well the current or future control programs will be able to reduce human and ecological exposures. There is a US interagency group responsible, as well as an international (UNEP) group considering this issue. However, in our view the support for research on global sources, transport, and fates is seriously deficient. EPA should be funded to play a leading role in such an effort, but at the current budget levels can not even begin to address the issue.

2.4. Research Program Evaluations

It is apparent that evaluations of research program effectiveness will continue to be conducted using the Program Assessment Rating Tool (PART). Therefore, it will be important for the Agency to anticipate the “outcome” measures that will be used in these evaluations and to collect data explicitly on these different outcome measures. In the Air Toxics and Quality Program area, it appears that the outcome measures to be used consist almost entirely of data such as a cumulative percent reduction in population-weighted ambient concentration of “pollutant X” from a 2003 baseline. Presumably, this measure translates into some expected improvement in human health.

Human exposure and health outcomes are indeed important concerns. However, since only human populations seem to be counted in developing these outcome measures, it appears that ecosystem health does not “count.” The Agency should be very careful not to build into their accountability data a systematic bias against ecosystem health or against the more fundamental types of research that are often needed to develop a proper understanding of

complex environmental and ecological systems. Admittedly, the greatest ambient concentrations of many pollutants will occur in conjunction with the greatest concentrations of people (i.e. in urban areas). Ambient concentration monitoring in less-populated areas may await more-sophisticated remote-sensing technologies, but the fact that current measures disenfranchise ecosystem health should not pass unnoticed and the Agency should work with OMB to educate them on the need to adopt a broader metric.

The existing evaluation process (PART) apparently requires a significant use of Agency resources. In some cases, these may be one-time costs, since one program's scrutiny and measures development could help other Agency programs to realign their ongoing investments in accountability data development towards outcome measures that are more useful to the current evaluation process. However, it is essential for the Agency to negotiate the weights to be used for evaluations in less-standardizable programs. In particular, EPA should insist that while one-dimensional summaries are useful in evaluating program successes, they necessitate the use of weights on different program attributes and that those attributes are measured in different units that are difficult to compare. Further, for the current system, many of these weights likely do not reflect social preferences for the country as a whole. Instead, they appear to be negotiated between OMB and the Agency. Arbitrary weights merely reflect the preferences of the group(s) involved in negotiating them. It is possible that neither group may have the overall (intertemporal) welfare of society as its objective function. The "right" set of weights to use in a metric such as the PART is normative (a matter of opinion, rather than a matter of fact), should include inputs from the most affected, and depends upon what one is seeking to maximize.

Also somewhat troubling about the current evaluation process is the discreteness of the categories into which different programs are placed. Inappropriate weights, and inappropriate formulas for combining the components of the PART formula, both contribute to "errors" in the assignment of numeric scores. The PART score is interpreted as a point value, and the score for a program places it into one of five categories, creating an artificial impression of certainty. Ideally, the rating would acknowledge the existence of some doubt about the correct magnitudes of the weights and the correct functional form used to combine program attributes with these weights. A PART score should be a range, at best. That range may lie entirely within one of the five designations, or it may span two or more categories.

3. WATER RESEARCH PROGRAMS

3.1. Drinking Water Program Budget Comments

The SAB believes that the Goals and Metrics for meeting the Safe Drinking Water Act mandates will be attained and measured with the support of ORD's research products developed for the Office of Water, Regional Offices, States, and municipalities.

The drinking water research program has been reviewed by the EPA SAB, the ORD's Board of Scientific Counselors, and by OMB using the PART. In the PART evaluation, the drinking water research program was rated as adequate. The Board of Scientific Counselors recently produced a final report (Oct. 17, 2005) on the "Review of the Office and Research and Development's Drinking Water Research Program at the U.S. Environmental Protection Agency" and had a series of recommendations. These recommendations are incorporated into the recommendations made by the SAB that follow.

- 1) The drinking water research program Multi-Year Plan is being revised during FY 2006. In addition, the Agency has decreased their three Long Term Goals into two in this area. It appears that collapsing the three LTGs from the past into two was driven by considerations associated with the PART process and not by a scientific rationale. From a science perspective the themes that were in Long Term Goal 3 [source water protection (watershed) and distribution systems] have some commonality in that both the source water protection (watershed) and distribution systems are highly complex, difficult to monitor and require multiple-scale assessments involving in-situ systems (gauges and sensors) as well as extensive modeling efforts. Therefore, the Agency should consider returning to three Long Term Goals in this area instead of the two which now exist because of the possibility that parts of the program (e.g., source water and distribution systems) might not receive adequate consideration if merged into the other LTGs. In revising its plan, EPA should clearly reflect the need for long-term basic research and work to clarify their Long Term Goals, as well as to develop initiatives that recognize their expanded client base that now includes communities. EPA should incorporate this into their efforts to identify measurable outcomes of activities covered by this program.
- 2) EPA intends to initiate research on drinking water distribution system infrastructure (e.g., leak detection, assessment of high risk mains, cost effective rehabilitation and replacement, distribution system design). Research on technologies to decrease operating costs of distribution systems provides an opportunity to define outcomes that can be readily achieved via EPA's external and internal research programs. Currently, these programs have different emphases, i.e. the internal program focuses on applied research and the externally funded research focuses on basic research. EPA should articulate a budget and activity plan that will clearly show the research strategies that will be used to implement this new distribution system research initiative.

- 3) EPA's research budget reduces the regulated contaminant activity by nearly one million dollars. Even though EPA considers this research to be a "low priority research area" there is a need to continue research on regulated contaminants because some are still in the implementation stage of regulation and all drinking water standards will undergo a 6 year review to determine whether there is a need to revise their existing standard. These reviews are mandated by the US Congress. Thus, EPA should determine the critical level of funds required to achieve its legislated mandate in this area. In addition, the strategy for meeting the mandate under this reduced funding scenario should be outlined.
- 4) EPA's CCL research is one area that focuses on the risks associated with emerging contaminants. In evaluating whether these contaminants might need to be regulated, EPA must evaluate both exposure pathways (transport and fate, removal by treatment, exposure to the public, as well as the ability to reduce the exposure (e.g. treatment controls) and health impacts. Thus, funding in the Water Quality Research side may impact the effectiveness of the Drinking Water research in achieving the LTGs and perhaps Annual Performance Measures. This interrelationship among these two research programs should be better articulated.
- 5) The SAB supports and encourages EPA's research collaborations with other agencies (e.g. USGS); however, it is ultimately EPA that must link the environment and human health together thus, EPA's research programs must be funded at a level that is adequate to do the task. EPA is leading the research in pathogen studies in water particularly via molecular characterization. Pharmaceuticals and Mercury are other examples of contaminants that move through the environment via various matrices (land/air/water) and these contaminants and others, require a national data base on water quality to eventually understand the impact on drinking water and human health.
- 6) EPA's Program in Drinking water research needs to ensure that it includes activities that will allow the Agency to include scientific advances in microbial risk assessment in its evaluations of the public health benefits from reduction of contaminants that are microbial pathogens.
- 7) The SAB supports EPA's goal to achieve national and global scientific leadership in issues relevant to safe drinking water. An assessment of the critical areas where EPA can position itself to take the global lead is needed as is a strategy to move the leadership program forward. Thus investment and participation in organizations like the Global Water Research Coalition is appropriate and EPA could incorporate this activity within its drinking water research program in the future.

3.2. Water Quality

The water quality research program provides ORD's research and expertise in support of the development of water quality criteria for designated uses of aquatic systems that are intended to protect human health and the environment and research on the beneficial use of biosolids. The research program also develops tools to assist in the selection of watershed management technologies in protecting and restoring these systems and in forecasting their effectiveness. The Water Quality Research Program budget has a net increase of nearly \$6 million dollars in FY

2007. These increases are for new activities on the protection of ecosystems with an emphasis on the impacts of multiple stressors from CAFOs on water quality (~\$2.8M), and a new investment in innovative strategies for sustainable wastewater infrastructure (~\$5M). These investments are worthwhile and fit with the mission and goals of the program.

The water quality research program is clearly relevant to EPA's mission and it is effectively coordinated with other program and regional offices within the Agency. There is also a history of coordination with the European Union and the private sector in certain areas such as ecological risk assessment. It is less clear how it coordinates with other Federal agencies that also have responsibilities for water resources.

The Water Quality Research Program has linkages to research needs in several other EPA programs, for example, EPA's ecological research program and EPA's drinking water program. However, the interrelations among these programs are not clearly articulated in the materials provided to the SAB. By definition these programs are related and require coordination. Specifically, the SAB is concerned that the substantial decreases in funding ecological research have not been mitigated by any funding or corresponding increase in funding or programs in water quality research. Further, decreases in funding for mercury fate and transport and exposures to endocrine disrupting chemicals are not being replaced by efforts in water quality research. All funding for the impact of climate change on water quality has been eliminated. Thus while some goals within the water quality research program are being adequately funded, the ecosystem goals are not being adequately funded by either water quality or ecological research.

The Agency is also considering implementation of watershed pollutant trading as a means of achieving water quality goals. To do this, EPA will need to evaluate and align the goals of the water quality and ecological science research programs. This will also require that EPA also strengthen its scientific knowledge base and research activities that address ecological uncertainties.

4. ECOLOGICAL RESEARCH

The Ecological Research Program has three major components:

- i) condition assessment and accountability,
- ii) development of methods and tools (primarily diagnostic), and
- iii) research on ecological services and restoration.

In the FY 2007 budget, ecosystems research programs are once again the target of significant resource reductions (approximately 10% relative to FY 2006). The SAB is greatly concerned with EPA's continuing reductions in Ecological research funding. The ecological research budgets have removed nearly \$30million since 2004. Even though the Congress has restored some of these reductions, real reductions of approximately \$20 million have been taken in the STAR ecosystems grant program during that time.

The total budget for Ecological research is down \$ 6.1 million in the 2007 budget. This reduction in budget is inconsistent with the prevailing position that such research is critical for the Agency to better manage and track the benefits of such management of the environment. A number of external Agency Advisory groups, such as the Board of Scientific Counselors, the National Academy of Sciences, and even EPA Science Advisory Board groups such as Environmental Processes and Effects Committee and Committee on the Valuation and Protection of Ecological Systems and Services, have explicitly expressed support for greater research in this area.

Understanding the response of ecosystems to biological, chemical and physical stress is essential for protecting the environment and the humans that live in it. The short-sightedness of the continued ecosystems research budget decreases is clearly demonstrated by events of the 2005 U.S. hurricane season. Ecosystems such as coastal wetlands and forests provide significant ecological service by acting as natural buffers to dampen the damaging force of such severe storms. Had the nation possessed the scientific understanding of the services provided by those coastal ecosystems and used that information to manage their protection, the costly damage associated with storms such as *Katrina* and *Rita* would most likely have been greatly diminished.

The SAB recommends that the funding for this key area should be reestablished and expanded in future years. Further, the Agency needs to do a better job of communicating the importance of this research area and the breadth of substantive supporters that it has for these research efforts. While motivated by real-world problems, a significant portion of the Agency's ecosystem research needs to be fundamental in nature, and the Agency also needs to do a better job of explaining this fact.

The U.S. Environmental protection Agency's Ecological Research Program directly supports EPA's mission objectives and it appears to be effectively linked to programs within the agency and to the Agency's Regional Offices and laboratories, as well as to the states. However, the linkage to other federal agencies, and non-government ecological organizations has not been articulated as clearly. The agency needs to advance its efforts to demonstrate this coordination

with other agencies so that it can better communicate those connections and their collaboration in future PART assessments and budget discussions.

The budget for Ecological Research is actually part of a budget area titled "Human health and Ecosystems. Although there is no indication that this is a barrier to effective planning, it seems this valuable area should stand on its own as a research focus area. The Agency should consider separating this budget category into a separate area.

It was noted during further discussions with the agency that two principle factors may well have contributed to the reduction in the 2007 budget for Ecological research. First, the most recent update of the OMB PART assessment resulted in a rating of *ineffective* for this program. It appears that the PART assessment focused primarily on one aspect of the Ecological Research program, i.e., the Environmental Monitoring and Assessment Program (EMAP), which is only about 1/3 of the actual budget expenditures. In efforts to justify this program the agency either failed to communicate or OMB did not understand the EMAP program's value to environmental management decisions and actions. In particular the program was given low scores in areas of the PART assessment related to the uniqueness of the research, clarity on aggressive timelines for achieving deliverables and related cost-effectiveness methods rather than the scientific relevance of this area of research.

The Ecological Research Program has developed important probabilistic tools (e.g. Environmental Monitoring and Assessment Program) to assess the status and trends of aquatic and terrestrial resources (streams, lakes, estuaries, forests, etc.) at a variety of scales (regional, and national).

It is important to recognize that although Water Quality research and Ecological research are placed into different budget areas these two programs are critically linked to each other. The SAB emphasizes that reductions to ecosystems research can and will lead to time, data or other resource limitations for accomplishing EPA's Water Quality research objectives. The agency needs to aggressively improve its communication of the broader value of its Ecological Research program and its critical and systematic linkage to other research and also program areas such as the Water Quality program.

Additionally, losses in several ecosystems programs may have much greater or amplified impacts on progress on other research programs. The logic seems to be to cut programs because of perceived redundancies with programs of other agencies or because of perceived redundancies with other programs within EPA. However, those making budget decisions need to recognize that some research that seems to be redundant because of the superficial information available to them can in reality be a lynch-pin in a larger, overarching and integrated research program that is conducted by multiple organizations, each of which specializes in areas where they have explicit missions and expertise. Examples of this include the elimination of the global climate change program funding of water quality research, and the reduction in extramural research in mercury fate and transport. It is difficult to see how EPA will achieve some of its strategic goals with continuous erosion of these small but important pieces that are not understood within a larger context.

It is obvious that in the broad area of Ecological research there are many important gaps in EPA and the nation's knowledge of the environment that are worth bringing into the research program as other projects are completed. Answering a small piece of the puzzle does not remove the need to study other issues that are also quite important to EPA's mission. Ecological Research is not a small definable set of activities that can be reduced one-by-one like a list of steps in a project. There are many of important research initiatives waiting to be addressed. These are not of lower importance rather they may only be waiting on other research to be completed so that they can be placed onto the active research agenda.

An important consideration was highlighted for the SAB through anecdotal information on how EPA sets its specific goals for research. It seems to be that the agency must negotiate the specific language that specifies its goals. In one example of this practice, it appears that EPA staff was not allowed to include a goal that focused on regional and local decision-making needs. The practical outcome of this was that EPA was not able to include an important focus of ORD's activity, support of real-world decision-making on actions needed to respond to localized events. Therefore, it appears that assessments of value and performance of the research is constrained to National policy making. In reality the more likely key audience for the ecological research is a regional, state, and local scientific communities that assesses real problems at regional and local levels (e.g., regional ecological systems such as watersheds) while implementing specific federal regulations in their own localities. During its meeting on March 2-3, 2006, the SAB received an excellent and effective presentation of such an example by Regional and ORD representatives (i.e., the Georges Creek, MD case that demonstrated an explicit link between EPA ORD research and an outcome of improved stream quality in Maryland). The SAB believes that this is a powerful example showing an important real-world environmental improvement outcome that was directly related to EPA's research program. This lack of linkage to of ecological research to Regional benefits may well have constrained the agency as it attempted to demonstrate the value of the ecological research during the PART review.

The SAB believes that the agency should not be constrained in setting goals that demonstrate the alignment of its research with attaining real world outcomes that assist state and local governments to implement Federal mandates.

Finally, Long Term Goal 3 (Ecological Services & Restoration) appears to address impacts on ecosystem services. This is an important emerging environmental issue. EPA must continue to move beyond status and trends data and focus more on linking their regulatory efforts to ecological services protected or restored. EPA should pursue research to develop the capability to demonstrate how regulatory programs impact ecological services. EPA also needs to develop analytical approaches for regional and local assessments and at the same time not abandon research on national level tools.

5. HUMAN HEALTH RESEARCH

5.1. Human Health Research

The Human Health Research Program is one of only two core research programs in the Agency, the other being ecology. Core research programs generate, and provide incentive for researchers outside EPA to generate critical parts of the basic scientific knowledge that underpins EPA's applied science program and the regional and headquarters operating programs that carry out EPA's human health and environmental protection missions. According to comments made by EPA's Assistant Administrator for Research and Development, during the SAB March 3 session, the proportion of EPA's research budget devoted to core science issues has changed from what used to be close to 60% core to 40% program driven research to about 30% core and 70% problem driven research. The purpose of this program is to provide to risk assessors, and other interested parties, scientific data that are necessary to assess and to make important decisions regarding human health risks. The program develops and collects the scientific information to make decisions about exposure that provide appropriate protection to the health of humans. These policy decisions often involve substantial monetary impacts to industry, governmental agencies, and eventually to the public that may amount to many millions of dollars. In contrast, errors in these policy decisions may lead to risks to living persons or even to future generations.

EPA focuses on four long-term goals, to provide the science necessary for risk assessors and managers to make the best informed decisions based on science. These Long Term Goals include efforts to: reduce uncertainty using mechanistic information, to characterize the cumulative and aggregated risks from multiple chemicals to characterize the susceptible populations to provide adequate protection for all groups by age and by factors related to genetics such as race and ethnicity and develop principles to evaluate risk management decisions.

This program has been evaluated by both the ORD Board of Scientific Counselors and by EPA and OMB using the PART process. The BOSC determined that the mission of this research program was being well conducted. In addition, the SAB's scientific panels have also given parts of the programs that have reviewed their general approval. At the same time, the SAB has also asked for more and more science from EPA as it carries out the Agency's mandates. The SAB has also asked for a greater level of review of the science that is used in regulation.

As the program has continued to work to fulfill these demands, the science and technology surrounding the information about human risks has grown rapidly. For example, the development of the fields of "omics" and the relationship of the information in these areas to human disease is increasing at previously undreamed of speeds. Therefore, EPA has more science to gather for each pollutant that it evaluates both from internal and external sources. In addition, the data are very complex and requires even more time, effort, and resources to integrate into a rational scheme for developing a regulation. As the agency science budget continues to be reduced, the number of evaluations that it can conduct decreases and evaluations that are carried out are delayed. In turn, this means that when a document is subjected to peer

review by scientific experts, the data are often old and more uncertainties have often identified. There is no easy solution to this problem. Thus, if EPA continues in this "spiral," it may be important to consider just how closely the scientific demands can be met in the future.

The preceding paragraphs have discussed primarily the problems encountered by a reduced capacity in Long-Term Goal 1. The SAB believes that all four goals are important and thus is concerned with the potential impacts associated with the reduced budgets in the other three goals. There, considering the risks of joint exposures to multiple chemicals will likely experience major delays. In goal 3, the Agency has had to withdraw their financial support for the National Children's study although they continue to look at the risks from exposures in the youngest of our population. However, other factors that can influence the risks both by life stage, especially the elderly, and the potential genetic differences by race or ethnicity will not be part of the current activities in any serious effort. The fourth aim is essentially to look at the public health consequences of the decisions made by the agency. This effort is also delayed.

There are also areas that the Human Health Program is not able to address adequately. While the Agency is collecting the data relevant to humans it has not, they have not extensively addressed the issue of the exposures. Its effort at collecting relevant data from other sources is also greatly delayed by lack of funds.

5.2. Computational Toxicology

The Computational Toxicology program focuses on improving the linkages in the source-outcome paradigm; providing tools for screening and prioritizing chemicals under regulatory review; and enhancing quantitative risk assessment. Efforts in this program appear to be targeted at supporting both human health assessments and ecological assessments. The program has a planned increase of about \$2.0 million in FY 2007.

The SAB commends the expanded investment in the Computational Toxicology research program. This investment is essential to providing EPA with the expertise and technologies necessary to keep pace with the rapid expansion in genomic and modeling sciences occurring in biomedical research. However, because the Computational Toxicology program is highly dependent on data inputs from other EPA human health and ecosystems research programs, the SAB is concerned that the flat or declining research investments in these associated areas will likely compromise the future effectiveness of this research investment.

5.3. Human Health Risk Assessment

EPA's Human Health Risk Assessment program includes the Integrated Risk Information System (IRIS) and other health hazard assessments; development of risk assessment guidance, methods, and models; and development of Air Quality Criteria Documents. The program reduces from \$39.4 to \$38.3 million in 2007. The cuts are in the children's health area while a \$0.5 million increase is provided to obtain peer reviews of IRIS assessments by the National Academy of Sciences.

Resources are planned to decrease in this program area, even though there is an increasing need for high quality risk information and increasing requirements for complex

scientific analyses at the EPA. There is a need to increase risk assessment research resources to support these efforts. For example, pharmacokinetic analyses are an essential component of dose response evaluations; data permitting, and exploration of pharmacodynamic approaches have also been recommended to the EPA. At a minimum such approaches would help to articulate the range of model uncertainty. It is important to recognize that even if EPA does not conduct research to improve how it incorporates more and more complex data into assessments, data continue to be gathered at a high rate, thus, without better methods, EPA will fall further behind in the risk assessment area.

Past involvement by outside groups in the review of EPA assessments, as well as the development of additional review requirements, have resulted in the advice that increases this complexity further. For example, the SAB strongly recommended the development of methodologies for quantitative uncertainty and variability analyses of toxicological parameters such as cancer unit risk values and reference doses (EPA SAB, 2004²). Further, the OMB's Risk Assessment Bulletin, if adopted in its present form, could in essence make such analyses a requirement. Demands on Agency risk assessment resources have also resulted from the Data Quality Act and OMB's Peer Review Bulletin. The need to address multiple pollutant exposures to support air program efforts is also clear. Agency products such as certain IRIS assessments and other health effects assessments (e.g., dioxin and trichloroethylene) are undergoing expensive reviews by the National Research Council. Without an increase in resources, the ability for the Agency to produce high quality assessments for the large number of chemicals of public health interest will be severely limited, as will the number of peer reviews that EPA can obtain from independent groups, such as the NAS as is planned in its IRIS program.

5.4. Safe Pesticides and Safe Products Research

This program focuses on research that addresses specific issues managed by the EPA Toxic Substances program and the EPA Pesticides program. This program complements research efforts in the Human Health and Ecosystem Research programs as well as those in the Human Health Risk Assessment, and Endocrine Disruptor programs. The efforts in this area: i) provide predictive tools for prioritization and enhanced interpretation of exposure, hazard identification and dose-response information; ii) create the scientific foundations for probabilistic risk assessment methods that protect natural populations of birds, fish and other wildlife; iii) provide the scientific foundation for guidance to reduce risks to human environments within communities, homes, workplaces; and iv) provide strategic scientific information and advice concerning novel or newly discovered hazards.

The Safe Pesticides and Safe Products Research program Presidential Budget for FY2007 is set at \$26.2M, down \$4.1M from the enacted budget funding for FY2006. The \$4.1M cut in the President's FY2007 budget is in fact funds in the FY2006 budget that were allocated to this program from a special allocation designated by Congress for added science and technology projects. These one-time funds were applied to special initiatives and grants related to this

² EPA Science Advisory Board. 2004. *EPA's Multimedia, Multipathway, and Multireceptor Risk Assessment (3MRA) Modeling System*. EPA-SAB-05-003, November, 2004. Available at: <http://www.epa.gov/sab>.

program's long term goals. The EPA budget notes that these decreases will impact biotechnology, and collaborative and risk related research efforts.

Projects included under Long Term Goals 1-4 are funded in the FY2007 budget. The major areas covered by these projects appear to be consistent with both the short-term and long-term research needs of the Office of Pesticide Programs and Toxic Substances (OPPTS). The SAB's greatest concern for this program area is not the proposed level of funding for FY2007 but the fact that the level of funding has remained flat for several years (notwithstanding the one-time increase in 2006) and in real dollar terms has consistently declined. The scientific demands on ORD research staff and OPPTS regulatory functions are becoming increasingly complex, and involve genomics, proteomics, genetic engineering, and endocrinology. The SAB recognizes that ORD cannot be expected to maintain large intramural or extramural research programs in each of the rapidly expanding areas of science and technology. However, ORD must have senior scientists who are capable of understanding these areas at an expert level and who can integrate research results from other government agencies, industry and academic research programs into its support of OPPTS policy formation and regulatory activities. If the ORD budget in this program area continues to decline in real dollar terms, it will not be able to maintain the scientific staff and infrastructure to fill this critical role.

Finally, the proposed FY2007 budget for this program will not permit ORD to launch a planned initiative to develop standard biomarker measures that the FIFRA Scientific Advisory Panel and other EPA panels have regularly stated are essential to the validation of the probabilistic risk assessment models that are increasingly important components used in the aggregate and cumulative risk assessments of pesticides and herbicides

5.5. Endocrine Disruptors

The endocrine disruptors program is organized to address a major nationally recognized human health and ecosystem health concern. The program long term goals are to: i) improve the underlying science regarding the effects, exposures, assessment, and risk management of endocrine disruptors; and ii) to determine the impact of endocrine disruptors on humans, wildlife, and the environment. The budget proposal for FY 2007 is for \$9.1 million, down from \$10.5 million in FY 2005 (as enacted).

The Endocrine Disruptor program was evaluated (using the PART process) during 2004 and it was the first USEPA program that received a passing score (adequate), a score not surpassed by any other program in the EPA. The Board of Scientific Councilors (BOSC) also evaluated this program in 2005. The BOSC found the endocrine disruptors program to be highly effective especially in view of an extremely limited budget in FY 2005 (\$10.4 million) and 2006 (\$10.5 million). The BOSC indicated that this budget was grossly under funded.

Despite the Endocrine Disruptor Program's focus on addressing a high national priority, and despite its conduct of this program in a scientifically high quality and efficient manner, the proposed 2007 President's budget cuts this program by \$1.4 million (10%). All of the cuts occurred in the STAR program, the extramural program that recruits the nation's academic community to address the endocrine disruptors science program needs. The SAB recommends that the budget for endocrine disruptors be reinstated.

6. TECHNOLOGY

6.1. Land Restoration and Preservation Research

The Land Research Program supports that Agency's objective of reducing or controlling potential risk to human health and the environment at contaminated waste sites by providing science to support decision making at complex sites. The program has two themes restoration and preservation. Resources come from the Science and Technology account (about \$10.5 million is budgeted for FY 2007) and the trust funds (\$21.9 million from Superfund; \$650 thousand from UST; \$900 thousand from Oil Spills). The S&T account that primarily supports the RCRA program research decreases by about \$1.0 million in 2007 and the Superfund account decreases by about \$1.0 million as well. Overall, the Goal 3 FY07 budgetary priorities have changed little from those in FY06, although the overall goal budget is down by 15% (\$40.0 to \$34.1).

Three programs have either been eliminated or maintained at a minimal level (Oil spills, Superfund Innovative Technology Evaluation, and Underground Storage Tanks). The Board is satisfied with the notion that elimination of mature programs that can be assumed by the private sector, or other agencies is justified, however there is concern that there has been little planning associated with the phase outs in this program. These programs contain expertise and capabilities that should not be lost in the future, since there remain many waste cleanups yet to be carried out. In addition, the Board believes that there are still significant research needs associated with the waste cleanup program, particularly related to site characterization.

The strategic targets for Goal 3 are certainly worthy, but it is not clear how the S&T budget will be used to achieve these goals. The Resource Conservation Challenge (RCC) is presented as an important tool for promoting voluntary cooperation, but the research budget for RCC is still unclear (anecdotal evidence suggests that about \$1 million has been allocated—if this is so it would indeed represent an increase).

The only specific information on the RCC research program is from page S&T-99 in the budget document that notes that RCC is "...a major national effort to reduce waste and conserve natural resources by promoting the use of recycled products. EPA will continue to develop effective options for minimizing waste, and for assessing the performance of waste minimization programs through multimedia risk assessments...In FY 2007, utilizing its multimedia modeling risk assessment methodologies, EPA's research and development program will provide an estimate of the benefits realized (i.e., reduction in risk to human and ecological receptors) in reducing priority chemicals waste streams." As the Board pointed out last year in its commentary, areas of relevant research are many and varied, ranging from material flow and life cycle studies, to data certification, to appropriate policy instruments to create incentives for material conservation.

The Board notes that the goals and objectives of the RCC are consistent with the Agency's Sustainability Research programs, which appear to have emerged from the previous

“pollution prevention” and “technology for a sustainable environment” programs. The SAB will soon review EPA’s Sustainability Research Strategy and the Board will have more to say on this in the future. However, we believe that among the important topics to include in a sustainability program would be: re-engineering processes, the implications of new products for commerce, and the need to provide meaningful incentives for maintaining and improving environmental performance. The Board believes that it is possible to articulate Sustainability – RCC research budgets, strategies, and plans in a way that shows their relationships, and their individual focus, e.g., the RCC might provide the basis for the kinds of research needed as drawn from connections with EPA’s partners, and Sustainability Research might focus on using the best and most appropriate research tools. The RCC would then serve the dual purpose of mining information from its partners for relevant research needs, and then to the extent possible transferring the results of Sustainability Research to the field.

In carrying out this task, the Board suggests that it be subjected to PART review as soon as practicable so that the PART tool can be used for program design and documentation, as well as ex post evaluation. The Board looks forward to the presentation of a coherent Sustainability/RCC research program next year.

Science programs in Goal 3 reflect coordination among EPA organizations. The Board notes that the targets of Goal 3 and those of Goal 5 overlap, with the latter supporting S&T research on pollution prevention. It is important that these functions be closely coordinated if the research is to be relevant and useable in the short term.

The Board is on record as stating that the Agency does coordinate well with other agencies, but the SAB has requested more specific information on the quantitative amount of leveraging that is actually achieved (see the Board’s FY 2006 advisory). Such information should be developed across the Federal government routinely as part of the science and research budget evaluation. It would be helpful if this information would include trends over the preceding five years. This information on Agency resource leveraging is important if all involved are to understand the degree to which environmental research portfolios across the federal government intersect and how well they are coordinated. As noted during the Board’s review meeting, the EPA S&T research budget accounts for about 7% of the total federal environmental funding. Without a more detailed knowledge of research supported by other agencies, it is difficult for the Board to assess the impacts of EPA’s programmatic cuts and reallocations, in this and other Goals, and how they impact overall federal research on specific topics (an example is the continuing de-emphasis in EPA’s ecosystems research program and its impact on other agencies having complementary research programs and mission areas. Accordingly the Board renews its longstanding request for more detailed information on the cross-agency collaborative research funding.

This year the SAB was able to examine emerging research programs in the general area of nanotechnology, and also the GEOSS/Advanced Monitoring Initiative

6.2. Nanotechnology

EPA's nanotechnology program increases from \$4.6 million to \$8.6 million in FY 2007. In FY 2007 EPA's program will conduct nanotechnology research through its extramural exploratory grants program which funds investigator initiated projects and they will develop an intramural research program.

The Board notes the significant (more than 80%) increase in funding devoted to the national nanotechnology initiative for pursuing environmental impact research. The increase in EPA's nanotechnology budget is encouraging, though the absolute amount is still small when compared with other agencies in the National Nanotechnology Initiative and given the level of public concerns about the environmental impacts of nanotechnology.

The SAB has noted over the past two years that nanotechnology will have immediate impacts on the environment. This will occur in two ways: i) nanotechnology support for environmental improvements (e.g., development of new sensors, water purification membranes, etc.), and ii) potentially negative environmental impacts associated with nanotechnology products or manufacturing processes.

Thus far, most studies seem to have focused on the fate, transport, and human health effects of fine particle structures. The Board has noted in its previous reports, and re-emphasizes again, the need to include nano-manufacturing within the EPA research portfolio. This trend is already well underway, in the industrial sector, yet it is unclear if the Agency understands the differential impacts of old versus new technologies, and if it has the correct regulatory tools at its disposal to address these issues.

The SAB supports the decision by EPA to build up internal capacity on nanotechnology. This will become increasingly important as more nano-based substances and products penetrate the marketplace. The federal government will increasingly need good science to permit it to evaluate and underpin the need for possible regulations in this area (e.g., under the TSCA, the Clean Air Act, the Clean Water Act, and RCRA).

EPA is still planning its intramural research on nanotechnology for 2007. The objectives of this program will be to understand the potential human health and ecological impacts of manufactured nano-materials, and to investigate how nanotechnology can be used safely in commercial and environmental applications. EPA's background information indicated that it was still planning its 2007 nanotechnology efforts and that from 60 to 80% of its new intramural research would likely focus on nanotechnology's environmental implications and the remainder would address nanotechnology's potential applications (e.g., nano-scale sensors for environmental monitoring).

The SAB believes that the current planning underway for EPA's nanotechnology program is appropriate and important to the design of both EPA's intramural and extramural programs. However, before investments are made planning should include an analysis of previous nanotech implications research (by EPA and other agencies) to identify the important gaps which might exist (e.g., in areas such as ecosystem impacts -- terrestrial and aquatic--, bioaccumulation, or chronic effects). Further, EPA should focus its efforts on research that is

not likely to be undertaken by any other agency in the government. NIOSH, for instance, can do nanoparticle characterization, and NIEHS can cover many areas related to human toxicology. There are, however, gapping holes in our understanding of the environmental impacts of nanotechnology, and EPA should include these in its research program.

The EPA will need to work closely with other agencies depending on the products (the FDA for cosmetics, for instance). The proposed emphases on dissipative uses and techniques to detect and remediate nanotechnology in the environment are also important.

EPA should carefully consider how much money it spends on applications research, what impacts that will have on their ability to undertake key implications research, and how they can partner with other agencies on applications development (DOD, for instance, funds work on nano-scale sensor systems).

The SAB has stated several times that the EPA's research program in nanotechnology should fund complementary research that industry either can not or will not fund. But partnering with industry, in order to leverage meager Agency funds, makes much sense because it is the various industries that understand the technologies involved. By partnering, EPA gets to learn the basis of new technologies and their environmental implications, and industry gets to have their input to Agency thinking on how best to manage the problems that might be associated with these new technologies. Proprietary issues will undoubtedly come up, and will have to be dealt with creatively, and diplomatically.

The Board in particular points to the need for a life cycle approach for existing and emerging nano-based substances and products in order to more fully evaluate systems on a "cradle-to-grave", and "gate-to-end-of-life" basis (product cycle). The EPA will need to work closely with other agencies to better understand the life-cycle impacts of products not under EPA jurisdiction (drugs and cosmetics would be examples, which fall under FDA). The proposed emphases on dissipative uses (such as fuel additives) and techniques to detect and remediate nanotechnology in the environment are also important areas of focus.

A key problem in this area is how to efficiently manage any risks that nanotechnology may pose without seriously impeding the development of these important new technologies. A simple extrapolation of past risk management strategies does not look like it will get us the kinds of results we need. EPA needs to work harder on developing strategies to create new and innovative ideas for risk management in the area of nanotechnology.

6.3. Advanced Monitoring Initiative (AMI)/GEOSS

EPA's Advanced Monitoring Initiative (AMI) is linked to the interagency U.S. Global Earth Observation initiative and the international Global Earth Observation System of Systems (GEOSS) program. Resources in FY 2007 decrease from \$5.3 million to \$5.1 million. Overall GEOSS intends to provide planet-wide information to be used in policy making. EPA has begun its work in this area and continued funding of the Advanced Monitoring Initiative will permit EPA to continue its participation in this initiative and to develop its strategy and plans for the future use of the promising data that GEOSS will make available to users.

This is a new program that only started in the current fiscal year and thus, it is difficult to evaluate. There is certainly great potential for space-based and other dispersed observations to support protection of human health and the environment. The Board has been given little specificity as to how the technology will be integrated into the Agency's efforts. The focus seems to be more on the data collection and archiving systems and less on disseminating the information across the Agency or building a clientele for their results.

The SAB believes that cuts in the Climate Change program will impact the effectiveness of the modest EPA piece of the GEOSS program. The Societal benefits identified in regard to water, weather, climate and human health identified in GEOSS will be integral to the science in the Climate Change program. Thus while EPA is a minor player in terms of funding GEOSS, the unique role that EPA has [contaminant sources, discharges to water, transport, exposure and health impacts] suggests that these cuts will place EPA at a scientific disadvantage nationally and more importantly internationally (as this is developing as a global endeavor). In addition, this will impede the realization of the societal benefits in regard to water quality and health.

7. HOMELAND SECURITY RESEARCH

7.1. Background Information on the Program

Budget and Components: EPA documents available to the SAB indicate that during FY 2007, EPA proposes to allocate some \$184 million to activities in support of its total U.S. Homeland Security effort. This total investment increases by about \$55 million from FY 2006 to 2007. Of this increase, some \$33 million is in the S&T account for the EPA Office of Water and \$9 million is in the S&T account of the EPA Office of Research and Development. The total Homeland Security resource is allocated across five Program/Projects as follows (amounts shown are in the aggregate of all accounts funding the work):

- i. Homeland Security: Critical Infrastructure Protection - \$54 M
- ii. Homeland Security: Preparedness, Response, and Recovery - \$98 M
- iii. Homeland Security: Protection of EPA Personnel/Infrastructure - \$20 M
- iv. Homeland Security: Communication and Information - \$7 M
- v. Categorical Grants: Homeland Security - \$5 M

Themes: The predominant theme in the EPA Homeland Security program is the conduct of research and operations to better prepare the Agency to deal with emergencies associated with intentional releases of chemical, biological, and/or radiological agents. Most of EPA's offices are working on Homeland Security issues, among them the Office of Water, Office of Air and Radiation, Office of Research and Development, the Office of Solid Waste and Emergency Response, the Office of Prevention, Pesticides and Toxic Substances, and the Office of Administration and Resource Management. Efforts include the development, enhancement, and deployment of monitoring networks, data systems, and laboratory capacity to allow EPA to detect releases of agents and/or determine the levels and risk associated with released agents. EPA is also working to protect water infrastructure, evaluating and developing decontamination technologies, preparing responders to respond, assessing the efficacy of antimicrobial agents, and determining clean up guidelines for high priority agents. Two of these, Critical Infrastructure Protection and the Preparedness, Response and Recover Program/Projects are further summarized and commented upon below.

7.2. The Critical Infrastructure Protection Program

EPA documents available to the SAB indicate that the Critical Infrastructure Protection Program aims are to lead and support state and water utility efforts to secure their water infrastructure from terrorist threats and other intentional harm. The overall program budget for FY 2007 is approximately \$54 million. Approximately \$45 million of this is S&T (an expansion of funding of about \$33 million S&T from FY 2006). This program supports the water sector by implementing protective measures directly and by improving such measures through an expanding pilot program known as WaterSentinel. Homeland Security Presidential Directive-7 "...designates EPA as the Sector-Specific Agency 'responsible for infrastructure protection activities' for the water sector (drinking water and wastewater utilities)." "HSPD-9 directs EPA to develop a 'robust, comprehensive, and fully coordinated surveillance and monitoring system'

for drinking water and a water laboratory network that would support water surveillance and emergency response activities. The overall goal of Water Sentinel is to design and demonstrate an effective system for timely detection and appropriate response to drinking water contamination threats and incidents through a pilot program that would have broad application to the nation's drinking water utilities." The WaterSentinel program provides the context for some of the research and development activities that are to be conducted by the Office of Research and development during 2007 and which are discussed in the next section of this report.

In FY 2007 EPA will expand the number and diversity of pilot projects initiated in the U.S. The pilots will integrate information from contaminant-specific sampling and laboratory analysis, on-line water quality monitoring, public health surveillance, customer complaints, and physical security to form a comprehensive contamination warning system. The WaterSentinel program is intended to prove the concept of an effective contamination warning system, so that drinking water utilities of all sizes and characteristics can adopt such a system. EPA will also provide critical tools, training, and exercises that will help utilities detect, prevent, and respond to threats. This program is largely implemented by the Office of Water with some support from the Office of Research and Development in at least the training aspect. It is not clear how much ORD involvement is planned for this program. Some of this work appears to have operational components, though the extent is not clear from the information available to the SAB.

7.3. Preparedness, Response, and Recovery

EPA documents available to the SAB indicate that the goal of this program is to increase the Agency's preparedness, and its response and recovery capabilities for homeland security incidents involving chemical, biological or radiological threats through the conduct of research, development, and technical support activities. The total budget for ORD in this Program/Project is about \$40 million with most coming from the S&T account and \$2.0 million from the Superfund account.

Efforts in this program project are intended to increase EPA's knowledge of potential threats and its response capabilities by assembling and evaluating private sector tools and capabilities so that preferred response approaches can be identified and evaluated for future use by first responders, decision makers, and the public. There is a substantial collaborative nature to this program among EPA and other Federal institutions. EPA intends to focus its own activities on topics where EPA has unique knowledge and expertise.

It appears that much of the work in the Program/Project could at least indirectly support the work within the Critical Infrastructure Program/Project summarized above. The Program/Project is broken into areas of National Homeland Security Research Center (NHSRC), Radiation Monitoring, and Biodefense.

1) National Homeland Security Research Center:

The NHSRC oversees research in preparedness, risk assessment, detection, containment, decontamination, and disposal associated with chemical, biological, and radiological attacks. The NHSRC work supports responsibilities assigned in HSPDs 7, 9, and 10. Specific programs address the following areas:

- Water infrastructure protection research directly supports the CIP by developing, testing, demonstrating, communicating and implementing enhanced methods for detection, treatment, and containment of biological and chemical warfare agents; certain radiological contaminants; and bulk industrial chemicals.

- Threat and Consequence Assessment focuses on risk assessment of decontamination byproducts, refining toxicology databases, developing fate/transport/dispersion/exposure parameters, and develop computer-based tools to aid decision makers in assessing risks from biological and chemical attacks and determining cleanup and/or guidance goals.

- Standardized Analytical Methods (SAM) efforts will expand the SAM document for Homeland Security and include development, validation, and testing of non-standard methods and additional methods for chemicals/biologicals/radiologicals in new matrices. Efforts also establish an applied measurement science research program to administer the activities of a national laboratory network that will manage methods development, validation, and application for contaminants resulting from terrorist attacks. This work appears to support the WaterSentinel program though it could also support other parts of EPA's Homeland Security program.

- Decontamination Systems efforts will do critical research to improve decontamination methods, and develop new ones for new contaminants in buildings/large structures/outdoor areas. Field studies will also be conducted to validate decontamination methods for anthrax. Efforts will also continue to develop decontamination methods for building materials

- Risk Characterization for Bio-Contaminants evaluates toxicity, infectivity, and mode of action for biological contaminants in order to develop dose-response information for cleanup guidelines. Technologies for in situ management of crops/animal carcasses contaminated with agents will also be evaluated..

2) Radiation Monitoring:

EPA is responsible for maintenance and enhancement of the RadNet monitoring Network (previously known as ERAMS). EPA is responsible for personnel and asset readiness for radiological emergency responses and it will participate in responses and provide technical support. EPA will upgrade RadNet to get near real-time information to support decision making and build upon work already begun to augment EPA's existing applied science radiological labs to meet emerging Homeland Security needs and to serve as the EPA radiological reference lab.

3) Biodefense:

Efforts will continue to develop and validate methods for evaluating the efficacy of products employed against bioterrorism agents; address gaps in efficacy testing knowledge and knowledge of microbial resistance; begin to address viruses and emerging pathogens; and propose the development and evaluation of efficacy test protocols for products designed to control viruses during decontamination.

7.4. SAB Comments

The SAB considered these issues in two ways. The first was in a recent 2006 SAB Homeland Security Advisory Committee meeting during which the SAB held an official consultation with EPA representatives on the WaterSentinel and Standard Analytical Methods programs associated with Homeland Security. That meeting was held as a closed meeting because it discussed aspects of the program that are considered to be sensitive in nature. Remarks that follow in this budget report reflect publicly available documentation from that meeting as well as additional open discussions between SAB members and EPA representatives during the Board's advisory meeting on the EPA research budget for FY 2007 (i.e., the SAB March 2-3, 2006 meeting) which did not involve sensitive information.

WaterSentinel Strategy and Priorities. The SAB is not able to comment on the underlying strategy, in terms of the allocation of resources to specific threats or approaches to address specific threats. Those strategic directions reflect determinations made largely outside of EPA, and they are at least partially based on sensitive information. As a result, the SAB cannot offer any opinion regarding whether any program passes a cost-benefit test (i.e., is it worth doing at all). We could only address the cost-effectiveness test, regarding how allocated resources are invested.

It is often the case that as programs begin to address critical issues with near-term needs, such as the development of technologies to monitor and respond to identified threats, they focus on adapting existing technologies to the new situation. While this is deemed to be a reasonable tactic, it can often have unintended consequences. For example, it could result in developing a technology that turns out to be useable only by highly specialized laboratories and persons with expertise far above that likely to be available in the new area of application. Thus, we are concerned that EPA might be investing in techniques that will not be useful to laboratories near an attack, at times when rapid response is essential. Even if some specialized laboratory equipment and personnel are available, the capacity for large throughput of many analyses may not be. The materials made available to the SAB did not allow it to make a confident assessment that a systems analysis had been conducted and produced a satisfactory result that provided guidance to EPA's currently planned activities in this area.

The SAB has commented over the last two years about the lack of significant investments in organizational or behavioral science. Behavioral science activity will be necessary as part of any Agency systematic evaluation of technology needs in this program. These issues go beyond just the physical sciences that are used in developing technologies and they include such issues as usability, first responder training and protection, decision rules for acting on signals from sensors (embedded in their social, political, economic context), risk communication, recovery, and acceptability of decontamination standards. EPA's program managers have stated to the SAB that these issues are not intended to be a focus of EPA's program. The SAB believes that EPA is aware of these issues, and that staff does the best that they can to address them in practical matters of design; however, that means relying on professional judgment, typically with professionals trained in other disciplines. The SAB has serious concerns about the threat to system design posed by this lack of the necessary behavioral sciences base.

The SAB understands the need for security that surrounds the Homeland Security program across government. Those needs are important and valid. However, the SAB is concerned with the lack of transparency in some aspects of the Homeland Security program. An example of such an issue is related to the "usability" issue discussed immediately above. During the March 2, 2006 discussions, the SAB questions concerning whether the products of this research would be publicly available were met with ambiguous statements. It is the SAB's opinion that much of the homeland security research would benefit from public input and participation, which would necessitate open discussion. Part of the need for the behavioral science activities noted above play out in the area of restoring public confidence in the ability of government to handle emergencies, whether natural, accidental, or intentionally triggered by a terrorist is essential to obtaining public cooperation. A strong investment in the social science component of homeland security projects will be of tremendous benefit to the Agency. For the FY2008 budget, the SAB hopes to see this aspect integrated into the Agency program.

Resource impacts to other programs. The SAB was concerned about potential impacts associated with the growth of the EPA Homeland Security program because of the substantial increase in its budget for FY 2007. The SAB was concerned that this growth in the budget reflected a redirection of funds from other critical EPA research activities including its important research on hazards other than terrorism (e.g., ecosystem protection, watershed preservation, economic evaluation of non-market goods). In addition to the SAB's concerns about the EPA research budget erosion over the last several years, the SAB has also observed a trend and preference for funding short term applied research over research that has a longer time horizon. It appears to the SAB that this shift toward short-term activities is being facilitated by the lack of appropriate procedures for measuring benefits of longer-term, core research programs. Homeland Security, with its urgency and perceived immediate need for concrete research and developmental products, appears to be exacerbating this trend to displace programs like ecological research or research fellowships that produce more diffuse results (even though those results are critical to the nation's human health and environmental goals). Agency staff assured the SAB that there was no "one for one trading" of longer term research focused on traditional EPA topics for shorter term applied research. Even so, it seems that this has been the practical result of increased funding for Homeland Security. A large portion of the increase in Homeland Security activities for FY 2007 under the S&T account (approximately \$42 million) had to come

at the expense of other traditional S&T activities). Though tradeoffs were not explicitly made, they seem to have occurred.

Beyond just the notion of the need for a balance in longer term core research with shorter term problem driven research in ORD's program, is the notion that research funds should be applied to research and not to operations. This was stated in the SAB's report on the FY 2006 budget and it continues to be the case. It is of course difficult to assign parts of EPA's research program to core vs. problem-driven research categories. Further, at EPA it is possible that results from core research rapidly move to the applied arena because of EPA's need for data for use in decision making. However, it appears that core research is declining rapidly. Over the last several years, the SAB has observed that core research occupied some 50 to 60 % of ORD's budget. Now, it is closer to 30% core and 70% problem driven research. The SAB recommends that the EPA budget office adopt a transparent scheme for categorizing individual projects in terms of where they fall on the continuum for core research to operating the products, methods, and processes that are the product of research and development. We suggest considering the scheme proposed in the report of the committee chaired by Frank Press, former President of the National Academy of Science (NAS 1995³).

There is a further concern, then, when the SAB considers the general nature of research that goes beyond the core vs. problem driven issue. That is, many research programs transition into operating programs in the fast paced issues that EPA must address. The SAB has a longstanding concern for the former and a growing concern with the latter – funding operations with research funds. Many of the activities within the CIP appear to be at least transitional activities toward a routine operating program, if not frank operating programs themselves. It also appears that some of the activities within ORD's PR&R research and development program that supports the CIP, could also be operational. If that is correct, the SAB would be concerned that the trend toward diverting long-term research support to short-term applications support might finally be reaching its extreme and shifting research resources to operating programs which is the province of EPA's program offices which have funds that are appropriated for those purposes. As mentioned, the SAB is also concerned that the Homeland Security budget is itself disproportionately weighted toward short-term solutions, using existing technology, despite being a domain where the technology is changing rapidly and the threats may change as well.

Exacerbating the issues raised just above about including operational activities within a Science and Technology account is the clear recognition that some of the Homeland Security projects have equipment purchases in the first year. The SAB cautions the agency to consider the continuing costs, for equipment calibration, maintenance, and for training of individuals to use the equipment. With emergency response functions, there is a tendency to conduct one initial round of training, but if there are no opportunities to put the training into practice, skills deteriorate. Stable and predictable funding is needed for these homeland security projects so the equipment will be operable and there will be individuals skilled in using it when the need arises. The Agency also assured the SAB that an "all hazards" approach was embraced which would guarantee the use of the equipment and skills for natural disasters, as well as for terrorist incidents. The continuing need for operational funding to support these activities will only

³ NAS. 1995. *Allocating Federal Funds for Science and Technology*. National Academy Press. 1995. Frank Press, Chair.

further exert pressure on the budget process to continue to shift funds from basic to applied research and thence to operations. Stable and predictable funding suggests long-term commitments. This deviates from the defined role of “research” and moves to a program area.

There is serious concern that, once developed, these technologies will become the operational responsibility of the program that develops them. That will reduce the Agency’s capacity for future innovation, in an arena where the science is advancing and the threats may change. Three measures that could address this concern: (a) Explicit Agency commitment to transition, (b) research into usability (at the operation, organizational, and institutional levels), ensuring that transition is feasible; and (c) budgeting that explicitly characterized the research and development stage of specific projects. A proposal for (c), endorsed by the National Research Council can be found in *Allocating Federal Funds for Science and Technology* (see footnote 3).

It appears tht the Homeland Security portfolio has not been subject to PART review. If PART is viewed as a critical evaluative tool, it would be sound administrative policy to make it central to these new programs as early as possible in their development.

The SAB has several additional comments to offer about the efforts in this area. These include issues of dual application of research; program integration; local community involvement; compliance; and collaboration.

Dual Use of Research Results: The SAB sees a number of opportunities for the integration of projects which were initially funded and designed for homeland security purposes, to application in the regular goal areas of the agency. In particular, the monitoring systems such as WaterSentinel, RadNet, and Biowatch, the dispersion modeling, fate and transport modeling, analytical techniques, decontamination methods, and disposal options can be useful in the regular goal areas of the EPA.

Program Integration: A key component in the Critical Infrastructure and Preparedness, Response and Recovery programs is integration of systems. It is difficult to get a clear picture of the integration of functions across time frames and operating agencies (e.g., water utilities of different sizes). Although EPA staff expressed an all-hazards perspective, it is hard to see from the planning documents. An organizational science question is how to integrate new systems with existing operations, in order to ensure that they are properly used and exercised, so that they are not expected to attain peak performance the first time that they are used.

Local Community Involvement: The programs have not obviously budgeted for research ensuring their integration with local communities, environmental justice, etc. These will be critical for decontamination, among other things. There is no obvious consideration of impacts of contamination on ecosystems and their role in food supplies, amenities, etc.

Compliance and stewardship. Although the programs have some operational connections with government and industry, these are treated as matters of practice, rather than science. There is not an obvious place for understanding the impacts of changes on reporting, inspection, etc., on the prevention and detection of attacks.

Collaboration: The SAB has been told that there is good communication and coordination among EPA, Department of Homeland Security, and other federal agencies. For the EPA's four major areas of direct responsibility, there appears to be no duplication of effort. In fact, if the EPA does not receive full funding for these research areas (water infrastructure, decontamination/disposal, chemical/biological detection and laboratory capacity, and establishment of risk-informed clean-up levels, significant gaps in national preparedness will be left.

8. ECONOMICS, DECISION SCIENCES, AND SUSTAINABILITY

8.1. Economics and Decision Sciences

Economics and Decision Sciences Research (EDS) is designed to improve our understanding of human and organizational environmental behavior. Since its inception, this program has contributed many articles to the literature on this behavior and thus supported policy-making at both the Federal and State levels. Research is guided by the Environmental Economics Research Strategy that outlines the research needs and priorities in this area. The program is proposed to receive \$2.5 million in FY 2007 a small increase from 2006. The EDS program is a part of EPA's Goal 5 program area of Sustainability which seeks to minimize or eliminate environmental liabilities, integrate management of problems across media; and change traditional methods of creating and distributing goods and services.

In FY 2007 EDS research will focus on three long-term goals: identifying and reducing uncertainties and potential biases associated with benefits transfer methods; improving our understanding of decision making with respect to compliance behavior and environmental performance in response to interventions; and identifying regulated entities response to market mechanisms and incentives. Benefits transfer research will work toward methodological advances on existing datasets and thus enable faster attainment of results. Research will be conducted to help design practical trading programs for local and new markets (e.g., water quality trading programs; pesticide trading; and local air pollution trading programs).

Research will be carried out through STAR EDS Requests for Applications as well as other activities.

SAB comments on this area are summarized below and expanded upon in the following sections.

- The scope of Economics and Decision Sciences seems not to be fully appreciated in the EDS section of the budget information given that component issues of this area are pervasive across almost all other categories in the budget justification (e.g., 66 quotes can be extracted from other categories of the budget justification document that refer to economics and decision sciences issues).
- The resources of the National Center for Environmental Economics are increasingly strained by the requirement that all "large" regulations be subjected to a benefit-cost analysis, whenever such an assessment is requested. In addition, the ORD STAR is inadequately funded to cover all basic research needs in Economics and Decision Sciences. As a consequence, the STAR program for economics has been unable to offer funding to a full complement of RFAs in each cycle (some have been skipped).

- It is inappropriate to categorize practical exercises in benefit-cost analyses, especially those based solely on benefit-transfer methods, as “basic research.” Benefits transfer will continue to be necessary, however, so basic research that will actually broaden the inventory of available benefits estimates/functions for use in benefits transfer is essential. Research on how to do benefits transfer is not a substitute for research on benefits, since the existing inventory of benefits is not yet sufficiently comprehensive.
- Data, especially for longitudinal analyses, are critical to researchers in Economics and Decision Sciences—i.e. the TRI and the PACE data must be maintained; there are also many smaller and unique datasets (some of which have been funded by the EPA) that could be archived in a form that makes them more widely available.
- Economics and Decision Sciences within the Agency continues to be hampered by a long-standing emphasis on risk assessment and safe minimum standards as endpoints. These approaches do not necessarily provide information in a form that is useful for benefit-cost analysis.
- Risk communication and an understanding of public risk perceptions are critical to the Agency’s mission and these topics require expertise beyond the purview of environmental economists and decision scientists. Other social science disciplines have expertise in these areas, yet they remain under-represented and underutilized in the Agency’s research portfolio.

1) Pervasiveness of Economics and Decision Sciences: Economics and decision science are more pervasive across the Agency’s Science and Technology programs than many people may realize. Among the 32 other sub-categories of the budget justification, beyond the document’s very limited 2.5 page discussion devoted specifically to the topic of “Research: Economics and Decision Sciences (EDS),” at least 66 different discussions of economic/decision-science issues can be found.

The only portion of the Agency’s Economic and Decision Sciences activity that is officially funded as part of the S&T budget is the STAR grants (extramural) program. Given how pervasive economics and decision sciences issues are, across all of the Agencies science activities, it is unreasonable to expect that extramural research can completely fulfill the Agency’s needs in this area. As in other disciplines, the Agency has internal expertise in Economics, collected within the National Center for Environmental Economics. While these researchers represent a pool of expertise for basic research, it appears that their energies are devoted mostly to benefit-cost analysis for other units within the Agency.

2) NCEE Staff Involvement in OMB-Required Benefit-Cost Analysis: The resources of NCEE are increasingly strained by the requirement that all “large” regulations be subjected to a benefit-cost analysis. The SAB finds it appropriate that the Agency should be able to demonstrate that its policies and activities produce improvements in net social benefits. However, an increasingly large share of NCEE staff seems to be devoted to reviewing or assisting with economic analyses for other programs within the Agency (e.g. over 20 economic analyses were dealt with in the last year). These benefit-cost analyses increasingly rely upon

benefits transfer, which typically amounts to the application of existing research, rather than the undertaking of new research. Basic research under the S&T budget amounts solely to the STAR grant program.

3) Benefits Transfer: In the past, basic (and very expensive) research concerning society's willingness to pay for improved environmental quality in some contexts was occasionally stimulated by large legal cases. Now, in the face of restricted budgets, the Agency is often forced to rely on benefits transfer, i.e., to assess benefits essentially by using interpolation or extrapolation methods, based on an existing inventory of benefits estimates. This strategy may be viable for some types of human health effects (e.g. sudden mortality from accidents). However, existing research that covers a wide range of risks, with different latencies, that affect a wide range of subpopulations, is still sparse. Even more problematic are the challenges involved in measuring ecosystems benefits. Ecosystems are far more heterogeneous than humans and there is not much depth at all in the inventory of established and robustly measured values for ecosystems endpoints. The Agency will need to continue to fund basic research in both human health and ecosystem benefits.

4) Data for Research in Economics and Decision Sciences: The development and maintenance of crucial environmental data sets for cross-sectional and longitudinal analysis is fundamental to research in Economics and Decision Sciences. At least three data-related issues deserve attention:

a) **The Pollution Abatement and Control Expenditures (PACE) survey.** Several years ago, the Environmental Economics Advisory Committee argued that the EPA should step in to reinstate the PACE survey. (The Bureau of the Census had discontinued the collection of these data.) NCEE's budget for FY06 apparently includes \$650K for the PACE survey, and significant expenditure for this item will continue. The PACE is the main source of data related to the costs of environmental regulation. The SAB notes that other data collection activities are not charged against the "research" budget of the Agency.

The PACE data represents a large share of the budget for the NCEE. It may be necessary to demonstrate that this expenditure is justified by the nature and results from the research that uses it. Should this program be subjected to a PART analysis, it will be useful for the Agency to be queuing up some appropriate "outcome" measures that document the social value of the PACE data.

b) **The Toxics Release Inventory (TRI).** The TRI represents a very important public good, not just to communities under EPCRA, but also to intra- and extramural Economics and Decision Sciences researchers concerned with the causes and consequences of such releases. Recent proposals involve changes in TRI reporting requirements, including changes in which firms will report and what they will report, as well as a plan to cut back from annual to bi-annual reporting. These changes (the proposed "Toxics Release Inventory (TRI) Burden Reduction Proposed Rule") would jeopardize the value of this database for longitudinal research. The SAB shares the concern of its Environmental Economics Advisory Committee (EEAC) that substantive

changes in reporting requirements for the TRI have the potential to seriously compromise its usefulness for longitudinal analyses. Maintenance of databases that support a significant category of research in Economics and Decision Sciences should be a significant concern for the Agency. However, it is not clear that funding to preserve collection of these data should be allocated away from basic research activities.

c.) Preservation and distribution of various unique data sets. EPA-funded research in economics and decision science often creates specialized data unique to each study. Funding should be made available so that it would be possible to further develop these original data sets so that they are widely accessible and useful for replication or for new studies. There is presently no requirement that Agency-funded data collection be made publicly available, and no incentive for individual researchers to do so. The only grant-related requirement is that the Agency be provided with a plan to make the data available.

SAB Economists have argued that it would be appropriate for the Agency to assist in establishing a national clearinghouse for specialized data relevant for environmental economics and decision analysis. The Inter-university Consortium for Political and Social Research (ICPSR) Archive housed at Michigan might perhaps be an appropriate home for these data. EPA-funded data, in particular, represent public goods that could sometimes be exploited much more thoroughly in many cases. Like the major databases that have traditionally been widely used by labor economists—for example, the Panel Study on Income Dynamics (PSID), the National Longitudinal Survey (NLS), and the Health and Retirement Survey (HRS)—the existence of accessible and well-documented environmental databases could do much to foster more environmental economic research without incurring large fixed costs for data every time.

5) STAR Program RFA's: The SAB notes that the Agency has lately been forced to skip some of its three regular RFAs in the Economics and Decision Sciences area. In its review of the budget last year, the SAB noted the Agency's interest in reliance upon voluntary programs but emphasized that our understanding of the potential for success of these programs was still limited. The SAB called for more research into incentives and constraints. This year, approximately one-quarter of current STAR funding for Economics could be characterized as research to increasing our understanding of "voluntary programs" (i.e. programs that do not involve Agency enforcement).

In response to the President's FY06 budget, the SAB also called for the Agency to spend more of its own research money to conduct research on market mechanisms and incentives directed at pollution prevention. There has been no RFA for Market Mechanisms and Incentives (MMI) since 2003. For FY 2007, STAR programs appear to devote about \$1 million for research on trading programs and about \$1 million for benefits transfer studies. Additional money to support extramural research could go a long way towards supporting the basic research needs of the Agency.

6) Risk Assessment versus Benefit-Cost Assessment: It must be noted that the Agency has traditionally been far more concerned with risk assessment (predicting the sizes of existing risks and the risk reductions to be expected from environmental policies) than with

understanding the social values of risk reductions and thus society's willingness to pay for environmental management. Unfortunately, traditions change only slowly. At present, it seems that these traditions are definitely not changing quickly enough to keep up with the demands for benefit-cost assessments.

7) Risk Communication and Risk Perceptions: Social science research and genuinely interdisciplinary efforts that span multiple social sciences and integrate with physical and life sciences continue to be under-funded and under-utilized. Before a society is willing to incur the costs associated with environmental risk reductions, its members must recognize, understand and appreciate the risks in question. Much of the risk perception and risk communication research upon which the Agency currently relies predates the Internet Age. Risk communication has changed dramatically with this new technology. The relevant disciplines include more than just Economics and Decision Sciences. Also relevant are other behavioral and cognitive sciences, including (but not limited to) psychology, sociology, and anthropology. Information—how it is perceived, processed, and utilized—is critical to an understanding of social preferences and choices with respect to environmental policies.

While EPA enjoys reasonable staff expertise in the areas of economics and decision science, it has far less capability in the area of behavioral social science. The SAB has noted this gap on a number of occasions in the past (and in the discussion above of the new programs in Homeland Security). The Agency needs to continue to work to find ways to fill this gap, both with new staff and through external collaborations (such as the now defunct collaborative research program that was conducted with the National Science Foundation (NSF-DRMS).

8.2. Sustainability Research

EPA has considered sustainable and preventive approaches to health and environmental problems since the Pollution Prevention Act of 1990. Sustainable approaches require innovative design and production techniques that minimize or eliminate environmental liabilities; integrated management of air, water, and land resources; and changes in the traditional methods of creating and distributing goods and services. The defining characteristic of sustainability research is the need to evaluate impacts of the flows of material and energy on future generations, a practice that has not been a common feature of past societal and industrial development. In addition to conducting research related to human health and environmental threats, EPA is committed to promoting sustainability—achieving economic prosperity while protecting natural systems and quality of life. The Sustainability research program is proposed to receive about \$21 million in FY 2007 (a decrease of about \$4 million from 2006 levels).

Specific areas of sustainability research include:

Pollution Prevention Tools for improved environmental decision making (e.g., P2 Tools will develop Life Cycle Impact Assessment analytical techniques that are cost effective and take less time and provide high priority life cycle benchmark data).

Small Business Innovation Research (SBIR) Programs that develop and commercialize new environmental technologies.

National Environmental Technology Competition that funds a student competition to develop solutions to sustainability challenges.

Sustainable Environmental Systems research to develop methodologies for understanding and managing large, complex environmental systems such as metropolitan areas and watersheds.

This program emerged from the former “Pollution Prevention and Technology for a Sustainable Future” program. The topic is of great importance, and research on technology for sustainability creates opportunities for reducing pollution, reducing costs, and increasing economic competitiveness. Technological innovation has the potential to provide substantial environmental and economic gains. By working with major industrial partners and by addressing new designs, technologies and processes, we can avoid problems before they start. Sustainability research offers the opportunity to take a strategic approach to environmental protection which should also help to improve the international competitive position of U.S. industry involved in “green” technology. Research in this area needs to become a priority for EPA.

The Board stated in the “Technology” section earlier in this report, that the goals and objectives of the Resource Conservation Challenge are consistent with the EPA’s Sustainability Research Program. The SAB will soon review EPA’s Sustainability Research Strategy and the Board will have more to say on it in the future. However, we believe that among the important topics to include in a sustainability program would be things such as: re-engineering processes, research on the implications of new products for commerce, and the need to provide meaningful incentives for maintaining and improving environmental performance. The SAB believes that it is possible to articulate—RCC and sustainability research budgets, strategies, and plans in a way that shows their relationships, and their individual focus, e.g., the RCC might provide the basis for the kinds of research needed as drawn from connections with EPA’s partners, and Sustainability research might focus on using the best and most appropriate tools. The RCC would then serve the dual purpose of mining information from its partners for relevant research needs, and then to the extent possible transferring the results of Sustainability research efforts to the field.

A small-business focus is appropriate, but EPA should also give major attention to leveraging EPA’s efforts with major industrial partners, and with emerging technology companies. The current emphasis appears to stress recycling at the local level, which is important, but does not appear to address the increasing globalization of economies, industrial design, and the evolution of main-stream industrial processes.

During the discussions with EPA, and in the documents and presentations provided to the SAB, there seemed to be no sense of urgency or high priority associated with this program.

A revised program, once designed and in its initial stages, could be subject to PART review as noted in the “Technology” section of this report; so that it could be used as a tool for program design and documentation, as well as post-hoc evaluation.

9. STAR FELLOWSHIPS

The Agency acknowledges the importance of the “White House Report ‘Science for the 21st Century’” that articulates the Administration’s top priorities for maintaining and enhancing the scientific enterprise of the nation. The Office of Research and Development has for the majority of the past decade pursued the goals of this report through the Graduate Research Fellowship Program of its Science to Achieve Results (STAR) efforts. This program awards fellowships to leading science graduate students throughout the United States. However, the agency has identified the STAR Graduate Fellowship program as an area for declines in each of the last several years’ budgets. The program has been funded at nearly \$9.5 million from 2004 through 2006, mostly because the Congress has increased the requested levels each year. Again, EPA proposes the lowered level of \$5.9 million for the Fellowships program.

The Agency’s adoption of the White House goals for education and workforce development can not be met with the level of resources requested for this program. Even at a full funding level of \$10 million, the program would not meet the full need. At the requested level this deficiency is even bigger. This is inconsistent with the articulated goals, and nearsighted in view of EPA’s looming loss of an aging population of scientists to retirement. The Board recommends that the STAR Graduate Fellowships program be restored to its full funding level of \$10 million.

**ATTACHMENT A: STATEMENT OF DR. M. GRANGER MORGAN, CHAIR
U.S. ENVIRONMENTAL PROTECTION AGENCY SCIENCE ADVISORY BOARD
BEFORE THE SUBCOMMITTEE ON ENVIRONMENT, TECHNOLOGY AND
STANDARDS COMMITTEE ON SCIENCE, U.S. HOUSE OF REPRESENTATIVES
MARCH 16, 2006**

Good morning Mr. Chairman and members of the Subcommittee on Environment, Technology and Standards. My name is Granger Morgan. I chair EPA's Science Advisory Board (SAB or Board). I am a faculty member at Carnegie Mellon University where I am a University Professor, hold the Lord Chaired Professorship in Engineering, and am Head of the Department of Engineering and Public Policy, a department in the Engineering College.

Thank you for this opportunity to present the SAB's views about the Agency's 2007 Science and Research Budget Request. The Board is completing approval of its final report, and with the permission of the Chairman, we will submit that report for the record.

Over the past few years, the Board has been working with EPA to review the Agency's science and research programs and budget on a systematic and ongoing basis. The Agency now presents that information to the Board in ways that correlate with EPA's Strategic Plan.

Between 2004 and the proposal for 2007, the inflation adjusted⁴ budget for EPA's Office of Research and Development has declined by just over 16%. Yet, the environmental challenges that face the Agency have grown and EPA will face increasingly complex and difficult science challenges over the coming decades. It will also face opportunities to improve our environmental and international competitiveness with new technologies – but, to paraphrase the microbiologist Louis Pasteur, opportunity favors those who are prepared.

We all want environmental decision-making to be based on sound science. However, our nation is not investing adequately in producing that sound science.

I know a number of people who argue that this lack of investment reflects a hope that if the science is not there, somehow additional regulation will not follow. A much more likely outcome is that, if we don't do the needed research we will simply get poorer regulation – which could end up costing the nation a great deal more in the long run.

In my view we all need to work harder on explaining the importance of investing in R&D at EPA if we want to ensure that America will enjoy a clean, safe, healthy and sustainable environment in the years to come.

You have specifically asked if the Agency's overall level of Science and Technology funding is appropriate and whether its research priorities are adequately balanced among core research, mission-driven research, emerging issues, and homeland security. I will elaborate below, but the short answer is no.

⁴ Computed using the NASA Gross Domestic Product Deflator Inflation Calculator, available at <http://cost.jsc.nasa.gov/inflateGDP.html>

You have also asked what impacts the proposed budget reduction may have on the Office of Research and Development's ability to use the latest scientific methods and information in its regulatory decisions, and to build strong ties to the external scientific research community and foster graduate student work in the environmental sciences. Again, while I'll elaborate below, the short answer is these impacts will be serious and negative.

In the discussion below I elaborate on these, and related points, in three contexts:

1. The need for government-wide, systematic tracking of environmental research;
2. Some specific aspects of EPA's proposed 2007 research budget; and
3. The critical problem of continuing reductions in long-term, more fundamental environmental research at EPA.

1. Need for a Government-wide View of Environmental Research and Development

EPA is not the only federal agency that collects environmental data or performs environmental research. The Departments of Agriculture, Energy, Homeland Security, and Interior, as well as the CDC, NASA, NIEHS, NIH, NSF, USGS, and a number of other Federal entities all make significant contributions. Some of these organizations work on topics that may sound similar; in many cases the details turn out to be different in important ways.

In many specific areas of research, there are examples of excellent coordination and cooperation between some of these programs.

But today, across the Federal system as a whole, it is virtually impossible to develop an informed understanding of what research is being done; where it is being done; where there are duplications; and where there are critical gaps. A simple list of topics is not sufficient. Just because the same noun appears in two agency lists of research topics does not mean that they are doing the same thing, or that there is duplication.

Before we on the Science Advisory Board, or you in the Congress, can hope to determine if the U.S. has a balanced and comprehensive national strategy for environmental research, we need a clear picture of what is being done in the form of concise substantive descriptions of all the environmental research programs across the federal system. Conceivably, things could be better than they look from the isolated EPA's budgetary perspective. I suspect that they are worse. However, we need a comprehensive picture.

I urge the Committee to work with the executive and independent agencies to realize the development of such a comprehensive description of all our nation's environmental research. Such a summary would assist everyone involved in ensuring: that needed federal environmental research is being done efficiently; that the different federal agencies involved are sharing information; and that the results are readily accessible to the scientific community, the public, and environmental decision-makers.

2. Comments on Several Proposed Changes in Individual EPA Programs

Now I'd like to offer four examples of how the proposed cuts to the EPA 2007 research budget will adversely impact the Agency's mission to protect human health and the environment as well as offer some brief comments in response to your question about the expansion of the Agencies program related to Homeland Security.

First, I will address mercury research. While some of the mercury in our food and water comes from power plants and other human activities, much comes from natural sources or is carried across the Pacific from natural and anthropogenic sources in Asia. On a global scale, science cannot yet accurately tell us where all the mercury in the U.S. comes from, where it goes, or in what chemical forms it exists. If we are going to be able to assess the adequacy and effectiveness of the costly mercury controls that EPA regulation is imposing on U. S. industry, we need to understand those planetary flows. However, last year's EPA research budget for mercury was reduced approximately 35% to \$3.4 million. This year's budget proposes only a slight increase. Funding at these levels is too small to even adequately address the issues that EPA-ORD has been addressing, let alone to allow any work on the key problem of planetary flows of mercury.

A second important and undervalued area of research, that the Board is especially concerned about is Ecology and Ecosystems Research which has been systematically cut for several years. While we all value and marvel at the beauty and complexity of natural ecosystems, it is easy to forget that every year these systems also provide us with billions of dollars worth of services that are critical to our way of life.

As an example, the salt-water marshes of the Gulf Coast provide more than wildlife habitat. They also provide protection against erosion, and they buffer the effect of storms on coastal lands. How are we to protect such vulnerable natural systems as the salt-water marshes of the Gulf Coast, the Great Lakes, the Chesapeake Bay, the Mississippi River Basin, and countless other smaller natural systems in every state in the country, if we don't adequately invest in understanding them?

The \$79.2 million for ecological research in the proposed 2007 amounts to just 15% of the overall ORD research budget. For well over a decade the Board has called on both the Agency and the Congress to revitalize, raise the profile, and increase the funding of ecological research at EPA. Since 2004, the Board has watched budgetary support for ecological research decline by 26%. This is not the route to a clean and healthy future for either us, or for our air, land and waters.

Third, I will say a word about research in human health. The SAB was delighted to see a proposed increase of just under \$3-million in Computational Toxicology. This work holds great potential to streamline the process of assessing the safety of chemicals, speed approval of new products, and in so doing, enhance the productivity and competitiveness of American industry.

However, to make effective use of these powerful new computational tools, researchers also need data to put in the computer models. The Board is deeply troubled by proposed cuts in human health research areas that are needed to provide the data necessary for computational toxicology to be effective. These cuts include a proposed 13% reduction for work on endocrine disruptors, a proposed 14% reduction for pesticides, and an increase of only 3% for other core programs in human health research.

Finally, the Board is concerned about research in Global Change and Sustainability. For each of the past two years, research support for global change has declined by roughly one million dollars. The current budget proposal of \$17.5 million will only allow the agency to meet its impact assessment obligations under the government-wide Climate Change Science Program. The Agency will be forced to terminate, in midstream, research vital to understanding ongoing changes in temperature, precipitation, flooding, snow pack, and other factors will affect water quality across the U.S. To our knowledge, no other federal agency is supporting such work on a national scale.

Following \$9.6 million dollar reduction in 2006, sustainability research is slated for further reduction of \$4.4 million in 2007. These reductions are coupled with the termination of the Superfund Innovative Technology Evaluation Program and Environmental Technology Validation Program. This means that the Agency will lose much of its ability to test and verify new environmental technologies. This loss harms American industry's competitive position for environmental technology in world markets, at a time when other nations treat these technologies as opportunities.

I turn now to your questions about appropriate science priorities and needs for Homeland Security. The proposed 2007 budget calls for an increase of almost 25% to \$39.5-million for Homeland Security research in ORD, and an increase of just under 30% to \$58.1 million for work in other parts of the Agency. These increases will support research and other activities related to increased preparedness and better response for water security, analytical methods, decontamination, clean-up goals, radiation monitoring and biodefense. Clearly improving our ability to deal with terrorist and other threats is a critical national need and the SAB has been most favorably impressed by the dedication and hard work of the staff addressing these important national priorities. However, while all of us on the SAB agree that this is an important area of national need, we are concerned that it not be met through serious erosion of support for the Agency's core research needs in health and environmental research.

I would like to offer two other cautions regarding the Agency's current research program in homeland security research. First, there is some risk of focusing too much at the level of individual devices and sub-systems, without first understanding at a broad level such key issues as how effective alternative approaches can hope to be in providing needed protection, and whether the nation can afford them. Second, we are concerned that current programs are not sufficiently informed by the behavioral and social sciences, which are crucial to effectively organizing the complex systems needed to manage these technologies and communicating research results and risk to the general public.

You also asked about sole reliance on Science and Technology funding for the WaterSentinel pilot program expansion, and if EPA has adequate plans for transitioning WaterSentinel to an operational program. The SAB understands the need for WaterSentinel, but EPA's strategy for allocating resources to this program is unclear. Science and Technology funding is probably appropriate for developing the scientific aspects of WaterSentinel, but other aspects of the program appear to be operational. Accordingly, the SAB believes that operational aspects of WaterSentinel should be funded by appropriate operational funds. The SAB Panel that reviewed WaterSentinel recommended development of a plan to transition WaterSentinel from research and development to an operational program. The SAB is concerned that WaterSentinel funding comes at the expense of the Agency's other responsibilities.

3. Longer-term More Fundamental Research

EPA is a mission-oriented agency, charged with assuring that America enjoys, and will continue to enjoy, a clean and healthy environment. Earlier I paraphrased Louis Pasteur. Don Stokes, the former dean at Princeton's Woodrow Wilson School wrote a wonderful little book⁵ that argues that research cannot simply be sorted out along a line between basic and applied. Some important real world problems, such as those that lead Pasteur to understand how to preserve milk, can only be addressed by doing fundamental research that is *motivated* by real-world needs. Many environmental problems fall into this category – what Stokes termed "Pasteur's quadrant." Much of the knowledge that is needed to assure continued success in EPA's mission requires research of this kind – research which is not being done anywhere else across the Federal system.

In our meetings with agency research managers, we were deeply troubled when we were told that the basic or "core" portions of ORD's research budget have shrunk from roughly 40% to 25% of current research investments. Environmental issues are complex, and often subtle. If EPA does not continue to invest in a significant amount of basic environmental science, we will likely find ourselves making costly regulatory mistakes in the future. We also run the risk of paralyzing innovative industries, like nanotechnology, uncertain about the regulatory rules that they will face.

The SAB is especially troubled by the ongoing difficulty that EPA has had with the application of the OMB Performance Assessment Review Tool or "PART" process. My own view is that both the agency and the OMB need to work harder to resolve this issue, especially in the context of ecosystem research. On the one hand, OMB needs to recognize the need for a portion of EPA's research to be fairly fundamental in nature. As I have argued above, not all EPA research has immediate short-term applications – nor should it have. Long-term investments in developing basic understanding of environmental and ecological science are very important if we are to achieve sensible and efficient environmental protection. At the same time, EPA needs to do a better job of refining and communicating several of its research programs, especially those in ecosystem research, a topic whose importance has been stressed by both the SAB and National Academy of Sciences. Simply continuing to cut the budget is not a viable strategy for achieving future improvement.

⁵ Donald E. Stokes, *Pasteur's Quadrant: Basic science and technological innovation*, Brookings Institution Press, 180pp, 1997

Looking back at the analyses that the SAB has done of EPA's science and research budgets over the past several years, the SAB has become convinced that the Agency is in danger of losing core scientific expertise in both conventional and emerging environmental issues. A number of the agency's research programs are in need of major rejuvenation and modernization, but this is almost impossible in the face of ever shrinking resources. On top of this, a significant number of retirements is anticipated over the coming decade. If proposed cuts in the STAR Doctoral Fellowship program are not restored, where will the next generation of U.S. environmental scientists come from?

Thank you again for the opportunity to testify about EPA's science and research budget request. My colleagues and I would be pleased to answer your questions.