

## Environmental Protection Agency

### FY 2002 Annual Performance Plan and Congressional Justification

#### Sound Science, Improved Understanding of Environmental Risk, and Greater Innovation to Address Environmental Problems

**Strategic Goal:** EPA will develop and apply the best available science for addressing current and future environmental hazards as well as new approaches toward improving environmental protection.

#### Resource Summary

(Dollars in thousands)

		FY 1999 Enacted	FY 2000 Actual	FY 2001 Enacted	FY 2002 Request
<b>Goal 08</b>	<b>Sound Science, Improved Understanding of Env. Risk and Greater Innovation to Address Env. Problems</b>	\$335,618.2	\$295,022.4	\$334,326.0	\$307,247.7
<b>Obj. 01</b>	Conduct Research for Ecosystem Assessment and Restoration.	\$110,540.6	\$100,537.0	\$118,158.6	\$114,865.9
<b>Obj. 02</b>	Improve Scientific Basis to Manage Environmental Hazards and Exposures.	\$49,902.0	\$40,335.5	\$55,349.0	\$55,388.0
<b>Obj. 03</b>	Enhance Capabilities to Respond to Future Environmental Developments.	\$54,935.7	\$45,565.6	\$57,719.7	\$55,848.2
<b>Obj. 04</b>	Improve Environmental Systems Management.	\$68,385.2	\$63,784.4	\$58,562.1	\$45,462.3
<b>Obj. 05</b>	Quantify Environmental Results of Partnership Approaches.	\$14,660.6	\$16,807.5	\$9,604.2	\$7,626.8
<b>Obj. 06</b>	Incorporate Innovative Approaches.	\$27,975.4	\$19,593.8	\$25,313.6	\$21,449.6
<b>Obj. 07</b>	Demonstrate Regional Capability to Assist Environmental Decision Making.	\$6,732.0	\$5,896.9	\$6,843.7	\$3,594.1
<b>Obj. 08</b>	Conduct Peer Review to Improve Agency Decisions.	\$2,486.7	\$2,501.7	\$2,775.1	\$3,012.8
	Total Workyears	1,205.7	1,036.3	1,024.1	998.4

\*For proper comparison with the FY 2002 request, the historic data has been converted to be consistent with the new 2000 Strategic Plan structure. Goal and Objective resources for FY 1999, FY 2000, and FY 2001 may therefore differ from the resources reported in the FY 2001 Annual Plan and Budget and the FY 2000 Annual Report.

## **Background and Context**

EPA has a responsibility to ensure that efforts to reduce environmental risks are based on the best available scientific information. Sound science allows us to identify the most important sources of risk to human health and the environment as well as the best means to detect, abate, and avoid environmental problems, and thereby guides our priorities, policies, and deployment of resources. It is critical that research and scientific assessment be integrated with EPA's policy and regulatory activities. In order to address complex issues in the future, the Agency will design and test fundamentally new tools and management approaches that have potential for achieving environmental results. Under Goal 8, EPA conducts core research to improve our understanding of the fundamental principles underlying risk assessment and risk management.

Another important role for EPA is to pursue innovations that show promise for improving environmental and public health protection. In recent years, a number of significant trends have accelerated innovation in environmental programs. For example, during the past three decades, states have steadily assumed more responsibility for managing programs; in doing so, they have gained valuable experience and insight into how environmental programs can be improved. Seeking to cut costs, increase competitiveness, and operate as good corporate citizens, companies have looked beyond environmental requirements and towards new areas, including voluntary performance partnerships, for improving environmental -- and economic -- performance. Schools, hospitals and other organizations that haven't traditionally interacted with EPA have become more active partners in environmental protection. Perhaps most significantly, many diverse organizations -- representing very different viewpoints -- acknowledge the complexity of today's environmental problems and the need for new solutions for solving them. Thus, these interests in regulatory reform, stronger environmental stewardship, and problem-solving are driving important innovations in environmental programs and practices.

## **Means and Strategy**

EPA is continuing to ensure that it is a source of sound scientific and technical information, and that it is on the leading edge of environmental protection innovations that will allow achievement of our strategic objectives. The Agency consults a number of expert sources, both internally and externally, and uses several deliberative steps in planning its research programs. As a starting point, the Agency draws input from the EPA Strategic Plan, available research plans, EPA program offices and Regions, Federal research partners, and outside peer advisory bodies such as the Science Advisory Board (SAB) and others. This input is used internally by cross-office teams that prioritize research areas using risk and other factors such as National Science and Technology Council (NSTC) research and development priorities, client office priorities, court orders and legislative mandates. EPA's research program will increase our understanding of environmental processes and our capability to assess environmental risks to both human health, and ecosystems.

In the area of ecosystem protection research, EPA will strive to establish baseline conditions from which changes, and ultimately trends, in the ecological condition of the Nation's aquatic ecosystems can be confidently documented, and from which the results of environmental management policies can be evaluated at regional scales. Currently, there is a patchwork of monitoring underway in the aquatic systems of the U.S. Due to differences in objectives, methods, monitoring designs and needs, these data cannot be combined to estimate, with known confidence, the magnitude or extent of improvement or degradation regionally or nationally in this economically critical resource. Therefore, the ability to demonstrate success or failure of increasingly flexible watershed management policies, regionally and nationally, is also not possible. EPA's ecosystem protection research program will provide the methods, designs and summary of existing monitoring programs to develop the baseline required to address these weaknesses. This work is an important step toward providing the scientific understanding to measure, model, maintain, or restore the integrity and sustainability of ecosystems.

In order to improve the scientific basis for identifying, characterizing, assessing, and managing environmental exposures that can pose the greatest health risks to the American public, EPA is committed to developing and verifying innovative methods and models for assessing the susceptibilities of populations to environmental agents. Many of the current human health risk assessment methods, models, and databases are based on environmental risks for adults. This research is aimed at enhancing current risk assessment and management strategies and guidance to better consider risk determination needs for children. This information will be useful in determining whether children are more susceptible to environmental risks than adults and how to assess risks to children.

EPA's leadership role in protecting both human and ecosystem health requires that the Agency continue to be vigilant in identifying and addressing emerging issues. EPA will continue to enhance its capabilities to anticipate, understand, and respond to future environmental developments. EPA will address these uncertainties by conducting research in areas that combine human health and ecological considerations. Additionally, EPA will conduct research to enhance its capacity to evaluate the economic costs and benefits and other social impacts of environment policies. EPA is currently investigating, with the help of the National Academy for Public Administration (NAPA), a number of futures methodologies for their potential use in strategic, multi-year, and annual planning efforts. Continued research in the areas of endocrine disrupting chemicals and mercury are leading toward the development of improved methodologies for integrated human health and environmental risk assessment and sound approaches for risk management. EPA efforts, in concert with other agencies, will result in improved methods to assess economic costs and benefits, such as improved economic assessments of land use policies, and improved assessments for the valuation of children's health, and other social impacts of environmental decision-making. Benefits of these programs will include an improved framework for decision-making, increased ability to anticipate and perhaps prevent potentially serious environmental risks, improved methods for integrated human health and ecosystem risk assessments, improved methods for assessing socio-economic factors, and enhanced communication with the public and other stakeholders.

The Agency also seeks to develop and verify improved tools and technologies for characterizing, preventing, and cleaning up contaminants associated with high priority human health and environmental problems. In order to do this, EPA will develop, evaluate, and deliver technologies and approaches from multiple sectors (e.g., metal finishing, printing, pulp and paper, and textile). Emphasis will be placed on developing preventive approaches and assessing those that are currently available for industries and communities having difficulty meeting pollution standards. The Agency is accumulating data on performance and costs of environmental pollution prevention and control technologies which will serve as a basis for EPA, as well as other organizations, to evaluate and compare effectiveness and costs of a variety of technologies developed within and outside the Agency.

EPA's strategy for solving environmental problems and improving our system of environmental protection also includes developing, implementing and institutionalizing new policy tools, collaborative community-based and sector-based strategies, and the capacity to experiment, test, and disseminate ideas that result in better environmental outcomes. For example, EPA's Sector Program Plan 2001-2005 sets forth a vision and specific actions to enhance the effectiveness of innovative sector activities (at the Federal and state levels) and to fully integrate sector approaches into the Agency's overall mission and core programs. Similarly, EPA is strengthening its capacity to evaluate innovative approaches and make institutional changes that adopt successful innovations.

Sector strategies complement current EPA activities by allowing the Agency to approach issues more effectively; tailor efforts to the particular characteristics of each sector; identify related groups of stakeholders with interest in a set of issues; link EPA's efforts with those of other agencies; and craft new approaches to environmental protection. EPA is building on successful experiences from its current sector-based programs such as the Sustainable Industries Partnership Programs, Design for the Environment, and sector-based compliance assistance programs to expand the ways in which the Agency is working in partnership with industry sectors to meet high environmental standards using flexible, innovative approaches. While these programs are innovative in and of themselves, they also foster the development of innovations at the industry sector level, testing new regulatory ideas, technologies, tools, and incentives in non-adversarial settings.

Project XL provides regulated entities a gateway to work with EPA, its co-regulators, and other stakeholders to develop and implement alternative environmental management strategies that achieve superior environmental performance in exchange for regulatory flexibility. These initiatives offer a balance between the uncertainty in testing promising new approaches and safeguards to ensure the protection of human health and the environment. These pilots, and those conducted under the EPA/State Joint Agreement to Pursue Regulatory Innovation and other initiatives, if successful, will be integrated into our system of environmental protection. Sector-based and facility-based approaches will offer valuable supplements to traditional media-specific environmental policy and, along with place-based and pollutant-based approaches, offer a menu of solutions to environmental issues.

## **Strategic Objectives and FY2002 Annual Performance Goals**

### **Objective 01: Conduct Research for Ecosystem Assessment and Restoration**

- Produce a report on trends in acid deposition and the acidity of lakes and streams to assess progress toward reducing the impacts of acid rain.

### **Objective 02: Improve Scientific Basis to Manage Environmental Hazards and Exposures**

### **Objective 03: Enhance Capabilities to Respond to Future Environmental Developments**

### **Objective 04: Improve Environmental Systems Management**

- Improve P2 tools for the industrial sector and other sectors by providing updated/new methods and approaches to help users simulate product, process or system redesign and evaluate resulting pollution levels, impacts and costs.
- Formalize generic testing protocols for technology performance verification, and provide additional performance verifications of pollution prevention, control and monitoring technologies in all environmental media.

### **Objective 05: Quantify Environmental Results of Partnership Approaches**

### **Objective 06: Incorporate Innovative Approaches**

### **Objective 07: Demonstrate Regional Capability to Assist Environmental Decision Making**

### **Objective 08: Conduct Peer Review to Improve Agency Decisions**

## **Highlights**

### Research for Ecosystem Assessment and Restoration

In order to balance the growth of human activity and the need to protect the environment, it is important to understand the current condition of ecosystems, what stressors are changing that condition, what the effects are of those changes, and what can be done to prevent, mitigate, or adapt to those changes. In FY 2002, the Western Environmental Monitoring & Assessment Program (WEMAP) study will be a primary activity of EPA's monitoring research. Streams and coastal estuaries will continue to be sampled in FY 2002 and landscape indicators will continue to be developed. This study will determine the aquatic biological health of streams in arid, grassland, and alpine ecosystems in western states. The national coastal monitoring program will survey the condition of the Nation's coastal resources (with an emphasis on estuaries) by creating an integrated, comprehensive coastal monitoring program among the coastal

states. By the end of FY 2001, all coastal states will have completed at least an initial round of estuarine sampling. Activities in FY 2002 will focus on analysis and reporting of data resulting from FY 2000 and FY 2001 sampling.

#### Research for Human Health Risk Assessment

An important aim of human health research in FY 2002 will be the development of measurements, methods and models to evaluate exposures and effects of environmental contaminants, particularly in children. The Agency will continue to support a children's research program specifically targeted at addressing major areas of uncertainty and susceptibility. An important element of the program is the children's research centers. These nine university-based research centers (eight of which are co-funded by NIEHS) explore a range of children's risk issues, including childhood asthma and development disorders. Other children's research focuses on data gaps (e.g., longitudinal birth cohort study) and endocrine disruptors. To address evidence suggesting that the effects of endocrine disrupting chemicals (EDCs) exposure in children could be different from those experienced by adults, research will continue to support the development of methods to evaluate hazards in immature organisms exposed to EDCs that are quantitatively or qualitatively different from those observed in adults.

#### Research to Enhance Environmental Decision Making

In recent years, EPA has begun to move beyond environmental regulation to anticipate and prevent potential problems before they evolve into major concerns. In FY 2002, research will focus on improving our understanding of the impact of potential exposure to environmental pollutants on human health and the environment, and on developing approaches to reduce human health and ecological risks. This research will result in accessible, seamless, common methodologies for combined human health and ecological risk assessments. This research will provide sound approaches for risk management so that decision-makers will have the integrated view of risk needed to make intelligent choices.

#### Improve Environmental Systems Management

EPA supports pollution prevention as a necessary and logical strategy for dealing with potential high-risk human health and environmental problems that are addressed by Federal, environmental, and health and safety regulations. In FY 2002, the Agency will incorporate a systems-based approach to pollution prevention that more closely matches the multiple, interactive stressors that threaten both human and environmental health. In addition, pollution prevention research will test the ability of risk assessors and risk managers to develop tools and methodologies to better convey the costs and benefits associated with the magnitude of risk that may be identified.

#### Increased Community-Based Approaches

In FY 2002, EPA will promote development of community-based efforts to manage local environments and strengthen the links between healthy environments and prosperous local economies. EPA will continue to assist communities by providing information, analysis, and management tools; and by

working with other Federal departments and agencies and state and tribal governments to coordinate activities that support local planning and decision making to manage natural resources and ecological services. The Agency will also demonstrate integrated measures of ecological and economic change to provide a foundation for better decision making at all levels, and will provide key evaluations of processes and projects that allow successful approaches to be shared more broadly. In addition, EPA will use Regional Geographic Initiatives (RGI) to partner with states, local governments, private organizations, and others to solve environmental problems.

#### Increased Facility and Sector-Based Strategies

EPA's strategy for improving our system of environmental protection is to pilot innovative approaches designed to achieve better protection at less cost and, if successful, integrate those pilots into our core practices. Through Project XL, the EPA/State Joint Agreement to Pursue Regulatory Innovation, and other initiatives, the Agency is testing and implementing a number of innovative ideas in various environmental programs that will lead to changes in rules, permits, information management, environmental stewardship, enforcement and compliance assurance, stakeholder involvement and Agency culture. For example, as part of Project XL, EPA is testing ways to streamline permitting so manufacturers can respond more quickly to market demands.

#### Science Advisory Board Peer Review and Consultations

The Agency will continue to support the activities, principally peer reviews, of the Science Advisory Board (SAB), which provides independent scientific and technical advice to Congress and the Administrator on scientific, engineering, and economic issues that serve as the underpinnings for Agency positions, such as research direction to regulations.

The agenda of SAB activities is derived from requests from Congress and the Agency, as well as self-initiated activities aimed at highlighting areas of concern that may have escaped Agency attention or may be incompletely addressed by individual Agency office programs.

The SAB's broad objective is to help the Agency perform the best science and use the results of that science appropriately and effectively in making regulatory decisions. In so doing, the SAB promotes sound science within the Agency and a wider recognition of the quality of that science outside the Agency. The SAB actively consults with the Agency on how to incorporate science appropriately and effectively into current and new environmental decision-making approaches.

The use of the SAB for peer reviews also supports the Agency-wide commitment to sound science based on rigorous peer-review, a commitment that has been re-emphasized as a result of GAO findings in 1997 that such efforts are applied unevenly within the Agency. In addition, the SAB's activities provide the kind of support described in the 1999 National Academy of Sciences report, "Evaluating Federal Research Programs: Research and the Government Performance and Results Act", which concludes that

the most effective way of evaluating a Federal research program is by expert review, which includes quality review, relevance review, and benchmarking.

### **External Factors**

Sound science is predicated on the desire of the Agency to make human health and environmental decisions based on high-quality scientific data and information. It challenges the Agency to perform and apply the best available science and technical analysis when addressing health and environmental problems that adversely impact the United States. Such a challenge moves the Agency to a more integrated, efficient, and effective approach of reducing risks. As long as sound science is a central tenant for actions taken by the Agency, then external factors will have a minimal impact on the goal.

The Office of Policy, Economics, and Innovation will lead the Agency's work to explore legislative actions that could strengthen, expedite and stimulate innovative "second generation" approaches to environmental protection and stewardship.



**Environmental Protection Agency**

**FY 2002 Annual Performance Plan and Congressional Justification**

**Sound Science, Improved Understanding of Environmental Risk, and  
Greater Innovation to Address Environmental Problems**

**Objective # 1:** Research for Ecosystem Assessment and Restoration

By 2008, provide the scientific understanding to measure, model, maintain, and/or restore, at multiple scales, the integrity and sustainability of highly valued ecosystems now and in the future.

**Resource Summary**  
(Dollars in thousands)

	<b>FY 1999 Enacted</b>	<b>FY 2000 Actual</b>	<b>FY 2001 Enacted</b>	<b>FY 2002 Request</b>
<b>Conduct Research for Ecosystem Assessment and Restoration.</b>	<b>\$110,540.6</b>	<b>\$100,537.0</b>	<b>\$118,158.6</b>	<b>\$114,865.9</b>
Environmental Program & Management	\$0.0	\$6,576.3	\$9,158.7	\$8,821.1
Science & Technology	\$110,540.6	\$93,960.7	\$108,999.9	\$106,044.8
Total Workyears	439.1	383.6	342.9	347.8

**Key Programs**  
(Dollars in thousands)

	<b>FY 1999 Enacted</b>	<b>FY 2000 Enacted</b>	<b>FY 2001 Enacted</b>	<b>FY 2002 Request</b>
Clean Water Exposure Research	\$1,406.0	\$4,440.6	\$4,448.7	\$4,577.8
Coastal Environmental Monitoring	\$0.0	\$6,954.0	\$7,467.5	\$7,607.6
Environmental Monitoring and Assessment Program, EMAP	\$33,153.5	\$30,543.5	\$29,470.7	\$32,985.7
Rent, Utilities and Security	\$0.0	\$6,754.5	\$6,537.9	\$7,246.2
Administrative Services	\$0.0	\$1,426.2	\$1,647.9	\$1,574.9

## **FY 2002 Request**

### Research

Natural ecosystems provide valuable services and resources to the public, such as air and water purification, flood control, raw materials for industrial processes, food, as well as less tangible benefits such as recreation. Many human activities alter or damage ecosystems and their ability to provide these goods and services. In order to balance the growth of human activity and the need to protect the environment, it is important to understand the condition of ecosystems, what stressors are changing that condition, what the consequences of those changes are, and what can be done to prevent, mitigate, or adapt to those changes. EPA's ecological research program has four primary areas of emphasis within this objective: 1) ecological monitoring research; 2) ecological process and modeling; 3) ecological risk assessment; and 4) ecological risk management and restoration.

### Ecological Monitoring Research

In FY 2002, EPA's monitoring research efforts include the Environmental Monitoring & Assessment Program (EMAP) and the coastal monitoring program. EMAP is developing the monitoring science that is required to implement the Committee on Environment and Natural Resources (CENR) National Monitoring Framework, and to develop EPA's capability to measure trends in the health of freshwater and marine ecosystems. In FY 2002, the Western EMAP study will be a primary activity of EPA's monitoring research. This study has four areas of focus: 1) the landscape atlas for western states; 2) the intensive study of three watersheds (Columbia River basin, Missouri River basin, and San Francisco Bay region); 3) Pacific coast monitoring; and 4) a western-wide stream survey. The national coastal monitoring program (Coastal 2000) will survey the condition of the Nation's coastal resources (with an emphasis on estuaries) by creating an integrated, comprehensive coastal monitoring program among the coastal states. By the end of FY 2001, all coastal states will have completed at least an initial round of estuarine sampling. Activities in FY 2002 will focus on analysis and reporting of data resulting from FY 2000 and FY 2001 sampling.

Additional monitoring research will focus on genetic and community-level exposure. Environmental indicators are used in monitoring programs to estimate ecological status, and to detect and quantify changes within an ecosystem due to chemical exposure, nutrient levels, sediments, or changes in landscape quality. In FY 2002, EPA will develop indicator methods to measure environmental exposure for aquatic systems. Research will attempt to link biological responses to known chemical, physical, and/or biological stressors.

Further ecosystem monitoring research will be undertaken in the following areas: 1) development and demonstration of indicators of estuarine environmental health; 2) assessment of stressors to wildlife sustainability; 3) development of national aquatic ecosystem classification systems and associated reference conditions; 4) nutrient science for watershed management; and 5) statistical survey design for aquatic resources.

## Ecological Process and Modeling Research

Process and modeling research addresses biological, chemical, and physical processes affecting the condition of ecosystems and their responses to stressors. Drawing from information gathered by monitoring efforts, process and modeling research develops a basic understanding of the processes that govern ecosystem function, and the technology to model those processes. This modeling ability allows for predictions of future landscapes, stressor patterns, ambient conditions, and receptor responses. Predicting the impact of changes in conditions allows resource managers to address problems in ways that will more effectively achieve their desired environmental protection goals.

Since measurements are not possible in every watershed because of cost and other practical constraints, landscape indicators offer an efficient means to detect change, measure watershed level stressors, and quantify relationships between landscape metrics and specific parameters. A new generation of wall-to-wall spatial data (e.g., Multi-Resolution Landscape Characterization (MRLC) land cover and the North American Landscape Characterization (NALC) historical landscape data), and advances in geographic information systems (GIS) make it possible to evaluate the compositional and spatial pattern of landscape characteristics. Using this information, EPA's landscape sciences program will conduct a national assessment of landscape change between the early 1970's and early 2000's and evaluate the consequences of these changes on aquatic resources.

EPA will also conduct research to address the effects of excess nitrogen from atmospheric or other sources on aquatic ecosystems. This research will develop models that predict the loading-response relationships for nitrogen in aquatic habitats. Such models can be used for stressor source apportionment and for the assessment of management and mitigation strategies. In addition, EPA will develop approaches for evaluating relative risks from chemical and nonchemical stressors on fish and wildlife populations across large areas or regions. This information can then be used to describe habitat requirements for wildlife and the sustainability of ecological resources.

## Risk Assessment Research

EPA's risk assessment research addresses the risk posed to ecosystems by stressors, alone and in combination, now and in the future. Ecological assessments can link stressors with consequences and evaluate the potential for damage to particular ecosystems. Ecological assessments can also be used to compare the relative risks associated with different stressors, different regional areas, and different ecosystems. This is a valuable tool for environmental risk managers at local, state and federal levels, enabling them to identify high priority ecosystems that are at high risk.

The completion of the first phase of EMAP in the Mid-Atlantic region provided baseline information on the current status of most resources in the region. New research in FY 2002 will build on EMAP and other data to project future environmental conditions in the region so that risk management activities can be targeted in a proactive manner. The Regional Vulnerability Assessment (ReVA) project, begun in FY

2000 as part of EPA's support for the National Science and Technology Council's cross-Agency Integrated Science for Ecosystem Challenges (ISEC), will continue in FY 2002. ReVA will combine modeled projections of changes in stresses (e.g., pollution deposition, land use change) with information on sensitive ecosystems in order to identify: 1) the greatest environmental risks that are likely to arise in the next 5-25 years; and 2) where those risks are likely to occur. ReVA will also integrate socio-economics into the analyses to identify factors driving changes in environmental condition and to better communicate trade-offs associated with alternative policy decisions. Given that we will not protect every ecosystem, everywhere, at all times, examining resources and their vulnerability at this larger scale will greatly assist in identifying ecologically important features of the region which merit special consideration by all managers (local, regional, or national).

### Risk Management and Restoration Research

EPA's risk management and restoration research focuses on the options available to manage the risks to and restoration of degraded ecosystems. The growth rate of the man-made environment necessitates the development of cost-effective prevention, control, and remediation approaches for sources of stressors and adaptation approaches for ecosystems. In addition to risk management technologies, it is also important to invest in restoration. These technologies will diagnose ecosystem restoration needs, evaluate progress toward restoration, and establish ecologically relevant goals and decision support systems for state and community planners. EPA is developing restoration technologies which focus on: 1) rehabilitation, to the extent possible, of the structure of watershed ecosystems (e.g., restoring a riparian zone); 2) reduction of the perceived stressors (e.g., cleaning up contaminated sediments); and 3) enhancing the natural resilience of the system. These approaches are complementary and can often be used in concert with one another. EPA will also develop tools to assess the progress, effectiveness, and cost of candidate restoration technologies, including the development of methods for evaluating negative or unexpected impacts of the restoration technology. This research will be incorporated into restoration protocols to allow more uniform approaches to determining effectiveness and cost.

### **FY 2002 Change from FY 2001 Enacted**

#### S&T

- (+\$2,346,300 and 15.8 FTE) Resources have been redirected from global and from the nearly completed Mid-Atlantic Integrated Assessment (MAIA) for higher priority research in support of the Environmental Monitoring and Assessment Program (EMAP). Research will focus on the effects of excess nitrogen from atmospheric or other sources on aquatic ecosystems. Research will involve the development of classification schemes as well as models that predict the loading-response relationships for nitrogen in aquatic habitats.

- (+\$1,482,500) This increase is for the development of national aquatic ecosystem classification systems and associated reference conditions. This research will focus on the development of functional, defensible classification schemes and associated reference conditions for use in the application of biocriteria to one or more of the following aquatic resources: wetlands, large rivers, ephemeral systems, reservoirs, lakes, streams, estuaries, near-shore coastal environments, and coral reef communities.
- (+\$800,000) This increase will support continued research on deposition of nitrogen, along with other atmospheric stresses such as sulfur. These will be monitored throughout the northeastern U.S. to determine the effects of acid deposition on streams, rivers and lakes.
- (+\$398,700) This increase in research will support efforts to better understand the fate and transport of nutrients in the environment. This work will address: a) the factors that affect nitrogen deposition, transport, and transformation, b) how terrestrial, freshwater, and coastal marine processes and communities change in response to changing nitrogen loads, c) the critical threshold loadings of nitrogen, and d) the spatial distribution of nitrogen across the components of a watershed.
- (+\$1,623,800) This increase reflects an increase in workforce costs.
- (-\$972,900) This realignment of mercury research to Objective 8.3 (Emerging Priorities) will shift the focus of research from the effects of mercury in water to study mercury emissions, fate and transport, and deposition.
- (-\$749,300 and 5.8 FTE) This redirection from the nearly completed Mid-Atlantic Integrated Assessment (MAIA) will fund high priority work in EMAP to study the effects of excess nitrogen on aquatic systems.
- (-\$1,003,500) This reduction to lower priority research in PBT monitoring and measurement, exposure assessment models, and High Performance Computing and Communications (HPCC) is primarily to offset the payroll cost of living and enrichment increases in support of the overall ecosystems protection research program.
- (-\$6,800,400) The FY 2002 Request is \$6,800,400 below the FY 2001 Enacted budget level due to Congressional earmarks received during the FY 2001 appropriations process which are not included in the FY 2002 President's Request.

#### EPM

- (-\$972,900) The FY 2002 Request is \$972,900 below the FY 2001 Enacted budget level due to Congressional earmarks received during the FY 2001 appropriations process which are not included in the FY 2002 President's Request.

Research

**Estuarine Ecosystem Conditions**

- In 2001      Establish baseline conditions from which changes, and ultimately trends, in the ecological condition of the Nation's estuaries can be confidently documented, and from which the results of environmental management policies can be evaluated at regional scales.
  
- In 2000      EPA reported on monitoring findings in the Mid-Atlantic Region as a cost-effective means of measuring the condition of these systems by completing the products below and other research activities.
  
- In 2000      EPA developed monitoring designs, including indicators, for streams in western watersheds by completing the products below and other research activities.
  
- In 2000      EPA developed monitoring designs for National coastal monitoring by completing the products below and other research activities.

Performance Measures:	FY 1999 Actuals	FY 2000 Actuals	FY 2001 Estimate	FY 2002 Request
A final report on the extent and magnitude of fish tissue contamination in small, wadeable streams in the Mid-Atlantic Region as means of identifying high risk areas.		1		final report
Draft design for a National coastal monitoring program to assess the biological condition of estuaries		1		draft design
Final report on the relationship between macroinvertebrate & periphyton assemblages & chemical & physical stressors to verify the applicability of these biological indicators in the Mid-Atlantic.			1	report
Refined coastal health indicators developed and applied in salt marsh estuaries and near coastal water of the Gulf and South Atlantic.			28-Feb-2001	indicators
Develop a final work plan for western stream condition monitoring.			30-Sep-2000	
Report describing the condition of the Nation's Estuaries.			1	report
Baseline:      Currently, there is a patchwork of monitoring underway in the estuaries of the U.S. Due to differences in objectives, methods, monitoring designs and needs, these data cannot be combined to estimate, with known confidence, the magnitude or extent of improvement or degradation regionally or nationally in this economically critical resource. Therefore, it is also not possible to demonstrate the success or failure of increasingly flexible watershed management policies, regionally and nationally. By the end of 2001, the methods, designs				

and summary of existing attempts will be in place to develop the baseline required to address these weaknesses.

**Integrated Ecosystem Modeling**

- In 2002 Produce a report on trends in acid deposition and the acidity of lakes and streams to assess progress toward reducing the impacts of acid rain.
- In 2000 Publication of a conceptual model for developing watershed assessment techniques has been delayed until 12/31/02.
- In 2000 EPA produced a final report on the relationship between land-use patterns and water quality in watersheds of the Lake Superior basin, as well as a draft implementation protocol/prototype approach for estimating sediment loadings.

Performance Measures:	FY 1999 Actuals	FY 2000 Actuals	FY 2001 Estimate	FY 2002 Request
Peer-reviewed draft TMDL Implementation Protocol/Prototype approach for estimating loadings of sediments to be used by OW, Regions, Tribal Governments, and States in implementation of CWA S.303.		1		protocol
Release of multimedia wildlife exposure assessment model which consists of a computer friendly system to assess and integrate exposures of wildlife to env. contaminants in soil,water,food,and air model			31-Dec-2002	
Develop expanded guidance for performing an ecological risk assessment; conduct a series of colloquia and a workshop on ecological assessment issues			30-Sep-2001	guidance
Final report on relationships between wetland extent and land-use patterns with stream water quality and biotic communities in watersheds of the Lake Superior basin.			1	report
Trends in acidity in lakes and streams in the NE and Mid Atlantic Regions of the U.S.				1 report
Baseline: In response to the Clean Air Act amendments, actions were taken to reduce the causes of acid deposition and aid in the recovery of lakes and streams affected by this deposition. Our understanding of the expected rate and degree of recovery has been primarily based on results of similar actions in northern Europe. Research is being conducted to evaluate the status of acidic lakes and streams in the northeastern United States, a region sensitive to and impacted by acid deposition, to evaluate the degree to which the actions taken have been effective. This research focuses on measuring the end result of controls in place and will provide insights into whether additional controls are needed.				

## Regional Scale Ecosystem Assessment Methods

In 2002 Assess the condition, vulnerability, and restoration potential of streams and their watersheds in the Mid-Atlantic.

In 2001 Develop methods for regional scale, comparative risk/vulnerability assessment using the Mid-Atlantic Region as a case study.

Performance Measures:	FY 1999 Actuals	FY 2000 Actuals	FY 2001 Estimate	FY 2002 Request
Final report and data base on landscape change in the Mid-Atlantic states between the early 1970s and the early 1990s, based on remotely sensed monitoring data, and the consequences for water quality			1	report,database
Estimating Vulnerability of Streams and Ground Water to Sediments, Nutrients, Pesticides, and Toxic Substances: Applying Landscape Assessment Tools to the Mid Atlantic Coastal Plain.		1		journal article
Develop a probability-based methodology for conducting regional aquatic ecosystem exposure and vulnerability assessment, for pesticides.		1		methodology
Submit manuscripts for peer-review publication on: The Spatial Distribution and Trend Analysis of Sulfur and Nitrogen Deposition in the Eastern United States.			09/30/01	publication
Report on the use of conceptual models for conducting large spatial scale assessments based on the principles of the ecological risk assessment guidelines.			1	report
Report on the condition of streams in the Mid-Atlantic region.				1 report
Baseline: Despite years of monitoring, effects research, and ecological modeling, flexible approaches have not yet been developed to assess the regional impacts of multiple stresses on multiple resources such that risk management activities can be prioritized. Methods are needed to evaluate and compare the condition of ecosystems and their risk of future degradation while assessing the role of individual stresses. New techniques to synthesize existing condition data, including but not limited to that provided by the Environmental Monitoring and Assessment Program (EMAP), with modeled estimates of future stressor distributions are needed. Application of such techniques in a demonstration to be completed in FY 02 for the Mid-Atlantic Region will allow the identification of ecosystems at greatest risk, stressors that have the greatest impact on valued resources, and watersheds where restoration efforts may afford the greatest benefits.				



## **Verification and Validation of Performance Measures**

**Performance Measure: Report on trends in acidity in lakes and streams in the NE and Mid Atlantic Regions of the U.S.**

**Performance Database:** Not applicable. This performance measure relates to an EPA scientific or technical product which is not tracked in an environmental database.

**Data Source:** Agency generated material

**QA/QC Procedures:** N/A

**Data Quality Reviews:** As required by the Agency-wide formal peer review policy issued in 1993, and reaffirmed in 1994 and 1998, all major scientific and technical work products used in Agency decision making are independently peer reviewed before their use. EPA has implemented a rigorous process of peer review for both its in-house and extramural research programs. Peer review panels include scientists and engineers from academia, industry, and other federal agencies.

**Data Limitations:** N/A

**New/Improved Data or Systems:** N/A

## **Coordination with Other Agencies**

Research in ecosystems protection is coordinated Government-wide through the Committee on Environment and Natural Resources (CENR). It is the unique mission of EPA to go beyond resource management assigned to other agencies like NOAA's National Marine Fisheries Service, USDA's Forest Service, and DOI's Fish and Wildlife Service and Bureau of Land Management, and to protect the whole environment, accounting for both public and private sources of adverse ecological effects. EPA has been an active participant in the CENR, and all work in this objective is fully consistent and complementary with other Committee member activities.

EPA researchers work within the CENR on EMAP and other ecosystems protection research. The Mid-Atlantic Landscape Atlas was developed in cooperation with NOAA, USFW, the University of Tennessee, and the U.S. Department of Energy's (DOE's) Oak Ridge National Laboratory. Development of the Multimedia Integrated Modeling System is coordinated with the Army Corps of Engineers (USACE), USDA, and DOE. EPA participates in the Integrated Sciences for Ecosystem Challenges initiative formulated by CENR's Subcommittee on Ecological Systems, where the Agency participates in restoration

of habitats and species, impacts of landscape change, invasive species, and inventory and monitoring programs.

EPA also participates in the interagency Water and Watersheds research grants program. This program is co-sponsored by EPA, the National Science Foundation, and USDA. Integrating the physical, biological and social sciences, this research is focused on developing watershed assessment and restoration approaches and decision tools that will assist resource managers in making decisions based on sound science. Additional interagency grants programs in Ecology include: the Coastal Index Sites Network (CISNet) co-sponsored with NOAA and NASA; the Ecology and Oceanography of Harmful Algal Blooms (EcoHAB) program with NOAA, NSF, DOD, and NASA; nutrient science for watershed management with USDA; and Estuarine and Great Lakes (EAGLES) program with NASA.

### **Statutory Authorities**

Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)

Toxic Substances Control Act

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)

Resource Conservation and Recovery Act (RCRA)

The Clean Air Act Amendment

The Safe Drinking Water Act

Pollution Prevention Act (PPA) (42 U.S.C. 13101-13109)

Clean Water Act (CWA) Title I (33 U.S.C 1251-1271)

## Environmental Protection Agency

### FY 2002 Annual Performance Plan and Congressional Justification

#### Sound Science, Improved Understanding of Environmental Risk, and Greater Innovation to Address Environmental Problems

**Objective # 2:** Improve Scientific Basis to Manage Environmental Hazards and Exposures.

Improve the scientific basis to identify, characterize, assess, and manage environmental hazards and exposures that pose the greatest health risks to the American public by developing models and methodologies to integrate information about exposures and effects from multiple pathways. This effort includes focusing on risks faced by susceptible populations, such as people differentiated by life stage (e.g., children and the elderly) and ethnic/cultural background.

#### Resource Summary (Dollars in thousands)

	FY 1999 Enacted	FY 2000 Actual	FY 2001 Enacted	FY 2002 Request
<b>Improve Scientific Basis to Manage Environmental Hazards and Exposures.</b>	<b>\$49,902.0</b>	<b>\$40,335.5</b>	<b>\$55,349.0</b>	<b>\$55,388.0</b>
Environmental Program & Management	\$18.8	\$3,482.4	\$3,941.9	\$4,114.5
Science & Technology	\$49,883.2	\$36,853.1	\$51,407.1	\$51,273.5
Total Workyears	225.5	166.3	176.8	174.3

#### Key Programs (Dollars in thousands)

	FY 1999 Enacted	FY 2000 Enacted	FY 2001 Enacted	FY 2002 Request
Endocrine Disruptor Research	\$0.0	\$379.3	\$366.9	\$366.3
Human Health Research	\$49,652.2	\$48,883.9	\$50,940.4	\$50,807.2
Rent, Utilities and Security	\$0.0	\$3,860.3	\$3,370.9	\$3,631.3
Administrative Services	\$0.0	\$606.1	\$529.1	\$435.3

## **FY 2002 Request**

During much of its history, EPA has focused its human health risk management decisions and regulations on single environmental pathways and individual contaminants. Often, this approach has been mandated by environmental legislation. In recent years, advances in the state of environmental science have illustrated that new risk assessment methods are needed to investigate complex environmental and human health issues that were not contemplated by early environmental legislation. These advances illustrate the significance of new risk management options for EPA.

Creating a strong scientific foundation for risk assessment and for subsequent risk management decisions requires research to reduce significant areas of scientific uncertainty and to develop the methods, models, and data needed to support EPA's scientific and regulatory programs. EPA's "*Human Health Risk Assessment Research Strategy*," which is currently in draft, outlines the approaches the Agency will use over the next 5-10 years to provide the science and scientific leadership needed to characterize and enable the prevention and reduction of environmental risks to public health. The general approach of the draft strategy is to conduct research needed to address complex environmental issues, i.e., harmonization of cancer and non-cancer risk assessment, aggregate toxicity and cumulative risk, and the evaluation of health-driven regulatory decisions.

In FY 2002, human health research will be undertaken in three key areas of activity: 1) development of multimedia/multipathway exposure methods and models; 2) development of mechanistically-based data, tools, and approaches; and 3) susceptible subpopulations. Following is a detailed discussion of the FY 2002 program in terms of these three activity areas.

### ***Multimedia/multipathway exposure methods and models***

EPA is committed to developing models to assess, predict, and diagnose the population distribution of multimedia/multipathway exposures to major classes of environmental agents. A number of exposure-related activities will be undertaken in achieving this objective. They have been chosen to address substantial uncertainties that exist in human health risk assessment and, thereby, improve the scientific basis for assessing and managing risks. They include: 1) human exposure measurement research; 2) research on mixtures and cumulative and aggregate exposure; and 3) National Human Exposure Assessment Survey (NHEXAS) data analysis. This research seeks to improve the core science in these areas by focusing on multimedia/multipathway exposures to pesticides and other consumer products and major exposure venues.

In FY 2002, human exposure measurement research will continue to develop, demonstrate, and evaluate human exposure measurement and surveillance investigations along the U.S. - Mexican Border in conjunction with the Border XXI (NAFTA) program. Areas of emphasis for the Border program in FY 2002 will include: 1) exposure and epidemiological studies that investigate children's exposure to pesticides; 2) studies which investigate the potential for differential exposures which may be related to contaminants from agricultural pesticide application and other activities along the border; and 3) an investigation of population exposure in Arizona in communities along the border. During FY 2002, a report will be published on the results of pesticide exposure and health measurement screening for a pediatric cohort along the border.

In FY 2002, EPA will continue to develop measurements and measurement-derived models that represent aggregate exposure and source-exposure-dose relationships for contaminant mixtures to which the general population and children are exposed to daily. Research will continue to focus on human multi-pathway exposure modeling, including developing the modules/models that describe multi-media, multi-pathway human exposure, incorporating human activity patterns and measured or modeled distributions of exposure concentrations. These modules are key devices for linking environmental concentrations with human actions to estimate the actual exposures. Another focus will be on human exposure-to-dose modeling, including developing state-of-the-art exposure-dose mathematical models to describe the uptake of pollutants into the body and the distribution of the pollutants throughout the body. These human exposure-to-dose models provide the essential linkage between regional environmental or micro-environment toxicant models and dose-response models designed by toxicologists.

Research on mixtures, cumulative, and aggregate exposures will continue to provide methodologies, prototypical assessments and guidance for risk assessors on the use of information on multiple sources, multiple chemicals and stressors, multiple routes and pathways, and multiple time frames and durations of exposure.

In FY 2002, the Agency will continue to implement the strategy, which was recommended and reviewed by the Science Advisory Board (SAB) for analyses of the NHEXAS data. Building on basic analyses initiated in FY 2001, research will focus on statistical analyses to identify predictors of exposure, including residential sources and activity patterns, and on the use of measurements in multiple media to evaluate and refine current exposure models.

Finally, the Agency will begin efforts to develop methods and approaches, including monitoring, to enable the Agency to define and demonstrate measures of success to determine whether the intended benefits in protecting public health are/were realized. Research in FY 2002 will include determining the state of the science to address this issue.

The results from the application of methods, models, measurements, and data developed under this research program will significantly improve our understanding of the extent of human exposure to specific pesticides and toxic substances. Methods resulting from this research will be incorporated into the Agency's battery of testing guidelines.

### ***Mechanistically-based Data, Tools, and Approaches***

The Agency faces limitations in its ability to assess potential health risks of environmental exposures both qualitatively and quantitatively because of a lack of understanding about the underlying biological, chemical, and physical processes that determine target tissue exposures and effects. Without sufficient knowledge of these processes, uncertainties are introduced into the risk assessment process that may allow for wide interpretation of what is often limited data. Research in this objective addresses both qualitative (hazard identification) and quantitative (dose-response analysis) concerns associated with current risk assessments.

Under this research program, EPA is committed to reducing reliance on methodologies that rely on default assumptions by providing mechanistically-based data, tools and approaches for more quantitative and biologically defensible human health risk assessments. EPA will achieve this objective through sustained research aimed at reducing reduce significant uncertainties in EPA's ability to identify and characterize health hazards, and then to quantify, model and assess exposure-dose-response relationships. In FY 2002, research will focus on harmonizing cancer and non-cancer risk assessments.

More specifically, health effects research will continue to focus on mechanistically-based risks and development of fundamental tools, such as biomarkers of effect and susceptibility, to address risks posed by cumulative and aggregate exposures, exposure to chemical mixtures and risks to susceptible populations (such as the elderly, children or persons predisposed to disease). The Agency will develop methods to identify the critical physiologic and mechanistic factors that contribute to health effects in laboratory animals and humans. Research to determine the effects of varying route, dose, dose-rate, duration and cumulative dose on health outcomes will be used to develop mechanistically-based models. Mechanism-of-action information will improve confidence in the qualitative assessment of hazard and also shed light on the cascade of events linking exposure and disease, consequently improving our ability to perform more biologically-based dose-response estimates.

Risk assessment research will focus on providing methodologies, prototypical assessments, and guidance for risk assessors on the use of information on: 1) common levels of "response" for risk assessment; 2) common dose metrics for risk assessment; and 3) framework and guidelines for harmonized and integrated risk assessments.

### ***Susceptible Subpopulations***

EPA is committed to developing and verifying innovative methods and models for assessing the susceptibilities of populations to environmental agents and enhancing current risk assessment and management strategies and guidance.

The Agency will support research on individual variability in susceptibility. In FY 2002, one area of emphasis will be mechanistically-based risk assessment methods for genotoxic effects. Efforts will also focus on developing methods for assessing cumulative risks.

Risk assessment research will continue to provide methodologies, prototypical assessments and guidance for risk assessors for using information on biological susceptibility, exposure variability, methodologic variability, and stochastic processes.

In 1997, in response to the heightened awareness and concern about the unique susceptibilities of infants and children, EPA established the Children's Health Research Program:

Much of the effort under the Children's Health Research Program in FY 2002 is based on the *EPA Strategy for Research on Environmental Risks to Children*, which provides direction for research in age-related exposures, physiology, and biological responses that may result in increased risks, and research

in risk reduction methods. This research provides the scientific underpinnings that will result in better EPA risk assessments for children and ultimately reduced risks from potential environmental health threats. In FY 2002, EPA's children's health will maintain a strong research program to provide the data to strengthen Agency risk assessments for children.

EPA began to address environment-related childhood diseases in 1998 by establishing, in cooperation with the National Institute of Environmental Health Sciences (NIEHS), eight university-based pediatric environmental research centers. Their aim is to better understand the causes of environmentally-induced disease among children and to eventually decrease the prevalence of childhood disease. Their efforts are focused on children's childhood asthma and other respiratory disease, growth and development, and children's exposure and susceptibility to pesticides. The Centers are also investigating community-based risk reduction methods to lower children's exposures to environmental agents and improve their health outcomes. The Agency enhanced these efforts by establishing a ninth pediatric center to study developmental disorders. These children's centers will continue their efforts in FY 2002.

The Agency will continue to support extramural and in-house children's research through a variety of other on-going efforts. For example, a program of mechanism-of-action experimentation aims to facilitate the extrapolation of animal and experimental model data to humans, enhancing ability to predict and study adverse effects in humans. Broadly applicable physiologically based pharmacokinetic (PBPK) models and biologically based dose-response (BBDR) models will be developed to produce more accurate risk assessments for children, making full use of pharmacokinetic and mode-of-action data.

The Agency is participating in a Federal Consortium established by the National Institute for Child Health and Human Development (NICHD), which includes the Centers for Disease Control (CDC) and Prevention, in the design of a national longitudinal study of environmental influences on children's health and development, authorized by the Children's Health Act of 2000. The prospective study would enroll 100,000 or more pregnant women before their child's birth and study the newborn infants to adulthood. The Act requires that the study incorporate various aspects of a child's exposures to assess the physical, chemical, biological, and psychosocial environmental influences on children's well-being. The Act also requires that the study gather data on environmental influences and outcomes on diverse populations of children. Data on outcomes would be collected during pregnancy, infancy, childhood, and beyond. The Agency will continue methods development work for the national longitudinal study in FY 2002, focusing on methods for collecting exposure data, for assessing effects in infants and young children, and for recruitment and retention of study candidates.

The Agency will continue work on developing broadly applicable methods for removing chemicals from residential environments and for preventing exposure in the residential environment where children are most likely to be exposed.

Because of the rising rate of asthma in the United States, especially among children, and the scientific uncertainty as to why asthma rates are increasing, the Agency has developed an asthma research strategy, which we will implement in 2001. EPA will conduct research to understand the impact of

environmental agents and factors on the induction and exacerbation of asthma. The Agency is proposing to accomplish some of the asthma research through the Longitudinal Birth Cohort Study described above.

To address evidence suggesting that the effects of endocrine disrupting chemicals (EDCs) exposure in children could be different from those experienced by adults, research will continue to support the development of methods to evaluate hazards in immature organisms exposed to EDCs that are quantitatively or qualitatively different from those observed in adults. Also, the Agency will continue to support research to develop test procedures and create market incentives for the manufacture and use of products, including water-based cleaners, that result in improved indoor air quality. This research will provide the scientific basis to upgrade guidance to schools.

**FY 2002 Change from FY 2001 Enacted**

S&T

- (+\$771,500) This increase reflects an increase in workforce costs.
- (-\$1,080,000) Fundamental health effects research (e.g., biomarkers of effect and susceptibility to address risks posed by cumulative and aggregate exposures) and efforts in support of the NHEXAS program have been reduced in order to fund additional mercury research in Objective 8.3.

Research

**Human Health Risk Assessment Research**

In 2002 Produce a framework with supporting models and analyses to better link human exposure measurements and health effects outcomes and address complex, high priority risk issues including aggregate/cumulative risk, high to low dose extrapolation, and susceptible populations.

In 2001 Implement completed Human Health Risk Assessment Research Strategy focusing on research to improve extrapolation, cumulative and aggregate risks, mixtures, susceptible populations, harmonization of cancer and non-cancer risk assessments, and evaluating the effectiveness of public health decisions.

In 2000 Reports on the use of mechanistic data in developmental toxicity risk assessment and assessments of pesticide exposures to children were published. The Exposure Factors Handbook was delayed due to an extension of the public comment period, and will be released in FY 2001.

Performance Measures:	FY 1999	FY 2000	FY 2001	FY 2002
	Actuals	Actuals	Estimate	Request

Assess pesticide exposures to children in Washington, Minnesota, and Arizona.	1	assessment
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Report on the use of mechanistic data in developmental toxicity risk assessment.	1		report
Develop Exposure Factors Handbook for children	0	1	Handbook
Publish peer reviewed research strategy on human health risk assessment.		1	resrch strategy
NHEXAS: Begin implementation of Strategic Data Analysis Plan.		1	strategic plan
Develop a prototype source-to-exposure-to-dose modeling framework that enables the complex computation for human exposure modeling.		1	modelassessmen
Analysis and report on factors for children's exposure to pesticides that may lead to high-level, short-term exposure to pesticides.		1	report
Advance the human exposure and dose model by improving the modules for dermal and dietary exposure.		2	modules
Framework for conducting risk assessments for children as a sensitive subpopulation.		1	framework
Report on the Contribution of Genetic Polymorphisms of Metabolic Pathways to Susceptibility and Population Variance.		1	report
Report on health effects associated with exposures to indoor and outdoor pollutants using NHANES health effects data and EPA monitoring data.		1	report

Baseline: As EPA has successfully addressed the most apparent environmental problems, research is now needed to address increasingly complex issues. Significant uncertainty surrounds assessing the risks associated with multi-pathway exposure to a pollutant or class of pollutants (aggregate risk), or from multiple pollutants via multiple pathways (cumulative risks). It is also critical to identify the subgroups in our populations for which these exposures pose the greatest risks. These issues will be addressed through research to identify and quantify the fundamental mechanisms that impact human exposures, the resulting "dose" that the individual receives and the attendant health risks. As an important step forward, an integrated program linking exposure, dose and effects will be undertaken for two areas, namely, susceptible populations and aggregate/cumulative risk. Establishing these predictive linkages will lead to more scientifically defensible Agency risk assessments.

### **Exposures and Effect of Environmental Research**

In 2002 Complete planning and initiate proof of concept projects(s) to develop methods and approaches that will more directly evaluate the public health outcomes of environmental

decision-making relative to the more traditional surrogates such as increased compliance/decreased emissions.

In 2001 Develop initial measurements, methods and models to evaluate exposures and effects of environmental contaminants, particularly in children.

In 2000 EPA developed initial measurements, methods, and models to evaluate exposures and effects of environmental contaminants, particularly in children, by completing the products listed below and other research activities.

Performance Measures:	FY 1999 Actuals	FY 2000 Actuals	FY 2001 Estimate	FY 2002 Request
Develop and validate first phase models using mechanistic data to predict toxicity for two noncancer endpoints following less-than-lifetime exposures to environmental contaminants.		2		report
Develop first generation multimedia and multipathway exposure models for infants, children, and the general population.		1		model
Guidance on improving PK model usage for children.			1	guidance
Deliver a strategy to guide EPA's research on methods for measuring improvements in human health, informing decision makers and the public of environmental progress.				1 rsch. strategy
<p>Baseline: Just as the environmental issues that the Agency must address have gotten more complex, so have the solutions. The decisions leading to further, incremental improvements in environmental conditions may have substantial costs, and as such, can benefit from data reflecting the improvements in public health resulting from such decisions. One element of the Human Health Risk Assessment Research program will be directed at conducting research, in partnership with other agencies, to develop and validate methods and measurements that can assess changes accompanying the implementation of environmental decisions. In keeping with GPRA, the goal is to eventually have a set of true "outcome" indicators to assess the success of regulatory decisions and practices.</p>				

### **Coordination with Other Federal Agencies**

Several Federal agencies sponsor research on variability and susceptibility in risks from exposure to environmental contaminants. NIEHS achieves its mission through a multidisciplinary biomedical research program, prevention and intervention efforts, and communication strategies that encompass training, education, technology transfer, and community outreach. In 1998, in collaboration with NIEHS, EPA established eight Centers for Children's Environmental Health and Disease Prevention to define the environmental influences on asthma and other respiratory diseases, childhood learning, and growth and development. Also, with the NIH/NICHHD and CDC, the Agency is part of the consortium of Federal agencies that are planning, developing and implementing the national longitudinal study.

The Agency continues to work on interagency task forces with a number of federal agencies, including NIOSH, NIEHS, FDA, and CPSC, in developing health risk assessment guidelines (e.g., Carcinogen Risk Assessment Guidelines, Developmental Toxicity Guidelines, Exposure Assessment Guidelines) and has maintained interagency agreements with NIOSH and NIEHS (e.g., the Children's Health Centers).

### **Statutory Authority**

Clean Air Act (CAA)

Safe Drinking Water Act (SDWA)

Clean Water Act (CWA)

Toxics Substances Control Act (TSCA)

Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)

Resources Conservation and Recovery Act (RCRA)

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

Superfund Amendments Reauthorization Act (SARA)

Food Quality Protection Act (FQPA)

## Environmental Protection Agency

### FY 2002 Annual Performance Plan and Congressional Justification

#### Sound Science, Improved Understanding of Environmental Risk, and Greater Innovation to Address Environmental Problems

#### **Objective #3:** Enhance Capabilities to Respond to Future Environmental Developments

Enhance EPA's capabilities to anticipate, understand, and respond to future environmental development and conduct research in areas that combine human health and ecological considerations.

#### Resource Summary

(Dollars in thousands)

	FY 1999 Enacted	FY 2000 Actual	FY 2001 Enacted	FY 2002 Request
<b>Enhance Capabilities to Respond to Future Environmental Developments.</b>	<b>\$54,935.7</b>	<b>\$45,565.6</b>	<b>\$57,719.7</b>	<b>\$55,848.2</b>
Environmental Program & Management	\$7,216.1	\$7,733.5	\$7,789.5	\$8,298.0
Science & Technology	\$47,719.6	\$37,832.1	\$49,930.2	\$47,550.2
Total Workyears	192.2	144.9	164.4	155.6

#### Key Programs

(Dollars in thousands)

	FY 1999 Enacted	FY 2000 Enacted	FY 2001 Enacted	FY 2002 Request
Reinvention Programs, Development and Coordination	\$6,596.1	\$7,046.3	\$6,518.3	\$7,055.0
Endocrine Disruptor Research	\$12,098.4	\$7,658.7	\$12,482.5	\$10,955.1
Exploratory Grants Program	\$12,038.0	\$10,803.5	\$10,368.5	\$10,290.0
STAR Fellowships Program	\$8,941.0	\$8,952.6	\$9,704.3	\$9,708.4
Rent, Utilities and Security	\$0.0	\$396.8	\$371.4	\$397.0
Administrative Services	\$0.0	\$454.2	\$560.5	\$464.4

## **FY 2002 Request**

In recent years, EPA has begun moving beyond environmental regulation to environmental protection, including anticipating and preventing potential problems before they develop into major concerns. Research conducted under this objective endeavor to develop common methodologies for combined human health and ecological risk assessments and sound approaches for risk management that provide decision-makers at all levels with the integrated view of risk needed to make sound decisions.

### Endocrine Disruptors

Evidence has been accumulating that humans and animals, both domestic and wildlife species, have suffered adverse health consequences resulting from exposure to EDCs. Reports of declines in the quality and quantity of human sperm production over the last four decades, and increases in certain cancers that may have an endocrine-related basis (breast, prostate, testicular), have led to speculation about environmental causes. Recognizing the potential scope of the problem, the possibility of serious health effects on populations, and the persistence of some EDCs in the environment, EPA published a “Research Plan for Endocrine Disruptors” ([www.epa.gov/ORD/WebPubs/final](http://www.epa.gov/ORD/WebPubs/final)) in 1998. In FY 2002, endocrine disruptors research will continue to focus on the priorities established in the 1998 plan by developing tools to identify hazards and manage risks from exposure to EDCs. The research focuses on: 1) developing a better understanding of the science; 2) determining the extent of the problem in human and wildlife populations; and 3) supporting EPA’s screening and testing program that is mandated under the Food Quality Protection Act and Safe Drinking Water Act Amendments of 1996. As in the past, EDC-related work will be organized along an integrated pathway of effects, exposure, risk assessment and risk management research.

Effects research is needed to determine the nature and extent to which environmentally relevant exposures to EDCs are producing adverse effects in humans and wildlife species. This research will focus on: 1) evaluating the adequacy of current testing guidelines for the assessment of EDCs; 2) identifying the classes and potencies of chemicals that may act as EDCs; 3) determining the dose-response curves for EDCs at environmentally relevant concentrations; and 4) developing tools to monitor the health of individuals inhabiting areas of EDC contamination. Assessment research will result in the development of an analytical framework for evaluating impacts of reported EDC phenomena, and will focus on the following: 1) identifying key risk assessment issues for endocrine disruptors; 2) providing methods for evaluating data on effects of EDCs on human health and the environment; 3) developing a framework for assessing EDCs; and 4) developing guidance for assessing EDCs. The goal of the risk management research effort is to identify current EDC releases that can be mitigated or eliminated by existing risk management tools and to develop new tools to manage current and future EDC risks.

## Pharmaceutical and Personal Care Products (PPCPs)

Pharmaceutical and Personal Care Products (PPCPs) represent a growing area of concern to the scientific community. PPCPs comprise very large, broad and diverse classes of often highly bioactive and potentially endocrine disrupting chemicals. Large quantities of PPCPs can enter the environment through a variety of ways, however, the occurrence, fate and effects (both ecological and human) of PPCPs in the environment are poorly defined. Research will focus on conducting initial risk assessments that will help chart the research focus; developing requisite analytical methods for target analytes; initiating small-scale proof of concept and early warning environmental monitoring; promoting scientific dialog at national and international levels; and communicating knowledge to the public.

## Mercury

Mercury is released from a variety of sources, exhibits a complicated chemistry, and proceeds via several different pathways to humans and wildlife. The Mercury Study Report to Congress (1997) found that fish consumption dominates the pathway for human and wildlife exposure to methylmercury. After release, mercury undergoes complicated transformations that can result in highly toxic methylmercury, an organic form of mercury. Methylmercury bioaccumulates in fish and animal tissue, and human exposure to methylmercury has been associated with serious neurological and developmental effects. Because the developing nervous system is more vulnerable to mercury toxicity, children exposed to methylmercury through their mother's consumption of fish, and individuals who eat large amounts of fish from local waters, can be particularly at risk of adverse effects.

According to the EPA's Mercury Study Report to Congress (1997), mercury availability in water, soil, and other media has increased by a factor of two to five over pre-industrial levels; Mason, et.al., (1994) attribute this increase to human activities. Mercury may be released through natural events and human activities, and it is being re-released continuously. Because it is persistent and because of the risks of neurological and reproductive problems for humans and wildlife it is a pollutant of considerable human health and environmental concern. The presence of mercury in freshwater fish higher in the food chain is the most frequent basis for fish advisories, represented in 70 percent of all water bodies with advisories in 1999. Forty-one states have advisories for mercury in one or more water bodies, and eleven states have issued statewide mercury advisories.

Several research issues will continue to be emphasized in FY 2002, including: 1) risk management for combustion sources; 2) atmospheric, aquatic, and terrestrial transport, transformation, and fate of mercury; 3) ecological/environmental assessment of mercury; 4) source characterization and inventorying from non-combustion sources; 5) mercury risk communication strategies (especially to sensitive populations); and 6) disposal of excess mercury stocks and improved management of mercury wastes. A focus of the research conducted in FY 2002 will be to provide a more accurate methods for quantifying mercury emissions resulting from manmade sources to improve domestic and international estimates of mercury levels, and to assess the cost and performance of control/prevention options for key sources of mercury. Increased emphasis will be placed on research related to both atmospheric transport modeling

and ecological assessment. One particular focus of the mercury research in FY 2002 will be atmospheric transport, transformation, and fate from source to deposition point. The research resulting from this grant work will contribute to an improved understanding of mercury biogeochemical cycling—from release at a source to transformation and uptake by ecosystems.

### Socio-Economic Research

Effective accomplishment of EPA's mission depends on understanding not only the physical and biological effects of environmental changes, but also on the behavioral causes and consequences of those changes. The focus of socio-economic research at EPA is to develop a better basis for making decisions using sound assessments of the human behavior that affects environmental outcomes. Priority socio-economic research areas identified by EPA economists and outside experts include: ecosystem and human health benefits valuation and decision-making processes that incorporate non-monetized benefits. Research conducted in FY 2002 should enhance environmental decision making by improving our understanding of how people value the environment. The principal means for addressing these research areas will be a joint EPA/NSF sponsored competition, which will encourage research to develop practical, credible approaches for estimating the benefits and cost of environmental programs and improve decision-making on environmental issues.

### Graduate Fellowships and Exploratory Grants

A blue ribbon panel of the Science Advisory Board recommended in 1994 that EPA enhance its environmental education programs for training the next generation of scientists and engineers, and in 1995 the graduate fellowship program was initiated to meet that challenge. This competitive, peer-reviewed program is designed to attract some of the brightest and most dedicated students in the Nation for training in scientific and engineering disciplines pertaining to the protection of public health and the environment. The goal of this program is to encourage these students to pursue careers in environmental science and engineering – not only with EPA, but with states, localities, and industry. Research completed under the fellowship program helps resolve uncertainties associated with particular environmental problems and focuses graduate research on priority research areas. In FY 2002, the Agency expects to support fellowships across multiple disciplines, including the biological and physical sciences, mathematics, computer sciences, and engineering.

In FY 2002, the Exploratory Grants research program will publish an annual general solicitation to promote research in areas where significant gaps in the scientific knowledge and understanding exist. This program provides opportunities for individual investigators from the academic research community to conceive, define, and propose research projects. Topics from a broad variety of areas, such as environmental chemistry and physics, health and ecological effects of pollution, can receive attention under the Exploratory Grants program. The proposals are competitively reviewed by panels of predominantly non-EPA researchers, with only the most scientifically sound proposals ultimately receiving support. The major program outputs are scientific articles published in peer-reviewed literature; these publications are intended to enhance scientific knowledge and understanding, and to be used as inputs into more targeted, applied environmental research programs.

In addition to the developments in risk assessment, EPA will continue to improve the economic information and methods available for use in the Agency's analyses. In FY 2002, the Agency will invest in new economic research and analyses to improve measures of the benefits and costs of EPA programs. Economic valuation studies will be undertaken to quantify human health and ecological benefits from air, water and waste management programs. EPA will continue to convene economic valuation of reduced risks to children, use of market-based approaches to environmental management, the economics of emerging environmental policies (e.g. bioenergy and genetically modified organisms), and the measurement of values from reduced mortality risks. EPA will continue to analyze the environmental impacts from changes in economic markets associated with new international trade policies and proposals. EPA will continue to engage the Science Advisory Board on new research and analytical methods being considered by EPA to assess and manage environmental risks.

### **FY 2002 Changes from FY 2001 Enacted**

#### **S&T**

- (+\$842,400 and 9.0 FTEs) This realignment of dollars and workyears away from a primary focus on EDCs to support efforts to research the exposure of humans and ecosystems to Pharmaceutical and Personal Care Products (PPCPs). PPCPs comprise very large, broad and diverse classes of often highly bioactive, and potentially endocrine disrupting, chemicals. Large quantities of a wide spectrum of PPCPs and their metabolites can enter the environment through a variety of ways. However, the suspected risks resulting from exposures to multiple PPCPs by aquatic organisms and to humans have not been clearly documented. Research will focus on conducting initial risk assessments that will help chart the research focus; developing requisite analytical methods for target analytes; initiating small-scale proof of concept and early warning environmental monitoring; promoting scientific dialog at national and international levels; and communicating knowledge to the public.
- (+\$2,016,400) This investment in mercury research represents both a realignment of resources as well as a net increase in funds for mercury research. Roughly half of these funds come from existing mercury resources in Goal 8.1. The remaining increase is a result of redirections from health effects research in Goal 8.2. Efforts in FY 2002 will support mercury research in the area of atmospheric chemistry, specifically, mercury fate and transport. This work includes developing an enhanced scientific understanding of the chemical and physical forms of mercury emissions, as well as developing a more complete understanding of chemical and physical transformations of mercury in air and cloud water.
- (+ \$1,031,700) This realignment of socio-economic resources from Goal 8.4. into Goal 8.3 will support research on the valuation of the environmental benefits of pollution control and on decision-making for environmental protection. Priority research areas include ecosystem and human health benefits valuation and decision-making processes that incorporate non-monetized benefits,. The principal means for addressing these research areas will be the joint EPA/NSF competition, which



will encourage research that will develop practical, credible approaches for estimating the benefits and cost of environmental programs and improve decision-making on environmental issues.

- (-\$927,500 and -5.4 FTEs) The Agency is reducing its intramural efforts in lower priority EDC programs. Work on EDCs exposure studies, namely the ecological field exposure studies along the Neuse river, will be discontinued. Development and validation of new exposure methods and protocols for existing and emerging EDCs will be postponed.
- (-\$842,400 and -9 FTEs) This reduction in resources is due to a realignment away from a primary focus on EDCs in order to directly focus on Pharmaceutical and Personal Care Products research.
- (-\$4,377,800) The FY 2002 request is \$4,377,800 below the 2001 Enacted budget level due to Congressional earmarks received during the FY 2001 appropriations process which are not included in the FY 2002 President's Request.

**EPM**

- (+\$579,000) The FY 2002 Request is \$579,000 above the FY 2001 Enacted budget level for increased payroll costs.

**Research on Endocrine Disrupting Chemicals**

- In 2002 Develop tools to identify hazards and evaluate existing approaches to manage risks from exposure to endocrine disrupting chemicals (EDCs) capable of inducing adverse effects in humans and wildlife.
- In 2001 Develop tools to identify and characterize hazards, conduct initial assessments, and formulate preliminary strategies to manage risks from exposure to endocrine disrupting chemicals capable of inducing adverse effects on humans and wildlife.
- In 2000 Tools to identify hazards and formulate strategies to manage risks from exposure to endocrine disrupting chemicals were developed by completing the products listed below and other research activities.
- In 1999 Completed a protocol for a field exposure study of children to two (2) endocrine disrupting chemicals (EDCs), which will help reduce uncertainties about actual exposure to EDCs.

**Performance Measures:**

FY 1999	FY 2000	FY 2001	FY 2002
Actuals	Actuals	Estimate	Request

Produce workshop report on the EDSTAC screening process for EDCs and determine application of the EDSTAC testing program for chemical hazard and risk assessment.

1

report

Characterization of environmental agents as risk factors in human prostate cancer.

0

characterization

Reports on endocrine and other effects in exposed women and their offspring in a cohort contaminated by PBBs.	2	report
Reports on the molecular mechanisms underlying estrogen receptor functions in ER knockout mice.	2	report
Development and refinement of test methods for use in Tier 1 testing of potential EDCs	2	methods
Development of amphibian assay for use in hazard identification.	1	assay
Protocol for field exposure study of children to 2 EDC's	30-Sep-1999	
Provide prototypical mechanism-based methods for assessing the risk of developmental and reproductive toxicants using amphibian and small fish models.	9/30/01	methods
Report on the int'l Org. of Economic Coop. and Dvlpmnt (OECD) validation of the Hershberger protocol to detect anti-androgens in the EDSTAC Tier 1 screening battery.	1	report

Baseline: In order to address uncertainties with regard to whether endocrine disrupting chemicals are having adverse impacts on wildlife and humans, EPA must increase its ability to detect their activity at various levels of biological organization, as well as across species. As pointed out in EPA publications, as well as the most recent NAS report on Hormonally Active Agents, there are large gaps in our current science regarding the nature, significance, and magnitude of the endocrine disruptor issue. In the short term, EPA needs to develop and validate specific tests of endocrine activity to support implementation of the screening and testing requirements of the Food Quality Protection Act as recommended by the Agency advisory committee, EDSTAC. EPA must also bring more focus to addressing questions of the risk assessment approaches to endocrine active compounds, especially in relationship to endogenous hormone levels, exposures to ambient levels of single and multiple endocrine disruptors, and the key life stages that are at greatest risk. In the longer term, EPA needs to identify the critical sources and fates of endocrine disruptors that are deemed to be of highest concern on the basis of their biological effects, and to develop technologies or approaches to mitigate those exposures. Research in FY02 will result in: 1) the development of screening protocols to be implemented in EPA's screening and testing program, 2) improving our understanding of impacts of EDCs on wildlife and human populations, and 3) improving our understanding about the actions and potencies of certain EDCs. The results of this research will lead to having better information on potential EDCs which in turn will result in improved Agency risk assessments and better informed decisions as to how to manage any unreasonable risks.

**Mercury Research**

- In 2002 Improve methods for quantifying mercury emissions from manmade sources to improve domestic and international estimates of mercury levels, and assess the cost and performance of control/prevention options for key sources, such as utility boilers.
- In 2001 Provide recommendations both about revising, if needed, EPA's reference dose (RfD) for methylmercury and for managing risks from environmental exposures to mercury.
- In 2000 The mercury research strategy was completed as scheduled and will act as a guide in the execution of an EPA-based mercury research program.

Performance Measures:	FY 1999 Actuals	FY 2000 Actuals	FY 2001 Estimate	FY 2002 Request
Improve a mercury research plan to act as a guide in the execution of an ORD-based mercury research program.		1		plan
Publish results of bench and pilot testing aimed at identifying improved sorbents for mercury mitigation from coal-fired utility boilers.			1	publication
Make recommendations, as appropriate, for revision of EPA's RfD for methylmercury based on analysis of the National Academy of Sciences report on mercury.			9/30/01	recommendations
Report on the parameters that impact both the species of mercury in coal-fired utility boiler flue gas and the performance of promising mercury control technologies.				1 report
Baseline: EPA's Mercury Study Report to Congress identified emissions from coal-fired utilities as one of the most significant contributors of mercury to the air. On December 14, 2000, EPA determined that mercury emissions from coal-fired utilities needed to be regulated. Regulations are to be promulgated in three years and finalized a year after that. The most cost-effective technological approaches for controlling mercury emissions from utilities are not well understood. Control technologies must be evaluated prior to regulation with a goal of minimizing mercury emissions at the lowest possible cost. In order to advance the state-of-the-science on emission controls for mercury, the parameters that impact both the species of mercury in coal-fired utilities flue gas and the performance of promising mercury control technologies will be identified, investigated, and described by the end of 2002.				

**Coordination with Other Agencies**

The broad nature of the EDCs issue necessitates a coordinated effort on both the national and international level. EPA has shown extensive leadership at both levels - chairing the Committee on Environment and Natural Resources (CENR) interagency working group and chairing a Steering Group on Endocrine Disruptors under the auspices of the International Programme on Chemical Safety/World

Health Organization/Organization for Economic Cooperation and Development (IPCS/WHO/OECD). Due to the complex nature of the uncertainties posed by the endocrine disruptor hypothesis, the overlapping concerns of federal agencies, and the resource constraints on the federal budget, close coordination and cooperation among federal agencies are essential to the resolution of critical research questions. While the CENR provides the umbrella for this coordination, individual agencies are responsible for the development of their own independent research plans. Under EPA's leadership, an inventory of federal research on endocrine disruption has been developed and is used to evaluate federal efforts, identify research gaps and establish priorities, and clarify governmental roles and responsibilities ([www.epa.gov/endocrine](http://www.epa.gov/endocrine)).

Working with other nations, EPA has expanded the U.S. federal inventory to include projects from Canada, Japan, and Europe and turned it into a Global Endocrine Disruptors Research Inventory with close to 800 projects. The IPCS/WHO/OECD Steering Group on Endocrine Disruptors is developing a "Global State-of-the-Science Review," scheduled for completion in 2002. Both the inventory and the international assessment result from recommendations made at the 1997 G-8 Environmental Ministers' Meeting. In FY 2002, EPA will continue to collaborate with European countries under the U.S.-EU Science and Technology Agreement and with Japanese scientists under the U.S.-Japan Science and Technology Agreement.

EPA is in a unique position to focus federal pollution prevention efforts in the critical area of mercury research. Progress has been made in organizing the concepts and ideals of pollution prevention in the private sector, but much work remains. The Agency, through partnerships with private sector companies, non-profits, other Federal agencies (such as the as Department of Energy), universities and states, including California EPA, has worked to identify and control human exposure to methylmercury.

For socio-economics, EPA will continue to support jointly sponsored economic workshops with other regulatory agencies, such as efforts with the Food and Drug Administration and Department of Agriculture, to address the economic valuation of human health effects. These workshops on economics and environmental policy will continue to draw upon EPA's sponsored economic research, facilitating information exchanges among academic and federal regulatory agency representatives.

## **Statutory Authorities**

Clean Air Act (CAA) and amendments

Environmental Research, Development and Demonstration Act (ERDDA)

Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)

Toxic Substances Control Act (TSCA)

Food Quality Protection Act (FQPA) of 1996

Safe Drinking Water Act (SDWA) and amendments

TSCA sections 4, 5, and 6 (15 U.S.C. 2603, 2604, and 2605)

CWA sections 304 and 308 (33 U.S.C. 1312, 1314, 1318, 1329-1330, 1443)

SDWA section 1412 (42 U.S.C. 210, 300g-1)

RCRA/HSWA: (33 U.S.C. 40(IV)(2761), 42 U.S.C. 82(VIII)(6981-6983))

CAA: 42 U.S.C. 85(I)(A)(7403, 7412, 7429, 7545, 7612)

CERCLA: 42 U.S.C. 103(III)(9651)

PPA (42 U.S.C. 13101-13109)

Federal Technology Transfer Act

**Environmental Protection Agency**

**FY 2002 Annual Performance Plan and Congressional Justification**

**Sound Science, Improved Understanding of Environmental Risk, and  
Greater Innovation to Address Environmental Problems**

**Objective # 4:** Improve Environmental Systems Management.

Provide tools and technologies to improve environmental systems management while continuing to prevent and control pollution and reduce human health and ecological risks originating from multiple economic sectors.

**Resource Summary**

(Dollars in thousands)

	<b>FY 1999 Enacted</b>	<b>FY 2000 Actual</b>	<b>FY 2001 Enacted</b>	<b>FY 2002 Request</b>
<b>Improve Environmental Systems Management.</b>	<b>\$68,385.2</b>	<b>\$63,784.4</b>	<b>\$58,562.1</b>	<b>\$45,462.3</b>
Environmental Program & Management	\$877.7	\$4,052.0	\$7,291.5	\$4,524.6
Science & Technology	\$67,507.5	\$59,732.4	\$51,270.6	\$40,514.2
Hazardous Substance Superfund	\$0.0	\$0.0	\$0.0	\$423.5
Total Workyears	169.3	162.7	168.7	160.8

**Key Programs**

(Dollars in thousands)

	<b>FY 1999 Enacted</b>	<b>FY 2000 Enacted</b>	<b>FY 2001 Enacted</b>	<b>FY 2002 Request</b>
Common Sense Initiative	\$867.0	\$630.4	\$0.0	\$0.0
Environmental Technology Verification (ETV)	\$6,908.5	\$6,392.6	\$6,294.0	\$3,619.6
Pollution Prevention Tools and Technologies	\$30,509.5	\$27,442.0	\$24,386.7	\$21,890.0
Rent, Utilities and Security	\$0.0	\$4,001.1	\$3,204.5	\$3,337.8
Administrative Services	\$0.0	\$839.0	\$965.0	\$948.5

## **FY 2002 Request**

In FY 2002, the Agency will continue to move from one-dimensional solutions involving a single medium/single pollutant to an integrated, systems-based approach to pollution prevention that more closely matches the multiple, interactive stressors that may threaten both human and environmental health. This approach will enable a cumulative assessment of risks and more effective responses to those risks. EPA will accomplish its holistic approach to pollution prevention through research on pollution prevention tools and technologies, environmental systems management, and environmental technology verification.

The first component of this Objective features the development of tools and methodologies to assist decision-makers in choosing the most preferred pollution prevention options. The types of research to be conducted include: (1) improving life cycle assessment tools (tools that address the environmental consequences of a product throughout its life span); (2) creating and enhancing tools for the reduction and assessment of chemical impacts and for measuring pollution prevention progress; (3) developing and enhancing computerized databases on less-polluting alternatives; and (4) creating computerized decision tools for process simulation and chemical replacements. The Agency will focus on developing methodologies and computerized tools applicable both within and beyond the industrial sector (e.g., municipal, agriculture, energy, ecosystems).

Green chemistry, a fundamental approach to preventing pollution at the source, involves the design of chemicals and alternative chemical syntheses that do not use toxic feedstock, reagents, or solvents, and do not produce toxic by-products or co-products. Research in this area will contribute to the development of safer commercial substances and environmentally friendly chemical syntheses. Likewise, novel engineering approaches will be employed to prevent or reduce pollution from discrete and continuous industrial manufacturing activities. The program will also focus on equipment and technology modifications, bioengineering, reformulation of products, substitution of alternative materials, and in-process changes in order to reduce harmful emissions from volatile organic compounds (VOCs), global warming compounds, and persistent bioaccumulative toxics (PBTs).

The Agency will additionally support PBT prevention and minimization and when possible, elimination by improving methods for identification and testing of PBTs. Four focus areas of this work have been identified by EPA: (1) research on dioxins/furans; (2) development of a national routine PBT monitoring strategy; (3) supplementing mercury retirement research; and (4) understanding the presence of persistent organic pollutants in the United States. By concentrating on these areas, EPA intends to advance the understanding of exposure, assessment, and management of PBTs while simultaneously working toward prevention of exposure from PBTs.

In light of the recognition that adoption of pollution prevention alternatives often hinges on cost effectiveness criteria, FY 2002 will feature cost and market-related analyses of pollution prevention tools and technologies. Research will explore the costs of mechanisms and incentives for environmental

management while seeking to understand the economic impacts of innovation, competitiveness, and trade. Research will also evaluate the relationship between market forces and incentives for environmental compliance.

In FY 2002, environmental systems management research will address the development of principles governing sustainable systems, the integration of many disciplines into one comprehensive set of tools, and the development of principles for using biotechnological systems in a sustainable manner. These new capabilities must lead to an evolution in environmental management that will not only support development, social equity, and environmental quality, but will expand environmental stewardship by industry, governments, and citizens.

The final component of this program, the Environmental Technology Verification (ETV) Program, focuses on all areas of environmental technology and is a market-grounded verification program, working with over 850 stakeholders who represent vast points of view within environmental areas. The goal of ETV is to verify the performance characteristics of private-sector-developed cleaner technologies so that purchasers, users, and permit writers have the information they need to make environmentally-beneficial decisions. Having completed a five-year pilot in 2001, the ETV Program will have delivered more than 100 test plans and protocols, making them available to the entire research and testing community, and will have verified approximately 150 technologies, making data on their performance available for public use as well. EPA will continue to enhance ETV Program outreach efforts through the ETV Web site (<http://www.epa.gov/etv/>), national conferences/workshops, and State permit writer training. The Agency will issue a report in FY 2002 summarizing the results of the five-year pilot.

## **FY 2002 Change from FY 2001**

### **S&T**

- (+\$1,446,800) This represents a redirection of funds from the High Performance Computing and Communication (HPCC) Program to research that will explore the costs of mechanisms and incentives for environmental management. Fundamental understanding of effects such as impacts on innovation, competitiveness, and trade is also desired.
- (+\$1,404,000 and +10 FTE) This represents a redirection of funds from pollution prevention tools and technologies research to new research in Environmental Systems Management (ESM). This research will explore the integration of social, economic, and environmental objectives in order to conduct environmental assessment and management for specific places.



- (-\$4,864,300) The FY 2002 Request is \$4,864,300 below the FY 2001 Enacted budget level due to Congressional earmarks received during the FY 2001 appropriations process that are not included in the FY 2002 President's Request.
- (-\$2,699,400 and -1 FTE) This reduction in funding represents the successful conclusion of the five year pilot phase of the Environmental Technology Verification (ETV) Program. These redirected resources will support Environmental Systems Management. These resources will also fund additional global change assessment research in Goal 6, watershed restoration research in Goal 2, and waste treatment and containment research in Goal 5.
- (-\$1,945,700) This reduction reflects the successful completion of this area of High Performance Computing and Communication (HPCC) research. Specifically, this program developed a flexible framework for incorporating advanced computing technologies that would facilitate cross-media environmental modeling and risk assessments, data management and manipulation, and techniques for representation of the earth's surface and subsurface characteristics. Advanced computing technologies are now routinely incorporated into new research on specific large scale, cross-media environmental models. These resources have been primarily redirected to support research on mechanisms and incentives for environmental management.
- (-\$1,830,900) This reduction relates to the change in resources set aside for the Small Business Innovative Research (SBIR) Program from its FY 2001 levels, and is primarily due to the fact that FY 2001 Congressional earmarks are not included in the FY 2002 President's Request.
- (-\$1,031,700) This reduction reflects a realignment of socio-economic research to Objective 8.3 where ecosystem and human health benefits valuation and decision-making processes will be researched.
- (-\$813,600 and -9 FTE) This reduction in workyears from pollution prevention tools and technologies research will be refocused to the Environmental Systems Management (ESM) Program where research will explore environmental issues beyond those in the industrial sector.
- (-\$632,800 and -7 FTE) The Agency is reducing its intramural efforts in lower priority pollution prevention programs. This reduction will result in reduced work in pollution prevention tools and technologies research, particularly the development of new and innovative technologies that go beyond remediation and control measures.

#### **EPM**

- (-\$2,777,600) The FY 2002 Request is \$2,777,600 below the FY 2001 Enacted budget level due to Congressional earmarks received during the FY 2001 appropriations process that are not included in the FY 2002 President's Request.

**Pollution Prevention Tools and Methodologies**

- In 2002 Improve P2 tools for the industrial sector and other sectors by providing updated/new methods and approaches to help users simulate product, process or system redesign and evaluate resulting pollution levels, impacts and costs.
- In 2001 Prepare and deliver pollution prevention tools and methodologies for multiple economic sectors in order to enhance a preventive approach to risk management and advance the use of pollution prevention and sustainable development.
- In 2000 Decision-support tools and methods were developed which can be applied to determine the value and costs of solutions to environmental problems. Partnerships were also developed to assist community-based environmental programs in implementing these tools and methods.
- In 2000 Computer-based tools capable of preventing or reducing pollution in chemicals and industrial processes were developed by completing the products listed below and other research activities.

Performance Measures:	FY 1999 Actuals	FY 2000 Actuals	FY 2001 Estimate	FY 2002 Request
Complete dev. of the PARIS II Software, a tool to design env. benign solvents, & complete dev. & integration of WAR Algorithm, v 1.0, into a commercially available chemical process simulator		30-Sep-2000		software
Complete BETA testing of decision support tool for life cycle analysis of municipal solid waste management options.		30-Sep-2000		tool
Provide an upgraded & enhanced Solvents Alternatives Guide (SAGE) software (expert) to incl. cost algorithms, giving it cost projection capability to complement its process selection capability		30-Sep-2000		software
Integrate the process change/waste reduction algorithm (WAR) with costing software (Icarus) and a chemical process simulation package (Aspen).			1	package
Complete a decision support tool for life cycle analysis of municipal solid waste management options.			1	tool & report
Publish a peer-reviewed protocol for conducting Risk Management Evaluations.			1	protocol
Complete grant on development of tool for				

predicting biodegradability of compounds. 1 grant report

Enhance the Waste Reduction Algorithm environmental impact assessment tool used to design or retrofit chemical processes with:  
 (1) a better assessment methodology and  
 (2) new features (costing). 1 method

Prepare a pest resistance management framework to prolong the effectiveness of genetically-modified corn pesticide characteristics for the Office of Pesticide Programs during product registration. 1 protocol

Provide a PC-based tool for use by EPA and the metal finishing sector in evaluating exposure and inhalation health risks to workers and residents living near metal finishing facilities. 1 risk tool

Baseline: Although pollution prevention is the preferred approach to protecting human health and the environment, implementation of preventive approaches is hampered by a lack of available information on comparative risks, effectiveness, and costs of alternatives. Current tools for evaluating proposed changes in products, processes, or system designs are focused on only a few sectors; limited in availability, ease of use, and application; and restricted in their capability to determine pollution levels, health and environmental impacts, and costs of the proposed changes. This research will produce a set of improved tools for the chemical, coatings, metal finishing and other sectors that will be widely available, easy to use, and applicable for evaluating alternative approaches and predicting results, at relatively low cost, prior to the investment of capital in these alternatives.

**New Technologies**

In 2002 Formalize generic testing protocols for technology performance verification, and provide additional performance verifications of pollution prevention, control and monitoring technologies in all environmental media.

In 2002 Develop and deliver new or improved technologies and chemical processes that minimize or eliminate the production of hazardous pollutants from air, liquid, and solid waste streams, primarily metals and organic solvents used in the pulp and paper, metal finishing, coatings and chem. industrial sector

In 2001 Develop, evaluate, and deliver technologies and approaches that eliminate, minimize, or control high risk pollutants from multiple sectors. Emphasis will be placed on preventive approaches for industries and communities having difficulty meeting control/emission/effluent standards.

In 2000 A very successful pilot program to verify environmental technologies has been underway, producing a number of verified, innovative environmental technologies now commercially available by completing the products listed below and other research activities.

Performance Measures: FY 1999 FY 2000 FY 2001 FY 2002

	Actuals	Actuals	Estimate	Request
Complete test protocols for all 12 ETV pilots will be available.		51		protocols
Verify 125 technologies (cumulative since 1996).		111		technologies
Deliver a Report to Congress on the status and effectiveness of the Environmental Technology Verification (ETV) Program during its first five years.			1	report
Complete performance evaluations of various metal finishing processes aimed at zero-discharge metal pretreatment as replacements for more hazardous processes.			1	report
Complete a capstone report summarizing current knowledge about volatile organic compounds and hazardous air pollutants emissions from paints used indoors.			1	report
Develop new process for drycleaning microelectronic wafers to decrease water usage and toxic chemicals.			1	grant report
Develop the scientific basis for pollution prevention alternatives in the pulp and paper industry for advancement of BAT.				1 evaluation
Provide engineering data on cleaner alternative processes or oxychemical production for the formulation of environmental impact and cost analyses.				1 evaluation
Advance the use of low toxicity chemicals utilizing engineering/cost evaluation techniques in the metal finishing industry.				1 evaluation
Complete 20 stakeholder approved and peer-reviewed test protocols in all environmental technology categories under ETV, and provide them to testing organizations world-wide.				20 protocols
Baseline:	A significant hindrance to wider acceptance and implementation of pollution prevention is a shortage of cost-effective alternative technologies and processes. This is particularly true for some industrial sectors using or generating pollutants that pose significant health and environmental risks that are resistant to treatment, reduction, or elimination, such as chlorinated organic solvents and toxic metals. This research will create alternative technologies and processes for reducing or eliminating these pollutants in key industries.			

Actual environmental risk reduction is directly related to performance and effectiveness of environmental technologies purchased and used. Private sector technology developers produce almost all of the new technologies purchased in the U.S. and around the world. Purchasers and permittees of environmental technologies need an independent, objective, high quality source of performance information in order to make more informed decisions; and vendors with innovative, improved, faster, and cheaper environmental technologies need a reliable source of independent evaluation to be able to penetrate the environmental technology market. Having completed a five-year pilot in 2001, the Environmental Technology Verification (ETV) Program will have delivered more than 100 test plans and protocols, making them available to the entire research and testing community, and will have verified approximately 150 technologies, making data on their performance available for public use as well.

## **Verification and Validation of Performance Measures**

### **Performance Measures:**

- 1) Enhance the Waste Reduction Algorithm environmental impact assessment tool used to design or retrofit of chemical processes with: a better assessment methodology and new features (costing).
- 2) Prepare a pest resistance management framework to prolong the effectiveness of genetically-modified corn pesticide characteristics for the Office of Pesticide Programs during product registration.
- 3) Provide a PC-based tool for use by EPA and the metal finishing sector in evaluating exposure and inhalation health risks to workers and residents living near metal finishing facilities.

**Performance Database:** Not applicable. This performance measure relates to an EPA scientific or technical product which is not tracked in an environmental database.

**Data Source:** Agency generated material

**QA/QC Procedures:** N/A

**Data Quality Reviews:** As required by the Agency-wide formal peer review policy issued in 1993, and reaffirmed in 1994 and 1998, all major scientific and technical work products used in Agency decision making are independently peer reviewed before their use. EPA has implemented a rigorous process of peer review for both its in-house and extramural research programs. Peer review panels include scientists and engineers from academia, industry, and other federal agencies.

**Data Limitations:** N/A

**New/Improved Data or Systems:** N/A

**Coordination with Other Agencies**

Pollution prevention, cost benefit analyses, and Environmental Technology Verification (ETV) are all research areas that lend themselves to and benefit from engagement with other Federal organizations as described below.

EPA has worked over the years with the National Science Foundation (NSF) in co-funding extramural research on Technology for a Sustainable Environment and Environmental Valuation. The Agency has contributed projects to the Department of Defense's (DOD's) Strategic Environmental Research and Development Program with particular emphasis on the pollution prevention pillar and the use of life cycle thinking in addressing the production and manufacture of weapons and military hardware. Preliminary contacts have been made with the Department of Agriculture (USDA) regarding life cycle analysis and a preventive approach in the development and advancement of biologically and genetically altered products. EPA is also working with the Department of Energy (DOE), DOD, USDA, the National Institute of Health (NIH), the National Institute of Standards and Technology (NIST), NSF, and the National Aeronautics and Space Administration (NASA) in Metabolic Engineering research. EPA and DOD's U. S. Army Corps of Engineers will continue addressing the costs and benefits associated with the implementation of new engineering projects and technologies.

Under the Persistent Bioaccumulative Toxics Program, EPA has been working with DOE and the U. S. Geological Survey to address risk management issues associated with mercury emissions from utilities. In FY 2002, these efforts will continue to expand through the Mercury Research Strategy under Goal 8, Objective 3.

With respect to ETV, the Agency has co-funded efforts on monitoring technology evaluation with DOE's Sandia and Oak Ridge National Laboratories. Additionally, EPA signed a Memorandum of Agreement with DOD to jointly advance ETV and DOD's Environmental Science and Technology Evaluation Program for evaluating and verifying environmental technologies. Discussions are underway with the U.S. Coast Guard on verification of technologies for treating ship ballast water.

### **Statutory Authorities**

Clean Air Act

The Safe Drinking Water Act

The Clean Water Act

The Toxic Substances Control Act

The Federal Insecticide, Fungicide, and Rodenticide Act

The Resources Conservation and Recovery Act

Superfund Amendments Reauthorization Act

Clean Air Act Amendments of 1990

Pollution Prevention Act of 1990

**Environmental Protection Agency**

**FY 2002 Annual Performance Plan and Congressional Justification**

**Sound Science, Improved Understanding of Environmental Risk, and  
Greater Innovation to Address Environmental Problems**

**Objective #5:** Quantify Environmental Results of Partnership Approaches

Increase partnership-based projects with counties, cities, states, tribes, resource conservation districts, and/or bioregions, bringing together needed external and internal stakeholders, and quantify the tangible and sustainable environmental results of integrated, holistic, partnership approaches.

**Resource Summary**

(Dollars in thousands)

	<b>FY 1999 Enacted</b>	<b>FY 2000 Actual</b>	<b>FY 2001 Enacted</b>	<b>FY 2002 Request</b>
<b>Quantify Environmental Results of Partnership Approaches.</b>	\$14,660.6	\$16,807.5	\$9,604.2	\$7,626.8
Environmental Program & Management	\$14,660.6	\$16,807.5	\$9,604.2	\$7,626.8
Total Workyears	15.4	46.2	9.3	4.6

**Key Programs**

(Dollars in thousands)

	<b>FY 1999 Enacted</b>	<b>FY 2000 Enacted</b>	<b>FY 2001 Enacted</b>	<b>FY 2002 Request</b>
Innovative Community Partnership Program	\$4,725.0	\$0.0	\$0.0	\$0.0
Regional Geographic Program	\$8,358.3	\$8,352.7	\$8,192.3	\$7,421.3
Administrative Services	\$0.0	\$0.0	\$70.9	\$50.3
Regional Management	\$0.0	\$0.0	\$93.2	\$108.5

## **FY 2002 Request**

The Regional Geographic Initiatives (RGI) program was established to help integrate local initiatives for control of hazards to human health and ecosystems that are matters of intense state and local concern or controversy. Project implementation is an efficient, bottoms-up, stakeholder planning and participation process. The RGI program is a grassroots approach to long-term, sustainable environmental restoration that is now proving itself in diverse communities across the nation.

In FY 2000, the RGI program supported 132 projects in 47 states and 3 United States territories. The RGI program is a critical resource for place-based, state-of-the-art multi-media projects and has succeeded in fostering a wide array of partnerships, including states, businesses and local communities.

The RGI program is different from other traditional EPA programs in that it addresses environmental risk holistically (multi-media) and requires partnering. RGI is EPA's role model for transitioning from a single-media to multi-media focus, based on consensus-building, science and risk assessment.

The program provides grants for projects that are identified as high priority by an EPA Region, state or locality, that poses a high human health or ecosystem risk, and has significant potential for risk reduction. The program supports projects that are bounded by the region or place in which the problem exists rather than a pollutant or sector. The problems addressed by this program are often multi-media in nature and showcase innovative, multi-media solutions. All of the geographic initiatives within the program directly support one or more of the EPA seven guiding principles: ecosystem management, environmental justice, partnerships, sound science and data, pollution prevention, reinventing EPA management, and environmental accountability.

## **FY 2002 Change from FY 2001 Enacted**

### EPM

- (-\$698,500) The FY 2002 Request is \$698,500 below the FY 2001 Enacted budget level due to Congressional earmarks received during the FY 2001 appropriations process which are not included in the FY 2002 President's Request.
- (-\$342,000/-1.9 FTE) The FY 2002 Request is \$342,000 and 1.9 FTEs below the FY 2001 Enacted budget level due to reductions taken to the Regional Geographic Initiatives Program.
- (-\$257,000/-2.8 FTE) The FY 2002 Request is \$257,000 and 2.8 FTEs below the FY 2001 Enacted budget level due to reductions and redistributions to goal 10 regional management activities.



**Verification and Validation of PMs**

None

**Coordination with Other Agencies**

None

**Statutory Authorities**

Multi-media

## Environmental Protection Agency

### FY 2002 Annual Performance Plan and Congressional Justification

#### Sound Science, Improved Understanding of Environmental Risk, and Greater Innovation to Address Environmental Problems

##### **Objective #6:** Incorporate Innovative Approaches

Incorporate innovative approaches to environmental management into EPA programs, so that EPA and external partners achieve greater and more cost-effective public health and environmental protection.

#### Resource Summary

(Dollars in thousands)

	FY 1999 Enacted	FY 2000 Actual	FY 2001 Enacted	FY 2002 Request
<b>Incorporate Innovative Approaches.</b>	<b>\$27,975.4</b>	<b>\$19,593.8</b>	<b>\$25,313.6</b>	<b>\$21,449.6</b>
Environmental Program & Management	\$27,075.4	\$18,216.3	\$24,914.5	\$21,449.6
Science & Technology	\$900.0	\$1,377.5	\$399.1	\$0.0
Total Workyears	132.5	105.2	134.0	129.7

#### Key Programs

(Dollars in thousands)

	FY 1999 Enacted	FY 2000 Enacted	FY 2001 Enacted	FY 2002 Request
Project XL	\$4,681.9	\$3,065.0	\$2,922.2	\$3,090.2
Common Sense Initiative	\$6,779.9	\$4,072.2	\$1,781.1	\$1,921.6
Reinvention Programs, Development and Coordination	\$9,712.3	\$9,748.9	\$10,404.9	\$11,050.1
Small Business Ombudsman	\$1,110.3	\$1,120.3	\$3,000.9	\$3,106.6
Performance Track	\$0.0	\$0.0	\$1,995.6	\$1,843.6
Administrative Services	\$0.0	\$110.6	\$98.6	\$88.2

## **FY 2002 Request**

EPA's community-based approach works to provide integrated assessment tools and information for environmental protection in partnership with local, state, and Tribal governments. EPA Regions also provide direct assistance to communities to assist them in implementing local environmental management efforts and in building capacity for local problem solving. In 2002, EPA will continue to support over 150 demonstration projects assisting local community environmental planning and management. These projects strengthen local and intergovernmental partnerships to address risks to human health and ecosystems that provide goods and services to our communities. Specifically, EPA will provide assistance to communities to help them identify the integrated set of local environmental issues and develop strategies to address interconnected issues with appropriate regulatory and non-regulatory tools. EPA will also provide tools and information to build better stakeholder involvement and to assist communities in conducting assessments of environmental issues. EPA will assist local communities with identifying measures of performance to enlighten local decisions and assess the value of various models of community-based efforts. EPA will also conduct evaluations of existing projects to assess and fine-tune its own approaches and to derive direction for future demonstrations.

EPA is also exploring the potential for more integrated, holistic regulatory approaches at a facility level, building on experience with permitting and pollution prevention innovations already piloted at both Federal and state levels. EPA sees facility-wide approaches as holding the possibility of obtaining better environmental results while eliminating unnecessary regulatory burdens. These approaches should also help stimulate pollution prevention, and help facilities obtain the maximum benefit from their use of environmental management systems.

In order to reform the regulatory system to achieve better results at less cost, without sacrificing public health or environmental protection, EPA will pursue a program focused on sectors, facility-based pilots, small business, performance incentives, and communities.

In FY 2002, EPA will begin to implement recommendations in its Sector Program plan 2001-2005 (endorsed by the National Advisory Council on Environmental Policy and Technology in November 2000). The Agency's sector programs will expand their innovative sector-based approaches to improved environmental protection, continuing work with current sectors (e.g., the Metal Finishing Strategic Goals Program), starting new work with interested industries, and developing recommended tools and services through a new Center for Industry Sector Innovation to enhance the performance of sector programs at the Federal, state, and local levels.

Project XL, launched in 1995, was designed to improve EPA's ability to innovate and incorporate flexible approaches that result in environmental improvement and reduced cost. In FY 2002, EPA will move innovative piloting to the next phase. This next phase will include: 1) managing ongoing XL pilot projects (now over 50); 2) evaluating the project results for their environmental and economic benefits and their applicability to policy and regulatory improvements; 3) incorporating the applicable policy and

regulatory improvements into EPA's core functions including regulations, permitting, monitoring and reporting requirements, and other areas; 4) working with states to implement innovative pilots that require Federal flexibility under the ECOS-EPA Innovations agreement; and 5) implementing additional innovative pilots that address opportunities identified by EPA, the business community and other stakeholders. In addition, the Agency will work to build its capacity to conduct program evaluation and foster its use as a management tool for continuous program improvement. This activity responds to recommendations from the National Academy of Public Administration and will ensure that EPA is able to keep pace with the rapidly expanding program evaluation activities at the state level and the emergence of Environmental Program Evaluation as a nationally-recognized sub-discipline.

Sector strategies complement current EPA activities by allowing the Agency to approach issues more holistically, with integrated strategies for each industry sector. Sector-based approaches also enable EPA to tailor efforts to the particular characteristics of each sector, identify related groups of stakeholders with interest in a set of issues, link EPA's efforts with those of other agencies, and craft new approaches to environmental protection.

In 2002, the Agency will extend its sector-based programs by building consideration of sector-specific applications into the development of regulations and policy/guidance documents. It will continue to expand its work with specific sectors, particularly those characterized by a high concentration of small businesses. EPA will continue implementation and expansion of the Metal Finishing Strategic Goals Program, and will pursue similar performance partnership programs with other industries, including the Metal Casting, Meat Processing, Shipbuilding, and Specialty-Batch Chemical sectors. In these and newly selected Sustainable Industries Partnership program sectors, EPA will develop incentives, create tools, test innovative ideas, and remove barriers to improved environmental performance with reduced regulatory burden. Sector-based approaches are also inherent in other innovations that the Agency is exploring or scaling up, such as the Massachusetts Environmental Results Program and the PrintStep Program.

In the process of developing sectoral approaches, EPA will continue to add to the set of tools it uses to effectively and efficiently deliver environmental quality, promote pollution prevention, and increase risk reduction. While EPA continues to rely on standard setting, permitting and enforcement, these traditional tools are now often augmented by compliance assurance, voluntary programs, stakeholder involvement and many new sector-based processes and programs designed to ensure quicker or more effective results. In support of these strategies, EPA will continue to implement projects that offer flexibility or other benefits to test innovative approaches to environmental protection.

In 2002, the Agency will build on its recent successes and continue to work with the small business community to develop new tools, and explore incentive approaches that are tailored, information rich, and are key to a company's bottom line and improved performance. The Agency will support the integration of small business assistance and policy innovation efforts with the program offices, and explore more creative ways to deal with compliance assistance and enforcement. We will work with program offices to streamline and coordinate Agency efforts to provide more reliable environmental information to existing state assistance providers and to small businesses.

Finally, the Agency will more effectively integrate and manage EPA's resources and efforts that are currently available for promoting environmental quality at the community level. The Agency will work to ensure that those communities pursuing development strategies that incorporate environmental quality considerations receive appropriate credit under the Agency's core program areas - air quality, water quality, waste management. Under this goal, the Agency will focus on improving environmental quality by: (1) removing barriers and creating incentives for environmentally beneficial development; (2) developing tools and technical assistance; (3) leveraging EPA's resources to provide and disseminate information (e.g., through web sites and publications); (4) forming multi-disciplinary, multi-lateral partnerships among public and private sector stakeholders; and (5) identifying and conducting research related to environmental quality impacts associated with development patterns and practices.

The Agency will be responsive to a large and growing number of requests from states to help them address the environmental issues associated with growth and development. EPA will integrate smart growth approaches to environmental quality and voluntary smart growth programs within key program offices and Regional offices. In response to their requests, EPA will help states and local governments achieve their environmental goals, using smart growth approaches. The Agency will also develop regulatory incentives that will encourage redevelopment within metropolitan areas and help preserve watersheds, open space, and habitats on edge. These incentives will also encourage more environmentally-friendly development in rural areas.

EPA has developed a broad-based, Agency-wide strategy for achieving cleaner, cheaper, smarter results from environmental programs. By rethinking problems and the solutions typically used to solve them, reinvention engages Agency managers and staff, as well as external stakeholders, in finding better ways of doing business without imposing unnecessary costs and regulatory burdens. EPA has developed a dual strategy for reinventing environmental protection: (1) innovating and streamlining the current regulatory system (e.g., consolidate and simplify regulations and reporting requirements, and streamline permitting), and (2) designing and testing integrative and holistic approaches (e.g., sector- and industry-based approaches, and community-based environmental protection, partnership programs). Through this work, EPA is implementing strategies that lead to better protection at less cost, and is moving beyond the single-media focus of the past to better address today's environmental challenges.

The Office of Policy, Economics, and Innovation (OPEI) will serve as a primary gateway for stakeholders/customers to use in interacting with EPA on innovation and will define the vision, strategy, ground rules, and principles for innovation by engaging stakeholders. The office will ensure new approaches are identified, designed, and piloted by program-specific approaches in other EPA offices and manage Agency-wide approaches in OPEI. Integrating and coordinating new approaches across the Agency into a coherent strategy for change, tracking innovation progress and evaluating innovation success, and ensuring successful new approaches are incorporated into the way EPA does business will also be a focus of OPEI.

In 2002, EPA will work to provide incentives and rewards to good environmental performers in the business community. A Performance Track Program that is designed to motivate and reward top environmental performance will be developed. Participation in the Performance Track program enables

facilities to implement flexible and potentially more efficient approaches to environmental protection. Participating facilities will receive several incentives in return for their environmental commitments EPA will continue to pursue reforms in the permitting system and to develop policy on the role of environmental management systems in environmental regulation. Using lessons learned from recent initiatives, EPA will undertake projects suggested by internal or external stakeholders that test ways to modify EPA's core programs to foster flexibility (in regulations, policy, and guidance) as incentives and to gain superior environmental performance. Taken together with related work across the Agency, this approach is designed to promote a systematic process of experimentation, evaluation, and program change in response to the lessons learned from innovation.

**FY 2002 Change from FY 2001 Enacted**

EPM

- (-\$4,330,300) The FY 2002 Request is \$4,330,300 below the FY 2001 Enacted budget level due to Congressional earmarks received during the FY 2001 appropriations process which are not included in the FY 2002 President's Request.
- (-\$161,000/-2.2 FTEs) Reflects a reduction taken to low priority urban sprawl activities in the Office of Policy, Economics, and Innovation.
- (-\$161,000) Reflects reductions taken to the Performance Track program.
- (+\$1,007,300) This increase reflects an increase in workforce costs.

S&T

- (-\$399,100) The FY 2002 Request is \$399,100 below the FY 2001 Enacted budget level due to Congressional earmarks received during the FY 2001 appropriations process which are not included in the FY 2002 President's Request.

**Annual Performance Goals and Performance Measures**

Research

**Reinvention Activities**

In 2002 Through Performance Track Program, achieve environmental performance improvements in participating facilities.

Performance Measures:	FY 1999	FY 2000	FY 2001	FY 2002
	Actuals	Actuals	Estimate	Request

Through established Performance Track reporting program, achieve measurable

environmental performance improvement  
in 50% of the reporting facilities

50 percent

Baseline: Baseline will be established in FY2002

### **Verification and Validation of PMs**

None

### **Coordination with Other Agencies**

None

### **Statutory Authorities**

National Environmental Policy Act

The Economy Act of 1932

TSCA sections 4, 5, and 6 (15 U.S.C. 2603, 2604, and 2605)

PPA (42 U.S.C. 13101-13109)

CWA

**Environmental Protection Agency**

**FY 2002 Annual Performance Plan and Congressional Justification**

**Sound Science, Improved Understanding of Environmental Risk, and  
Greater Innovation to Address Environmental Problems**

**Objective #7:** Demonstrate Regional Capability to Assist Environmental Decision Making

Demonstrate regional capability to assist environmental decision making by assessing environmental conditions and trends, health and ecological risks, and the environmental effectiveness of management action in priority geographic areas.

**Resource Summary**  
(Dollars in thousands)

	<b>FY 1999 Enacted</b>	<b>FY 2000 Actual</b>	<b>FY 2001 Enacted</b>	<b>FY 2002 Request</b>
<b>Demonstrate Regional Capability to Assist Environmental Decision Making.</b>	<b>\$6,732.0</b>	<b>\$5,896.9</b>	<b>\$6,843.7</b>	<b>\$3,594.1</b>
Environmental Program & Management	\$3,599.1	\$3,054.3	\$3,850.3	\$3,594.1
Hazardous Substance Superfund	\$3,132.9	\$2,842.6	\$2,993.4	\$0.0
Total Workyears	9.2	4.8	5.5	3.1

**Key Programs**  
(Dollars in thousands)

	<b>FY 1999 Enacted</b>	<b>FY 2000 Enacted</b>	<b>FY 2001 Enacted</b>	<b>FY 2002 Request</b>
Regional Science and Technology	\$6,697.0	\$5,963.4	\$6,843.7	\$3,594.1

**FY 2002 Request**

The Regional Science and Technology (RS&T) program will continue to provide field sampling, analytical, and data management support, including quality assurance to base program needs operating within the Regions before and after implementation of statutory mandates, community-based environmental protection, common sense, sector-based and geographically targeted initiatives.



Within the existing regional laboratory system, specialized expertise has been developed to respond to specific regional needs. These capabilities, collectively called the Centers of Applied Science, have broad application and frequently constitute the best knowledge of the subject in the country. Through these Centers of Applied Science, the regional laboratories are committed to advancing state-of-the-art applied science and sharing that information to state, local, and other Federal agencies through training and other appropriate forums. Centers have been established in the areas of ambient air monitoring, analytical pollution prevention, environmental biology, environmental microbiology, and environmental chemistry.

Data and information management systems will be in place, including data quality indicators, that will enable EPA and partner agencies to locate, assess and share environmental data for their program needs. The RS&T program will continue to build capacity and support partner agencies by providing technical and analytical support in the assessment of environmental problems, and by converting environmental data into useful decision-making information.

### **FY 2002 Change from FY 2001 Enacted**

#### EPM

- (-\$256,200) The FY 2002 Request is \$256,200 below the FY 2001 Enacted budget level due to reductions taken to Regional Science and Technology efforts.

#### SF

- (-\$2,993,400) Redirection from Goal 8 to Goal 5 to better align laboratory resources that support the Superfund program.

### **Verification and Validation of PMs**

None

### **Coordination with Other Agencies**

None

### **Statutory Authorities**

Multi-media

## Environmental Protection Agency

### FY 2002 Annual Performance Plan and Congressional Justification

#### Sound Science, Improved Understanding of Environmental Risk, and Greater Innovation to Address Environmental Problems

**Objective #8:** Conduct Peer Review to Improve Agency Decisions

Conduct peer reviews and provide other guidance to improve the production and use of the science underlying Agency decisions.

#### Resource Summary (Dollars in thousands)

	FY 1999 Enacted	FY 2000 Actual	FY 2001 Enacted	FY 2002 Request
<b>Conduct Peer Review to Improve Agency Decisions.</b>	\$2,486.7	\$2,501.7	\$2,775.1	\$3,012.8
Environmental Program & Management	\$2,486.7	\$2,501.7	\$2,775.1	\$3,012.8
Total Workyears	22.5	22.6	22.5	22.5

#### Key Programs (Dollars in thousands)

	FY 1999 Enacted	FY 2000 Enacted	FY 2001 Enacted	FY 2002 Request
Science Advisory Board	\$2,486.7	\$2,861.7	\$2,763.3	\$3,012.8

#### **FY 2002 Request**

The Science Advisory Board (SAB) plans to maintain the level and quality of its peer review activities to support the Agency by selecting issues for review that best meet the criteria for SAB review; i.e, those that impact on overall environmental protection, address novel problems or principles, influence long-term technological development, deal with problems that transcend Agency boundaries, strengthen the Agency's basic capabilities, and/or serve Congressional and other leadership interests.

In addition, the SAB will expand its efforts to incorporate the technical aspects of economics and other social sciences into environmental decision making and to find the best ways to integrate science considerations into the Agency's new ways of doing business (e.g., place-based and sector-based).

For many years the SAB's goal has been to make a positive difference in the production and use of science at EPA. Established by Congress in 1978, the SAB utilizes non-government technical experts who serve as its 100 members and more than 300 consultants. They represent a broad range of disciplines -- physics, chemistry, biology, mathematics, engineering, ecology, economics, medicine, and other fields. Operating under the Federal Advisory Committee Act (FACA), the SAB empanels technically strong and diverse groups to ensure a balanced range of technical views from academia, communities, states, independent research institutions, and industry.

To truly make a positive difference in the production and use of science at EPA, the Board must do more than review Agency products from traditional line offices. It must help the Agency make strategic use of science. Science alone is insufficient for making environmental decisions, but it is impossible to protect human health and the environment without science.

Economic and other social science issues are particularly important now that EPA is experimenting with new information-based, voluntary approaches to environmental protection -- such as working with stakeholders in communities and sectors to achieve environmental goals that voluntarily go beyond the national standards. Therefore, the SAB will find effective ways for science to contribute to the Agency's new ways of doing business.

## **FY 2002 Change from FY 2001 Enacted**

### EPM

- (+\$237,700) This increase reflects an increase in workforce costs.

## **Verification and Validation of PMs**

None

## **Coordination with Other Agencies**

The Science Advisory Board (SAB) interacts with comparable advisory bodies within and outside the Agency; in some cases, seeking and maintaining liaison and integrated membership with some of these bodies. For example, the chairs of the ORD Board of Scientific Counselors (BOSC), the FIFRA Scientific Advisory Panel (SAP), and the Children's Health Protection Advisory Committee participate in the quarterly meetings of the SAB Executive Committee (EC) meetings. There are also membership contacts and exchanges with technical advisory bodies in the Department of Defense, Department of Energy, and the National Research Council of the National Academy of Sciences. In addition, the Board has sought interactions with advisory groups at different levels (e.g., the advisory committee to the Mayor of

Columbus, Ohio; the environmental advisory board to the Governor of the State of Michigan; the Health Council of the Netherlands; and the Academy of Sciences of Australia).

The success of the SAB is measured, in part, by the extent that the knowledge that it generates and the advice that it offers is followed and by the extent to which the Board is used as a model for advisory boards at various levels of government -- from the local level to the international level.

### **Statutory Authorities**

Federal Advisory Committee Act (5 U.S.C. App.)