

Environmental Protection Agency

FY 2003 Annual Performance Plan and Congressional Justification

Sound Science, Improved Understanding of Env. Risk and Greater Innovation to Address Env. 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 2001 Actuals	FY 2002 Enacted	FY 2003 Request	FY 2003 Req. v. FY 2002 Ena.
Sound Science, Improved Understanding of Env. Risk and Greater Innovation to Address Env. Problems	\$338,261.4	\$337,540.9	\$327,837.9	(\$9,703.0)
Conduct Research for Ecosystem Assessment and Restoration.	\$134,525.5	\$120,594.7	\$119,114.6	(\$1,480.1)
Improve Scientific Basis to Manage Environmental Hazards and Exposures.	\$52,407.6	\$53,021.7	\$56,355.0	\$3,333.3
Enhance Capabilities to Respond to Future Environmental Developments.	\$48,626.6	\$64,249.5	\$50,965.8	(\$13,283.7)
Improve Environmental Systems Management.	\$59,130.3	\$57,757.0	\$52,274.1	(\$5,482.9)
Quantify Environmental Results of Partnership Approaches.	\$9,539.9	\$8,672.7	\$9,058.4	\$385.7
Incorporate Innovative Approaches.	\$24,887.3	\$23,324.5	\$29,787.9	\$6,463.4
Demonstrate Regional Capability to Assist Environmental Decision Making.	\$6,417.2	\$6,677.9	\$6,591.8	(\$86.1)
Conduct Peer Review to Improve Agency Decisions.	\$2,727.0	\$3,242.9	\$3,690.3	\$447.4
Total Workyears	1,006.4	991.6	996.3	4.7

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.

Today's environmental innovations extend beyond scientific and technological advances; they also include new policies and management tools that respond to changing conditions and needs. Examples include market-based incentives that provide an economic benefit for environmental improvement, regulatory flexibility that gives companies more discretion in how specific goals are met, and disclosure of information about environmental performance. As a result of these and other innovations, the nation's environmental protection system is evolving. The focus is on creating a system that is more efficient and effective and more inclusive of all elements of society.

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). 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 increases 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 is providing the methods and designs to address these weaknesses. In FY 2003, EPA will produce a report on the condition of the nation's estuaries. This report will provide the first integrated, comprehensive, and statistically valid national report card on the health of a specific aquatic resource. This work is an important step toward providing the scientific understanding to measure, model, maintain, and 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 sub-populations, such as children, to environmental agents such as pesticides. 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. Continued research in the areas of endocrine disrupting chemicals and mercury is leading toward the development of improved methodologies for integrated human health and environmental risk assessment and sound approaches for risk management. EPA will conduct research to enhance its capacity to evaluate the economic costs and benefits and other social impacts of environmental policies. These efforts, undertaken 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, as well as other social impacts of environmental decision-making.

The Agency also seeks to characterize, prevent, and clean up contaminants associated with high priority human health and environmental problems through the development and verification of improved environmental tools and technologies. EPA will incorporate a holistic approach to pollution prevention by assessing the interaction of multiple stressors threatening both human and environmental health, and by developing cost-effective responses to those stressors. Research will also explore the principles governing sustainable systems and the integration of social, economic, and environmental objectives in environmental assessment and management. Emphasis will be placed on developing and assessing preventive approaches 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 that 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.

In FY 2003, EPA will improve its regulatory and policy development process. The Agency will strengthen the policy analysis of key regulatory and non-regulatory actions, improve the economic analysis underlying Agency actions, and improve the regulatory and policy action information management system.

The Agency also seeks to develop and verify improved tools, methodologies, and technologies for modeling, measuring, characterizing, preventing, controlling, 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 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.

EPA's strategy for solving environmental problems and improving our system of environmental protection includes developing, implementing and institutionalizing new policy tools, collaborative community-based and sector-based strategies, and the capacity to experiment, test, and disseminate innovative ideas that result in better environmental outcomes. In each area, EPA is looking to advance the application of the innovative tool or approach by promoting broader testing and incorporation into our system of environmental protection and to support collaborative partnerships for environmental management based upon prudent analysis and decision methodologies. 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.

EPA's community-based approach works to provide integrated assessment tools and information and direct assistance for environmental protection in partnership with local, state, and Tribal governments. The work focuses on building the capacity of communities to work effectively at identifying and solving environmental issues in ways that support healthy local economies and improved quality of life.

Sector strategies complement current EPA activities by allowing the Agency to approach issues more holistically; 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. In a somewhat related effort, EPA is exploring the potential for broader use of a sector-based regulatory model for small businesses developed by the state of Massachusetts.

Strategic Objectives and FY 2003 Annual Performance Goals

Conduct Research for Ecosystem Assessment and Restoration

- Provide the public with a reliable and statistically valid baseline for the condition of the Nation's estuaries against which to measure the success of ecosystem protection and risk management practices.

Improve Scientific Basis to Manage Environmental Hazards and Exposures

Enhance Capabilities to Respond to Future Environmental Developments

Improve Environmental Systems Management

- Develop 10 testing protocols and complete 40 technology verifications for a cumulative Environmental Technology Verification (ETV) program total of 230 to aid industry, states, and consumers in choosing effective technologies to protect the public and environment from high risk pollutants.

Quantify Environmental Results of Partnership Approaches

Incorporate Innovative Approaches

Demonstrate Regional Capability to Assist Environmental Decision Making

Conduct Peer Review to Improve Agency Decisions

Highlights

Research for Ecosystem Assessment and Restoration

In order to balance the growth of human activity with 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 2003 EPA is proposing an initiative to refine and extend the Environmental Monitoring and Assessment Program's (EMAP) approach to the large rivers of the Mississippi River Basin (the Central Basin). The large rivers of the Central Basin are the inland receiving waters for the majority of the Nation's heartland, and are the link between small upland streams and the Gulf of Mexico. Through cooperative programs with the Regions, states, Tribes, and other Federal agencies in the Central Basin, EPA proposes to fill remaining scientific gaps (indicators, sampling design, and sampling methodology) currently limiting our ability to measure the condition of large rivers. EPA will use this information, along with that provided by other agencies, to develop future baseline assessments of Central Basin rivers. The approaches and technology developed within this effort will be transferred to the many responsible parties within the Basin to enable coordinated, scientifically defensible, long-term monitoring of the condition of these rivers that can help inform environmental management decisions affecting these rivers as well as the Gulf of Mexico. These approaches and technologies will also have widespread applicability to all of the Nation's large rivers. Also in FY 2003, the National Coastal Assessment (NCA) program will produce a report on the condition of the nation's estuaries. This report will provide the EPA and Congress with the first integrated, comprehensive, and statistically valid national report card on the health of a specific aquatic resource.

Research for Human Health Risk Assessment

To reduce uncertainties in risk assessment, in FY 2003 human health research will develop measurements, methods, and models to evaluate exposures and effects of environmental contaminants, particularly in children. The Agency will continue to support a children's health research program specifically targeted at addressing major areas of uncertainty and susceptibility. In an effort to address children's exposure in daycare centers and school environments, EPA is proposing new research to develop information on exposure, determinants of exposure for children in school and daycare environments, and approaches to reduce potentially harmful exposures, and to link these with health outcomes that can be measured using school health attendance and performance records. Other children's research focuses on asthma and data gaps (e.g., the Longitudinal Birth Cohort Study).

EPA will also conduct research on the influence of genetic factors on responsiveness to environmental chemicals. The main scientific question for this research is whether genetic differences are sufficient to influence risk assessment. Along with the current program designed to address aggregate and cumulative risks, in FY 2003 the Agency is proposing increased efforts to more comprehensively address these areas. This research is intended to complement and build on EPA's draft *Human Health Research Strategy*. New research will address temporal variation in exposures and its influence on health effects, methods for predicting the relative toxicity of mixture components, the development of biological markers that can quantify exposure, effects and susceptibility, and the use of the biological data and information on biological mechanisms and mode of action to assess cumulative risk.

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 2003, research will focus on improving our understanding of the impacts of potential exposure to environmental pollutants, particularly endocrine disrupting chemicals (EDCs) and mercury, on human health and the environment, and on developing approaches to reduce human health and ecological risks. This research will result in accessible and seamless methodologies for combined human health and ecological risk assessments. Additional research results will include an improved framework for decision-making, increased ability to anticipate and perhaps prevent potentially serious environmental risks, improved methods for assessing socio-economic factors, and enhanced communication with the public and other stakeholders. EPA will also direct special grant solicitations to support research at Minority Institutions. This program specifically assists minority institutions in establishing and supporting environmental research activities that would build capacity to assess and solve environmental problems. The cumulative result of EPA research is to provide sound approaches for risk management to decision makers, providing them with the integrated view of risk needed to make intelligent choices.

Improve Environmental Systems Management

In FY 2003, the Agency will continue its systems-based approach to pollution prevention, which will lead to a more thorough assessment of human health and environmental risks and a more

comprehensive management of those risks. EPA will develop tools and methodologies to prevent pollution at its source and will evaluate environmental technologies through the Environmental Technology Verification (ETV) Program. Research will also develop methodologies to better convey the social, economic, and environmental costs and benefits of reducing environmental risks. Additionally, through the National Environmental Technology Competition (NETC), EPA will recognize and reward innovative technologies that produce more effective and lower cost solutions to environmental problems. In FY 2003, EPA plans to develop competitive solicitations for technologies in various areas of environmental concern, including arsenic treatment technologies for small community drinking water systems. Research efforts will also focus on the reduction of persistent bioaccumulative toxics (PBTs) and volatile organic compounds (VOCs). This work will enhance EPA's ability to mitigate harm caused by environmental pollutants and will provide the public and private sectors with cost-effective environmental technologies.

Regulatory and Policy Development

EPA will improve its regulatory and policy development process by strengthening the policy analysis of key regulatory and non-regulatory actions, improving the economic analysis underlying Agency actions, and improving the regulatory and policy action information management system.

Increased Community-Based Approaches

Regional Geographic Initiatives (RGI) are an approach EPA Regional offices use to partner with states, local governments, private organizations, and others to solve environmental problems that are of particular local concern to the Regions and states.

Science Advisory Board Peer Review and Consultations

The Agency will continue to support the activities, principally peer reviews, of the SAB, which provides independent technical advice to Congress and the Administrator on scientific, engineering, and economic issues that serve as the underpinnings for Agency positions, from research direction to regulations. The SAB helps the Agency to "do the right science" and to 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. In this regard, the SAB is active in consulting with the Agency on how to incorporate science appropriately and effectively into the new approaches the Agency is using to make environmental decisions.

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 tenet for actions taken by the Agency, then external factors will have a minimal impact on the goal.

Environmental Protection Agency

FY 2003 Annual Performance Plan and Congressional Justification

Sound Science, Improved Understanding of Env. Risk and Greater Innovation to Address Env. Problems

Objective: Conduct Research for Ecosystem Assessment and Restoration.

Provide the scientific understanding to measure, model, maintain, and/or restore, at multiple spatial scales, the present and future integrity of highly valued ecosystems.

Resource Summary (Dollars in Thousands)

	FY 2001 Actuals	FY 2002 Enacted	FY 2003 Request	FY 2003 Req. v. FY 2002 Ena.
Conduct Research for Ecosystem Assessment and Restoration.	\$134,525.5	\$120,594.7	\$119,114.6	(\$1,480.1)
Environmental Program & Management	\$10,237.9	\$6,340.9	\$5,960.1	(\$380.8)
Hazardous Substance Superfund	\$0.0	\$24.2	\$21.6	(\$2.6)
Science & Technology	\$124,287.6	\$114,229.6	\$113,132.9	(\$1,096.7)
Total Workyears	349.0	352.6	350.9	-1.7

Key Program (Dollars in Thousands)

	FY 2001 Enacted	FY 2002 Enacted	FY 2003 Request	FY 2003 Req. v. FY 2002 Ena.
Administrative Services	\$250.3	\$0.0	\$0.0	\$0.0
Coastal Environmental Monitoring	\$7,467.5	\$7,325.3	\$7,671.2	\$345.9
Congressionally Mandated Projects	\$7,773.3	\$7,770.9	\$0.0	(\$7,770.9)
Ecosystems Condition, Protection and Restoration Research	\$65,261.3	\$66,707.9	\$67,202.1	\$494.2
Environmental Monitoring and Assessment Program, EMAP	\$29,470.7	\$32,360.0	\$38,259.6	\$5,899.6
Facilities Infrastructure and Operations	\$6,537.9	\$5,320.2	\$4,963.5	(\$356.7)
Homeland Security	\$0.0	\$65.5	\$0.0	(\$65.5)
Management Services and Stewardship	\$1,397.6	\$1,044.9	\$1,018.2	(\$26.7)

FY 2003 Request

Natural ecosystems provide valuable services and resources to the public, such as air and water purification, flood control, food, and raw materials for industrial processes, 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, the stressors changing that condition, the consequences of those changes, and the consequences of preventing, mitigating, or adapting to those changes. EPA's ecological research program has four primary areas of emphasis: 1) ecological monitoring; 2) ecological process and modeling; 3) ecological risk assessment; and 4) ecological risk management and restoration. In FY 2003, improvements in ecological assessment methods targeted at the application/evaluation of Ecological Risk Assessment Guidelines in specific scenarios (e.g., default assessment endpoints, watershed risk assessment, invasive species, dioxin) will increase the decision maker's understanding and use of this scientific information.

Ecological Monitoring Research

EPA's ecological monitoring research efforts consist in large part of the various components of the Environmental Monitoring and Assessment Program (EMAP). EMAP focuses on the monitoring science required to develop EPA's capability to measure trends in freshwater and marine ecosystem health. EMAP includes the National Coastal Assessment (Coastal 2000), Western EMAP, work in landscape ecology, and programs to develop and refine environmental indicators. In FY 2003 the National Coastal Assessment (NCA) program will produce a report on the condition of the nation's estuaries. This report will provide the EPA and Congress with the first integrated, comprehensive, and statistically valid national report card on the health of a specific aquatic resource. Also in FY 2003, the NCA will enter the second year of coastal monitoring for Alaska. This reflects a one-year delay in initiating these efforts due in large part to the inherent logistical problems of working in Alaska and to changes in the program leadership. The Western EMAP (a.k.a. Western Pilot) study will also continue as a primary activity of EPA's monitoring research. This study has four areas of focus: 1) the landscape atlas for western states; 2) 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. In FY 2003 the Western Pilot will continue with the study of streams in the western U.S., and will begin focused studies in selected estuarine and near-shore sites. These two programs will provide water resources managers with tools necessary to measure status and trends in the condition of the nation's streams and estuaries and to measure the impacts of management decisions.

EPA is also proposing to refine and extend the EMAP approach to large rivers in the Mississippi River Basin (the Central Basin). These rivers are the inland receiving waters for the majority of the nation's heartland, and are the link between small upland streams and the Gulf of Mexico. Central Basin rivers are challenged by long-term loadings of nutrients, sediments and toxic chemicals as well as extensive habitat alterations. The resulting inputs to the Gulf of Mexico are a significant contributor to causes of hypoxia, loss of wildlife habitat, and water quality concerns. At

the same time, these rivers represent a monitoring problem for the states and Tribes located in the center of the country because they are too large and complex for conventional environmental monitoring and assessment. Consequently, large rivers represent a scientific gap in our understanding of the flowing waters of the U.S. Through cooperative programs with the Regions, states, Tribes and other Federal agencies, EPA proposes to initiate a program within the Central Basin to fill remaining scientific gaps currently limiting our ability to measure the condition of large rivers. In FY 2003, EPA will expand already planned research on indicators, monitoring designs, and sampling techniques for the upper Missouri River to include the lower Missouri River and upper Mississippi River. The approaches and technology developed will be transferred to the many responsible decision-making parties within the Basin to enable coordinated, scientifically defensible, long-term monitoring of the condition of these rivers. Data from such monitoring can help inform environmental management decisions regarding these rivers, and provide support to managers in establishing total maximum daily loads and meeting water quality standards. There are important scientific linkages between the Central Basin effort and proposed watershed mitigation and management efforts. The health of these large rivers is linked to the conditions of small streams, and ultimately their watersheds. Once we are able to determine the condition of our large rivers, understanding the processes occurring in the watersheds will be important for diagnosing the causes of impaired conditions in these river systems. These approaches and technologies step off from successful efforts in the Mid-Atlantic, western U.S., and coastal regions, and will also have widespread applicability to all of the nation's large rivers.

Landscape ecology research focuses on improving estimates of the effects of land-based stressors on aquatic, estuarine, wetland, terrestrial, and landscape conditions. It also extends the EMAP probability sample design to estimate conditions of ecological resources across the West through the application of spatially-distributed models. Landscape characterization research includes: (1) planning and generating land characteristic databases for determining current conditions and change (land cover and other spatial databases); (2) continuing remote sensing research and developing high resolution imagery applications to document changes in land cover over time; and (3) quantifying relationships between landscape metrics and specific parameters. This research will significantly improve EPA ecological monitoring and assessments, as well as risk management decisions, and will reduce uncertainty in other high priority research programs.

Environmental indicators research will focus on: (1) the development of the next generation of biological indicators to characterize ecosystem condition and diagnose exposure to specific stressors; (2) their application to the monitoring of aquatic ecosystems; and (3) their interpretation in ecological risk assessments. These indicators include new condition indicators (e.g., genetic diversity of aquatic species) and new multi-metric methods (e.g., prototype indicators for deep rivers) to assess aquatic ecosystem population and community integrity.

Population genetics data are unique to ecological integrity studies, providing the only inherent measure of population fitness and sustainability which can be associated with historic or anthropogenic stresses. The research also includes the use of DNA microarray technology to develop highly specific and sensitive diagnostic indicators of exposure to chemical stressors for which no current measures of bioavailability exist (e.g., pesticides). This technology can be used to

develop methods capable of simultaneous measurement of the bioavailability of several chemical stressors to aquatic species exposed to mixtures.

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 environmental protection goals.

Since measurements are not feasible 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 data 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 will conduct a national assessment of landscape change between the early 1970's and early 2000's, evaluate the consequences of these changes on aquatic resources, and develop national assessments of riparian habitat conditions.

EPA will also conduct research to address the effects of excess nitrogen from atmospheric or other sources on terrestrial and aquatic ecosystems, including the development of models that predict the loading-response relationships for nitrogen in aquatic habitats and improved knowledge of the biogeochemical processes controlling nutrient processes in watersheds. Such models can be used for stressor source apportionment and for the assessment of management and mitigation strategies. In addition, deposition of nitrogen, along with other atmospheric stresses such as sulfur, will be monitored throughout the northeastern U.S. to determine the effects of acid deposition on streams, rivers, and lakes.

Other ecological process and modeling research will include the development of approaches for evaluating relative risks from chemical and nonchemical stressors on fish and wildlife populations across large areas or regions. Research in this area will improve the ability to perform retrospective (diagnostic) and prospective (forecast) assessments of risks to biota as determined by the spatial distribution of habitat quality and stressors (e.g., toxic chemicals, nutrients, disease, invasive species) in the landscape. Four major research activities include: 1) developing approaches to characterize landscapes (and water bodies) in terms of habitat quality and stressor distributions using remotely-sensed information and monitoring data; 2) developing mechanistically-based approaches for extrapolating biological response across species, chemicals, time, space, and response endpoints; 3) developing stressor-response relationships and modeling approaches for predicting population-level health as functions of habitat quality and stressor distributions; and 4)

characterizing spatial and temporal variability to distinguish between natural ranges of variability and anthropogenic impacts. This information can then be used to describe habitat requirements for wildlife and to manage watersheds to achieve and maintain desired ecological conditions, using biological indicators and metrics to determine the condition of aquatic ecosystems.

Due to the complexity of ecological systems, making scientifically sound predictions usually requires the use of numerical models, ranging in complexity from empirically based estimates to process-based simulations. Because aquatic ecosystems integrate atmospheric, landscape, groundwater, and upstream influences, models and support tools are being developed to manage, integrate, and evaluate the transport and fate of nutrients and other stressors in the environment over multiple scales. The resulting modeling framework will integrate multiple models and data sets to improve the environmental management community's ability to evaluate the impact of air quality and waste and watershed management practices on ecological and human health conditions, by embracing the watershed/airshed approach to environmental management, and building upon the latest technologies for environmental monitoring and geographic representation. It will address uncertainties in distributions of single-stressors and interactions among multiple stressors, and develop methods for incorporating uncertainty in decision-making. Given that the challenges of today's environmental problems far exceed what any one group or agency can expect to resolve, an open framework (non-proprietary) technology approach will facilitate combination of individual components developed by EPA and partners into multi-disciplinary, multi-scale modeling and assessment tools.

Ecological Assessment Research

EPA's ecological 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, and can be used to compare the relative risks associated with different stressors, regional areas, and ecosystems. This valuable tool enables environmental risk managers at local, state, and Federal levels to identify priority ecosystems that are 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. Continuing research in FY 2003 will build on EMAP and other data to project future environmental conditions in the region so that risk management activities can be targeted proactively. The Regional Vulnerability Assessment (ReVA) project, begun in FY 2000, will continue to 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 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 conditions and to better communicate trade-offs associated with alternative policy decisions. Given that we can not protect every ecosystem, everywhere, at all times, examining resources and their vulnerability on this larger scale will greatly assist in identifying ecologically important features of the region meriting special consideration by local, regional, or national managers.

Ecosystem 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. 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 integrated restoration technologies which focus on: 1) rehabilitation, to the extent possible, of the structure of watershed ecosystems (e.g., restoring riparian zones); 2) reduction of the perceived stressors (e.g., cleaning up contaminated sediments); and 3) enhancing the natural resilience of the system. 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 2003 Change from FY 2002 Enacted

S&T

- (+\$4,875,000) This initiative refines and extends the EMAP approach to large rivers in the Mississippi River Basin (the Central Basin). Through cooperative programs with the Regions, states, Tribes and other Federal agencies in the Central Basin, EPA proposes to fill remaining scientific gaps (indicators, sampling design, and sampling methodology) currently limiting our ability to measure the condition of large rivers. EPA will use this information, along with that provided by other agencies, to develop future baseline assessments of Central Basin rivers. In FY 2003, EPA will expand already planned research on indicators, monitoring designs, and sampling techniques for the upper Missouri river to include the lower Missouri and upper Mississippi rivers. The approaches and technologies developed will be transferred to the many responsible parties within the Central Basin to enable coordinated, scientifically defensible, long-term monitoring. Data from such monitoring can help inform environmental management decisions regarding these rivers, and provide support to managers in the establishment of total maximum daily loads and meeting of water quality standards. These approaches and technologies build on successful efforts in the Mid-Atlantic, western U.S., and coastal regions, and will also have widespread applicability to all of the Nation's large rivers.
- (+\$282,200, +1.5 FTE) This increase in resources will be used to coordinate EPA scientific participation in regulatory development with program offices on major rules.
- (-\$500,000) This is a modest reduction to work on core diagnostic and predictive tools for watershed assessment and restoration that will result in a minor slowing in this work.

Resources are being shifted to high priority research on the evaluation of public health outcomes in Goal 8, Objective 2.

- (-\$7,770,900) The FY 2003 Request is \$7,770,900 below the FY 2002 Enacted budget level due to Congressional earmarks received during the FY 2002 appropriations process that are not included in the FY 2003 President's Request.

GOAL: SOUND SCIENCE, IMPROVED UNDERSTANDING OF ENV. RISK AND GREATER INNOVATION TO ADDRESS ENV. PROBLEMS

OBJECTIVE: CONDUCT RESEARCH FOR ECOSYSTEM ASSESSMENT AND RESTORATION.

Annual Performance Goals and Measures

Research

Estuarine Ecosystem Conditions

In 2003 Provide the public with a reliable and statistically valid baseline for the condition of the Nation's estuaries against which to measure the success of ecosystem protection and risk management practices.

In 2001 Baseline conditions in the ecological condition of the Nation's estuaries have been established from which changes and ultimately trends can be evaluated at regional scales.

Performance Measures:	FY 2001 Actual	FY 2002 Enacted	FY 2003 Request	
Report describing the condition of the Nation's Estuaries.	1			report
Report on the condition of Nation's estuaries based on a statistically valid sampling design so that data is comparable across the Nation.			1	report

Baseline: The coastal monitoring strategy responds to the needs of EPA and the coastal states and tribes for information on the health of the coastal environment that will inform decisions to protect these vital coastal resources. For the past decade, ORDs Environmental Monitoring and Assessment Program (EMAP) has been working with federal, state, and academic scientists to develop the most cost-effective methods for measuring the physical, chemical, biological, and ecological conditions of coastal waters, bays, estuaries, beaches, and coastal wetlands. The data from this decade of EMAP research and field surveys in select areas of the country were combined with select data from EPA (ORD and OW), NOAA, Department of Interior, and Department of Agriculture to form an assessment of estuarine condition in 2001. Because of the need to determine current environmental health baselines and quantitatively measure improvement for GPRA, EPA developed an initiative that would implement the proven science developed by EMAP for the ecosystems found throughout the US coastal waters. Starting in 2000, survey information has been collected on the condition of estuarine resources, and the kinds of problems associated with them, in each conterminous coastal state and in Puerto Rico. In 2003, these data will be compiled for the first comprehensive National Coastal Assessment of estuarine condition in the contiguous U.S. This report also will compare the condition of estuaries in the period 1990-1997 to the period 2000-2001. For the first time, this will provide the public with a reliable picture of the current and changing condition of the Nations estuaries and coastal waters with known confidence, and using consistent measurements.

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.

Performance Measures:	FY 2001 Actual	FY 2002 Enacted	FY 2003 Request	
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.

Verification and Validation of Performance Measures

Performance Measure (PM): Report on the Condition of the Nation's estuaries.

Performance Database: Program output, no internal tracking system

Data Source: N/A

QA/QC Procedures: N/A

Data Quality Reviews: N/A

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 look beyond specific resource management responsibilities such as those assigned to other agencies like the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service, U.S. Department of Agriculture's (USDA) Forest Service, and the Department of the Interior's (DOI) Fish and Wildlife Service (USFW) 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 cooperates with the CENR's Subcommittee on Ecological Systems, in the restoration of habitats and species, impacts of landscape change, invasive species and inventory and monitoring programs.

EPA is working through interagency agreements with the USACE on the development of tools for the management of stressors in reservoir and lake watersheds and the establishment of an approach for the development of decision support systems to manage these types of ecosystems. Through interagency agreements with the U.S. DOI's U.S. Geological Survey (USGS), EPA has worked to investigate and develop tools for assessing the impact of hydrogeology on riparian restoration efforts. This work also focuses on development of tools for the dispersal modeling of invasive species, the evaluation of the effectiveness of restoration efforts to reconnect groundwater and surface water hydrology, and the establishment of zones of denitrification within impaired streams. The collaborative work with the USGS continues to play a vital role in investigating the impact and fate of atmospheric loadings of nitrogen and nitrogen applications as part of restoration technologies on terrestrial and aquatic ecosystems. All of these efforts have significant implications for risk management in watersheds, total maximum daily load (TMDL) implementation, and management of non-point source pollutants.

Additional interagency grants programs in Ecology include: the Ecology and Oceanography of Harmful Algal Blooms (EcoHAB) program with NOAA, NSF, DOD, and NASA; nutrient science for watershed management with USDA; and the 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 2003 Annual Performance Plan and Congressional Justification

Sound Science, Improved Understanding of Env. Risk and Greater Innovation to Address Env. Problems

Objective: 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 2001 Actuals	FY 2002 Enacted	FY 2003 Request	FY 2003 Req. v. FY 2002 Ena.
Improve Scientific Basis to Manage Environmental Hazards and Exposures.	\$52,407.6	\$53,021.7	\$56,355.0	\$3,333.3
Environmental Program & Management	\$3,896.6	\$3,118.4	\$2,937.3	(\$181.1)
Science & Technology	\$48,511.0	\$49,903.3	\$53,417.7	\$3,514.4
Total Workyears	163.4	175.8	176.0	0.2

Key Program (Dollars in Thousands)

	FY 2001 Enacted	FY 2002 Enacted	FY 2003 Request	FY 2003 Req. v. FY 2002 Ena.
Administrative Services	\$70.1	\$0.0	\$0.0	\$0.0
Congressionally Mandated Projects	\$0.0	\$731.3	\$0.0	(\$731.3)
Endocrine Disruptor Research	\$366.9	\$369.3	\$372.2	\$2.9
Facilities Infrastructure and Operations	\$3,370.9	\$2,656.7	\$2,505.1	(\$151.6)
Homeland Security	\$0.0	\$360.1	\$0.0	(\$360.1)
Human Health Research	\$49,825.7	\$47,225.6	\$51,824.5	\$4,598.9
Legal Services	\$41.9	\$51.0	\$54.8	\$3.8
Management Services and Stewardship	\$459.0	\$410.7	\$377.4	(\$33.3)
Research to Support FQPA	\$1,214.5	\$1,217.0	\$1,221.0	\$4.0

FY 2003 Request

EPA's human health research program is based on the assumption that major uncertainties in risk assessment can be reduced by understanding the fundamental determinants of exposure and dose and the basic biological changes that result from one or more exposures to one or more chemicals. Historically, EPA focused its human health risk management decisions and regulations on single environmental pathways and individual contaminants. Often, environmental legislation mandated this approach. In recent years, however, 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 statutes.

EPA's draft *Human Health Research Strategy* 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. Under the draft strategy, EPA will conduct research needed to address complex environmental issues, such as harmonization of cancer and non-cancer risk assessments, susceptible subpopulations, aggregate and cumulative risk, susceptibility resulting from age, developmental stage, gender, preexisting disease, etc., and the evaluation of health-driven regulatory decisions.

In FY 2003, human health research will be undertaken in four key areas: 1) development of multimedia/multipathway exposure methods, data, and models; 2) development of mechanistically-based data, tools, and approaches; 3) development and verification of innovative methods and models for assessing risks to susceptible subpopulations; and 4) development of tools to enable evaluation of public health outcomes.

Multimedia/multipathway exposure methods and models

EPA is committed to filling critical data gaps that reduce the risk assessor's reliance on default assumptions and improves the risk assessment process. One key way to accomplish this goal is by developing models to assess, predict, and diagnose the population's distribution of multimedia/multipathway exposures to major classes of environmental agents. Research activities in this area will address substantial uncertainties that exist in human health risk assessment and thereby improve the scientific basis for assessing and managing risks. Activities include: 1) human exposure measurement and modeling research, including source emission modeling; 2) research on aggregate and cumulative exposures, including mixtures; 3) an exposure study to examine the key factors influencing young children's exposures; 4) continued research supporting the National Human Exposure Assessment Survey (NHEXAS); and 5) research in support of the US/Mexico Border Program, the National Children's Study, and other relevant exposure programs.

Through the exposure research program, EPA will develop methods, measurement data, and measurement-derived models that estimate source emission, aggregate and cumulative exposures and source-exposure-dose relationships for contaminant mixtures to which the general population, children, and other susceptible populations are exposed daily. Research will continue to focus on developing, evaluating, and enhancing multimedia, multi-pathway exposure modeling modules

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 real-world 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 pollutants throughout the body. These human exposure-to-dose models provide the essential linkage between regional environmental or micro-environmental models and the corresponding dose-response models designed by toxicologists.

In addition, the Agency will continue to develop measurements, methods, models, and activity pattern data essential for eliminating critical gaps in our knowledge about children's aggregate and cumulative exposures to environmental contaminants. This research will provide information and data needed to characterize children's age-related and developmental stage factors of exposure. These children's exposure data will also be used to verify and update the aggregate and cumulative exposure source-to-dose models. The ultimate result of this research is to produce distributions of high quality children's, other susceptibles', and the general population's exposure and exposure factor data that will reduce the risk assessor's reliance on default assumptions.

Along with the current program designed to address aggregate and cumulative risks, in FY 2003 the Agency is proposing increased efforts to more comprehensively address these areas. This research is intended to complement and build on EPA's draft *Human Health Research Strategy*. These efforts will provide a focal point for Agency-wide strategic research planning and methods development and will address a broader array of issues than can be addressed within EPA's current human health research program. New research will address: 1) the timing of exposures and its influence on health effects; 2) methods for predicting the relative toxicity of mixture components; 3) the development of biological markers that can quantify exposure, effects and susceptibility; and 4) the use of the biological data and information on biological mechanisms and mode of action to assess cumulative risk.

EPA also conducts methods, measurement, and modeling research through the NHEXAS program, which integrates measurements and modeling to investigate critical information gaps about population-scale distributions of exposures to contaminant mixtures. In FY 2003, the Agency will continue to implement the NHEXAS strategic data analysis plan. The NHEXAS data provide fundamental input to the Agency and the scientific community for the development of aggregate exposure models, and assessments, and the evaluation of risk management/mitigation strategies. Building on basic analyses initiated in FY 2001, research will include more detailed/complex analyses, such as characterization of variance components, evaluation of spatial variability of exposures, construction of empirical exposure distribution models, and development of aggregate exposure assessments.

A major children's exposure field study will begin in FY 2003, which focuses on young children's aggregate exposure to pesticides in homes, day care centers and schools (this research is being leveraged with similar research programs within Goal 3, Safe Food). This field study will develop essential information for improving models that represent dermal uptake and exposure, dietary exposure and gastrointestinal (GI) uptake, and aggregate exposure. The validated children's

exposure protocol will be used by researchers within EPA, the scientific community, and by the pesticide and chemical industry to conduct future children's exposure studies and develop high quality data on exposure and exposure factors mandated by the Food Quality Protection Act (FQPA). The study will be completed in FY 2004 with delivery of major products (e.g., a validated protocol, a technical publication outlining the distributions of exposures by age and distribution of key exposure factors, an updated Exposure Factors Handbook, etc.) in FY 2005.

In the risk assessment area, research on mixtures, cumulative and aggregate exposures and cumulative and aggregate risks will continue to provide methodologies, prototypical assessments, and guidance for risk assessors. This information will be used to address key research issues in the areas of multiple sources, multiple chemicals and stressors, multiple routes and pathways, and multiple time frames and durations of exposure. Research highlights include: 1) identifying the most effective multiple source models for EPA risk assessments and demonstrating their use in risk assessments; 2) developing methods for predicting interactions in mixtures and applying them to risk assessments; 3) developing and validating methods for identifying and characterizing exposure levels associated with multiple pathways; and 4) developing guidance for which average exposure times are most appropriate for various health effects.

Mechanistically-based Data, Tools, and Approaches

There is a lack of understanding about the underlying biological, chemical, and physical processes that determine target tissue exposures and effects, which limits the Agency's ability to assess potential health risks of environmental exposures - qualitatively and quantitatively. Insufficient knowledge of these processes introduces uncertainties into the risk assessment process that may allow for wide interpretation of what is often limited data. Research in this area addresses both qualitative (hazard identification) and quantitative (dose-response analysis) concerns associated with current risk assessments.

In order to reduce uncertainties in the risk assessment process, health effects research will continue to focus on harmonization of risk assessment approaches and chemical mixtures. Work to harmonize risk assessment approaches will yield a consistent set of principles and guidelines for drawing inferences from scientific information, including the need for consistent application of all pertinent information on toxicity, dosimetry, and mode of action in all risk assessments. Research on chemicals in mixtures will focus on determining the risks associated with exposure to chemicals at the low end of the dose-response curve. It is particularly important to develop principles for how chemicals interact at low doses and to determine the conditions under which they may respond in a non-additive manner. The primary approach is to study chemicals having similar modes of action. Also, principles derived from mixtures research will address issues associated with the assessment of cumulative risk and aggregate exposure, as mandated by the FQPA.

Research will continue also to develop and improve risk assessment methodologies, conduct prototype risk assessments, and develop risk assessment guidelines and databases. More specifically, results of research on biological mechanisms will be used to improve understanding of and resolve uncertainties in dose-response 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 risk management strategies and guidance.

In FY 2003, EPA's Children's Health Research Program, established in 1997 in response to the heightened awareness and concern about the unique susceptibilities of infants and children, will continue to play a critical role in shaping how the Agency addresses children's health issues. Children may be more susceptible than adults to adverse effects because of differences in how chemicals are absorbed, metabolized, and stored in the body, resulting in higher doses over a longer period of time and greater harm to key organs and organ systems. In addition to inherent differences in susceptibility, children are often more vulnerable to toxic exposures because of their different diets, proportionally higher food intake, and child-specific behaviors, such as playing on floors, that result in greater contact with environmental contaminants.

Much of the effort under the Children's Health Research Program in FY 2003 is based on the *EPA Strategy for Research on Environmental Risks to Children* (in addition to the draft *Asthma Research Strategy*), 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.

The Agency will also continue to address environmental-related childhood disease via the Children's Environmental Research Centers. The aim of these grants is to better understand the causes of environmentally induced disease among children and to eventually decrease the prevalence of childhood disease. Efforts will focus on childhood asthma and other respiratory diseases, 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.

Health effects research in the area of susceptible subpopulations will develop the scientific basis for understanding the pharmacodynamic and pharmacokinetic differences between subpopulations that could account for different sensitivity and susceptibility following exposure to environmental chemicals. Results from this research will be used to develop better risk assessment methods for evaluating selected subpopulations that focus on the influence of life-stage, genetic predisposition, and health status on responsiveness to chemical exposure.

The Agency is participating in the National Children's Study (NCS) through a Federal Interagency Committee with the National Institute for Child Health and Human Development (NICHD), the Centers for Disease Control and Prevention (CDC), and other agencies, as mandated in the Children's Health Act of 2000. The NCS will enroll parents and children at or before birth and follow them for a number of years, documenting developmental disorders and collecting data on

environmental exposures and other factors that could be responsible for adverse outcomes. In 2003, EPA will continue to work on design and implementation of the NCS and to develop and pilot methods for measuring exposure to environmental agents and adverse health outcomes.

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 developed an *Asthma Research Strategy*. Consistent with the priorities laid out in the Strategy, EPA will focus its efforts on interactions between aldehyde exposure and allergic asthma, including extrapolation between rats and humans, and asthma and exposure of children to fungi. EPA is also developing methods and protocols for asthma research, as part of the National Children's Study (NCS), to enable evaluation of the role of environmental factors in the induction and exacerbation of asthma (and to assess the effectiveness of interventions).

The Agency will continue to support risk management research designed to assist schools in their efforts to eliminate or minimize emissions and releases of contaminants from products and materials they use that contribute to asthma and other respiratory irritations. This research will develop models and test procedures, and create market incentives for the manufacture and use of products, including water-based cleaners, that result in improved indoor air quality. Research results will provide the scientific basis to upgrade indoor air quality guidance to schools.

EPA will also conduct research on the influence of genetic factors on responsiveness to environmental chemicals. An important scientific question in this area is whether genetic differences are sufficient to influence risk assessment. In addition, the Agency will study whether the presence of pre-existing diseases may alter the response to environmental toxins. Data derived from these studies will be used to assess the possible increased risk of chemical exposure for individuals with pre-existing diseases, such as asthma and other respiratory diseases.

Research to Enable Evaluation of Public Health Outcomes

As part of its regulatory development process, the Agency often estimates the public health benefits, such as reduced incidences of disease and extended life years, of various possible Agency decisions. Estimating the public health benefits of Agency decisions, or in a more general sense evaluating public health outcomes from risk management actions, is most often prospective in nature. Generally, the Agency has not prepared retrospective evaluations to assess whether the intended benefits in protecting public health were realized once an Agency decision had been in effect for a period of time.

In FY 2003, EPA will begin the first in a series of solicitations requesting research to develop approaches for using human health and exposure data to evaluate the effectiveness of environmental decision-making on public health. Research will be conducted using case studies to evaluate approaches for using health-related information to evaluate the public health outcomes of regulatory decisions. The studies will test statistical and computational approaches and methods for evaluating cost-benefit relationships.

FY 2003 Change from the FY 2002 Enacted

Research

S&T

- (+\$3,412,500) This increase supports the Agency's research initiative on aggregate and cumulative risks. Research results will provide a focal point for Agency-wide strategic research planning and methods development; provide tools that can be applied to address key concerns that have arisen in settings where population-based human health risk assessment is the focus; and complement and build on EPA's human health research. This initiative has been specifically tailored to reduce uncertainty in this area and allow the Agency to address a broader array of issues than is currently possible. New research will address temporal variation in exposures and its influence on health effects, methods for predicting the relative toxicity of mixture components, the development of biological markers that can quantify exposure, effects and susceptibility, and the use of the biological data and information on biological mechanisms and mode of action to assess cumulative risk.
- (+\$2,450,000) Resources will be redirected within this objective to enhance the Agency's efforts in the area of computational toxicology. EPA seeks to strengthen further and integrate its capabilities in the areas of (but not limited to) molecular profiling and bioinformatics. The Agency's goal is to advance its ability to assess and predict the human health and ecological risks from environmental exposures.
- (-\$2,000,000) Resources will be redirected within this objective from efforts in human health in the areas of human health risk assessment and assessing exposure and risks from chemical mixtures. There are no programmatic impacts.
- (+\$500,000) Resources will be used to enhance EPA's efforts in evaluating the effectiveness of environmental decision-making on public health. Research will be conducted using case studies to evaluate approaches for using health related information to evaluate the public health outcomes of regulatory decisions. The studies will test statistical and computational approaches and methods for evaluating cost-benefit relationships.
- (+\$360,900, +1.9 FTE) Resources will be redirected within the Objective to develop methods, data, and measurement-derived models that estimate aggregate exposure and source-exposure-dose relationships for contaminant mixtures. Planned research related to Homeland Security will conclude in FY 2002.
- (-\$360,900, -1.9 FTE) Planned research related to Homeland Security in the area of model development incorporating human activity patterns and measured or modeled distributions of exposure concentrations will conclude in FY 2002. Resources will be redirected to aggregate and cumulative exposures and exposures to mixtures.

- (+\$281,200, +1.5 FTE) This increase in resources will be used to coordinate EPA scientific participation in regulatory development with program offices on major rules.
- (-\$786,000) This FY 2003 reduction eliminates funding for FY 2002 Congressionally-directed research.
- (-\$731,300) The FY 2003 Request is \$731,300 below the 2002 Enacted budget due to the Congressional Earmarks received during the appropriations process which are not included in the FY 2003 President's Request.

Annual Performance Goals and Measures

Research

Human Health Risk Assessment Research

- In 2003 Develop, summarize, integrate, and demonstrate an initial set of tools (methods, measurements, models) so EPA can assess aggregate exposures and risks from environmental contaminants in multiple media and determine how to best minimize/eliminate human and environmental harm from these contaminants.
- 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 and high to low dose extrapolation.
- In 2001 EPA developed a draft research strategy on human health risk assessment. Although publication has been delayed until FY 2002, the fundamentals of this strategy are being implemented into an analysis of data from the National Human Exposure Assessment Survey (NHEXAS).

Performance Measures:	FY 2001 Actual	FY 2002 Enacted	FY 2003 Request	
Publish peer reviewed research strategy on human health risk assessment.	0			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	model assessmen
Advance the human exposure and dose model by improving the modules for dermal and dietary exposure.			2	modules
External review draft report on 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
Provide access to human exposure data via the world wide web to states, Regions, Program Offices, exposure modelers, and other stakeholders for use in aggregate and cumulative risk assessments.				1 data base
Test and evaluate a framework for modeling aggregate exposures from source through human exposure to human dose.				1 model
Publish data and results from the National Human Exposure				1 report

Performance Measures:	FY 2001 Actual	FY 2002 Enacted	FY 2003 Request
Analysis Survey (NHEXAS) that will help characterize exposures to key pollutants and summarize human activities that impact exposure.			
Analyze NHEXAS data for use in updating the Exposure Factors Handbook.			1 analysis

Baseline: Currently, risk assessments often focuses on a small component of the total exposure and risk that people face. Aggregate exposure and risk expands that consideration to include all the pathways and routes by which people come into contact with pollutants: it is a first step in understanding the cumulative total of peoples exposures and risks. A variety of tools (measuremnt and analysis methods, measurement studies and data, and human exposure/risk models) are currently under development to allow estimation of aggregate exposures and risks. In FY03, research will provide: improved information on sources of exposure; analysis of actual aggregate exposures of people in the U.S. as observed in probabilistic exposure measurement studies; development and demonstration of models for describing the many ways pollutants move from sources to exposures to human dose; and the gathering together and publication of information and techniques needed to assess aggregate exposures and risk for use by the scientific community, risk assessors, and the public. Providing tools to assess aggregate exposure and risk is an initial step in understanding cumulative exposures and risks, and helping us move to more outcome-oriented measures of Agency actions to protect human health.

Coordination with Other Federal Agencies

Research

Several Federal agencies sponsor research on variability and susceptibility in risks from exposure to environmental contaminants. EPA has collaborated with the National Institute of Environmental Health Sciences (NIEHS) in establishing 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.

EPA is participating with the Centers for Disease Control and Prevention (CDC), through its National Center for Health Statistics (NCHS), in the National Health and Nutrition Examination Survey (NHANES)-4. NHANES-4 is a national population-based survey and includes data (i.e., children’s exposure to pesticides and other environmental contaminants) on potentially sensitive subpopulations such as children and the elderly.

The National Institute of Child Health and Human Development (NICHD) is the lead agency for conducting the National Children’s Study (NCS) of environmental influences on children’s health and development. EPA serves as one of the lead agencies within a consortium of Federal agencies that are planning, developing and implementing the NCS.

The Agency continues to work on interagency task forces with a number of Federal agencies, - including the National Institute for Occupational Safety and Health (NIOSH), NIEHS, and Food and Drug Administration (FDA) - in developing health risk assessment guidelines (e.g., Carcinogen Risk Assessment Guidelines, Developmental Toxicity Guidelines, Exposure Assessment Guidelines) and has maintained interagency agreements with several Federal agencies (e.g., NIEHS) to support the Children Environmental Research Centers.

Statutory Authority

Research

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 2003 Annual Performance Plan and Congressional Justification

Sound Science, Improved Understanding of Env. Risk and Greater Innovation to Address Env. Problems

Objective: Enhance Capabilities to Respond to Future Environmental Developments.

Enhance EPA's capabilities to anticipate, understand, and respond to future environmental developments; conduct research in areas that combine human health and ecological considerations; and enhance the Agency's capacity to evaluate the economic costs and benefits and other social impacts of environmental policies.

Resource Summary (Dollars in Thousands)

	FY 2001 Actuals	FY 2002 Enacted	FY 2003 Request	FY 2003 Req. v. FY 2002 Ena.
Enhance Capabilities to Respond to Future Environmental Developments.	\$48,626.6	\$64,249.5	\$50,965.8	(\$13,283.7)
Environmental Program & Management	\$6,801.4	\$10,147.8	\$10,008.5	(\$139.3)
Science & Technology	\$41,825.2	\$54,101.7	\$40,957.3	(\$13,144.4)
Total Workyears	159.6	152.6	152.6	0.0

Key Program (Dollars in Thousands)

	FY 2001 Enacted	FY 2002 Enacted	FY 2003 Request	FY 2003 Req. v. FY 2002 Ena.
Administrative Services	\$133.9	\$0.0	\$0.0	\$0.0
Congressionally Mandated Projects	\$4,377.8	\$3,753.8	\$0.0	(\$3,753.8)
Endocrine Disruptor Research	\$12,482.5	\$10,353.1	\$11,806.5	\$1,453.4
Facilities Infrastructure and Operations	\$371.4	\$2,267.8	\$2,177.2	(\$90.6)
Homeland Security	\$0.0	\$1,587.6	\$0.0	(\$1,587.6)
Management Services and Stewardship	\$426.6	\$327.7	\$299.1	(\$28.6)
Regulatory Development	\$6,857.6	\$7,552.3	\$7,532.2	(\$20.1)
Research to Support Emerging Issues	\$23,365.6	\$28,658.5	\$29,150.8	\$492.3
STAR Fellowships Program	\$9,704.3	\$9,748.7	\$0.0	(\$9,748.7)

FY 2003 Request

Research conducted under this objective endeavors to develop common methodologies for combined human health and ecological risk assessments and reliable approaches for risk management, and to conduct research in social science, environmental decision making, economic calculation, and estimation of environmental costs, risks and benefits. This research provides decision-makers at all levels with the integrated view of risk and risk reduction benefits and costs needed to make sound decisions.

Endocrine Disruptors

Evidence has been accumulating that indicates humans and animals, both domestic and wild, have suffered adverse health consequences resulting from exposure to endocrine disrupting chemicals (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) in 1998. Endocrine disruptors research will continue to focus on the priorities established in the 1998 plan by developing tools to identify hazards, characterize the extent of human and wildlife exposures to known and suspected EDCs, and manage risks from exposure to EDCs. This research focuses on: 1) developing a better understanding of EDCs; 2) determining the extent of the problem in human and wildlife populations; and 3) supporting EPA’s screening and testing program mandated under the Food Quality Protection Act of 1996 and the Safe Drinking Water Act Amendments of 1996. In FY 2003, EPA will continue to: develop state-of-the-art methods and conduct studies in laboratory species, ecological systems, and human populations with suspected contamination or exposure; develop physiologically-based pharmacokinetic (PBPK) and biologically-based dose-response (BBDR) models; identify major sources of EDCs entering the environment; and develop tools for risk assessment and risk management.

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 of adverse effects in humans and wildlife caused by exposure to EDCs. Efforts in this area will focus on: 1) developing and standardizing protocols for the Agency’s screening and testing program to identify endocrine disrupting chemicals; 2) determining the unique relationship between developmental exposures (e.g., prenatal and early postnatal) and the onset and severity of adverse health outcomes later in life (adulthood); and 3) determining the degree to which the effects of EDCs can be extrapolated across species.

Exposure research is needed to characterize the key factors contributing to how, when, and where EDC exposures occur and their magnitude. Efforts will focus on: 1) developing analytical and measurement tools for characterizing and quantifying EDC exposures; and 2) planning and conducting exposure studies to better define the spatial and temporal variability of real-world EDC exposures.

Assessment work will result in the development of an analytical framework and guidelines for evaluating health and ecological impacts of reported endocrine disruptors. To achieve this, risk assessment research will: 1) identify key risk assessment issues for evaluating endocrine disruptors; 2) identify methods to adequately evaluate data on the effects of EDCs on human health and the environment; 3) develop a framework that supports proper assessment of EDCs; and 4) develop and document guidance, incorporating this framework, for assessing EDCs.

Risk management research will identify current EDC releases that can be mitigated or eliminated by existing risk management tools and will develop new tools to manage current and future EDC risks. Initial efforts will focus on the following sources of exposure: 1) combustion, 2) confined animal feeding operations, 3) drinking water treatment, 4) contaminated sediments, and 5) waste water treatment.

Pharmaceutical and Personal Care Products

Pharmaceutical and personal care products (PPCPs) are used throughout the world in quantities on a par with agricultural chemicals, and 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. In contrast to agricultural chemicals, most of these products are disposed of, or discharged, into the environment on a continual basis via domestic/industrial sewage systems and wet-weather runoff. The occurrence, fate, and effects (both ecological and human) of PPCPs in the environment are poorly defined. Research will focus on: 1) framing initial risk assessments that will help chart the focus of future work; 2) developing requisite analytical methods for target PPCPs; 3) initiating small-scale proof-of-concept and early warning environmental monitoring; 4) promoting scientific dialogue at national and international levels; 5) and communicating knowledge to the public.

Mercury

Mercury is released from a variety of sources, exhibits complicated biogeochemistry, and proceeds via several different pathways to humans and wildlife. After release, mercury undergoes complicated transformations and speciation changes 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 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.

Since 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. The presence of mercury in freshwater fish higher in the food chain is the most frequent basis for fish advisories. Almost 79 percent of all advisories in the United States are at least partly due to mercury contamination in fish and shellfish. As of December 2000, mercury was the chemical contaminant responsible, at least in part, for the issuance of 2,242 fish consumption advisories by 41 states, in one

or more water bodies; 13 states have issued statewide mercury advisories.

Several research issues will continue to be emphasized in FY 2003, including: 1) measurement methods, continuous emissions monitoring, and control technologies for combustion sources of mercury; 2) source characterization and cataloging from non-combustion sources; 3) atmospheric, aquatic, and terrestrial transport, transformation, and fate of mercury; 4) ecological/environmental effects assessment of mercury; 5) mercury risk communication strategies (especially to sensitive subpopulations); 6) disposal of excess mercury stocks and improved management of mercury wastes; 7) studies of options for controlling mercury releases from contaminated media (e.g., sediments and landfills); and 8) studies of performance, cost, and residue of mercury control technologies, including methods for reducing emissions from coal fire utility boilers. Research in FY 2003 will provide data on measurement methods and control technology performance, cost, and residues that can be used to make informed choices on reducing the risks associated with mercury and methylmercury. EPA will place increased emphasis on research related to atmospheric chemistry, transport modeling and ecological assessment. FY 2003 research will also focus on the atmospheric transport, transformation, and fate from source to deposition point. Studies will focus on the Arctic depletion event and the mechanisms that transform elemental mercury to the reactive gaseous form in the upper atmosphere. Additional research will support the development of a watershed biogeochemical model for aquatic exposures in response to atmospheric deposition and within-watershed sources. This model will be used to evaluate the impacts of internal cycling versus long-range transport and the responses of fish concentrations to mitigation measures, and will have potential applications for development of mercury total maximum daily loads (TMDLs).

Socio-Economic Research

Effective accomplishment of EPA's mission depends on understanding not only the physical and biological effects of environmental changes, but also 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 human behavior that affect environmental outcomes. Priority socio-economic research identified by EPA economists and outside experts includes: ecosystem and human health benefits valuation; decision-making processes that incorporate non-market benefits; value of information; corporate environmental behavior and the effectiveness of government interventions; and effective group or community decision-making.

Research conducted in FY 2003 will enhance environmental decision-making by improving the understanding of how people value the environment, and will focus on difficult valuation issues of critical concern to environmental decision makers as they evaluate the justification for environmental policy initiatives. This is particularly important to regulatory programs that must conduct cost-benefit analyses. Ecosystem valuation is one of the top research priorities for Agency rule development due to extensive gaps in the information we have about biodiversity, habitat, wildlife, and different ecosystem states. Research on market mechanisms and incentives will support investigations that explore the conditions under which financial and other performance incentives will achieve environmental objectives (e.g., pollution reduction, habitat preservation) at a lower cost or more effectively than traditional regulatory approaches. This research will also help

Federal and state agencies understand how regulated entities respond to the incentives for environmental compliance offered through enforcement, compliance assistance, and information and voluntary mechanisms.

Exploratory Grants and Minority Programs

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.

In FY 2003, the Exploratory Grants research program will publish an annual general solicitation to promote research in areas where significant gaps in 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, and nanotechnology can be addressed under the Exploratory Grants program. The proposals are competitively reviewed by panels of 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 the basis for more targeted, applied environmental research programs.

EPA will also direct special grant solicitations to support research at Minority Institutions. This program specifically assists minority institutions in establishing and supporting environmental research activities that would build capacity to assess and solve environmental problems. A broad range of research in risk assessment and risk management will be supported at these institutions.

Improve Economic Information and Methods

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 regulatory and policy analyses.

In 2003, the Agency will invest in new economic research and analyses to improve measures of the benefits and costs of EPA programs. EPA will conduct economic analyses of emerging issues and provide economic analyses to fill key gaps in the Agency's ability to quantify the benefits of environmental regulations. 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 research and policy workshops, bringing economists together to explore important topics, such as 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. Also, EPA and the National Science Foundation will continue to support a series of new economic research solicitations directed at such priorities as

valuation of health benefits, market-based mechanisms and economic incentives, and corporate environmental performance and the effectiveness of government intervention.

FY 2003 Change from FY 2002 Enacted

S&T

- (+\$1,152,700) This represents a realignment of Minority Programs from the Superfund appropriation (in Objective 5.1) into the Science and Technology appropriation (in Objective 8.3). This will enhance the program by allowing for a broader scope of work to be done. The program specifically assists minority institutions in establishing and supporting environmental research activities that will build capacity to assess and solve environmental problems. A broad range of research issues will be supported at these institutions.
- (+\$440,000, + 4 FTE) This represents an increase in workyears to the EDCs program. These resources will focus on computational toxicology, specifically techniques of molecular profiling as the foundation for determining genes responsible for specific mechanisms EDCs' toxicity.
- (-\$9,700,000, -1 FTE) Funding for EPA's STAR Fellowship Program was eliminated in FY 2003 as part of a larger effort to increase environmental science education programs at the National Science Foundation. We will finish the commitment to fellowships awarded in previous years. However, fellowships that support minority academic institutions will continue.
- (-\$3,753,800) The FY 2003 Request is \$3,753,800 below the 2002 Enacted budget due to the Congressional earmarks received during the appropriations process which are not included in the 2003 President's Request.
- (-\$1,440,700, -2 FTE) This reduction reflects funding provided in the FY 2002 Emergency Supplemental Appropriation used to perform research to enhance understanding of biological agents and the ability to mitigate and prevent harm caused by these agents.

Annual Performance Goals and Measures

Research

Mercury Research

- In 2003 Support development of regulations on mercury emissions from coal-fired utility boilers by producing data on measurement methods and control technology performance, cost, and residues so that EPA can effectively reduce human health and environmental risk from mercury.
- In 2002 Provide 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 EPA developed a new peer-reviewed and consensus IRIS entry for methylmercury, including a reference dose (RfD). The results of bench and pilot testing aimed at managing mercury risks from coal-fired utility boilers was delayed until FY 2002.

Performance Measures: FY 2001 FY 2002 FY 2003

	Actual	Enacted	Request	
Publish results of bench and pilot testing aimed at identifying improved sorbents for mercury mitigation from coal-fired utility boilers.	0			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.	30-Sep-2001			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
Report on the performance/cost of reducing mercury emissions taking into account coal properties, combustion conditions, flue gas cleaning technologies and other air pollution control systems.			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.

Coordination with Other Agencies

Research

The broad nature of the EDCs issue necessitates a coordinated effort on both the national and international levels. 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 World Health Organization's International Program on Chemical Safety (IPC/WHO) and the Organization for Economic Cooperation and Development (OECD). Due to the complex nature of the uncertainties posed by endocrine disrupting chemicals, 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).

Working with other nations, EPA has expanded the U.S. Federal inventory to include projects from Canada, Japan, and Europe and has turned it into a Global Endocrine Disruptors Research Inventory with close to 800 projects. The joint IPC/WHO - OECD Steering Group on Endocrine Disruptors is developing a "Global State-of-the-Science Review," scheduled for completion in calendar year 2002. Both the inventory and the international assessment result from recommendations made at the 1997 G-8 Environmental Ministers' Meeting. In FY 2003, 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, universities, and states, including California EPA, has worked to identify and control human exposure to methylmercury. EPA has also been working with the Department of Energy and the U.S. Geological Survey to address risk management issues associated with mercury emissions from utilities as well as issues on the ecological effects of mercury and environmental processes effecting the fate and behavior of mercury.

EPA will continue to support jointly sponsored economic workshops with other regulatory agencies, such as 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-sponsored economic research, facilitating information exchanges among academic and Federal regulatory agency representatives. EPA is also coordinating its research strategy with other federal agencies interested in environmental economics and social science research including the Department of Justice (DOJ) and the National Science Foundation (NSF).

Statutory Authorities

Research

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

National Environmental Policy Act (NEPA)

Environmental Protection Agency

FY 2003 Annual Performance Plan and Congressional Justification

Sound Science, Improved Understanding of Env. Risk and Greater Innovation to Address Env. Problems

Objective: 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)

	FY 2001 Actuals	FY 2002 Enacted	FY 2003 Request	FY 2003 Req. v. FY 2002 Ena.
Improve Environmental Systems Management.	\$59,130.3	\$57,757.0	\$52,274.1	(\$5,482.9)
Environmental Program & Management	\$6,310.6	\$5,648.9	\$2,706.1	(\$2,942.8)
Hazardous Substance Superfund	\$0.0	\$0.0	\$2,468.0	\$2,468.0
Science & Technology	\$52,819.7	\$52,108.1	\$47,100.0	(\$5,008.1)
Total Workyears	164.5	148.2	146.6	-1.6

Key Program (Dollars in Thousands)

	FY 2001 Enacted	FY 2002 Enacted	FY 2003 Request	FY 2003 Req. v. FY 2002 Ena.
Administrative Services	\$92.3	\$0.0	\$0.0	\$0.0
Congressionally Mandated Projects	\$8,705.0	\$13,512.1	\$0.0	(\$13,512.1)
Environmental Technology Verification (ETV)	\$6,294.0	\$3,607.7	\$3,617.6	\$9.9
Facilities Infrastructure and Operations	\$3,204.5	\$2,290.0	\$2,084.0	(\$206.0)
Homeland Security	\$0.0	\$40.4	\$1,875.0	\$1,834.6
Legal Services	\$237.1	\$251.9	\$270.7	\$18.8
Management Services and Stewardship	\$872.7	\$382.0	\$351.4	(\$30.6)
Research to Support Pollution Prevention	\$39,156.5	\$37,672.9	\$44,075.4	\$6,402.5

FY 2003 Request

In FY 2003, the Agency will continue to move from one-dimensional solutions involving a single medium/single pollutant to an integrated, systems-based approach stressing pollution prevention. This approach more closely fits with the Agency's complex challenge of responding to the multiple, interactive stressors that threaten both human and environmental health, enables a more thorough assessment of human health and environmental risks, and supports a more complete set of management responses to those risks. EPA will accomplish its holistic approach to pollution prevention through research on pollution prevention tools and technologies, green chemistry, environmental systems management, and environmental technology verification, and through the National Environmental Technology Competition.

This objective focuses on the development of tools and methodologies to assist decision-makers in choosing the most preferred pollution prevention options. Research in FY 2003 will: (1) provide methods and models for management and prevention of source-specific emissions that threaten public health and ecological systems; (2) provide methods and tools to compare risks associated with different treatment technologies and management options; (3) develop more flexible and useful life cycle assessment methods; (4) incorporate life cycle and cost engineering concepts into industrial process simulators; (5) improve the ability to measure and objectively evaluate the environmental and human health impacts of risk management options; and (6) advance impact assessment theories, methodologies, and tools, including the capability to address such non-chemical impacts as resource depletion, habitat alteration, and decreased biodiversity. This research will also accelerate the adoption and incorporation of pollution prevention by developing, testing, and demonstrating technologies and approaches applicable across economic sectors. In a broader context, pollution prevention tools and technologies research will continue expanding beyond its traditional focus on industrial sectors to other sectors (e.g., energy, agriculture) and ecosystems.

EPA's Small Business Innovation Research (SBIR) Program, which is funded through a 2.5% set-aside of the Agency's extramural research and development budget, makes awards to small, high-tech firms to help develop and move new environmental tools and technologies from "proof of concept" to commercialization. The SBIR program targets research to prevent pollution, reduce water and air pollution, manage solid and hazardous wastes, and improve environmental monitoring - in each case addressing priorities in the Agency's Strategic Plan. Recognizing that the expense of carrying out research and development programs is often beyond the means of small businesses, SBIR participants receive both financial and technical assistance in developing and commercializing technologies according to the anticipated market. The technologies developed under SBIR help the regulated community meet environmental requirements in a more cost-effective manner (e.g., small water systems meet the new drinking water standard for arsenic); enable industry to reduce the use of toxic and hazardous materials in production processes and in recovering and recycling materials for reuse; and provide new approaches to designing more environmentally friendly products.

Green chemistry and clean technologies, fundamental approaches to preventing pollution at the source, involve 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. Green chemistry research will provide generic guidance to industry, particularly small and medium-sized companies, for selecting cleaner reaction pathways for conducting syntheses of a wide variety of organic products. Green chemistry research will also contribute to the development of safer commercial substances and environmentally friendly chemical syntheses. Research on clean technologies will be focused on designing, developing and verifying alternative materials, products, and processes that minimize use, emission, and discharge of toxic chemicals in mining, metal finishing, building/construction, and chemical sectors. This type of research is also conducted in partnership with the National Science Foundation (NSF) through EPA's Technology for a Sustainable Environment (TSE) program, which supports the development of cutting-edge pollution prevention technology through chemistry, chemical engineering, bioengineering, industrial ecology, and environmentally benign manufacturing tools. Research performed under the banner of industrial ecology will generate engineering or economic approaches to prevent or reduce waste from discrete and continuous industrial manufacturing activities. Efforts will explore equipment and technology modifications, reformulation of products, substitution of alternative materials, and in-process changes in order to reduce harmful emissions of volatile organic compounds (VOCs), global warming compounds, and persistent bioaccumulative toxics (PBTs).

A critical enabler of green chemistry and clean technologies is the development of technical tools that facilitate the development of technologies. The development of life cycle assessment (LCA) tools, specifically the simplified tools that can be afforded by small businesses, is a critical need to be addressed in product and process design. Other tools in this category are computer-based methods for assessing environmental impacts of products and processes, for designing cleaner processes, designing non-toxic solvents and solvent mixtures, and constructing a web-based LCA data portal. Research in green chemistry and clean technologies will be conducted in partnership with program and regional offices and industry.

The Agency will additionally support prevention, minimization, and, when possible, elimination of PBTs by improving methods for their identification and testing. Research will focus on the following areas: (1) dioxins/furans and polychlorinated biphenyls (PCBs); (2) persistent organic pollutants; (3) mercury B from source characterization to retirement of mercury stocks; and (4) the development of a national routine PBT monitoring strategy. By concentrating on these areas, EPA will advance the understanding of exposure, assessment, and management of PBTs while simultaneously working toward PBT prevention.

Another facet of this objective, environmental systems management research, endeavors to integrate environmental management with economic development and social equity, while simultaneously expanding environmental stewardship by industries, governments, and citizens. FY 2003 research in this area will explore the principles governing sustainable systems; the integration of social, economic, and environmental objectives in environmental assessment and management for communities, watersheds, and eco-regions; and the development of principles for the sustainable use of biotechnological systems. All these research efforts have been fashioned to include partners in EPA regions and several environmental institutes so that valuable inputs from potential users can be incorporated in the initial phases of this research.

Another component of research under this objective, the Environmental Technology Verification (ETV) program, addresses the difficulty of garnering financial support for and public acceptance of environmental technologies. ETV is a voluntary, market-grounded verification program for commercial-ready technologies, with over 1,000 stakeholders who represent all points of view within environmental areas. The goal of ETV is to verify the performance characteristics of private-sector-developed technologies so that purchasers, users, and permit writers have the information they need to make environmentally-beneficial decisions. The program is designed so that, as the value of ETV verification becomes more broadly appreciated, technology developers will be required to cover an increasing share of the verification costs.

By the end of FY 2003, the ETV program will have delivered more than 150 test plans and protocols, making them available to the entire research and testing community, and will have verified over 200 technologies, making data on their performance available for public use. Technology verifications during FY 2003 will focus on advanced monitoring; air pollution control; greenhouse gas abatement; drinking water systems; and water protection. EPA will continue to enhance program outreach efforts through the ETV website, national conferences and workshops, and state permit writer training.

EPA will also facilitate the adoption of innovative environmental technologies by the public and private sectors through the final component of this objective, the National Environmental Technology Competition (NETC). This new effort for FY 2003 addresses both the need for innovative technologies to solve environmental problems and the reluctance of potential buyers to assume the economic risks of using an unproven technology. Through NETC, EPA and its stakeholders will identify and prioritize environmental problems that can benefit from targeted, cost-effective technological solutions. EPA will develop competitive solicitations for technologies in a specified problem area (e.g., arsenic removal) and an external peer review panel will select the most promising technologies. In an effort to enhance the marketability and use of these innovative technologies, EPA will offer the winning technologies honorary awards, recognition, and other support to assist in commercialization.

In FY 2003, an area for technology solicitations will be arsenic removal from drinking water. This work will be an important source of EPA's commitment for research and development of more cost-effective treatment technologies to help small community water systems meet the new arsenic drinking water standard. Other potential areas for technology solicitations include: models to support effluent trading plans for total maximum daily loads (TMDLs); water and wastewater infrastructure repair and replacement; reduction of greenhouse gas emissions; and continuous monitoring of mercury in flue gases. Both EPA and states will encourage the use of NETC technologies by disseminating information and by using the technologies as performance benchmarks in regulations or enforcement agreements, or as a basis for cap-and-trade approaches. NETC will lead to better understanding between EPA and the industrial sector of areas of environmental concern, to the alignment of future environmental requirements with technology performance capabilities, to an increase in the quantity and quality of cost-effective options for the mitigation and prevention of environmental problems, and ultimately to a cleaner, safer environment

through a new level of environmental stewardship by industry and government.

Annual Performance Goals and Measures

Research

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 EPA integrated a waste reduction algorithm with costing software and a chemical process simulation package, and completed a decision support tool for life cycle analysis of municipal solid waste to enhance a preventive approach to risk management and the use of pollution prevention options.

Performance Measures:	FY 2001 Actual	FY 2002 Enacted	FY 2003 Request	
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.	0			protocol
Complete grant on development of tool for predicting biodegradability of compounds.	0			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 2003 Develop 10 testing protocols and complete 40 technology verifications for a cumulative Environmental Technology Verification (ETV) program total of 230 to aid industry, states, and consumers in choosing effective technologies to protect the public and environment from high risk pollutants.

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 2001 EPA developed, evaluated, and delivered technologies and approaches that eliminate, minimize, or control high risk pollutants from multiple sectors. Delivery of the evaluative report on the Environmental Technology Verification (ETV) pilot program is delayed until FY 2002.

Performance Measures:	FY 2001 Actual	FY 2002 Enacted	FY 2003 Request	
Deliver a Report to Congress on the status and effectiveness of the Environmental Technology Verification (ETV) Program during its first five years.	0			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.	0			grant report
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
Verify and provide information to States, technology purchasers, and the public on 40 air, water, pollution prevention and monitoring technologies for an ETV programmatic total of 230 verifications.			40	verifications
Complete an additional 10 stakeholder approved and peer-reviewed test protocols in all environmental technology categories under ETV, and provide them to testing organizations world-wide.			10	protocols

Baseline: 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. In FY 02, the first year of operating, after the pilot period ended in FY 01, the Environmental Technology Verification (ETV) Program will have delivered in FY 02 more than 20 additional protocols, making them available to the entire research and testing community, and will have verified approximately 30 additional technologies for a programmatic total of 180, making data on their performance available for public use as well.

Verification and Validation of Performance Measures

FY 2003 Congressional Performance Measure (PM): Verify and provide information to states, technology purchasers, and the public on 40 air, water, pollution prevention, and monitoring technologies for an ETV programmatic total of 230 verifications.

Performance Database: Program output, no internal tracking system

Data Source: N/A

QA/QC Procedures: N/A

Data Quality Reviews: Technology verifications

Data Limitations: N/A

New/Improved Data or Systems: N/A

FY 2003 Congressional Performance Measure (PM): Complete an additional 10 stakeholder approved and peer-reviewed test protocols in all environmental technology categories under ETV, and provide them to testing organizations world-wide.

Performance Database: Program outputs, no internal tracking system

Data Source: N/A

QA/QC Procedures: N/A

Data Quality Reviews: Test protocols

Data Limitations: N/A

New/Improved Data or Systems: N/A

FY 2003 Change from FY 2002

S&T

- (+\$9,750,000) This increase represents a new effort for FY 2003, the National Environmental Technology Competition (NETC), which will foster the adoption of cost-effective technologies for environmental priority areas by the public and private sectors through a competitive award process. NETC will lead to better understanding between EPA and the industrial sector of areas of environmental concern, to the alignment of future environmental requirements with technology performance capabilities, and to an increase in the quantity and quality of cost-effective options for the mitigation and prevention of environmental problems. Through coordination with states, Program and Regional Offices, and other stakeholders, EPA will prioritize areas of environmental concern that can benefit from the application of innovative technologies. One of the areas planned for competitive solicitations will be treatment technologies for arsenic in small community drinking water systems. Another potential area for competitive solicitations is models to support effluent trading plans for total maximum daily loads (TMDLs).
- (-\$9,610,700) The FY 2003 Request does not include \$9,610,700 contained in the FY 2002 Enacted budget level due to Congressional earmarks from the appropriations process not carried forward in the FY 2003 President's Request.
- (-\$3,000,000) This FY 2003 reduction eliminated funding for FY 2002 Congressionally-directed work under the National Technology Transfer Center (NTTC).

- (-\$2,030,100) This reduction relates to the change in resources set aside for the Small Business Innovative Research (SBIR) Program from its FY2002 levels, and is primarily due to the fact that FY2002 Congressional earmarks are not included in the FY2003 Presidents Request.

EPM

- (-\$2,535,100) The FY 2003 Request is \$2,535,100 below the FY 2002 Enacted budget level due to Congressional earmarks received during the FY 2002 appropriations process that are not included in the FY 2003 Presidents Request.
- (-\$189,900) This reduction relates to the change in resources set aside for the Small Business Innovative Research (SBIR) Program from its FY 2002 levels, and is primarily due to the fact that FY 2002 Congressional earmarks are not included in the FY 2003 Presidents Request.

Superfund

- (+\$1,875,000) This increase relates to resources set aside for the Small Business Innovative Research (SBIR) Program and allocated in FY 2003 for Homeland Security building decontamination technology development by small businesses.

Coordination with Other Agencies

Research

Pollution prevention, cost benefit analyses, and environmental technology verification are all research areas that lend themselves to and benefit from engagement with other Federal organizations.

In partnership with the National Science Foundation (NSF), EPA's Technology for a Sustainable Environment (TSE) program supports the development of cutting-edge pollution prevention technology through chemistry, chemical engineering, industrial ecology, and manufacturing. The EPA/NSF partnership in TSE is entering its seventh year of supporting research to prevent pollution at its source.

Under the Persistent Bioaccumulative Toxics (PBT) program, EPA has been working with the U.S. Geological Survey (USGS), the National Oceanic and Atmospheric Administration (NOAA), and the Centers for Disease Control and Prevention (CDC) to develop a national routine PBT monitoring strategy. Through the integration of existing monitoring programs, this new strategy will ultimately meet the mutual monitoring objectives of EPA and other Federal agencies.

EPA has contributed projects to the Department of Defense's (DOD's) Strategic Environmental Research and Development Program (SERDP), 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 for the development and advancement of biologically and genetically altered products. Additionally, 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 in order to understand and respond to the economic impacts of environmental innovation.

With respect to the Environmental Technology Verification (ETV) program, EPA has co-funded efforts to verify the performance of site characterization and monitoring devices with the Department of Energy's (DOE) Sandia and Oak Ridge National Laboratories. EPA signed a Memorandum of Agreement with DOD to verify jointly environmental technologies that are of mutual interest to EPA and DOD's Environmental Security Technology Certification Program (ESTCP). In June 2001, the U.S. Coast Guard (USCG) and EPA signed a Memorandum of Agreement to verify jointly the performance of innovative environmental technologies to control ballast water discharges that may contain invasive species and that have had significant and adverse economical and ecological impacts.

Statutory Authorities

Research

Clean Air Act
Safe Drinking Water Act
Clean Water Act
Toxic Substances Control Act
Federal Insecticide, Fungicide, and Rodenticide Act
Resource Conservation and Recovery Act
Superfund Amendments Reauthorization Act
Clean Air Act Amendments of 1990
Pollution Prevention Act of 1990
Small Business Innovation Development Act

Environmental Protection Agency

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Objective: 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)

	FY 2001 Actuals	FY 2002 Enacted	FY 2003 Request	FY 2003 Req. v. FY 2002 Ena.
Quantify Environmental Results of Partnership Approaches.	\$9,539.9	\$8,672.7	\$9,058.4	\$385.7
Environmental Program & Management	\$9,539.9	\$8,672.7	\$9,058.4	\$385.7
Total Workyears	16.1	16.7	18.0	1.3

Key Program
(Dollars in Thousands)

	FY 2001 Enacted	FY 2002 Enacted	FY 2003 Request	FY 2003 Req. v. FY 2002 Ena.
Congressionally Mandated Projects	\$698.5	\$700.0	\$0.0	(\$700.0)
Facilities Infrastructure and Operations	\$0.0	\$215.6	\$241.9	\$26.3
Legal Services	\$42.9	\$47.3	\$53.3	\$6.0
Management Services and Stewardship	\$164.1	\$100.6	\$112.1	\$11.5
Regional Geographic Program	\$8,192.3	\$7,609.2	\$8,651.1	\$1,041.9
Regional Management	\$506.4	\$0.0	\$0.0	\$0.0

FY 2003 Request

The Regional Geographic Initiatives (RGI) program is a holistic approach to long-term, cross-programmatic environmental enhancement that has proved successful in repeated applications.

Since 1994, the RGI program has funded hundreds of projects, including projects in all 50 states, in Tribal lands, and in U.S. territories and possessions. 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 those with states, businesses and local communities. The RGI program is different from other, more traditional EPA programs in that it addresses environmental risk holistically (multi-media) and actively fosters partnering. RGI is, therefore, EPA's role model for transitioning from a single-media to a multi-media focus, based on consensus building, science, and risk.

One of the hallmarks of the RGI program has always been the ability to use RGI funds to "leverage" funds from a wide variety of outside sources. Practically all of the grants made under this program include the commitment of substantial funds from EPA's partners, often greatly in excess of the funding level provided by EPA. The RGI Program enables EPA Regional offices to work with states, local governments and the private sector, in specific places on problems identified as high priority by the Regions, based on both national and regional criteria, and to bring additional resources to bear from EPA partners in a highly focused effort.

The funding for this effort was established in 1993 to enable the Regions to apply state-of-the-art, multi-media approaches to projects designed to bridge the gap between media-based, program-driven funding priorities, and the cross-jurisdictional, multi-media priorities identified by Regional comparative risk exercises. It funds projects that are important to the regions and the states, but which are not funded elsewhere in EPA's budget, such as an ozone flex project in six southern states that allows areas in near non-attainment to develop voluntary air quality plans tailored to local needs.

FY 2003 Change from FY 2002 Enacted

EPM

•(+\$1,000,000) The FY 2003 Request is \$1,000,000 above the FY 2002 Enacted level to enable the Regions to address their priority funding needs for multi-media, community-based environmental protection activities. This will fund 12-20 new projects, allowing states, local governments, and private partners to identify community-specific solutions to their unique environmental issues.

Verification and Validation of PMs

None

Coordination with Other Agencies

None

Statutory Authorities

Multi-media

Environmental Protection Agency

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Objective: 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 2001 Actuals	FY 2002 Enacted	FY 2003 Request	FY 2003 Req. v. FY 2002 Ena.
Incorporate Innovative Approaches.	\$24,887.3	\$23,324.5	\$29,787.9	\$6,463.4
Environmental Program & Management	\$24,488.2	\$23,324.5	\$29,787.9	\$6,463.4
Science & Technology	\$399.1	\$0.0	\$0.0	\$0.0
Total Workyears	127.1	120.2	126.7	6.5

Key Program (Dollars in Thousands)

	FY 2001 Enacted	FY 2002 Enacted	FY 2003 Request	FY 2003 Req. v. FY 2002 Ena.
Administrative Services	\$64.6	\$0.0	\$0.0	\$0.0
Common Sense Initiative	\$1,781.1	\$1,838.7	\$0.0	(\$1,838.7)
Congressionally Mandated Projects	\$4,729.4	\$1,000.0	\$0.0	(\$1,000.0)
Facilities Infrastructure and Operations	\$0.0	\$1,784.4	\$1,821.7	\$37.3
Legal Services	\$328.8	\$380.3	\$409.3	\$29.0
Management Services and Stewardship	\$34.0	\$186.1	\$168.7	(\$17.4)
Performance Track	\$1,995.6	\$1,834.6	\$1,834.6	\$0.0
Project XL	\$2,948.9	\$0.0	\$0.0	\$0.0
Regulatory Development	\$10,430.3	\$13,251.3	\$22,429.6	\$9,178.3
Small Business Ombudsman	\$3,000.9	\$3,049.1	\$3,124.0	\$74.9

FY 2003 Request

A critical priority for EPA in FY 2003 will be to improve the Agency's regulatory and policy development process. The Agency will strengthen the policy analysis of key regulatory and non-regulatory actions, improve the economic analysis underlying Agency actions, and improve the

regulatory and policy action information management system. The multimedia analysis will include policy option analysis, regulatory analysis, and analysis of innovative policy approaches. Work will also be directed at strengthening accountability to stakeholders by improving the quality and availability of regulatory data to stakeholders.

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 the course of this work, the Agency will continue to work closely with states, tribes, and local governments, and will pay particular attention to the needs of small and medium-sized businesses. EPA's revised strategy for innovation, the product of deliberation among all the Regional and media offices, will be reflected in a report to be issued in mid 2002.

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 FY 2003, 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.

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 (e.g., the Smart Growth Index); (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.

In response to a large and growing number of requests from states and local governments to help them address environmental issues associated with growth and development, the Agency has increased its activities under smart growth. EPA will help states and local governments achieve

their environmental goals using smart growth approaches. EPA will integrate smart growth approaches to environmental quality and voluntary smart growth programs within key program offices and Regional offices. EPA will also develop regulatory incentives that will encourage redevelopment within metropolitan areas and help preserve watersheds, open space, and habitats. These incentives will also encourage more environmentally-friendly development in rural areas.

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.

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 FY 2003, EPA will continue 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.

In FY 2003, 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 build on previous sector successes, concentrating on sectors with high concentrations of small businesses and complementing goals in EPA's new Innovations Strategy. EPA will continue to work with sectors to 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 FY 2003, 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.

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.

The Office of Policy, Economics, and Innovation (OPEI) will serve as a primary gateway for stakeholders/customers to interact 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. OPEI will integrate and coordinate 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.

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, the Agency's innovation strategy engages Agency managers and staff, as well as external stakeholders, in finding better ways of doing business without imposing unnecessary costs and regulatory burdens. Through innovation and streamlining the current regulatory system (e.g., consolidate and simplify regulations and reporting requirements, and streamline permitting), and through designing and testing integrative and holistic approaches (e.g., sector- and industry-based approaches, and community-based environmental protection partnership programs), 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 multi-media environmental challenges.

In FY 2003, EPA will implement the Agency's Innovations Strategy. The Strategy, developed through a joint effort by EPA and the states to implement lessons learned from innovation experiences to date, strategically focuses the Agency's innovation activities on priority environmental problems. Work in FY 2003 will include further integrating innovation efforts with those of the states; developing new tools and approaches; adapting the culture and management systems to foster innovation; and focusing on measuring and evaluating results. The Agency will continue 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.

In FY 2003, EPA will work to provide incentives and rewards to good environmental performers in the business community. The Agency will continue the Performance Track Program so that those businesses that perform well are treated differently from those that do not. 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 2003 Change from FY 2002 Enacted

EPM

(-\$1,844,700/-13.3 FTE) The Common Sense Initiative will be eliminated and the lessons learned from this program have influenced new generations of environmental innovation policy.

•(+ \$9,599,200/23.3 FTE) The FY2003 Request is \$9,599,200 and 23.3 FTEs above the FY 2002 Request level to fund regulatory development activities. These resources will support the management of an expanded regulatory development process, strengthen economic analyses, expand Performance Track, and increase regulatory innovation efforts in sectors, evaluation, and industrial ecology activities. Increased payroll costs are also reflected in this request.

Coordination with Other Agencies

None

Statutory Authorities

National Environmental Policy Act

The Economy Act of 1932

Toxic Substances Control Act sections 4, 5, and 6 (15 U.S.C. 2603, 2604, and 2605)

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

Clean Water Act

Environmental Protection Agency

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Objective: 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)

	FY 2001 Actuals	FY 2002 Enacted	FY 2003 Request	FY 2003 Req. v. FY 2002 Ena.
Demonstrate Regional Capability to Assist Environmental Decision Making.	\$6,417.2	\$6,677.9	\$6,591.8	(\$86.1)
Environmental Program & Management	\$3,656.9	\$3,622.6	\$3,647.1	\$24.5
Hazardous Substance Superfund	\$2,760.3	\$3,055.3	\$2,944.7	(\$110.6)
Total Workyears	3.9	3.0	3.0	0.0

Key Program (Dollars in Thousands)

	FY 2001 Enacted	FY 2002 Enacted	FY 2003 Request	FY 2003 Req. v. FY 2002 Ena.
Facilities Infrastructure and Operations	\$0.0	\$156.1	\$43.6	(\$112.5)
Management Services and Stewardship	\$0.0	\$2.2	\$1.7	(\$0.5)
Regional Science and Technology	\$3,850.3	\$3,574.9	\$3,601.8	\$26.9
Superfund Remedial Actions	\$2,993.4	\$2,944.7	\$2,944.7	\$0.0

FY 2003 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.

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 2003 Change from FY 2002 Request

- none

Verification and Validation of PMs

None

Coordination with Other Agencies

None

Statutory Authorities

Multi-media

Environmental Protection Agency

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Objective: 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 2001 Actuals	FY 2002 Enacted	FY 2003 Request	FY 2003 Req. v. FY 2002 Ena.
Conduct Peer Review to Improve Agency Decisions.	\$2,727.0	\$3,242.9	\$3,690.3	\$447.4
Environmental Program & Management	\$2,727.0	\$3,242.9	\$3,690.3	\$447.4
Total Workyears	22.8	22.5	22.5	0.0

Key Program (Dollars in Thousands)

	FY 2001 Enacted	FY 2002 Enacted	FY 2003 Request	FY 2003 Req. v. FY 2002 Ena.
Facilities Infrastructure and Operations	\$0.0	\$340.2	\$326.5	(\$13.7)
Management Services and Stewardship	\$0.0	\$14.9	\$11.3	(\$3.6)
Science Advisory Board	\$2,775.1	\$2,887.8	\$3,352.5	\$464.7

FY 2003 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 come from 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.

In FY 2001, the SAB made changes to address concerns raised by the Government Accounting Office concerning procedures to ensure that there are no conflicts of interest among members of the SAB and that review panels are balanced. A process has been drafted and it is anticipated that the new procedures will be fully operational during FY 2002.

FY 2003 Change from FY 2002 Enacted

EPM

- none

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 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.)